UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
INSTITUTO DE FILOSOFIA E CIÊNCIAS HUMANAS
PROGRAMA DE PÓS-GRADUAÇÃO EM
RELAÇÕES INTERNACIONAIS

STRATEGIC WEAPONS:

IMPACT OF WAR ON SCANNING AND DISTRIBUTION OF POWER IN THE INTERNATIONAL SYSTEM.

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Porto Alegre, March 2008.

*For **Bráulio dos Santos Álvarez***

(*in memoriam*)

“Para que empeces, el gusto, pelos sudamericanos.”

ACKNOWLEDGMENTS

I thank my supervisor prof. Dr. Aurelio Chaves Cepik March for having bet on my ability and the guidance received, and always an example of work and dignity. We also thank prof. ª Dr. Martha Lucía Olivar Jimenez, coordinator of the program for graduate.

I am deeply grateful to prof. Jose Miguel Martins Me Queda that cooperated, decisively, to work. His strength of will is always a source of inspiration in the continuing effort to build a Brazilian sovereign nation. Special thanks to friend Me Lucas Kerr Oliveira she transmit safety in difficult times, and friends Piana Nilo de Castro and Fernando Dall Onder Sebben, and sources that have helped draw up the work.

Leonardo Sosinski to friends, who knew at the time more difficult to extend its helping hand in spite of their pain, and Knulp de Souza Prudente Villar, for his struggle for true science.

To my former colleagues and the Society of PUCRS Porto-Alegrense Spiritist Union, the emotional support, including Luís Antônio Lampert Dornelles.

To my fellow Masters of the classes of 2005 and 2006, mainly to Gabriel Pessin Adams, Rodrigo Martins and Rafael Torsiano Pons Kings. Effusive thanks to Beatriz Accorci, who always performed their duties with zeal, talent and success.

Thank Taciana Kuplich Voss Monteiro the love, affection and patience in this journey. And the Liege Kuplich Voss Maria Mello Aristotle and the support received.

I thank the Schiavo family Regina Helena Rodrigues, Dino Antonio Schiavo (in memoriam), Eugene Souza Nunes (in memoriam), Iasodhara Moraes Nunes, and especially Antonio Nunes Adamy Avila by stimulating continuous, since the beginning of my journey.

When my brother Fabio Schiavo Avila showed that as men of truth beyond the worst adversity.

When my father Adam Nunes José Avila (in memoriam), who taught his example with a sense of duty and love for Brazil.

Especially to my mother, teacher Maria de Lourdes Avila Schiavo who provided me the opportunity to also be a teacher.

ABSTRACT

The evolution of the Post-Cold War (1991-2006) international system shows a significant amount of change regarding the strategic capabilities of United States, Russia, and China. The rise of a new class of strategic weapons called Directed Energy Weapons (lasers and high power microwaves), as well as the great costs associated with the quest for nuclear primacy, demand closer examination of the current assumption about the links between nuclear primacy and unipolar distribution of power in the International System. Starting with the current tensions between US and Russia, we try to reveal in this article what kind of competition might be observed in the International System over the next decade. The present work analyzes the real possibilities of the USA achieving an effective nuclear primacy condition, which requires the complete disarmament of all other powers. Since a nuclear war between the three countries has a very high political cost, disputes tend to be settled on the operational sphere. In order to demonstrate this final point, we made comparative use of two nuclear war scenarios. This works concludes by establishing the tactical and operational conditions that Russia and China seems to counting with in order to defeat United States if a shooting war comes.

Key-words: Nuclear Weapons – Polarity – War – Directed Energy Weapons – Russia, China – United States of America

SUMMARY

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GLOSSARY

ABM: Anti-Ballistic Missile. Anti-ballistic missile.

ACM: Advanced Cruise Missiles

ALCM: Air Launched Cruise Missile. A cruise missile launched from the air.

ASAT: Anti-Satellite Weapon. Anti-Satellite Weapon.

CEP: Circular Error Probable. Means the ability of the warhead in close to its target.

CFE: Conventional Forces in Europe. Conventional Forces in Europe.

CIA: Central Intelligence Agency. Central Intelligence Agency (North American).

DEFCON-3: The condition of defense number three.

DEW: Direct Energy Weapons. Direct Energy Weapons

DF: Wind from the East (Dong Feng). Appointment of Chinese missiles.

DSP: Defense Support Program.

FAS: Federation of American Scientists.

GPS: Global Positioning System. Global positioning system.

HPM: High Powered Microwave. High-power microwave.

ICBM: Inter-Continental Ballistic Missile. Intercontinental ballistic missile

INF: Intermediate-Range and Shorter-Range Nuclear Forces. Nuclear forces of short or medium range.

IRBM: Intermediate-Range Ballistic Missile. The Medium Range Ballistic Missile.

JDAM: Joint Direct Attack Ammunition. Projects Joint Direct Attack

JSTARS: Joint Surveillance and Target Attack Radar System. Set of System of Observation and Attack Radar

JTIDS: Joint Tactical Information Distribution System. Distribution system joint tactical information.

LACM: Land Cruise Missile (Acronym). Cruise missile launched from the ground.

MAD: Mutual Assured Destruction. Mutual Assured Destruction.

MIRACLE: Mid-Infrared Advanced Chemical Laser red. Advanced chemical laser mid-infrared.

MIRV: Multiple Independent Re-entry Vehicles. Of multiple independent reentry vehicle.

NMD: National Missile Defense. National missile defense system.

NNSA: Energy's National Nuclear Security Administration

PGM: Precision Guided Ammunition. Precision Guided Munitions.

RMA: the Revolution in Military Affairs. Revolution in military affairs.

SIPAM: Protection System of the Amazon.

SIVAM: the Amazon Surveillance System.

SLBM: Submarine-Ballistic Missile Lauched. Ballistic missile launched from submarine.

SRF: Strategic Rocket Forces. The Strategic Rocket Force (Russia).

SS: Surface-surface. Surface-surface.

SSBN: Strategic Ballistic Missile Submarine, nuclear powered. Acronym that means nuclear-propelled submarine equipped with ballistic missiles.

TEL: transporter-erector-launcher (missile platform). Vehicle transporting and erector-launcher.

U.S. Navy: United States Navy. United States Navy.

USAF: United States Air Force. North American air force.

INTRODUCTION

According Lieber and Press (2006a and 2006b), the construction of an anti-shield, the sustained development of U.S. nuclear capabilities, vulnerability and size of Chinese stocks and rapid obsolescence of the once huge Russian capabilities would be evidence that the United States close to is a condition of nuclear primacy even in this decade.

For primacy (or superior) of the U.S. nuclear means the loss of the ability of Russia and / or China to respond to a nuclear attack the U.S. with another. This ability of a second attack (second strike capability) has been the guarantor of nuclear deterrence and the distribution of power in the international system for forty years (Aron, 1986, 513). For deterrence, is the explicit and credible threat of an attack will be answered with a very heavy retaliation that makes the cost of a first attack much greater than any benefits it could generate (Jervis, 1979: 289).

In the first decade after the end of the Cold War the focus on the nuclear issue was the horizontal proliferation of weapons of mass destruction (Weapons of Mass Destruction - WMD) and their schemes of control. In the current decade, researchers in the International Security and Strategic Studies are facing the challenge of explaining, describing and analyzing the implications of the possible acquisition of normative nuclear primacy by the United States.

One of the main challenges of our time is whether this primacy can actually be obtained and analyzed the possible consequences that this fact would have for the distribution of power in the international system (type of polarity) and the patterns of friendship and enmity (degree of polarization) that tend to emerge from this process. The article clearly pointed out the lack of capacity of the second attack of Russian and Chinese to an attack preemptivo of Americans. The authors made a comparison of the strategic arsenals of the U.S. with the Sino-Russian arsenals of the post-Cold War for the justification of their hypothesis. The article supports the design of Samuel Huntington that the world would be interested in establishing the primacy U.S. because it would be the guarantor of international stability (Huntington, 1993: 68-83).

The main hypothesis (Hp) that guides the search, or the interim response to the question proposed at the beginning of this section is as follows: the nuclear primacy is a necessary but insufficient to ensure unipolarity. Even if the characterization of the limited resources of power that define a great power to their military might and the logistical requirements for maintenance and exercise of military might since the advent of

thermonuclear weapons is the ability to survive a first strike and retaliate against aggressor which has been the guarantor of the condition of major power in the international system. In this sense, depend on the primacy of the nuclear capacity to disarm effectively the other nuclear powers that have strategic forces based triad SLBMs, ICBMs and long-range bombers. This can be achieved by diplomatic means or through a brickbat (first disarming atack). However, even the capacity to produce material for nuclear primacy be built by any country, it would still be insufficient for the configuration of a unipolar international order for four main reasons provided for in clausewitzeana theory of war.

First, for what could be called the multidimensionality of the real.[1] The pursuit of nuclear primacy obeys political purposes (to obtain or maintain a condition of exclusive power pole). The subordination of policy to the war, is reversing the maxim of Clausewitz, embedded always the risk of a strategic disaster that the fighting could even be defeated.

Secondly, there is the problem of asynchronous between attack and retaliation with biological weapons of mass destruction. Even if something even beyond the nuclear primacy, this is defined as nuclear monopoly as an exclusive or even nuclear, that would be insufficient to ensure the condition of unipolarity. Even a country devastated by a thermonuclear attack remain part of its scientific capacity and its population. At any time (years or decades), the survivors could, even without a state, to develop biological weapons (viruses or bacteria) to destroy the aggressor country. The asynchronous time between the attack and defense is the argument clausewitzeano par excellence to demonstrate reentry policy considerations about the limitation in the use of force, regardless of any other political considerations, moral or ideological.[2]

Thirdly, the failure of nuclear primacy arises of what is called the asymmetry, or the siding of his weaknesses to weaken the opponent. The Chinese call it the art of the inferior defeating the superior, or the weak overcome the strong. Regarding the scope of the strategy is that it is very expensive to have a broad strategic nuclear arsenal. As the Russians already have a broad experience of management and control of manned space stations and the Chinese may have their own orbital space station on the horizon of years and not decades, if the U.S. take the initiative to militarize the space and try to get precedence nuclear, Russians and Chinese will also try to do it, combining anti-satellite

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[1] The **multidimensionality of the real** is the same concept of **synchronicity**, used in history.

[2] The update of Clausewitz's argument to the sphere of operations in case of a possible U.S. nuclear war against Russia and China was made recently by Filipino Brigadier General Victor N. Corpus, whose article also examines the extent of the role of new weapons of energy in a direct war between major powers. See Corpus (2006).

weapons (ASAT), lasers and high power microwave and thermonuclear warheads. The combination of some vectors thermonuclear able to survive a first attack and the use of directed energy weapons used against the civilian infrastructure, industrial and services would have a dissuasive potential as great or even more politically credible deterrence as the only nuclear . In summary, the method of deterrence capabilities in terms of strategic weapons to take into account also the strategic use of weapons of direct energy of great power.

Finally, we must consider the political costs, the moral and ideological destroyed as part of strategic deterrence (Thompson, 1985). As argues Ofer Shelah (2006) in relation to what happened in the specific context of the Israeli invasion in Lebanon in 2006, the limitations of moral and political effects of war in the information age is giving both the public and the soldiers themselves. The key to success in contemporary war, would, therefore, lies in knowing what you can not use. The preventive use of nuclear weapons or preemptivo strategically to disarm a state requires a very high probability of extinction of large civilian population contingents. It is supposed, as a hypothesis, that the policy of the destroyed, a condition of nuclear primacy credible, it would be unbearable for the political and social system of the United States. The country falls on the ruins of their own victory.

This last reason given to explain the situation on the failure of nuclear primacy sets, in fact, an important auxiliary hypothesis (HA1). She suggests that even if the United States achieve the disarmament strategy in China and Russia, the cost of a full use of nuclear primacy would be politically prohibitive. After all, the priority for U.S. politicians to act decisively, it needs to become monopoly, ie involve the disarmament of strategic nuclear Russians and Chinese. The disarmament could be achieved in two ways, through diplomatic negotiations or through a preemptive war.

I

STRATEGIC WEAPONS IN THE TWENTIETH CENTURY

This chapter, discusses the development of new weapons as the high-tech answer to the asymmetry. The battles of World War II offered the opportunity of developing new weapons.

I.1 - Background of the weapons of the Cold War.

As in other times, also in the twentieth century technological innovations gradually acquired a leading role in the strategy. Although technology has made the acceleration contours unprecedented in recent decades of the century, it is important to remember the history of the Cold War to demonstrate the mechanism by which some technological innovations and weapons systems end up becoming more crucial than others, including in some cases important against the expectations of experts and common sense.

During World War II in England, for example, when was being bombed daily by the Luftwaffe (air force of Nazi Germany) offset their lack of resources with the construction and improvement of radar.[3] At the end of the war, the Germans tried to compensate for their disabilities with the development of rockets V-1 and V-2.

Although the first radar was built in 1904, by C. Hülsmeyer in Germany, was the Battle of Inglaterrao its first large-scale employment effective[4] A major concern of military aircraft at the beginning of the war, was with the detection of enemy aircraft and the guiagem of its bombers to their targets. The problems of the controls of bombers, summarize it, initially to control damage from bombing. After an attack, the crew was interviewed and analyzed both the technical interview as aerial photos to assess the damage caused by the bomber. Again, another meeting was scheduled and trim analyzed their performance. The review process lasted several weeks. The experience of the American bombing of bearings factory in Schweinfurt (Sweetman, 1977: 6) Germany was

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[3] **Radar** — **Ra**dio **D**etection **A**nd **R**anging

[4] **Battle of Britain -** was the aerial battle between Nazi Germany and Britain during the Second World War. Comprised the period between July 10, 1940 until October 31 the same year. According to the orders of Adolf Hitler, the German operations durariam eight days and would be the preparation for Operation Sea Lion (Lion-Marine) the amphibious invasion of England. The British relied on their radars and aircraft and with it, managed to dissuade Hitler from his ideas, destroying much of the Luftwaffe.

a pattern established. About 229 bombers were sent on 17 August 1943 with the idea, based on Jomini, who hit a single day in an industry of ball bearings, undermine the war effort enemy, as part of the plan Eaker.[5]

The control of damage response to a need in times of war, which consisted in the evaluation and quantification of damage in the strategic bombing of German Industry. Mainly, the industries of the compressors that would be damaged the engines of German aircraft.

During the Battle of Britain, the Germans developed a whole network of guiagem of their bombers in the European territory (FORD, 1974: 9). Goniômetros installed in aircraft, which consist of a device, used with radio or radar transmitters, allowing a signal is emitted in any direction or the direction of a signal that reaches the receiver is determined without the help of an antenna physically rotating.[6]

At the same time, spread the beacons across Europe, mainly in the north coast.[7] It did not take long to realize the threat the British and began tracing the Germans with their own beacons goniômetros. The initial plan was the British bombers to destroy them, however, this would be very expensive, time consuming and questionable results. In solution, emerged the primordium of the war machine. The British, quite simply, the frequency descobrirama German beacons and settled in the north of the British Isles, bypassing the main cities of the German bombers.

However, in June 1940, the scientific adviser to Churchill, Frederick Lindemann, warned him that the Germans had created a new way of directional orientation. Initially, the Germans called the apparatus of Knickebein. The English recorrerama all kinds of subterfuge to obtain military secrets,. Aerial photos, tapping, etc ... Only an interview to a

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[5] This plan was launched in April 1943, by General Eaker, and was the bomber of the aircraft industries of bearings, oil and shipyards. See: Sweetman (1977. P. 62).

[6] **Goniometer or radio-bar** - electronic equipment that indicates the direction of a radio transmitting station. Although antiquated, is still used to support air navigation. See. **ASSOCIAÇÃO BRASILEIRA DE PILOTOS DE CAÇA.** ***Glossário.*** (*on-line*) http://www.abra-pc.com.br/glosR.html (02/02/2008)

[7] **Radio beacon** (often referred to by the acronym NDB of Non-Directional Beacon) is a specialized transmitting station, installed in a fixed geographical position and precisely known, emitting radiofrequency signals with a pre-determined format that allows radio stations to make up their identification and to determine its position relative to the geographical point of issue. Is the issuing of an issue with long-wave signals in Morse code radiotelegráficos, tagging groups of letters that make up the prefix designating a place or station. The beacons, despite the advent of satellite navigation equipment, are still widely used against the black-outs or distortions that occur in equipment that emit signals above the ionosphere. It is installed in the vicinity of aerodromes and at specific points along the routes most frequently used. Additionally, the satellite navigation systems (GPS and GLONASS) allow the DAA amplitude correction of the frequency, improving the front-to errors, such as relief, sea and adverse weather conditions. See: **U. S. FAA**. ***Aeronautical Information Manual*** (*on-line*) http://www.faa.gov/airports_airtraffic/air_traffic/publications/atpubs/aim/Chap1/aim0101.html#1-1-2 (19/02/2008)

German pilot solved the problem. The Germans had developed a radar radius double (Ford, 1974: 11). The radar operating on the coast north of France, giving their frequencies. In German bombers, there were signs of these receptors, which the English called Equipment X. During his mission of bombing, the pilot should guide their aircraft to the point where the issue of the radar wave crosses. This would be the place to launch the bombs. The allies tried to decipher and copy the frequency to divert the bombers, just as happened with the beacons. But the Germans began to operate at frequencies much higher than that of the allies. The Germans created the unit Kampfgruppe 100, equipped with that kind of artifact, which held its first attack on Coventry on November 15, 1940.

The English response to the development of equipment X, was hastily made plans team of Dr. Robert Cockburn to run research in telecommunications research center of Swanage. Despite the difficulty of projecting forward onds short, was discovered after the war that the German unit was much simpler. The English version German improved to incorporate four transmitters (Ford, 1974: 18). Upon receiving the notice of the first transmitter, the pilot was watching the altimeter and received the instructions of the browser. In the second transmission, the browser activated a pointer to a special chronograph.[8] The third was given the 5km transmission of the target, was triggered when the pointer of the second chronograph that stopped the first. When both hands are crossed, an electrical relay shooting and automatically drop the bombs.[9] The great contribution of this type of equipment was in getting crews of bombers that could carry out attacks with a basic training. Was established at RAF (Royal Air Force - British Air Force), the 80th Squadron to try to interfere in the German system. Its mission was to deliver the frequencies to perturb the German Nazi bombers. The English ability to know where the rays cross-saved many lives because the fighters could be sent to intercept the bombers.

Moreover, the British discovered that the use of frequencies in the short waves did not need, necessarily, the use of signals from two radars. The British started to equip its bombers with radiotelemetry that could fly to their targets using only a signal of radar based on land (Ford, 1974: 21).[10] The English called this technique as System Y. This system was virtually immune to interference, did not take long to discover the Germans

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[8] **Chronograph -** designation for cronômetros mechanical.

[9]The Brazilian pilots know that equipment such as radio-track. Is the navigation system using radio signals to set the sound cardinal points for a transmitting station. When approaching the station, in one of those tracks, the pilot heard a whistle in your receiver continuous. If you draw the "track" to one side hear the sound of the letter "A" in Morse code. If diverted to the other side hear the sound of the letter "N". The ground stations, transmitted at frequencies between 200 and 400 kHz. **ASSOCIAÇÃO BRASILEIRA DE PILOTOS DE CAÇA.** ***Glossário.*** (*on-line*) http://www.abra-pc.com.br/glosR.html (02/02/2008)

[10]**Radiotelemetry** - primitive type of radar.

and started implementing the system in their own bombers. The fate of England was the invasion of the Soviet Union by the Nazis that turned most of the Luftwaffe aircraft to the front east of Germany.

The V-1 bombs and V-2 were the response of the German allies in the last two years of the Second World War. Despite the entry of service of these weapons occur in 1944, research on such weapons began in 1929, with testing of jet engines (Ford, 1973: 12). Even before the First World War, the German army had a center to develop new weapons, called Wa Prüf.[11] The decisive occurred in 1935 when Germany breaks with the Treaty of Versailles. The acquisition of new materials and the mobilization of resources gave the Germans time to obtain weapons that influence throughout history, then. Over time, two divisions were created in the department of the army. A corresponding to the solid rocket fuel and one for liquid rocket, which were added to existing departments and investigating the communications equipment, ammunition and engineering. Maybe these divisions correspond to discuss the nature of the rocket is, essentially, are artillery shells of which, incidentally, port charges of propulsion, or as others say they are non-piloted aircraft wings of children (Ford, 1973: 14). Debate that emerged two weapons of revenge or retaliation (Vergeltungswaffe in German language). The V-1 rocket followed the first concept of an airplane and V-2 rocket[12], was the first liquid-fuel ballistic missile.

The history of V-1 starts in 1920, when a teacher from Munich, Paul Schmidt, began to search in the search for an aerial torpedo (Ford, 1973: 14). The Luftwaffe bank to project, because their military astronautics thought that was their job and could not be solely in the hands of the army (Ford, 1973: 59). The weapon V-1 contained a gyroscope for direction in altitude Askania.[13] Since 1906, the United States, the gyroscopes used to guiadance of torpedoes. [14] In such weapons, a small propeller in the head, suitable for

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[11] **Wa Prüf** — abbreviation in German, to Heereswaffenamt Prüfwesen, Department of the Army of Evidence. See: **FORD**, Brian. ***Armas Secretas Alemãs: plataforma para a morte***. Rio de Janeiro: Editora Renes LTDA, 1973. p. 11.

[12] Had the dimensions of 13.80 m in height and 1.67 m in length. His weight at the time of release, amounted to twelve tons, and fuel 3.700kg and 5.100kg of liquid oxygen, consumed to 123.75 kg / second. The speed of the gas desgarca was 7.506km / h. This type of request is a reflection of the design of war jominiana. See.: **FORD**, Brian. ***Armas Secretas Alemãs: plataforma para a morte***. Rio de Janeiro: Editora Renes LTDA, 1973. p. 54.

[13] **Gyroscope** is a device used for guidance of ships, aircraft and spacecraft, invented by Leon Foucault in 1852. The gyroscope consists of a rotor suspended by a support fomado articulated by two circles, with type cardan joints. Its operation is based on the principle of inertia. The guard rotation axis in the direction set in space. The gyroscope came to replace the compass in the sea. Thus, the gyroscope used as a reference of direction, but not in position. That is, you can usually move a gyroscope in space without any work beyond what is necessary to carry its weight. ***Gyroscopes*** (*on-line*) http://www.gyroscopes.org/behaviour.asp (19/02/2008)

[14] The Americans already search on top of the twentieth century for weapons systems guidance. See. **LEAVIK**, Frank M. ***Steering Apparatus for Mobile Torpedoes***. (on-line) http://www.pat2pdf.org/patents/pat839161.pdf (04/02/2008)

flight, activated a primitive record of distance. The distência a pre-determined, the fuel and the engine was turned off automatically muted. The device then fell on the ground, a diving and then exploded swinging (Ford, 1973: 68). The gun followed despretenciosas specifications and its production was forty-six times faster than a V-2 and its cost was around seven or fifty times lower also. [15] It was also immune to interference and its enemy electronic fuel could be extracted from the natural reserves of German lignite. However, their performance was less satisfactory that the V-2 rocket.[16] About a quarter of the V-1 rocket failed, the enemy fighters intercepted the possible cause of its low speed and often ravel in balloons air defense (Ford, 1973: 60).

That weapon is the beginning of a cruise missile. Different from ballistic missiles is that its trajectory follows a route parallel to the earth. That is, these missiles do not leave the earth's atmosphere. Such missiles can be launched from land or aircraft platforms. The missiles launched from U.S. aircraft receive the designation of ALCMs (Air-Launched Cruise Missile).

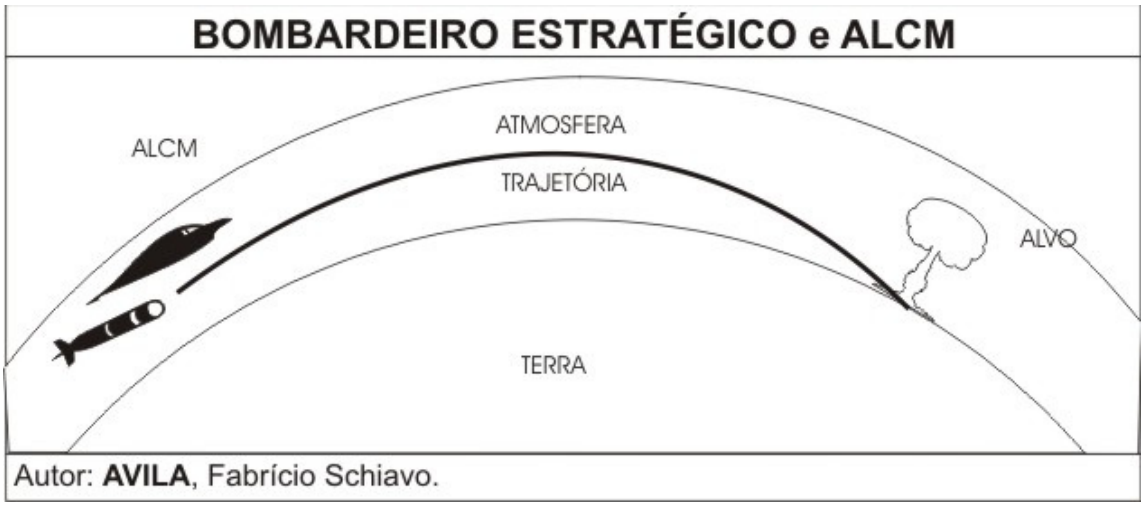

Fig.1: Cruiser Missile.

The V-2 in its commissioning, was named A-4. Appears as natural development of the A-3 rocket that did not have a system of outrigger reliable, however, presented itself as

[15] Each V-1 consumed 280 man-hours to produce them, while each V-2 revolved around 13,000. Its cost was around 1500 to 7500 DM, while a V-2 was 75,000. **FORD**, Brian. ***Armas Secretas Alemãs: plataforma para a morte***. Rio de Janeiro: Editora Renes LTDA, 1973. p. 60.

[16] The operational altitude of the V-1 was 330 to 2,100m, with a speed of 640km/he a range of 288 to 400km. Weighed 2.400kg, 1.000kg of being trinitrotoluol and ammonium nitrate as explosive warhead. Its length was 5.1 m and 1.5 m in diameter. See: **FORD**, Brian. ***Armas Secretas Alemãs: plataforma para a morte***. Rio de Janeiro: Editora Renes LTDA, 1973. p. 60.

a good rocket (Ford, 1973: 47). The artifact was trying to meet the requests of the German High Command that it intended to build the final.[17] . Only in its third test, on October 3, 1942, the weapon demonstrated its capabilities. Vôou at an altitude of 80km, and has a range of 20km (Ford, 1973: 54). The model was commissioned about five thousand copies produced. The Germans could count on 4% to guarantee that the rocket would reach their targets. The secret of its driveability was in Serbo-cybernetic system that directed the flow of discharge fins. The fins are moved from one side to another, slightly deflecting the path of the rocket thrust and producing side effects that slightly change the trajectory. Its importance was decisive in the first moments of the launch, when the speed of the rocket was too slow to make any use of aerodynamic lift to the fins. There were also controls in the elevators of the tail fins, but of secondary importance. From that moment, the rocket could reach the nearly one tonne warhead with an accuracy greater than expected (Ford, 1973: 54). Despite being a weapon more expensive and more difficult for production to V-1 because it depended on alcohol and liquid oxygen, its speed of impact, four times the speed of sound, ensuring that the destruction of its much larger rival, even if was the high pressure generated by the impact on the ground.

Despite sixty years of the end of World War II, some standards were maintained. The highlight is the bet in high technology as a response to asymmetry, countering the sense that one can not invest in high technology in moments where a defeat could be imminent. However, the facts show the opposite. The Germans mobilized its armed forces, together, as its industrial park, which had its greatest strength in chemistry, for new weapons that could change the course of the war. The same happened with England, who researched and developed systems for monitoring, control and guiagem of bombers to defend themselves from German aggression and damage to the effort of war with its enemy precise strategic bombing against the German industry.

I.2 - The construction of the weapons of the Cold War

[17] A arma definitiva é um de requisição que reflete a concepção jominiana de guerra. Cf. **BASSFORD**, Christopher. ***Jomini and Clawsewitz: their interaction*** (*on-line*) http://www.clausewitz.com/CWZHOME/Jomini/JOMINIX.htm#JOMINI (19/02/2008)

The Strategic Air Command of U.S. Air Force (SAC) was established on March 21, 1946. Only 148 B-29 bombers survived the demobilization after the war and were used.[18] The Strategic Air Command of the Air Force austeras Despite measures to control expenditures, the SAC managed to gather 319 bombers already in 1947, focusing on construction and development of B-36 bomber.[19] The bomber was designed in 1940 and would be produced if the England succumbed. However, its commissioning has occurred in the debate on the role of the SAC in nuclear war. It was a bomber representou that the apex of the industry of compressors. The compressors are mechanisms that increase the power of engines.[20] During the Second World War, the bomber tried to destroy themselves in the industry of compressors in Germany. The lack of power for the German bombers was one of the factors in his defeat. The aircraft could not take a large load of bombs and fuel, which reduces their effectiveness. The base of North American Walters, in New Mexico, focused the experienced staff at the time of World War II.

The transfer of technology from Germany to the United States was called Operation Lust (Miller, 1993: 17), the XP-80 fighter, the direct result of this transfer. The jet engine was one of the central points of development in the decade of war fifty. The Germans already had experience with the jet bombers since 1943, as the Ju-287. The four engine Junkers Jumo 004, producing a maximum speed of 680km / h, with a range of the aircraft was 1.500km. The most interesting factor was the use of a set of two trains of landing front of a U.S. bomber Consolidated B-24 Liberator in an aircraft fuselage of a German Heinkel He-177. In 1951, the U.S. Air Force (USAF), has commissioned its first jet bomber, the B-47.[21]

In 1953, the SAC started to operate the B-53, and at the same time, an entire family of intercontinental ballistic missiles were already part of their arsenal. LeMay believed that the missiles should be together with the force of bombers. In 1958, the SAC was four times higher than at the time of its creation. Had 258,703 and the number of military

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[18] The B-29 bomber was inaugurated the nuclear bomb to Hiroshima. Had a range of 6,852km and could carry nine tonnes of bombs. **PIKE**, John. ***B-29 Superfortress*** (*on-line*) http://www.globalsecurity.org/wmd/systems/b-36-specs.htm (16/02/2008).

[19] The B-36 bomber was the height of the piston-engine bombers. Had a range of 18,520km and could carry 38.7 tonnes of bombs, nuclear or conventional. **PIKE**, John. ***B-36 Peacemaker*** (*on-line*) http://www.globalsecurity.org/wmd/systems/b-36-specs.htm (16/02/2008)

[20] The compressors were present in the era of jet propulsion. In 1942 the General Electric developed the first engine of this type. Much of the effort of strategic bombers allies was the destruction of German industries that produce, for the high-tech prototypes were not produced in large quantities, as the Me-262. **PIKE**, John **GE-1A**. (*on-line*) http://www.globalsecurity.org/military/systems/aircraft/systems/ge-i.htm (19/02/2008)

[21] The B-47 bomber was one of the first strategic bomber jet. 3,800km had a range of 11.25 and could carry tons of bombs, nuclear or conventional. **PIKE**, John. ***B-47 Stratojet*** (*on-line*) http://www.globalsecurity.org/wmd/systems/b-47-specs.htm (16/02/2008)

aircraft jumped from 837 in 1948 to 3000, ten years later (Cronley, 1986: 71-92). That is, in the early days of the Cold War, there was a process of assimilation of the technology of ballistic missiles by the German allies. Even the credible use of such missiles, the bombers also had a leading role in the nuclear balance in the United States.

The Soviet Union, moreover, engaged in the construction of rockets in response to U.S. strategic bombers. It was an asymmetric response, the same way that Germany answered the combined pressure of the years 1944 and 1945. The Soviets left devastated World War II (Vizentini, 1990: 14). In 1949, the Soviet Union exploded its first atomic device in 1953, its first nuclear device (Gunston, 1984: 68). The priority of the Soviets was the exploration and production of a new weapon to allow the release of one and a half million men to work in the reconstruction of the country (Vizentini, 1990: 24). Studies of the Soviet Sergey Pavlovich Korolev show that the initial projects of the USSR were based German rocket.[22] The R-1 rocket showed great similarity with the weapon of the German V-2. The initial problem was to power so that the rocket could leave the atmosphere. Despite the R-1 rocket IM enable placing a nuclear device to be delivered over long distances. The only problem would be solved from the R-1 rocket MFIs where the initial output of jet, were added four more nozzles, giving the power required for the rocket (Godwin, 1971: 33). Thus came the first intercontinental rocket, the R-7, which would be the launching platform of the first Soviet ballistic missiles. The same rocket in 1957, was the launch of the first artificial satellite to orbit the Earth, the Sputnik. In August 1957, the Soviets tested the first ballistic missile of its range, really, intercontinental, the SS-6.[23]

The ICBMs are the ballistic missiles of intercontinental range.[24] Its ballistic trajectory is, or they leave the atmosphere and then return.

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[22] *Sergey Pavlovich Korolev* was the founder and first coordinator of the Office of Prime Projects (OKB-1) from 1946 to 1966. In addition was the designer of the first rocket of the USSR and the first space systems. See:**GODWIN**, Robert. ***Rocket and Space Corporation Energia***. Ontário: Apogee Books, 1971. p. 19.

[23] The R-7/SS-6/SAPWOOD ballistic missile was the first of two stages of intercontinental range of about 14,000km. Had a head of income 4Mt and a CEP of about 5,000m. See**PIKE**, John. ***R-7 - SS-6 SAPWOOD***. (*on-line*) http://www.globalsecurity.org/wmd/world/russia/r-7.htm (17/02/2008)

[24] **ICBM — I**nter-**C**ontinental **B**allistic **M**issile.

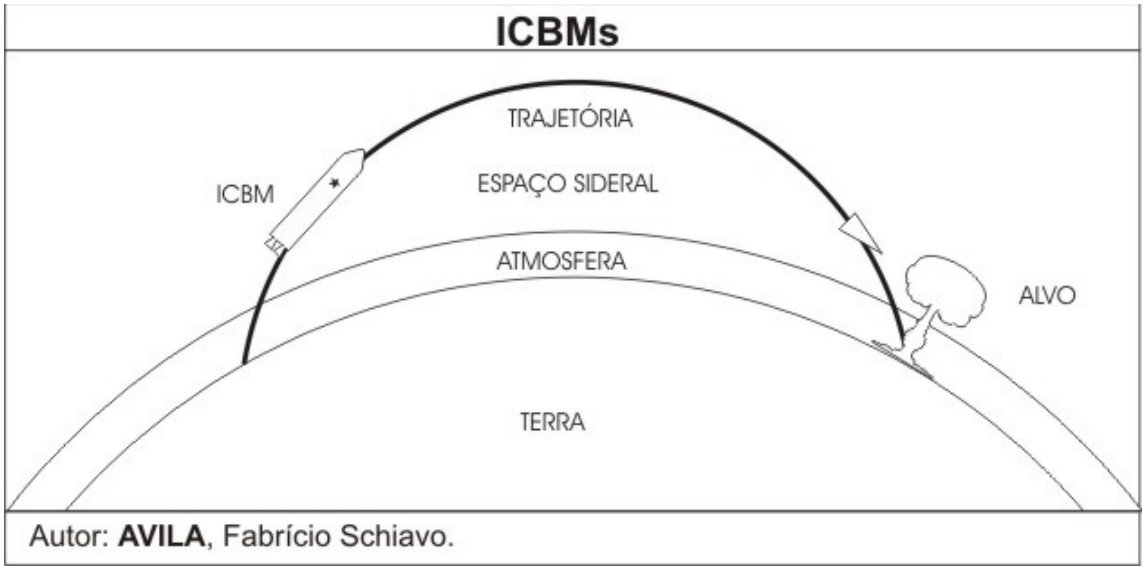

Fig.2: ICBM.

Generally, they are stored in silos that, too, are the most effective way to protect them. The silo is to bury the missiles on the ground, adding a coating of tons of concrete. This protection is measured in PSIs (pounds per square inch) which corresponds to a pressure of 70g/cm². Specifically, the systems guiagem have a significant importance for the destruction of that defense. We developed a concept called circular error probable (CEP). Helps measure the distance from the impact of the warhead against the silo. For example, a silo of 2.000psi resistance (140.61 kg / cm²) needs an impact 18.000kt of a radius of 500 meters for its destruction. And an artifact of nuclear 1.000kt colliding in the radius of 200m also destroy. The guiagem reduce power and increase the quantity of missiles and, with it, the strategic vulnerability with the highest number of targets with a possible impact. Before the existence of a higher accuracy, there was a need for many high-yield warheads to achieve a target to ensure their destruction, even if it fell to several kilometers away. That was the concept of using force against the missiles, who had long led the doctrines of the countries.

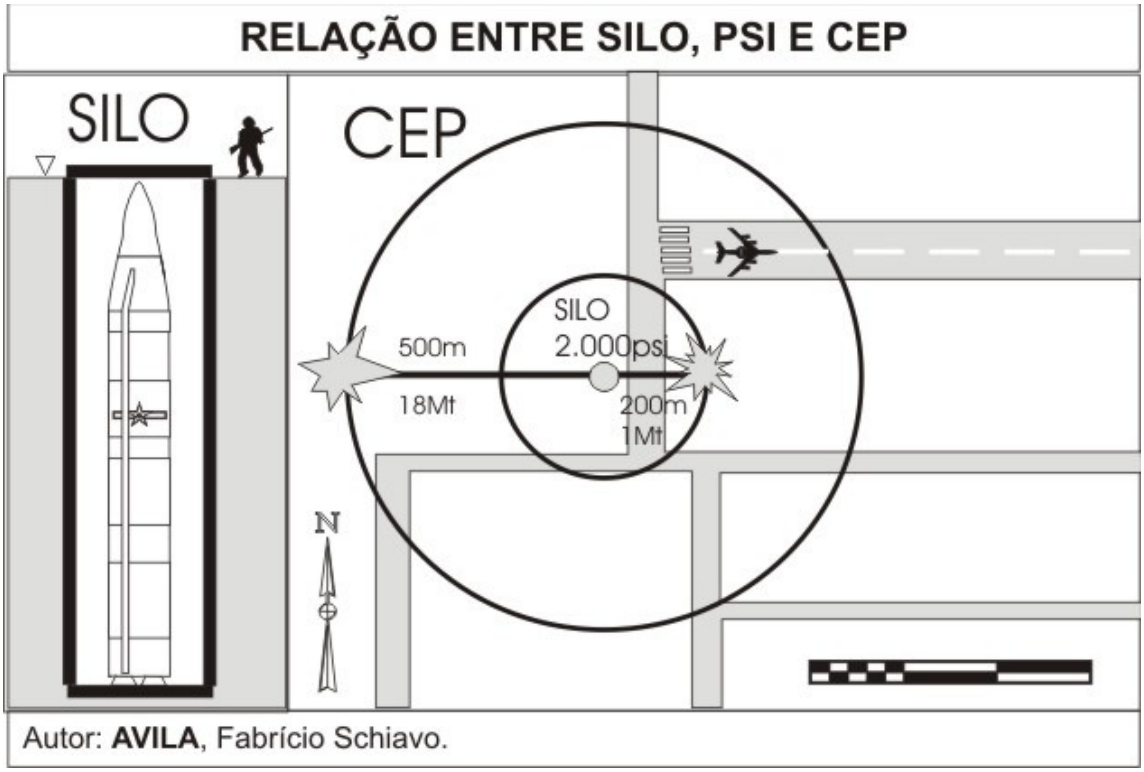

Fig.3: CEP and destruction of silos.

Meanwhile, the Soviets not descuidaram development of its strategic bombers. The same year, the bomber flew Mya-50 Bound.[25] It seems that this development was not priority, would have some kind of incentive if the project failed to Soviet strategic ballistic missiles. Two years later, in December 1959, when the missiles began to be installed, the Soviet Union created its Strategic Rocket Forces of the forces that have been declared prominent in case of war, taking the primacy of the Soviet army (Gunston, 1984: 69).

The big problem was the containment of the increase in U.S. strategic forces could be effectively contained with economies by ballistic missiles, because the risk of using bombers costs involved political, social and economic. Soviet workers were involved in the reconstruction of the country and could not be mobilized for crews of bombers. The conviction of the arrival of these aircraft to the continental United States to launch their bomb was doubtful. The air defense of the Americans could destroy, significantly, a formation of attack.

Originated in that period, a difference of Americans to the Soviets, and would mark the Cold War as a process, was the use of the fuel type. The U.S. missile already had

[25] The bomber never entered the jet into service. We made three prototypes. It would be supersonic and load thirty tons of bombs. See**Vladimir Mikhailovich Myasistchev** (*on-line*) http://www.aviation.ru/Mya/#50 (16/02/2208)

solid fuel[26]. This type of fuel has many advantages. The missile did not need to be prepared for its launch and its life is extended for much longer. The Soviets, in turn, used the liquid fuel[27]. The logistics were complicated, the warheads were stored, separated from the rocket and fuel (Lieber and Press: 2006). The actual need for its maintenance was ninety men. It took up 72 hours so that the missile could come into action. After supplied with liquid fuel, the missiles could last for 24 hours before beginning the internal corrosion (Lieber and Press, 2006: 56). That was one of the causes of the rapid collapse of the Russian strategic forces. The demobilization of personnel, by cutting the military budget, which left the missiles apodrecessem, literally, in their silos.

Join the bombers and missiles, the United States and Soviet Union were doing tests with the possibility of launching strategic missiles from submarines. At the beginning of the fifty, the Soviets were already experimenting with the R-1 rocket for its launch in MFIs vessels (Godwin, 1971: 32). Despite the technological advances of the time, the missile was still guiagem these inertial.[28] However, the North American Commission, already in 1960, the Polaris A-1 missile, built by Lockheed, initiating the concept of SLBM.[29] The SLBMs strategic missiles are launched from the bottom of the sea, which are commissioned on nuclear-propelled submarines (SSBNs). When in operation, are escorted by other submarines are nuclear-propelled, but not port strategic missiles, known as hunters, with the function to protect them from enemy navy.

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[26] The solid fuel is the oldest form of use of rockets. Even today a chemical mixture is placed in cylinders that entering combustion, expel gas at great speed. For example, the chemical mix that will rocket in the American space bus, consists of 69.93% of ammonium perchlorate, 16% aluminum powder, 0.07% of oxidizing iron powder (as a catalyst). The acrylic acid polybutadiene acrylonitrile (in 12.04%), secure the whole mixture, which still receives treatment for 1.96% epoxy. Both the acid and the epoxy burn as a fuel, adding power. See **PIKE**, John. ***Ballistic Missile Basics*** (*on-line*) http://www.globalsecurity.org/wmd/intro/bm-basics.htm (14/02/2008).

[27] The liquid fuel for rockets is usually stored in two liquid chemicals. The fuel, as of liquid hydrogen (-253 ºC) and an oxidant of liquid oxygen (-298 ºC), together burned by the engine to obtain thrust. See**PIKE**, John. ***Ballistic Missile Basics*** (*on-line*) http://www.globalsecurity.org/wmd/intro/bm-basics.htm (14/02/2008).

[28] The inertial guidance system that guides the projectile using the physical principle of inertia. Impactors in the warhead can act as accelerometers that alter the trajectory from the oscillation caused by the speed of the bolide. Generally, the trajectory of the rocket was corrected with the use of gyroscopes, before entering the GPS system. See**PIKE**, John. ***Ballistic Missile Basics*** (*on-line*) http://www.globalsecurity.org/wmd/intro/bm-basics.htm (14/02/2008).

[29] The Polaris was a two-stage ballistic missile, propelled by motors solid-fuel rockets and had a range of 222.4 km. Carried a single warhead of 800kt, with a CEP of 926m. See.: **GUNSTON**, Bill. ***Foguetes e misseis da III Guerra Mundial.*** Rio de Janeiro, Editora Ao Livro Técnico S.A., 1984. p. 32.

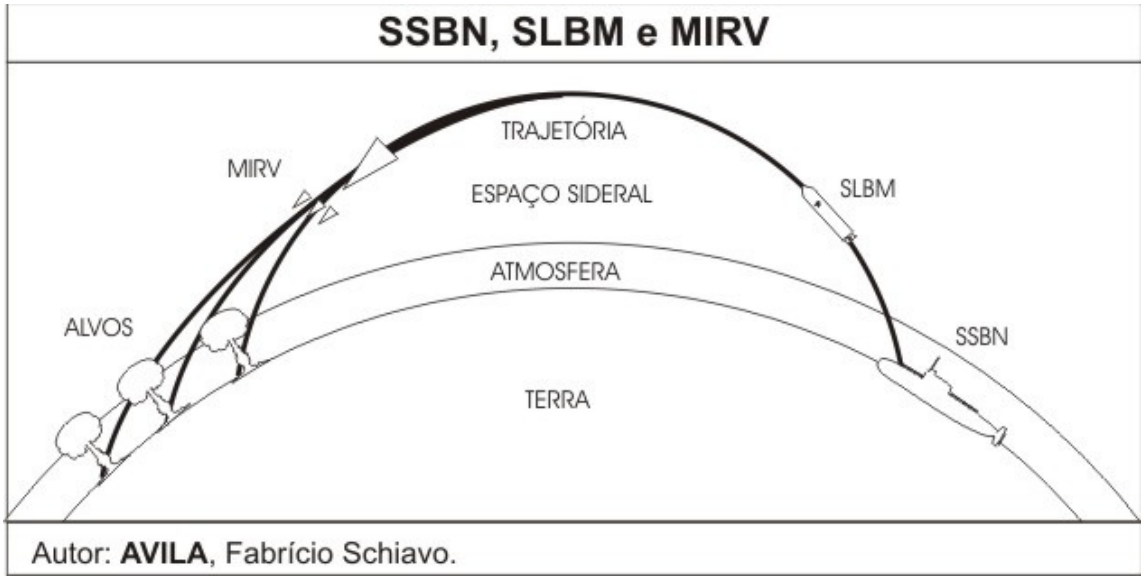

Fig. 4: SSBN launching a SLBM.

The Polaris remained in service until 1965. The image formed by the vectors for delivery of atomic devices, which consisted of long-range strategic bomber, the intercontinental ballistic missile and the missile launched from submarine, gave rise to that, the 1960 already had, which was designated the **nuclear Tripod.**

I.3 - The nuclear primacy in the past.

History shows that the phenomenon of nuclear primacy has happened at the beginning of the Cold War. Richard Betts (1986: 3 - 32) described this situation from the debate on the relationship between the quality of stocks, the quantity of forces and strategic nuclear primacy.

In the context of the Cold War, the U.S. had a monopoly of nuclear weapons from 1945 until 1949, when the USSR (Union of Soviet Socialist Republics) exploded its first nuclear device in fission. It was the stage of monopoly for superiority. The next phase, from 1950-1959 was called to sufficiency of superiority, since the Soviets worked tirelessly for the creation of a force of bombers and dissuasive credible race in obtaining thermonuclear bomb that succeeded in August 1953. The last phase was called to the sufficiency of the vulnerability, which began with the space race around 1960. At the end of the decade of fifty, the same rockets that began to take space satellites into space, could lead warheads, with intercontinental range, causing the ICBMs.

As an example, was the creation of the first test of ballistic missiles held by the Soviet Union in August 1957, that two months later, the same type of rocket put into orbit the artificial satellite Sputnik, and that would be the first Soviet ICBM, generating in 1959, the Strategic Rocket Forces of Soviets. This phenomenon caused, gradually, to replace the amount of discussion of strategic bombers, to the number of ICBMs necessary for the establishment of a credible deterrent force.

The chart below shows the number of warheads since the first nuclear artifacts and reaches our days. However, it seems that the figures indicate that the American perception of the threat of Soviet era, too, out of an empirical reality sustainable. The first phase of the monopoly for the superiority precludes further explanation being clearly understood.

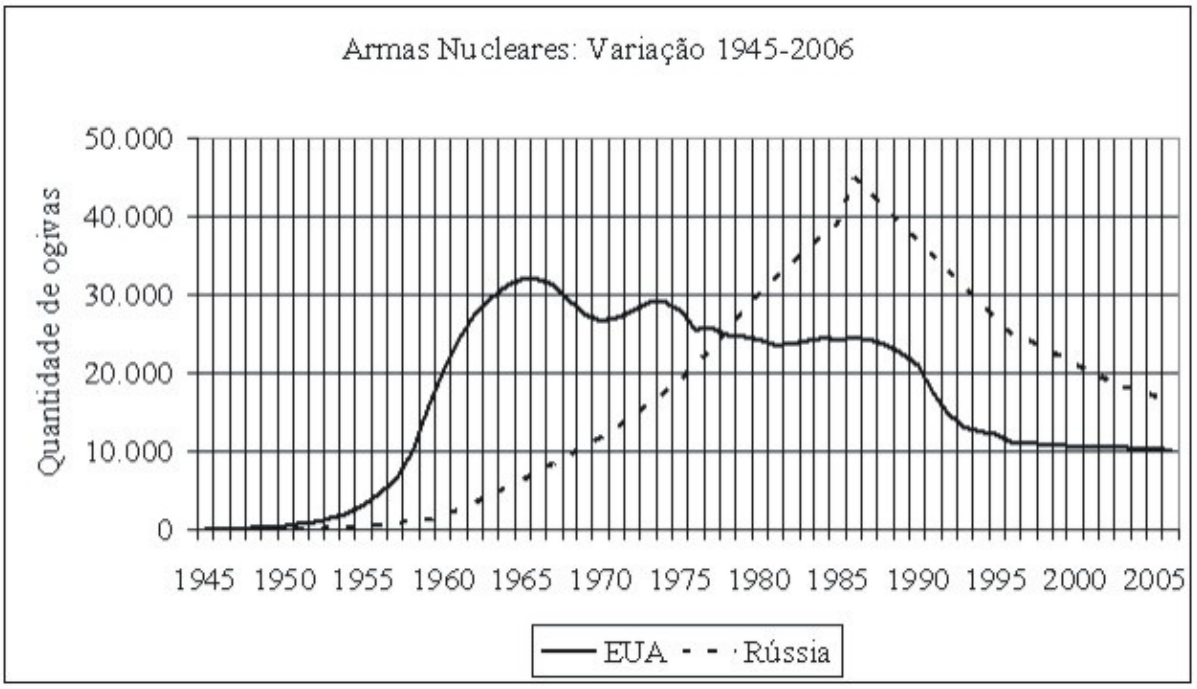

Fig. 5: Chart of Number of U.S. and Russian warheads in the period from 1945 to 2005. [30]

The next phase of superiority to the sufficiency, which permeates throughout the 1950s, showed the problems of a negative balance for the Soviets. In 1950, the Americans count with 369 warheads, ending 1959 with 15,468 artifacts. Despite the impressive numbers, this growth was 58.89% per annum. The Soviets began with 235 and finished the decade with 1060, an arsenal fifteen times smaller than the U.S.. Meanwhile, annual growth in the number of warheads was 81.34%. This shows some paradoxes of the last

[30] **Font**: **KRISTENSEN**, Hans & **NORRIS**, Robert S. ***Global Nuclear Stockpiles, 1945-2006***. In.: Bulletin of Atomic Scientists, July/August 2006. (arquivo .pdf) (on-line) http://www.thebulletin.org (1/04/2007).

phase in question, the sufficiency for the vulnerability. The U.S. arsenal continued to grow, reaching its peak in 1966, and. exceeded only by the Soviets in 1978.

The sufficiency U.S. patent was, but the vulnerability was questionable at this time. Two reasons are found, the first is that the vulnerability of the amount was still a trend. The Soviets took more eighteen years to build an arsenal equivalent. But the Soviets were initially in front of the arms race, to design and commission the ICBMs. It seems that the Soviets followed the same standard of English in the German first war, the answer to the imbalance with high technology.

I.4 - The militarization of space

During the 1960s, the world watched the race into space. Meanwhile, the Soviets launched it in front on 6 August 1961, when the ship was launched Vostok II with German Titov on board (Hobbs, 1986: 25). The importance lies in the fact that decade of experience with manned orbital flights, which culminated in the journey of man to the moon in 1969. Implicitly, which is the concern of most Americans was the leadership of the Soviets in the capabilities of heavy missiles. The launch of space vehicles were often modified missiles that, clearly, could be used for the dumping of thermonuclear devices anywhere in the world, which was aggravated by the fact that in that decade have not had a kind of effective defense against them. The growing number of North American satellites, which rose from 15 in 1960 to 100 in 1967, shows the pace of the search space. In subsequent years, the annual average of artificial satellite launches by superpowers was a hundred units a year (Hobbs, 1991:28).

Moreover, there was concern that the Soviets might develop anti-satellite weapons (ASAT) and therefore threaten the network space of communication United States. The first anti-satellite test was actually in 1959quando the United States launched a B-47 bomber a ballistic missile called Bold Orion to intercept the satellite Scientific Explorer VI. In this sequence, the Americans preferred missiles launched from land bases. The first operating platform, from 1964 to 1975, was the Nike-Zeus missile that had a secondary function of interception of ballistic missiles, its purpose was to intercept satellite.[31] The Soviets also made thirteen tests with this type of weapon in the seventies and the

[31] The Nike-Zeus missile was based on land, had a yield of 400kt warhead and a range of 400km. See **CLAREMONT INSTITUTE**. ***Safeguard***. (*on-line*) http://www.missilethreat.com/missiledefensesystems/id.39/system_detail.asp (17/02/2008).

Americans still had some commissioned even with the signing of the Treaty of outer space in 1967 that such a system Bania.

Two later versions of the Nike-Zeus missile, led to the Spartan and Sprint.[32] Operationally, these missiles intercepted nuclear ballistic missiles inside and outside the atmosphere, respectively, giving rise to the concept of anti-ballistic missile (ABM).[33] This concept is perhaps the oldest, as shown by the Xianfeng "super anti-missile weapon." The super gun could launch a projectile of 160kg, non-guided, propelled by rocket in order to achieve nuclear warheads.

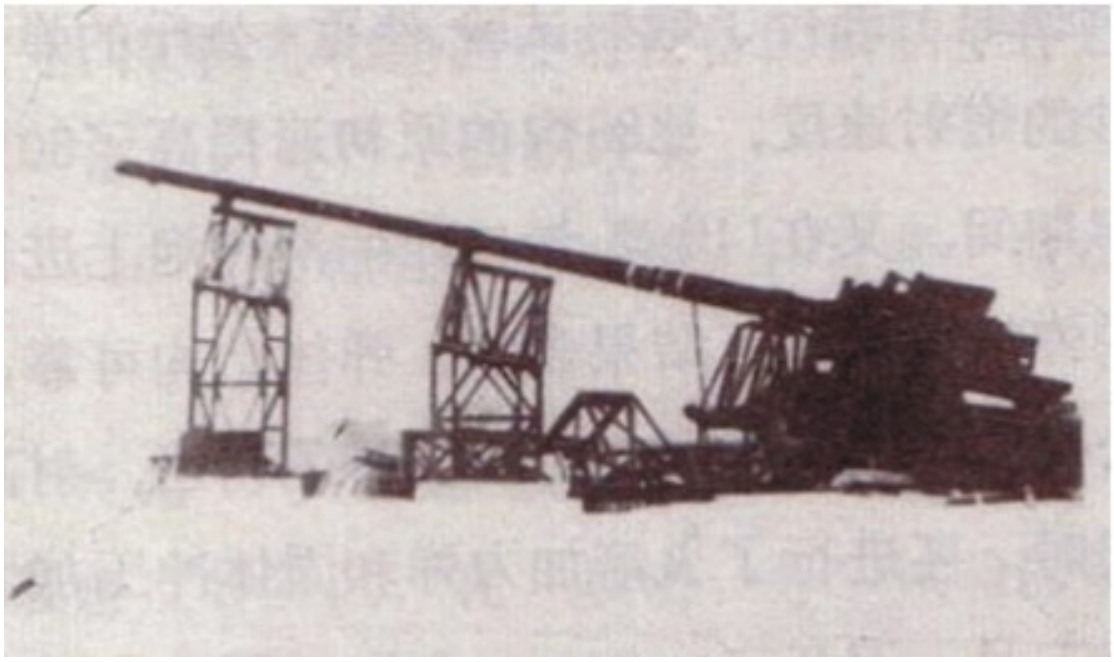

Fig. 6: XianFeng a “super arma anti-míssil”.[34]

The ABM treaty of 1972 reduced the anti-ballistic systems. The United States comissionaram Spartan Sprint and its systems of missiles in silos in North Dakota, while the Soviets comissionaram the system Galosh around Moscow.[35] The USSR knew that

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[32] Spartan Sprint and the systems were basically the same missile with a version of short-range and one long-range, respectively, for interception of ballistic missiles in the middle course and another at the back. See**CLAREMONT INSTITUTE**. ***Safeguard***. (*on-line*) http://www.missilethreat.com/missiledefensesystems/id.55/system_detail.asp (17/02/2008).

[33] **ABM** — **A**nti-**B**allistic **M**issile.

[34] **Chinese Military Forum.** (*on line*) Fonte: http://www.sinodefence.com/strategic/missile/missiledefence.asp (02/02/2008).

[35] The system Galosh was seen for the first time in Soviet military parade in 1964. It was a missile of three stages, solid fuel, with a range of 322km, carrying a warhead of around 3Mt. Its performance was comparable to the U.S. missile Nike-Zeus. **PIKE**, John. ***Galosh*** (*on-line*) http://www.globalsecurity.org/wmd/world/russia/galosh.htm (17/02/2008)

such missiles would be effective to protect the capital against nuclear attacks from China, France or England, but offer little resistance against a mass attack on the Americans. The capital of the Soviets became the most protected place in the world in relation to attacks with ballistic missiles.

The monitoring of air space was a central issue of concern in the defense of Americans and Soviets. Since 1962, the United States maintains the system in operation BMEWS.[36] There are three of those installed in Thule in Greenland, Alaska and Clear in Fylingdales in Britain. This system operates two types of radar: a pulse-Doppler radar and a tracking satellite dish with a length of 25m.[37] The same treaty that limited the systems against ballistic missiles, leaving the search for defensive means. Subsequent searches were the focus of the survival of a large radar conventional and nuclear attacks. Thus, emerging from the radar array step approach. These radars have the antennas arranged in an array of steps that can, subtly, changing the frequency and thereby achieve greater accuracy in the tracking of enemy ballistic missiles, watching them from your shot. Furthermore, the antennas are physically arranged in a large building plates. Thus, in case of attack, the antennas meet the survivors of the destroyed office[38]. The United States have two such radar, Pave Paws system for the control of their respective Pacific and Atlantic coasts.[39] The radar called FPS-115 is prepared in a building, trapezoidal structure of 30m in height that has two faces covered by 5,400 antennas. Operates in the UHF band (300MHz to 3GHz) and has technology for producing semiconductor radar beams in the coverage of 85 ° of elevation and azimuth of 240 °, with a range of 4.800km. Its function is the monitoring of SLBMs that can be launched from the two oceans.

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[36] Cf. **HOBBS**, David. ***Guerra no Espaço: a moderna guerra espacial e os sistemas de Defesa Estratégica das superpotências.*** São Paulo: Nova Cultural, 1991. p. 62.

[37] **Pulse-Doppler** - Consists of ujma sophisticated form of radar that can detect targets in flight rasante, even taking the background objects, clouds, which reflect the signs of an echo. See: **RICHARDSON**, **Doug.** ***Guerra Eletrônica***. Vol. I. São Paulo, Nova Cultural: 1986. p. 11.

[38] **CASTRO**, Fábio M. ***Radares de Varredura Eletrônica*** (*on-line*) http://sistemadearmas.sites.uol.com.br/ge/par1naval.html (17/02/2008)

[39] **PIKE**, John. ***Pave Paws*** (*on-line*) www.globalsecurity.org/space/systems/pavepaws.htm (17/02/2008)

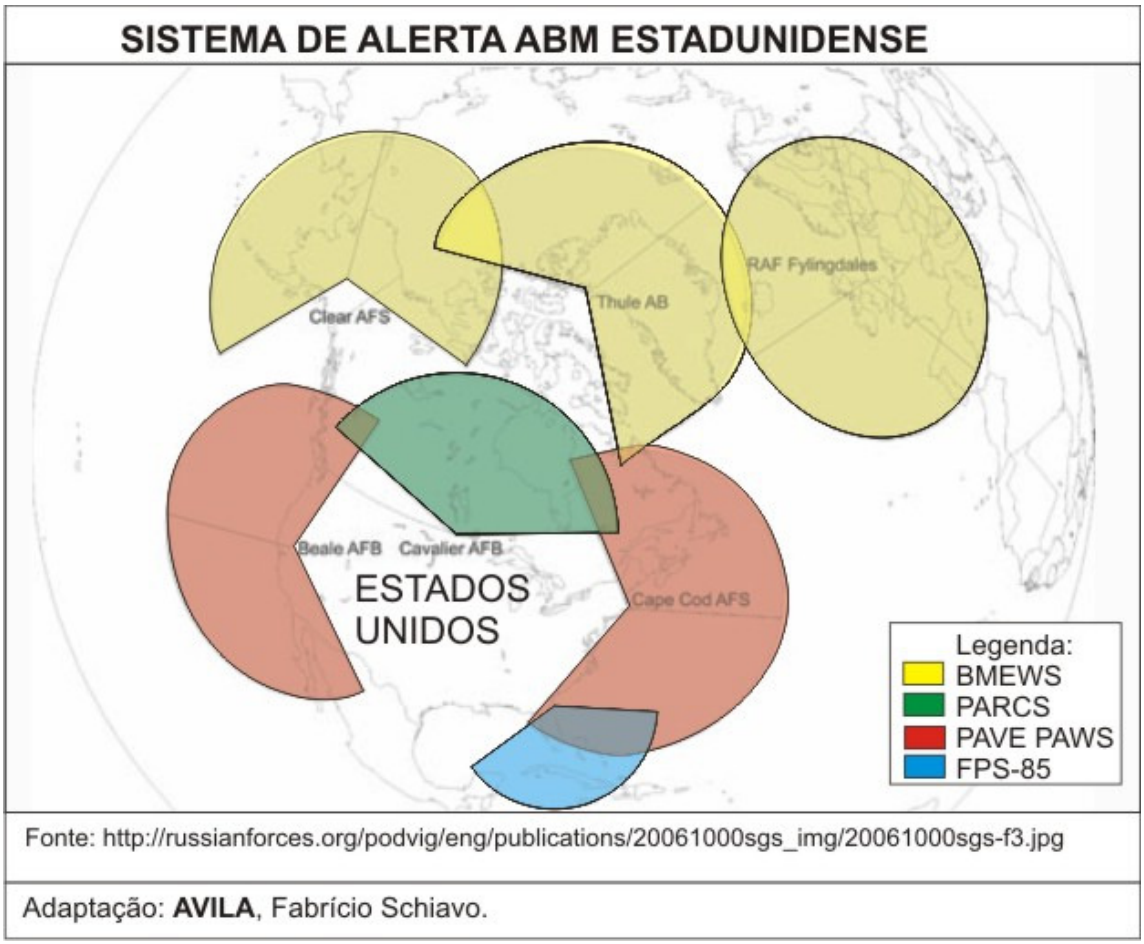

Fig. 7: Coverage of U.S. strategic radar.

His great range and effectiveness has made the controversy arose from the commissioning of arrangement fásico Soviet radar in Krasnoyarsk. According to the United States, this would not be the border of the Soviet Union, nor its beam pointing out of the country. The radar was located on the border with Kazakhstan today, tracking the West to the Siberian peninsula of Kamchatka. Would, therefore, outside the ABM Treaty. This radar was important because he defended the Soviet silos of possible incursions by aircraft that could see the Pacific Ocean. Its decommissioning, in the words of Lieber and Press (2006: 51A), has created a "blind spot" in the Pacific, leaving it vulnerable to future attacks preemptivos Russia to U.S.

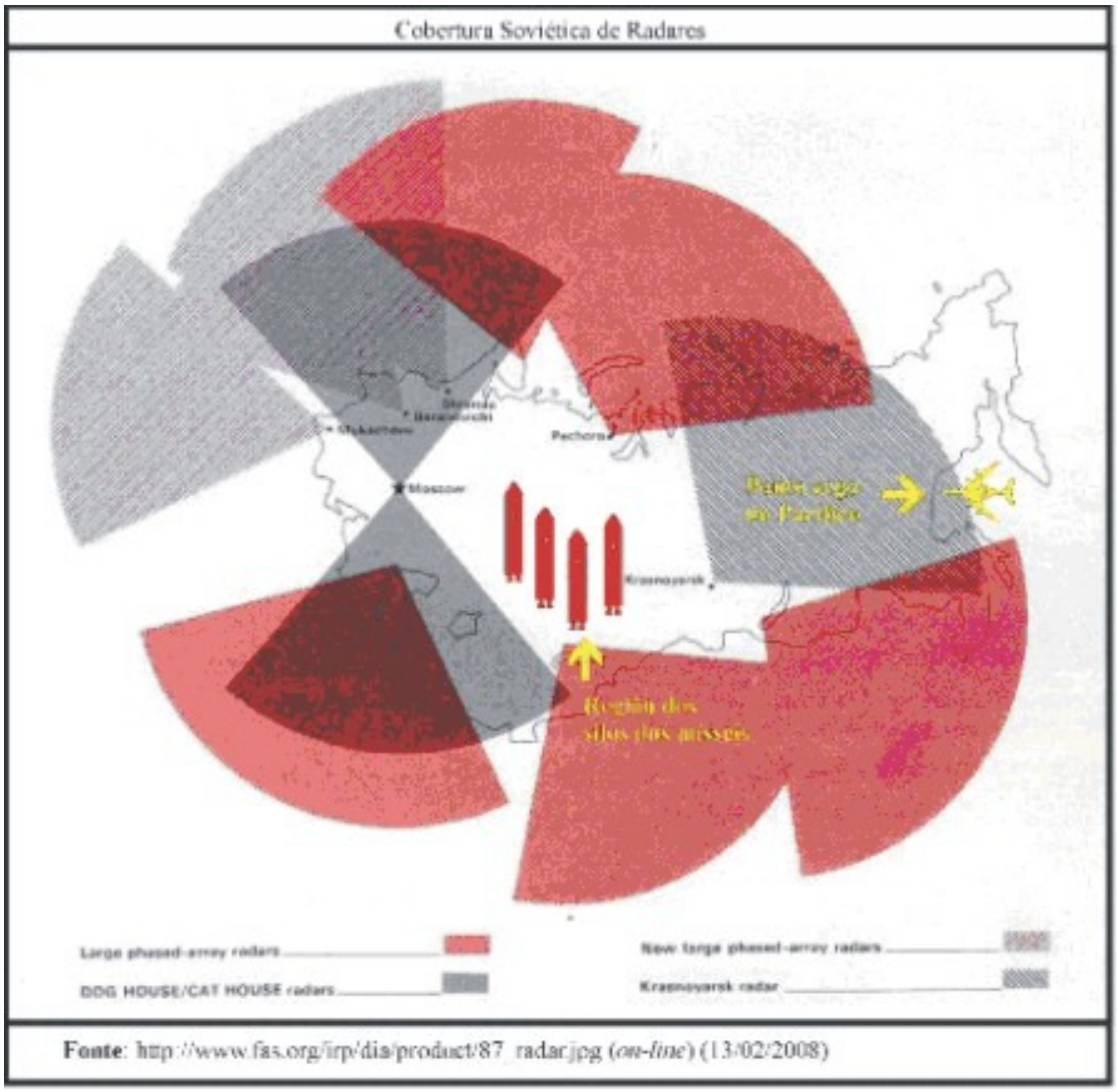

Fig. 8: Reach the radar of Krasnoyarsk.

II

THE SEARCH FOR THE OF NUCLEAR PRIMACY IN THE BEGINNING OF XXI CENTURY

II.1 - Criteria for the delimitation of the cases

Besides the five thermonuclear power, which correspond to the five permanent members of the UN Security Council, there are countries which declared or presumed, have nuclear arsenals. However, there is no indication that any of them safely has installed capacity in terms of weapons of fusion. This is the case of India, Pakistan, Israel and, arguably much of North Korea.

While these countries can make use of their nuclear arsenals if they decide to do so, could only reach the neighboring countries and still with limited income, which does not ensure a decisive result in the event of war place, much less decisively alter the distribution of forces under overall. In part it follows the same political factors limiting intrinsic to nuclear weapons as part of compellence and not just Deterrence. These factors are common to all nuclear powers, including USA, Russia and China. However, when combined with the limitations derived from the ability of destruction issued by the process of fission, which is expressed in thousands of tons of TNT (kilotons) of the estimated number of warheads that they possess and the absence of vectors (missiles, aircraft, submarines) capable of intercontinental supplies, are the determinants of the exclusion of Pakistan, India, Israel and North Korea, than the United Kingdom and France of the proposed study.

The United Kingdom has no ICBM own strategic weapons and withdrew its long-range bombers, the only remaining operational sub-strategic warheads. You must remember that this country has taken a political decision to switch to the use of weapons and fusion vectors Americans. Its main weapons systems are strategic SLBMs Americans (Polaris A-3P-II and Trident D-5), owned English, but whose final inspection is in the hands of the U.S. Strategic Command (USSTRATCOM). Besides, there is evidence that England has not C3I (Command, Control, Communications and Intelligence) suitable for strategic artifacts. Only the bombers are in line with the Prime Minister and the degree of control over the Trident is uncertain. Therefore, it is highly debatable, from a political and

administrative, that Britain can decide itself on the possible use of their thermonuclear weapons. Therefore it was decided to exclude the UK this study.[40]

The Vanguard class of submarines can carry sixteen missiles per unit. Each SSBN is protected by one or two hunter-killer submarines during the transit of its patrols of deterrence that are planned to be coordinated with the operations of French SSBNs.

France, by contrast, has its own arsenal and administrative resources under its strict control. However, the French military preparation is incompatible with the hypothesis that the French authorities will launch a thermonuclear war. After all, France has disabled its vectors offensive over the last decade. The country withdrew from service the short-range missiles and Hades Pluton in 1998. At the same time France has also dismantled its IRBM (Intermediate-Range Ballistic Missile) S-3D, which had only 3,500 kilometers of power, but was armed with a warhead of 1.2 megaton strategic. Although France still searching and trying to develop missiles SLBM, were canceled in the past decade all other programs missilísticos land-land.

In the strategic sphere have been withdrawn from the nuclear service in 1996 the 18 existing units of the Mirage IV bomber, the backbone of the strategic arsenal under the French Commandement des Aériennes Strategic Forces (CFAS). The aircraft remain in service as vectors of strategic recognition. France was, along with England, one of the first nuclear countries to join and ratify the Treaty of Complete Prohibition of Nuclear Test Ban Treaty (CTBT), and that France was so far the only country which dismantled its nuclear testing facilities, stopped produce material for nuclear strategic artifacts (plutonium) and dismantled the plant responsible for its preparation.[41]

France remained on the air-sun of vectors moyenne portée (ASMP) and air-sun of longue portée (ASLP), air-surface missile cruisers for medium (300 km) and long (1.200km) range. The ASMP and ASLP are missiles with warheads of 300kt maximum,

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[40] For some time the UK operated an intermediate range ballistic missile (from 3000 to 4800 km) also of American manufacturing, but the Thor, as it was called this IRBM was withdrawn from service in 1963. In turn, the Polaris are being phased out in favor of Trident. The SLBM Trident missiles are installed on submarines, with a maximum range of 6,000 km, equipped with multiple warheads (12) with income in the range megaton. Moreover, the Trident in the UK have clear links of C3I with USSTRATCOM, through coverage of the NATO command. Although the UK is not able to undertake strategic nuclear operations independently, its arsenal can be considered ancillary to the U.S. for the purpose of calculating the capacity of a second attack. See.: http://www.globalsecurity.org/wmd/world/uk.

[41] "*Since 1992, France no longer produces weapon-grade plutonium. At the end of 1997, it closed the Marcoule reprocessing plant where this plutonium was produced. Since mid-1996, France has ceased all production of fissile material for nuclear weapons. The Pierrelatte enrichment plant, where highly enriched weapon-grade uranium was produced, has also been closed. The dismantling of these plants, decided in February 1996, is underway*." Cf.: Global Security. *Nuclear Weapons* [Fr]. (*On-line*) http://www.globalsecurity.org/wmd/world/france/nuke.htm (04/05/2007).

being transported by aircraft Super-Étendard, naval aviation loaded, and the Mirage 2000N. Also remains in the service SLBM M-45, with a maximum range of 6,000 kilometers and armed with six MIRV warheads, each with a yield of 150 kt.

The word means MIRV Multiple Independent Re-entry Vehicles. It consists of a capacity of some missiles to carry nuclear warheads in its multiple re-entry vehicles.[42] The MX Peacekeeper missile the U.S. gives us a good example. It carries ten vehicles MK-21 that contains each of the W87 warhead. These vehicles have a conical shape and are in the last stage of the strategic missile. They are independent because this missile can reach ten different targets for each re-entry vehicle that door to head.

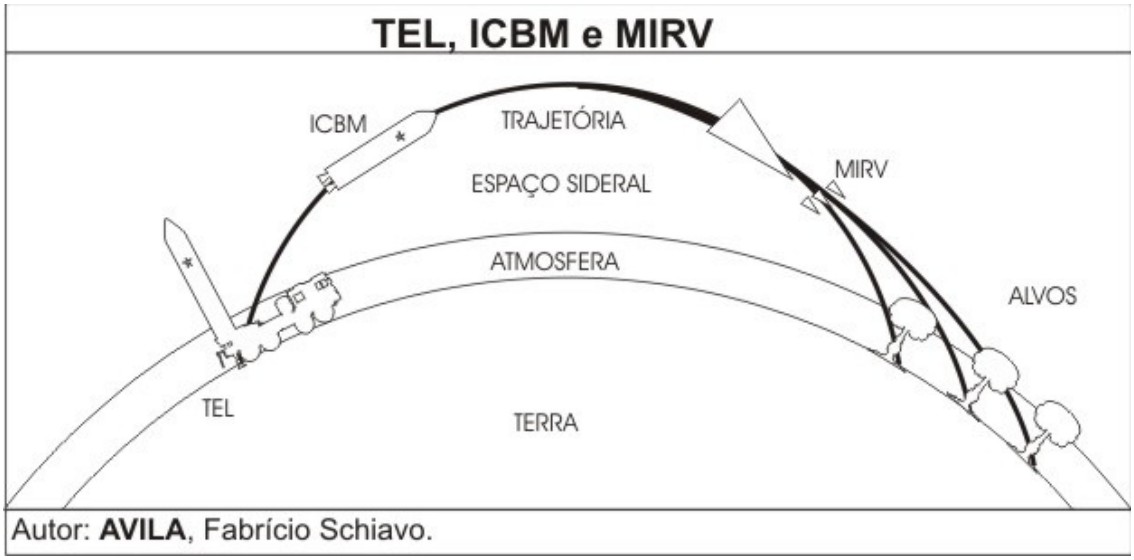

Fig. 9: MIRVs.

That is, although France has maintained a force of dissuasion nucléaire credible, any country without weapons of megaton yield and with limited capacity intercontinental ballistic cross the nuclear threshold against a power which has capacity of a second attack. The most likely use of nuclear weapons by France, not including the self, it would be against a non-nuclear. This is the practical effect of the new doctrine announced by President Chirac in 2006, when summoned the French nuclear forces to participate in the global campaign against terrorism. At the time the president stressed that in case of attack

[42] For example, vehicles of North American delivery, which contains the warheads, have the name Mark (Mk). The Mk 1 was just the bomb "Little Boy" used on Hiroshima. See: **PIKE**, John. (*on-line*) http://www.globalsecurity.org/wmd/systems/nuke-list.htm (08/08/2007).

with weapons of mass destruction against his country, France would use nuclear weapons in retaliation, targeting the countries that support terrorism.[43]

It is unlikely that France used its missiles to defend the U.S. if they start a war against Russia or China. In this case France probably be considered free from its Atlantic ties and would be driven to follow the path of national convenience, adopting neutral attitude. For all these reasons that France was also excluded from the proposed study in this dissertation.

The respect of empirical research is limited, therefore, the study of the strategic nuclear arsenals (warheads and vectors) of the three contemporary major nuclear powers, namely the United States, Russia and China in the period after the end of the Cold War (1991-2006). Focusing in 2006 and projections for 2007.

II.2 - The balance of strategic nuclear forces

The balance of strategic nuclear forces is considered as independent variable or causal (Vi) in the study. The independent variable is the cause of the dependent variable (G), which dissertation, is the kind of polarity in the international system. The indicators (units) that can be relevant to examine the variation in levels of strength in the post-Cold War are the numbers of thermonuclear warheads and delivery vectors of the United States, Russia and China between 2006 and 2007.

The level of possible measurement of independent variable corresponds to a wide gap between the absolute numbers obtained (equal frequency between categories), but the reason (ratio) is also relevant to the analysis, which is often the most varied in each category from a baseline to be set (say zero, because this is relevant to the counter-factual analysis if the agreements on disarmament had advanced to the point of generating the complete dismantling of the strategic capabilities of a country).

The type of polarity in the international system is the dependent variable or effect (G) in the proposed work. His operational definition has differences in the literature, especially in relation to what Pennings, Keman and Kleinnijenhuis (2003: 62-66) called for

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[43] FRANCE. *Speech by Jacques CHIRAC, President of the French Republic, during his visit to The Stategic Air and Maritime Forces at Landivisiau / L'Ile Longue. Thursday* 19 January 2006. (*On-line*) Disponível em: <http://www.globalsecurity.org/wmd/library/news/france/france-060119-elysee01.htm> Acesso em: 04.mai.2007.

intensive or extensive definitions. The intensity of the term describes the criteria that must be met for an entity is considered 'member' of that class. Intensive settings are better than the first because extensive definitions allow clearer decisions about whether a new previously unknown object belongs to the whole set by one or more criteria. In the case of the types of polarity, literature differs if the criteria listed should be observed on a combined (definition intensive type of conjunctive) or simply the presence of one or more criteria considered paramount (definition intensive type disjunctive). As the dependent variable of work (sort of polarity) allows only a nominal level of measurement (classification), the problem of classification criteria is crucial to be able to generate a comprehensive and mutually exclusive taxonomy. In this sense, the main procedure to search for the dependent variable is the critical analysis of theoretical literature on polarity and balance in the international system.

The sources of research to obtain the balance sheet data are available via the Internet in public collections in different organizations, especially the Federation of American Scientists (www.fas.org), Stockholm International Peace Research Institute (www.sipri.org) Bulletin of the Atomic Scientists (www.thebulletin.org), Global Security (www.globalsecurity.org) and the Center for Defense Information (www.cdi.org). In addition to these public databases, will be also used the databases of the Jane's Information Group (www.janes.com), the largest analysis and publications in the area of Strategic Studies and International Security of the world, and the International Institute of Strategic Studies (www.iiss.org), which publishes the The Military Balance, the annual strategic more respected in the area. The editions of The Military Balance include the interval from 2002 to 2007.

II.3 - Review of the U.S. strategic forces.

Remains the undisputed North American superiority in possession and production of nuclear artifacts. The year 2007 was the sixth year of implementation of the Nuclear Posture Review that has changed the composition of the arsenal of the country. The slow reduction continues after the Treaty of Moscow, which stated a proposal to reduce offensive between Russian and U.S.[44] The ambition of the country is in creating a new generation of strategic weapons. The country still has about ten thousand warheads, with a half (5,236) operational.

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[44] *Treaty Between the United States of America and the Russian Federation on Strategic Offensive Reductions*. (*on line*) http://www.state.gov/t/ac/trt/18016.htm#1 (28.maio.2007).

The Department of Energy announced the cut of about four thousand from 2004 in Plantex Plan, Texas. The plans of the Americans provide a new arsenal until 2030, called Complex 2030. The Administration's National Nuclear Security (NNSA) announced on October 18, 2006, that the main goal of this complex is the major functions of reactivate nuclear weapons as the Cold War. This includes the design, development, manufacturing and commissioning of new artifacts. The tests would be carried out simulations of Nevada Test Site, to reduce military and political uncertainties.

The force of five hundred Minuteman III ICBMs would undergo significant changes in the next six years. In October 2006 the USAF began to replace the W62[45] warheads (172kt) by W87[46] (330kt), more powerful, drawn from the MX Peacekeeper missiles [47]. ICBMs. Safety Enhanced was the code name of the operation to transfer.

Each Minuteman III can carry two new warheads that are more accurate. The full operational capability of these missiles is scheduled for 2010. The estimate is two hundred W87 warheads will be needed to supplement the in W78 Minuteman III. The Pentagon announced the cut of fifty Minuteman III. Probably will be the 341 th Space Wing of the Air Base of Malmström, Montana. The USAF began to reduce its arsenal to respect the Treaty of Moscow. The goal is to let 2,200 operational warheads in 2012. The USAF had a plan to withdraw old MIRV capability of some ICBMs. The future of four hundred and fifty missiles will be the shipment of five hundred with three other warheads in reserve, showing that not all lose the ability MIRV missiles. Around four tests were performed in the Vandemberg Air Base, California. The most important case in April 2006, where the Minuteman III missile had its flight range extended to about eight thousand two hundred miles. The Pentagon said it was a test in accordance with its new plans of attack that, probably, the target is the Far East.

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[45] The arsenal is estimated 615 warheads. 170kt of their income is almost half the W87 (330kt). (*on line*) http://www.globalsecurity.org/wmd/systems/w62.htm (08/08/2007).

[46] It is estimated that there are 550 warheads W87 that, originally, were designed for the MX Peacekeeper missile. The real triumph is the technology of small re-entry vehicle Mk-21. (*on-line*) http://www.globalsecurity.org/wmd/systems/w87.htm (08/08/2007).

[47] The MX Peacekeeper ICBMs are the last generation. Carry ten warheads W87 of 330kt in the vehicle re-entry Mk-21. Are being dismantled to meet the Treaty of Moscow and START II. However, it is estimated that around fifty remaining in the U.S. strategic arsenal. (*on-line*) http://www.globalsecurity.org/wmd/systems/lgm-118.htm (04/08/2007).

Fig. 10: Re-entry vehicle Mk-21.

The next component of the nuclear triad, the SSBNs are commissioned in two fleets of fourteen belonaves, which can carry about two thousand warheads. Many warheads have been removed from Trident missiles under the claim of compliance with agreements. The U.S. Navy chose to gradually reduce the number of warheads on its Trident missiles. Normally, the capacity of these missiles was MIRV warheads of eight, in the next six years will be only four. In 2005, were withdrawn from service the Trident I C4 Fleet Pacific and introduced the Trident II D5 missiles that have more precision and carry the W88 warhead, the latest North American conquest. But the program of improvement continues for the entire fleet. Remaining two conversions, the Henry Jackson to be completed in 2007 and Alabama in 2008. The Navy decided to base its power base in Bangor, Washington, for the care of their strategic needs (Russia, China and North Korea). Besides carrying the W88 warhead, the Trident II D5 can take the W76 warhead-1[48] (100kt) that has improved the AFS (*Arming and Fuzing Subsystem*)[49] which includes radar, flight computer and diagnostics in a compact device. This allows the first time, greater impact on a larger number of targets and reduces the failures caused by accidents. The new re-entry vehicle is designated as Mk-4A. This vehicle contains ceramic plates that are outside its structure, to support the re-entry into Earth's atmosphere. The production of warhead and that

[48] The W76 warhead (100kt) is the standard of the Trident I C4 missile. The arsenal is estimated to 3,200 warheads. However, the modified warhead W76-1 will be commissioned in the Trident II D5 missiles. (*on-line*) http://www.globalsecurity.org/wmd/systems/w76.htm (08/08/2007).

[49] The new design of the arms coming up in high costs that affect their commercial use as part of the exchange, innovation and automation of the package of the production process. (*on-line*) http://www.globalsecurity.org/wmd/systems/w76.htm (08/08/2007).

vehicle is expected by the navy for September 2007. The Lockheed Martin continues the development of a precision comparable to GPS for the W76 warhead-1, despite the refusal of the U.S. Congress in approving funds for the project. In March 2006 the Tennessee submarine launched a missile with this new technology. It was significant because it was the shortest flight of a SLBM (2.200km traveled in only thirteen minutes). The Pentagon proposed the manufacture of ninety-six new warheads for the development of new missile, however, failed to resources in Congress. Maybe in 2008, the navy will begin production of a modified version of the Trident II D5 missile. Projects is the construction of one hundred and eight missiles by 2011, and the initial cost of four billion dollars. Equiparão Ohio class submarines until the end for operating in a thirty or forty-four years. In 2029 begin the withdrawal from service and another class will be built.

In the last vertex of the tripod are the nuclear strategic bombers. Although, historically, are the first components of the tripod have been gradually losing its importance. Around two thousand nuclear weapons are capable of being launched by B-2A Spirit bombers and B-52H Stratofortress. These aircraft differ from other corners of the nuclear triad (ICBMs and SLBMs) as they were not always on alert, however, may soon be armed. The USAF's effort was the modernization of its equipment for communication for the better use of aircraft by the national command of the U.S.. The United States still use pumps, relying on stealth capability (camouflage "invisible") of its B-2 Spirit bombers. The B-2 and B-52 can carry nuclear numerous artifacts: a bomb strategic B61-7 (360kt), delivered in June 2006, the B61-7 "bunker-buster"[50], which can penetrate six meters before the explosion (it was delivered in January 2007) and B83[51], with variable income of one or two megatons, designed to be launched from low altitude and high speed against reinforced silos for ICBMs.

[50] The B61 bomb is part of a whole family of bombs including the B61-7, the B61-11 and the RNEP. (*on-line*) http://www.globalsecurity.org/wmd/systems/b61.htm (08/08/2007).

[51] The B83 bomb is strategic, with a variable income that reaches the 1.200kt. There are about 620 to equip the B-52 Stratofortress and B-2 Spirit. (*on-line*) http://www.globalsecurity.org/wmd/systems/b83.htm (08/08/2007).

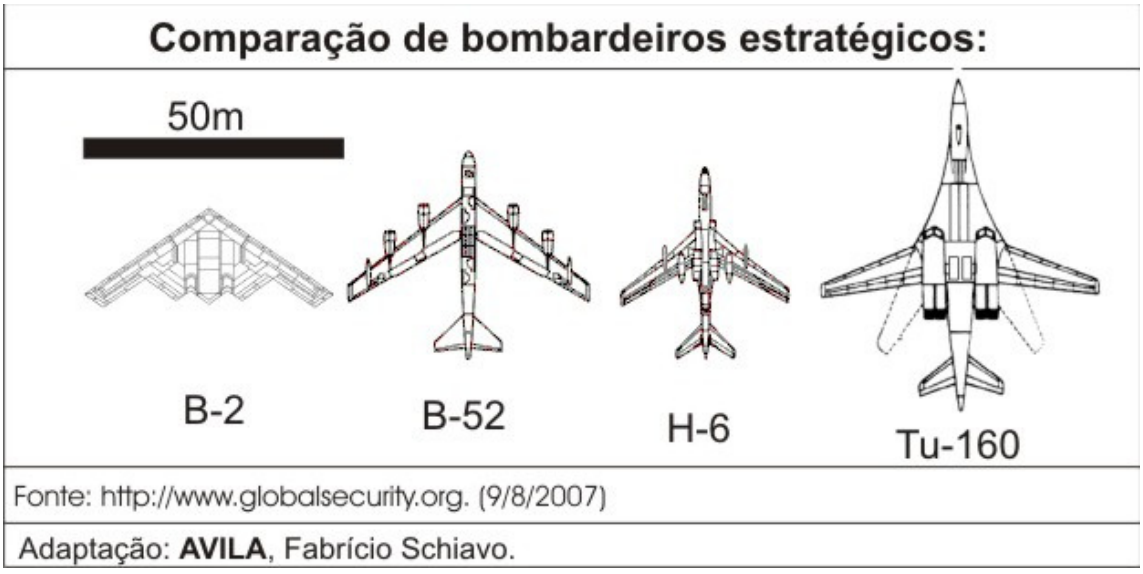

Fig. 11: Comparison of size of strategic bombers.

Projects is the life of the B-52 by 2030. Are capable of carrying cruise missiles from advanced (ACM) with 3.200km of reach and cruise missiles launched from the air (ALCMs) with 2400km range. Both carry a warhead missiles W80-1 150kt. There is the prediction of the commissioning of a new warhead for 2008. A program for extending the service of the W80 warhead was suspended, resulting in the withdrawal of some warheads in active service.[52] Meanwhile, the air force continues to study the options of a new generation of nuclear missile cruisers. These include the possibility of use by any vertex of the nuclear triad, combining a high load and a long range to support missions on a global scale. The objective is, according to the documentation of the air force, the scope of targets before inaccessible, protected by special features of the terrain, such as bases in mountains.

[52] ***US Air Force Decides to Retire Advanced Cruise Missile***. (*on line*) http://www.fas.org/blog/ssp/2007/03/us_air_force_decides_to_retire.php#more. (01/04/2007).

INVENTORY OF STRATEGIC WEAPONS U.S. (2006-2007)				
ICBMs				
Designation	**Range[km]**	**Yeld**	**Warheads**	**Total Yeld**
LGM-30G *Minuteman* III (Mk-12)[1]	9663,74[3]	1xW62(170kt)[1]	150[1]	25.500 kt
LGM-30G *Minuteman* III (Mk-12)[1]	9663,74[3]	3xW62(170kt) [1]	130[1]	22.100 kt
LGM-30G *Minuteman* III (Mk-12)[1]	9663,74[3]	3xW78(330kt)[1]	785[1]	259.050 kt
LGM-118A MX Peacekeeper[3]	9.661,88[3]	10xW87(330kt)[3]	550[2]	181.500 kt
		Subtotal estimated	1.615	488.150 kt
SLBMs				
Designation	**Range [km]**	**Yeld**	**Warheads**	**Total Yeld**
UGM-133A *Trident* II D5 (Mk-4)[1]	~8.0000[1]	6xW76(100kt) [1]	272[1], 96[2]	9.600 kt[2]
UGM-133A *Trident* II D5 (Mk-5)[1]	~10.000[1]	6xW88(455kt) [1]	64[1], 240[2]	29.120 kt[1]
		Subtotal estimated	133	38.720 kt
STRATEGIC BOMBERS				
Designation	**Range [km]**	**Yeld**	**Warheads**	**Total Yeld**
B-52H *Stratofortress*	14.170[3]	5xALCM/W80-1(150kt)[1] 5xACM/W80-1(150kt)	1.000[1]	150.000kt
B-2A *Spirit*	9.600[3]	16xB61-7(360kt)[2], 8xB61-11[2], 16xB83-1(1.200kt)[1,2]	555[1]	199.800kt
		Subtotal estimated	1.555	349.800kt
		Total estimated	**3.303**	**876.670kt**
Fonts: (1) KRISTENSEN, Hans e **NORRIS**, Robert. *Nuclear Notebook*. **(2) IISS**. *The Military Balance 2007*. **(3) PIKE**, John. *Global Security*.				
Remarks: the calculation of total income of warheads the U.S. was based on lower estimates of the amount of warheads. The reason is its arsenal beyond the amount of all other countries, for corroborating the ideas contained in the article by Lieber & Press.				

Table 1: Inventory of U.S. strategic weapons.

The balance of U.S. military shows that the country continues to prepare for nuclear enventualidades the strategic sphere. What the record shows is the growing U.S. concern in the maintenance of its existing strength. But if there is a credible disarmament preemptivo, this can be done with conventional weapons. The Americans might have more than 23,800 JSOW.[53] Therefore, it is difficult to know how it would be the planning of a

[53] The AGM-154 JSOW missile is the result of a joint project of the navy and air force of the United States. It can be commissioned in a very large number of aircraft and can carry many different types of cargo to release. It has a range of 200km and a maximum load capacity of 684kg. What impresses is that the variant C was commissioned in 2002 and by 2007, were built 7,800 units. See: **PIKE**, John. ***AGM-154 JSOW***. (*on-line*) http://www.globalsecurity.org/military/systems/munitions/agm-154-specs.htm (11/02/2008).

U.S. attack to Russian and Chinese. But the possibility of using conventional weaponry significantly reduces the political impact of the attack preemptivo.

II.4 - Russian strategic balance of forces.

Since the end of the Soviet Union, the country has experienced a continuous dismantling of its armed forces. The Navy introduced the scenario more compromised. His broad strategic strength is down, practically. According to the authors (Lieber and Press, 2006), the expansion of NATO to the east, the denunciation of the ABM Treaty and the construction of the national anti-shield (NMD) would be viable only in the context of a severe loss of capacity for deterrence by Russia . This loss is due to degradation of the arsenal of intercontinental ballistic missiles by corrosion, the withdrawal from service of submarines to launch ballistic missiles that could reach the U.S. even if positioned in Russian waters and the drastic reduction of the force of strategic bombers carry missile cruisers. Therefore, the dissertation, Russia falls within the analytical category like the Chinese. The lack of vectors launch of strategic weapons, is equivalent to Russian and Chinese ability of quantitative response to U.S. nuclear primacy.

Russia has continued reducing its nuclear arsenal in 2006 at the same time it is developing new nuclear weapons. Of the 18.64 billion dollars intended for the defense in 2007, 428.05 million are destined for military nuclear programs (2.29%).[54] It is estimated an arsenal of approximately 5,650 operational warheads. The total number is perhaps of fifteen thousand, where about nine thousand and three hundred await decommissioning. The Russian authorities, in official pronouncements, emphasize the comparison of their arsenals with the Americans constantly. The demand is a response to the assumption that the U.S. would reach the primacy nuclear claim and the recovery of the Russian arsenal in the near future.

Colonel-General Yury N. Baluyevsky, commander general of the General Staff of the armed forces, said that the Russians will have "thousands" of weapons in 2010. President Vladimir Putin spoke to the Russian Federal Assembly, in May 2006 saying that nuclear deterrence and balance of strategic forces remain central to the policy of Russia. However, the president explained what was in his view, the balance of strategic forces in a

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[54] **IISS**. ***The Military Balance 2007***. Routledge: London, 2007. p.190. Prices of U.S. $ 26.7 (rubles) to $ 1.00 (U.S. dollars) in 2006. See.: IISS. Op. cit. p.195.

meeting in November, the command of the Russian armed forces. It was not the quantity that mattered most was the quality, aiming to implement a unified command to ensure the implementation of new programs of strategic weapons. Putin also said the idea of maintaining the strategic balance is the ability of Russian deterrent forces to destroy any potential aggressor, no matter how the enemy is modern weapons.[55] Again, in June 2006, Vladmir Putin proposed new tratadosque accompany the development of new strategic arsenals. [56]

Also in June 2006, the Russian government issued a document reaffirming the non-proliferation and that the greatest threat to security was the use of strategic weapons by terrorists. Colonel General Nikolai Solovtsov, commander of the Strategic Rocket Force to (SRF), declared in December 2006, the Topol-M ICBMs start to have MIRV capability.[57] The program of the American defense against ballistic missiles continues against Moscow, especially the provision of U.S. forces concentrated in Eastern Europe. Baluyevsky says that the U.S. position is not friendly. If the program the American forward, Russia seek asymmetric means and affordable for its defense.[58]

Russia has about 1,840 nuclear warheads on 493 ICBMs of five types. The Russian missile carriers of thermonuclear weapons with multiple warheads (hydrogen bombs), the SS-18 and SS-19, because of fuel required a daily maintenance, which demanded a silo ninety men, full-time, under penalty of the Fuel tanks corrode and destroy the missile itself. In light of the collapse of the USSR, which overtook the administrative disruption, we could not maintain the conditions of maintenance.

For now, we must assume that only it can be fully operational in the two hundred warheads commissioned Topol-M missile, the solid fuel with a capacity to reach throughout the U.S.. The problem of the Topol-M is that it is not a missile out of the atmosphere, being open to interception by U.S. e-bombs in the course of its trajectory. In addition, it carries only one warhead (not MIRV), which significantly reduces their ability to attack.[59] Therefore, Lieber and Press (2006 and b) consider that the USSR lost the ability

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[55] **PUTIN**, Vladimir. "*Closing Address at the Meeting of the Armed Forces' Command Staff*". (*on-line*) www.kremlin.ru/eng/ (16/11/2006).

[56] **PUTIN**, Vladimir. "*Speech at Meeting with the Ambassadors and Permanent Representatives of the Russian Federation.*" Dsiponível em: <www.kremlin.ru/eng/>. Acesso em 27.jun.2006.

[57] "*Russia to Re-Equip Its New Mobile ICBMs with Multiple Warheads*". (*on-line*) http://en.rian.ru/ (15/12/2006)

[58] "*Russia Complains of U.S. Missile Defense Plans*," (*on-line*) http://www.iht.com/ (13/12/2006).

[59] The weapons that are being developed from lasers and high power microwave (HPM: High-Powered Microwave) are called E-bombs. They are weapons that use the spectrum for interference eletromagético or destruction of electronic devices. Be addressed in the third chapter of the dissertation.

to conduct a intercontinental ballistic second attack against a U.S. attack. The authors argue that the shield would be anti-American primary function down the few remaining Russian strategic vectors after a surprise attack launched by the United States (2006b: 22-26).

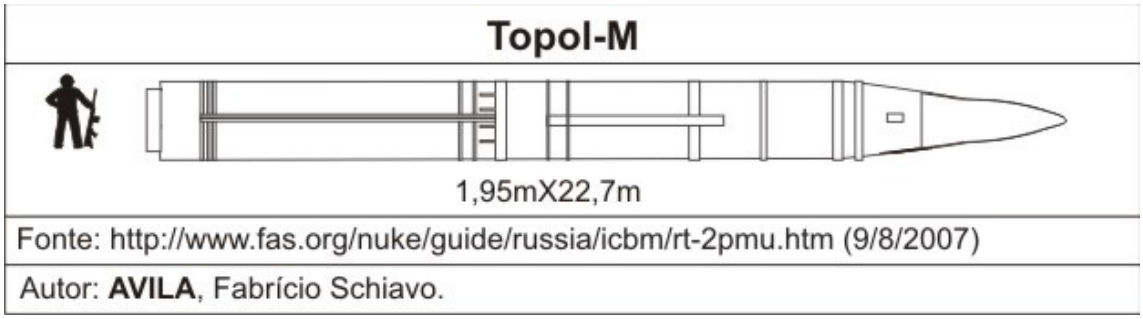

Fig. 12: Topol-M

The version of the silo-based Topol-M began to come into service in 1997. On January 31, 2006, Putin told the press that the Topol-M missile is a totally new, yet without parallel in the world this missile, perhaps, operate in speed HIPERSÔNICA. The defense system anti-ballistic missile (ABM) was made to intercept the old ICBMs with a ballistic trajectory. The Topol-M was not done in retaliation against the ABM system in Eastern Europe, is simply a new design.[60] That is, to circumvent the anti-American shield in Europe, the Topol-M is nothing but a large missile cruiser. This feature solves two practical problems. The first has already been said that the trajectory of ballistic missile deleted impairs the western defense system. In February 2006, Baluyevsky said that the maneuverability of the vehicle re-entry has special characteristics, perhaps because it was not a ballistic missile.[61] Another feature solves a problem of steel. For ballistic missiles, leaving the lower layers of the atmosphere, re-entry becomes the most critical moment. The artifact needs withstand temperatures of about 5,000 º C. The process cost the costs and the country that has such weapons states, also have an industrial power.

The Topol-M is a modernized version of the missile RS-12M2 (IISS, 2007: 188). The Russian army has fifty Topol-M (SS-25) in five regiments operational (IISS, 2007:

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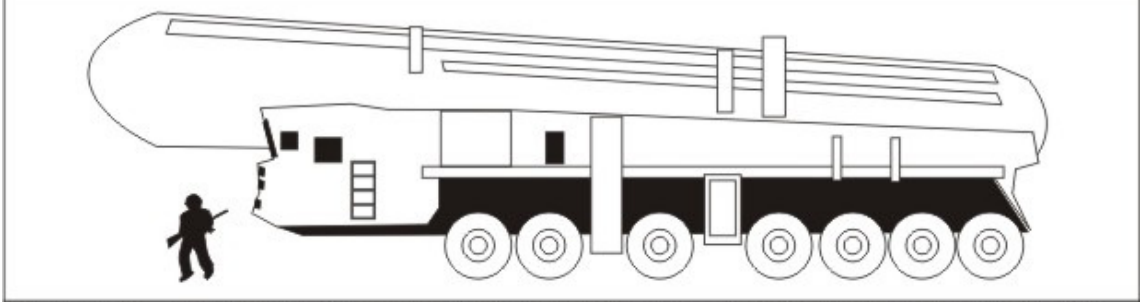
[60] Circular Hall, the Kremlin, Moscow. "*Transcript of the Press Conference for the Russian and Foreign Media.*" (*on-line*) www .kremlin.ru/eng/ (31/01/2006).

[61] The military referred to the missile likely feature MARV. Cf. **KISLYAKOV**, Andrei. "***The Missile That Does Not Care.***" (*on-line*) http://en.rian.ru/ (14/02/2006).

195), and the fifth regiment has about nine missiles. It is estimated that were added to two or three missile arsenal total in 2006. The Russian plan has about seventy such missiles (housed in silos) by 2015. The Russian authorities released new details of the handling capacity for the vehicle re-entry of the Topol-M. The fact shows evidence about its accuracy. The advent of the Topol-M did reduce the arsenal of missiles held since the end of the Cold War. The Russians reacted unfavorably to the U.S. plans to equip the Trident SLBMs with conventional warheads. Baluyevsky said that the same procedure can happen in Topol-Ms.[62]

The most significant fact of last year was the beginning of the commissioning of the missile Topol-M1, is a version "on wheels" of the missile Topol-M (SS-27 to NATO) for a single warhead of 550kt. The Topol-M1 begin to replace the ICBM SS-25 gradually. The SRF has announced that the first regiment of Topol-M1 became operational on December 10, 2006, when three missiles were incorporated into the 54 Rules of Missiles in Teykovo, northeast of Moscow. Approximately six more will be delivered in 2007, up to fifty by 2015. In the operations, the Topol-M1 permanently change the routes of their movements, and, supposedly, difficult to detect. New camuflagens that imitate the environment make it physically impossible to detect its his vehicle erector-launcher (TEL) to the space.[63]

TEL do Topol-M1



Fonte: **PIKE**, John. http://www.globalsecurity.org/wmd/world/russia/images/topol-tel.jpg. (9/8/2007).

Autor: **AVILA**, Fabrício Schiavo.

Fig. 13: TEL of Topol-M1.

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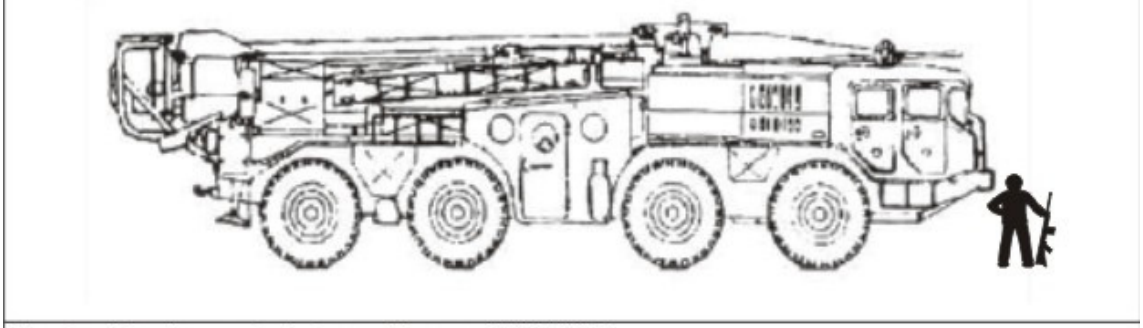
[62] "Baluevski: Rossiiskie Rakety Budut Preodolevat Luybye PRO" (Baluevski: Russian Missiles Will Penetrate Any BMD), Strana .ru, May 18, 2006, as cited in Nikolai Sokov, "Russia Weighing U.S. Plan to Put Non-Nuclear Warheads on Long-Range Missiles." WMD Insights, June 2006, pp. 26–28 (*on-line*) www.wmdinsights.com (02/02/2007)

[63] "*Russia: Missile Reduction Treaty Will Not Harm Russia's Nuclear Potential.*" (*on-line*) http://www.interfax.com/ (17/05/2006).

The TEL is an erector-launcher vehicle of ballistic missiles. Its main function was to transport the missiles to launch fixed. The development of the capacity to launch them came from countries in need of land have vectors that were not fixed, as SSBNs. Such weapons can ensure a certain capacity to retaliate for the nation that suffered the first attack, because the mobility of the launcher can ensure the survival of strategic missile.

TEL do SS-1Scud



Fonte: http://www.globalsecurity.org. (9/8/2007)

Adaptação: **AVILA**, Fabrício Schiavo.

Fig. 14: TEL of Scud.

Of the sixty-two strategic submarines at the time of the Cold War, leaving only eleven. Six of the Delta IV class and five of the Delta III class. The sixth Delta III was removed from service last year (2006). Practically all the Russian SSBNs needed to venture thousands of miles through the Pacific or the Arctic to move closer to the U.S. territory and make their attacks. In part this evaluation is due to the fact of Russian submarines are noisy, which facilitates its detection, but also because of new means of anti-submarine warfare (ASW), especially the digital sonar. In addition, a new class of submarine killers Americans (Sea Wolf) is not detectable by current Russian media (Clancy, 2002, 210ss). All this makes it a very low chance of any one of many Russian submarines to reach up to its position of launching without rather be neutralized.

The Navy has only three submarines of the Borey class (Typhoon). Were the only submarines that could launch attacks against the Americans from Russian waters. However, only one can fire the only Bulava missile (SS-N-30) exists, the Dmitri Donskoi.[64]

[64] For The Military Balance 2007 is a Bulava missile. However, it is necessary to realize that this is a prototype for testing a missile and not commissioned, ready to fight. (IISS, 2007: 195)

The submarine made a successful test of the missile on October 25, 2006 (IISS, 2007: 188). In August 2005 was a shot of a land and on 12 December 2005 he made his shot submerged. The missile tests failed in three previous to that, that have proved disastrous for the attempted recovery of the Russian navy.

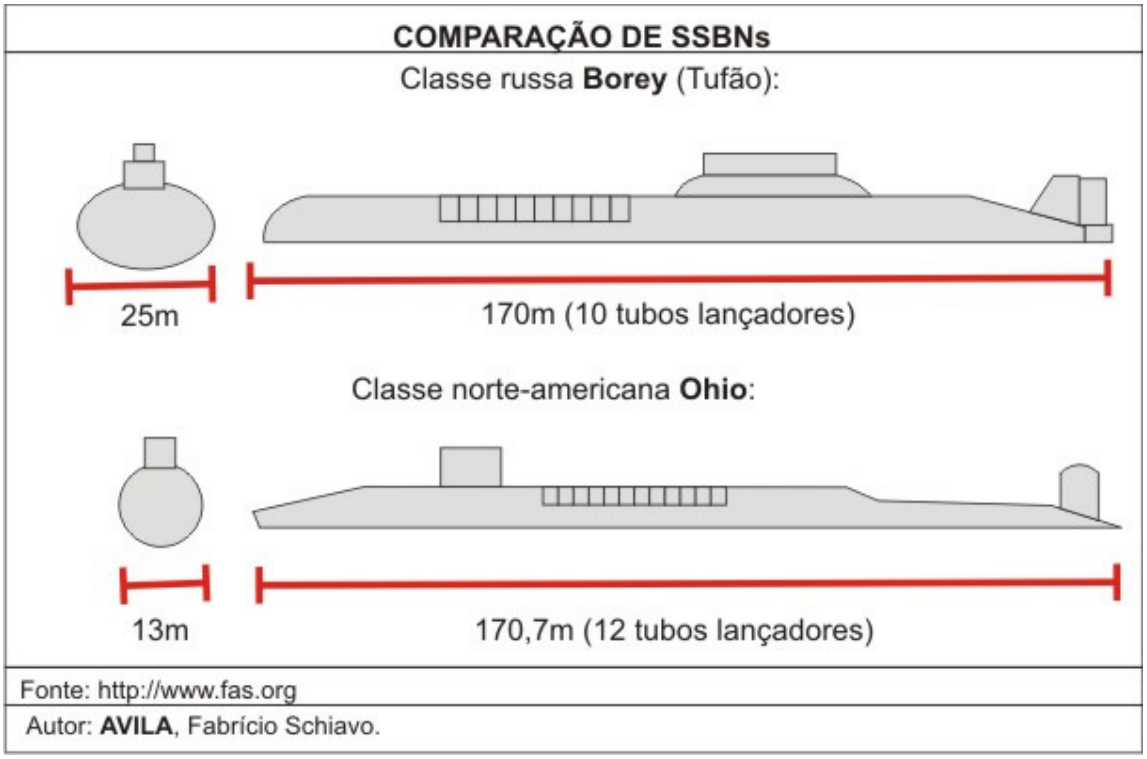


Fig. 15: comparação dos SSBNs russos e norte-americanos.

The first submarine of this class, the Yuri Dolgoruki only be operational in 2008, almost a decade after its construction. Alexander Nevski, the second class, was launched to sea in 2004 in yards in Severodvinsk. Also, only in 2008 is planned its commissioning. Another Vladimir Monomakh the submarine began to be built in 2006 and its completion is scheduled for 2012. The Minister of Defense Sergei Ivanov announced the construction of eight submarines of the Borey class by 2015. However, will require a major effort of yards in Severodvinsk. Because the fleet of nuclear submarines (SSBN) with intercontinental ballistic missiles (SLBM) of the Typhoon class was scrapped during the Yeltsin presidency. Of the remaining six units, two are awaiting demolition, two are in retirement and the only two assets have been converted to launch missile cruisers, and unable, therefore, to meet strategic missions.

The 37 is the Army Air Command of Aviation of Long Distance. Tu-160 has sixteen Blackjak, each armed with eight or KH-101 KH-555.[65] Are cruise missiles, and the first for the other targets on land has the anti-ship. Their income still remains unclear. The Americans believe that the entry of these missiles would service the strategic role of the fleet. Because besides the low number of bombers, the amount of cruise missiles, it is believed, will warheads for very low income (outside the megaton range).

The situation of Russian bombers is not much better than that of its ballistic missiles. Tu-160 of the hundred planned in the planning of Russian forces, only thirty-nine (39) came to be built, or less than half the minimum needed according to Lieber and Press (2006:14 b). When the end of the former USSR, many of the bombers who were in Ukrainian territory were dismantled, it appears, by U.S. pressure. A few were recovered by Russia, on account of payments for gas, but most were useless, becoming scrap or in recognition of strategic aircraft. Leaving only fourteen (14) with strategic capacity. As its base is in the heart of Russia, its destruction was difficult in the case of a surprise attack the U.S.. So the Tu-160 were a credible weapon to undertake a counter-attack retaliatório. Account for this assessment, its extreme mobility, their scope of 14.000km without need for refueling, and its ability supersonic missile with range of cruisers 3.000km This was the Tu-160 the best weapon in the world in its class (including overcoming the B-1 Lancer U.S.). Without them (or with only 14 of them), is greatly reduced the ability of Russian deterrence.

[65] In the West the missile receives the designation of AS-15 Kent (220kt). Its maximum range is 2,500km and CEP is 150m. (*on-line*) http://www.globalsecurity.org/wmd/world/russia/as-15.htm (08/08/ 2007).

INVENTORY OF STRATEGIC RUSSIANS WEAPONS (2006-2007)					
ICBMs					
Type	**Designation**	**Range [km]**	**Yeld**	**Warheads**	**Total yeld**
SS-25[1]	*Sickle*	10.500[3]	1x550kt[1]	242[1]	113.100kt
SS-27[1]	*Topol-M*[1]	10.500[3]	1x550[1]kt	42[1]	23.100kt
SS-27A[1]	*Topol-M1*[1]	10.500[3]	1x550[1]kt	3[1]	1.650kt
			Subtotal estimated	287	137.850kt
SLBMs					
Type	**Designation**	**Range [km]**	**Yeld**	**Warheads**	**Total yeld**
—	*Bulava*	—	—	—	—
			Subtotal estimado	—	—
STRATEGIC BOMBERS					
Type	**Designation**	**Range [km]**	**Yeld**	**Warheads**	**Total yeld**
Tu-95MS6[1]	*Bear-6*[1]	10.550 c/carga normal[3] 6.500 c/carga máx.	6x AS-15 (220kt) [3]	192[1]	42.420kt
Tu-95MS6[1]	*Bear-16*[1]	10.550 c/carga normal[3] 6.500 c/carga máx.	16x AS-15 (220kt) [3]	512[1]	112.640kt
Tu-160[1]	*Blackjack*[1]	10.000 (c/40.000kg)[3]	12xAS-15 (220kt)[3]	168[1]	36.920kt
			Subtotal estimated	872	191.980kt
			Total estimated	**1.159**	**329.830kt**
Fonts: [1]**KRISTENSEN**, Hans e **NORRIS**, Robert. *Nuclear Notebook* [2]***IISS****. The Military Balance 2007,* [3]**PIKE,** John: *Global Security*.					
Remarks: the calculation of total income of Russian warheads was based on higher estimates of the quantity of these. The reason is the contrast of the Russian response to the article in front Lieber & Press.					

Table 2: inventory of Russian strategic weapons.

Despite the dismantling of its armed forces, the Russians may reerguê it relatively quickly and easily, due to high oil prices and gas in the international market. Signing up as a partner of German unification in Europe, it is difficult to stop believing that this money is not reversed in equipping of its armed forces. Like Germany at the end of the Second World War, the Russians invest heavily in new technologies to tackle the American superiority. The cruise missile of Topol-M is a proof. Its development culminates with the expectations of Russian anti-shield face the North American installed in Europe. Another important factor is the ramifications of the alliance with the Chinese. This alliance, under the OCS (of Shanghai Cooperation Organization), has increased the capacity of conventional operations in Russia. The Peace Mission 2007 exercise showed that the Chinese troops could act in defense of Russia, near the eastern Europe, with the

displacement of more than 10,000 kilometers of Chinese troops.[66] However, it is still early for the reflexes of operations, reflected in the sphere of strategy.

II.5 - Chinese strategic balance of forces

The Chinese arsenal for 2006 is estimated at center and thirty warheads for ICBMs, SLBMs and strategic bombers. The sources were cited studies done in previous years added to statements from Chinese authorities about the size of nuclear forces. The country continues to modernize its forces. Additional warheads are designed to achieve the number of two hundred in a short period of time. Apparently, recent developments still cause disagreement among the experts. Mainly on the speculation of how Chinese behavior will be facing the development of the American program to defend against ballistic missiles.

The Chinese strategic forces are organized into brigades twenty launching of missiles in six armies. This organization varies by type of missile, test and basic target. ICBMs are forty-six, and a brigade of six DF-31 (CSS-9), two teams with twenty DF-4 (CSS-3), four brigades with twenty DF-5A (CSS-4 Mod 2). The Chinese have thirty-three DF-21 (CSS-5) in four brigades and only two DF-3A (CSS-2 Mod 2).[67]

The only intercontinental missile with real capacity is the DF-5. The liquid fuel missile is capable of reaching all points of the U.S. territory. The Chinese strategic arsenal would have only twenty missiles from liquid fuel Donfeng-5 (DF-5), probably with a single warhead. Anyway, for political reasons and because of the nature of the liquid fuel missile, the DF-5 remains to parts stored at three different sites (warhead, fuel and body of the missile). So 72 hours would be needed to mount them, supply them and shoot them. Further complicating the ability of China's strategic deterrence, depending on the scope of twelve thousand kilometers, the Chinese missiles are concentrated in one region of the country (in which belongs to Liaoning Shenyang Military Area Northeast) Despite the two hundred and fifty thousand men in three groups of army (IISS, 2007: 347) for protection, their destruction is facilitated, in a preventive strike by its concentration.

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[66] Cf.: **Sinodefence.** (*on-line*) http://sinodefence.blogspot.com (11/02/2008).

[67] The Military Balance 2007 classifies the DF-21 and DF-3 as IRBM. Both missiles, although its average power, are important because they can achieve the American bases in the Pacific Ocean as Guam. For this reason they are included in the description of Chinese ICBMs. (IISS, 2007: 346a)

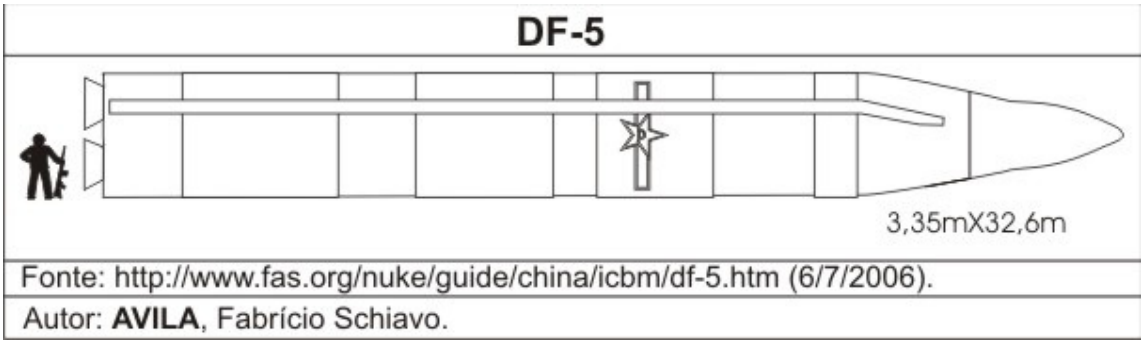
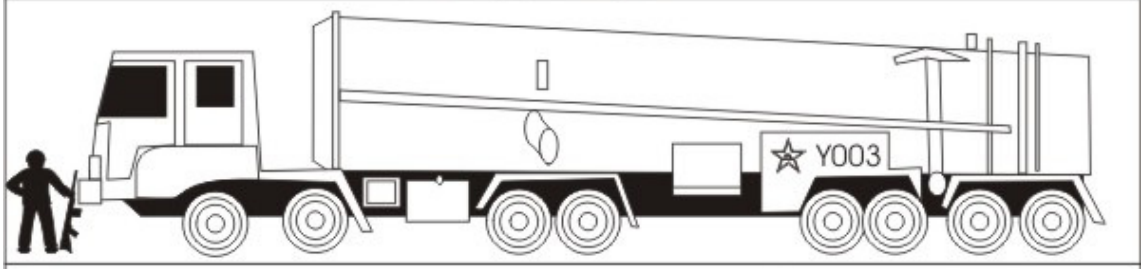


Fig. 16: Missile DF-5.

A program to modernize the DF-5, increasing its reach and cargo, has been done since the eighties. The Pentagon estimates that have ended recently, generating a version DF-5A. However, this program is dependent on a political problem, which is the strategic development of the U.S. defense against ballistic missiles. If the Chinese want to give the DF-5 missile with MIRV capability to eliminate it, will have to use about three lighter warheads designed to DF-31. The North American Agency of Intelligence (CIA) received information of a test of a prototype of the DF-5 with warheads of the DF-3 in 2001. Some scientists argue that, indeed, perhaps none has the capacity MIRV missile. The country has the technical capacity to produce MIRV to twenty years ago. However, the reasons remain obscure the choice not to incorporate this capability into its missiles. However, the possibility of commissioning of the DF-31A missile in 2008, can change this reality.

The DF-31, unlike the DF-5, are propelled with solid fuel and have your own vehicle to transport and erector-launcher (TEL) which makes them mobile and more credible as a weapon of counter-attack. Since these missiles are propelled with solid fuel, its terms allow for maintenance are always ready for employment and this, together with its constant movement, hinder their destruction even with a raid. Also unlike the DF-5, the DF-31 is equipped MIRV system: re-entry vehicles multiple independently, allowing a single missile strikes three targets simultaneously, even if separated from each other by thousands of miles. The characteristics of the DF-31, according to Wang (2007:10), would make the search by the U.S. nuclear primacy a dangerous illusion, and any attempt to disarm an adventure to China would be charged of the most serious consequences.

TEL do DF-31



Fonte: http://www.globalsecurity.org/wmd/world/china/images/DF-31-3.jpg (9/8/2007).

Autor: **AVILA**, Fabrício Schiavo.

Fig. 17: TEL of DF-31.

The Chinese already have six DF-31 (CSS-9) in a brigade (IISS, 2007: 346A). Are new missile with three stages and solid fuel. They have an estimated range of eight thousand three hundred kilometers and CEP of the six hundred meters. The DF-31 missile (CSS-9) began to be developed in 1985 and his first test was in August 1999 (IISS, 2007: 381). Scope (of eight thousand kilometers) suggests that its targets are Russia, India and the U.S. military bases in the Pacific, replacing the DF-4. The U.S. government still backs the lack of capacity of MIRV missile. This was repeatedly moved and would not be provided in a silo.

Chinese President Hun Jintao spoke on the anniversary of the Second Artillery Corps of the Chinese Army on June 29, 2006 (IISS, 2007: 333). The speech pointed the direction of the Chinese aerospace development to say that the DF-31A missile into service between 2007 and 2010. The Second Artillery Corps of the Chinese Army already has a squad with six DF-31 missiles (IISS, 2007: 346). This would have a range of fourteen thousand kilometers, six more than the first version, but a load smaller than the DF-5A land-based silos.

Meanwhile, the Chinese still encountering enormous difficulties for the development of its SSBN program. They have a single Xia class submarine built in the naval base of Huldao, launched in April 1981. The submarine carries twelve missiles Julang (JL) -1 with a warhead each (200-300kt). Its scope is estimated one thousand and seven hundred kilometers. The submarine built and operates the North Fleet is based in Jianggezhuang. The construction of a single SSBN is taken as a tremendous failure of the Chinese western. No nation (Western) build only one of a class, because the program demand resources voluptuous, sometimes scarce, a venture of such magnitude. However, it is

recommended that this stance is viewed with more caution. It is estimated that there is another submarine built. The program was canceled in 1985 after an accident. Meanwhile, news of 2008 linked the possibility of commissioning the new SLBM Jl-2. The new missile can change the whole strategic framework because its specifications are similar to the DF-31.

China possesses a small arsenal of nuclear bombs that can be launched from aircraft. The aircraft are organized into four regiments nuclear, one with twenty H-6 (Tu-16) Badger and forty-three with six H-6H of cruise missiles carrying the YJ-63.[68] The design of H-6 aircraft is newer than the B-52. Between 1965 and 1976, Hong aircraft (H) -5, H-6, and Qian (Q) -5 eleven nuclear bombs launched from the test site of Lop Nur. Only in 2007, as a result of the alliance within the CST, the Russians sent the original engine for the H-6 bombers Badger. The strategic capacity of these aircraft can increase a lot. But instead of being used for a nuclear counter-attack, his employment serves to defend China against the fleets of U.S. aircraft carriers.

The development of cruise missiles, carriers of strategic warheads, advancing rapidly. The phenomenon is similar to the missiles commissioned by Russian bombers and American. The changes are recent and still depend on further information and testing for evidence arising from this new trend. The difficulties of the Chinese focus on allocation of weapons of solid fuel. But it is about time for the commissioning of the DF-41 and with it, gives China a credible nuclear deterrence, which means even more the possibility of an attack to ensure its preemptivo U.S. nuclear primacy. In a short time, is no longer possible to do so because the political cost of supporting a retaliation would be unbearable for the system to the U.S.

[68] The missile appears in the Chinese inventory at The Military Balance 2007 (p.350A). But sources say that since 2000, the Chinese are developing a cruise missile Hongniao 3 (the first version had a yield of 90kt), with specifications similar to the U.S. Tomahawk. The missiles can be filled by H-6 bombers, with a strategic character of their employment. (*on-line*) http://www.globalsecurity.org/wmd/world/china/lacm.htm (08/08/07).

INVENTORY OF CHINESE STRATEGIC WEAPONS					
ICBMs					
Chinese Nomenclature	**Ocidental Nomenclature**	**Range [km]**	**Yeld**	**Warheads**	**Total yeld**
DF-5	CSS-4	12.000[3], 13.000[2], 8.460[5]	3.000 – 5.000kt[7]	>10[3], 24[2], 20[5]	120.000
DF-5A	CSS-4[2], CSS-4Mod 2[6]	12.000[3]	1x4.000-5.000kt[6]	20[6],20[1], 19-23[3]	115.000
DF-31	CSS-X-9[2], CSS-X-10[6], CSS-9[7]	8,000[2], 7.250[5]	1x1.000[7]	6[1], 8-12[3]	12.000
DF-31A	—	10.500 – 14.000[7]	5X90kt, 3X150kt[7]	5[7]	450
			Subtotal estimated	64	247.450
SLBM					
JL-1 (~DF-21)	CSS-N-3[2], CSS-N-X-3[6]	1.770[5], 1.700[2], 1.000-1.700[6]	1x600kt[3], 1x200-300kt[6]	14[5], 24[2], 12[6]	14.400
			Subtotal estimated	24	14.400
STRATEGIC BOMBERS					
Xian Hongza H-6	Tu-16 BADGER[2], B-6[6]	11.800[2], 3.100[6]	?xHN-3 (90kt)[2]	100~200[7]	18.000
			Subtotal estimated	200	18.000
			Total geral estimated	288	279.850
Fonts: (1) *IISS. The Military Balance 2007,* **(2) PIKE,** John: *Global Security*, **(3)** *Jane's Sentinel Security Assesment*, **(4) CORDESMAN**, Anthony e **KLEIBER**, Martin. *Chinese Military Modernization*, **(5) DoD**. *Military Power of PRC, 2006* e, **(6) KRISTENSEN**, Hans e **NORRIS**, Robert. *Nuclear Notebook*. **(7) Sinodefence**.					
Remarks: the calculation of total income of Chinese warheads was based on **higher** estimates of the quantity of these. The reason is the contrast of the Russian response to the article in front Lieber & Press.					

Table 3: Inventory of Chinese strategic weapons.

Finally, the development of new weapons is a standard description of the existing arsenals of the above three countries studied. But perhaps the discussion of the replacement of ICBMs by a cruise missile is the oldest. In 1987, Thomas Schelling wrote an article that cogitava replacement, in the U.S. arsenal of ICBMs and SLBMs by a cruise missile. It was written in a context of a bipolar world. However, while the spending would be severely reduced, the proliferation of the arms tend to get out of control. Also proposed that the agreements on a cruise missile defined, only the places of their commissioning and employment (targets). History shows that the United States have chosen not change its strategic weapons by a cruise missile because they were in a better position in the order and the post-Cold War.

Ironically, the Russians were as successors of the USSR to do so because they were at a disadvantage. Again, technologies emerge or are updated in response to asymmetry. Contrary to common sense, who has the disadvantage, the rewards you with high technology. In the current context, the digitization horizontalizou costs and technologies. The Americans still have the priority in terms of quantity, but the technologies are accessible to many. Such as Pakistan. The country needed F-16 aircraft to make nuclear attacks because they did not have radar and satellites to secure guiagem the scope of its ballistic missiles. Now you can count on the technology of missile cruisers to the delivery and can ban the sphere of operations. Keeping the appropriate scales between countries in the Pakistani case, this technology has become strategic. This same technology can, in a few years become strategic to countries like Brazil.

III

ASSESSMENT NUCLEAR PRIMACY: SIMULATION AND CRITICAL ANALYSIS

The nuclear primacy ensures unipolarity? For polarity, that here the distribution of power between the various units that make up the international system, that is realistic in terms of structural theory, it is an attribute of the structure of the international system (Waltz, 2000).

The literature acknowledges the history of the international system since 1648 at least four types of distribution of power between the great powers: a) bipolarity, when the two powers similar power concentrated more power than all the others, b) balanced multipolarity, when a system is dominated by three or more powers in which power is distributed similarly between them c) unbalanced multipolarity, when the system is dominated by three - or more - great powers, one of which is a regional hegemony with the potential to make is a global hegemony (MEARSHEIMER, 2001, 337-347), d) unipolarity, when a single power concentrated so much power that the other can not form a coalition that contrabalanceie (Diniz, 2005, 5-6).[69]

In summary, the working hypothesis to be tested in the study states that nuclear primacy is a sufficient condition to ensure the unipolarity. This is because the sphere of operations to any nuclear primacy of the United States is helping to accelerate the conventional and nuclear rearmament of Russian and Chinese. For Russians, from the oil resources are being employed in conventional reequipping and the digitization of existing systems. The Chinese, at least ostensibly, to spend very little strategic arsenal, however, are improving their arsenals equipping their missiles with solid fuel and perhaps introducing a MIRV capability in them. At the same time, in the sphere of strategy, the militarization of space doctrine advocated by the U.S. military, with the placing into orbit of systems artilhados tends, paradoxically, to neutralize the advantage the U.S. by forcing Russia and China to develop similar capabilities . For all that the nuclear primacy could lead to a consolidation of multipolarity rather than a possible guarantor of unipolarity

[69] For a brief review of the conflicting approaches on the relationship between stability (defined by the absence of war between the great powers), see Dougherty and Pfaltzgraff (2001:121-135). It is important to emphasize that the authors realistic means hegemony supremacy, higher dissuasive force, without the connotation of Gramscian a balanced combination of strength and able to pursue consensus on the direction system (Arrighi, 1994).

because the development of new weapons generates other defenses, and therefore a new diplomacy.

The U.S. nuclear primacy is the important fact of strategic disarmament of nations possessing ICBM's. If an attack happens, this requirement becomes effective. However, the theoretical Russians and Chinese were not passive and responded to the article. Currently, Chinese and Russians are commissioned new armaments (Topol-M1 and DF-31A) that are pushing again, the Americans to make new warheads and missiles to its defense strategy.

Ivan Safranchuk of the Russian side responded Lieber and Press (Safranchuck, 2006: 90 - 98). His main argument is that the MAD is the strategy of necessity. That its end would be the U.S. nuclear primacy. However, this condition is unacceptable to Russia. The emergence of MAD would be a consequence of American stubbornness in not focusing on the revision of treaties and arms control strategy established in the previous period. Especially, after the advent of the start of a strategic polarization between Chinese and Russian side and an American from another. However, because the end of the Cold War has left the possibility of resurgence of MAD, politically (and morally) unjustifiable.

The Chinese criticism was more scathing. Bruce Blair and Chen Yali wrote an article that had the title to the primacy nuclear fallacy (Blair and Yali, 2006: 51-78). The U.S. nuclear primacy, based on MAD is rejected in three main arguments. First, MAD never existed as operacionalizável policy. The proof is that the end of the Cold War led the world to a North American nuclear hegemony. Second, the debate takes place fifteen years after the end of the USSR, when the Russians began to modernize and increase again, its strategic arsenal, and the third, the Russian nuclear decline was not a kind of intense instability that theorists had predicted . Why was not dismantled its arsenal ten or fifteen years ago when it was most vulnerable? The biggest evidence is that nuclear safety is more a psychological factor that physical. The threat to more than the number of warheads. Russia and China know they can use a few warheads to defeat the Americans. Small countries also believe as North Korea. That is one reason for the Americans finish with any capacity to produce nuclear weapons, however insignificant it is.

Paradoxically, Americans have an unlimited range of options. Meanwhile know that the threat of massive retaliation is more powerful than the strategic effective disarmament of other nations. Both the U.S. to train its troops for strategic conventional operations. This ability retaliatory act as an umbrella for the troops. The academic community of the countries involved (especially the U.S.) are unable to think this new strategic reality.

Perhaps the biggest problem is to analyze the contemporary theoretical tools obsolete with the Cold War. The USSR no longer exists, and the dialogue bipolar. Additionally, China deserves a special analysis. Their society and therefore its policy does not operate as the West. The Chinese reinforce its defensive nuclear strategy in two main areas. Emphasize the non-first use nuclear weapons and the operations of a second attack. Are other perceptions that must be taken into account. Chinese and Russians still resist as residual threats of the Cold War. But the real threat to the U.S. today are the pariahs Member and terrorist organizations that would be contained in the strategy of asymmetric warfare, as does France.

The most fierce criticism came from Li Bin who compared the U.S. as a "paper tiger with white teeth" in its article (Bin, 2006: 78 - 90). The primary focus of U.S. superiority lies in the fact that the power of nuclear retaliation. It is an important factor in times of crisis. But diplomats who serve more to the military. This primacy sought by the U.S. is not a factor of stability in international politics. Neither the threat of strategic disarmament would make the Chinese back to its purpose of defense. To have nuclear disarmament, the dimension of intelligence must be analyzed. Precisely, what are the capabilities of the Americans to locate and destroy the Chinese arsenal?

Militarily, the Chinese warned that its missiles have already Donfeng-31 (DF-31). This is a missile with range of only 10.000km (11.270km according to the Pentagon), but that would be able to travel through the North Pole and reach the territory of North America, reaching the Great Lakes region to Washington. This path would be made possible through the pole thanks to the recent claim that the satellite positioning systems and guidance Beidou (Whang, 2007: 52-65).

The same phenomenon may be occurring with the introduction of missile cruisers in the current scenario of nuclear war. Even if these contain TELs fast, may contain features stealth (invisible to radar) and speed HIPERSÔNICA, entering the service will not lead, necessarily, the withdrawal of the other older weapons. Again, the historical fact that can still show us is that the U.S. and the USSR were coming out of the Second World War as well as U.S., Russia and China are experiencing the end of the Cold War. Although certain aspects of the U.S. remain more comfortable in its arms race with a much greater volume of resources to the Soviets, did not prevent the USSR develop its arsenal. The development of anti-shield the U.S. is encouraging the emergence of other weapons.

On one side laser and high power microwave (HPMs) appear as a defense against ballistic missiles, cruise to (Hipersônica or not) The commissioning of these new weapons

can change the reality of nuclear war and cause, to the obsolescence of strategic nuclear weapons. Specifically, this chapter is the first quantitative study of the oscillation of the strategic arsenal and qualitatively describing and comparing the existing weapons.

In quantitative terms, can only be mentioned that the Russians surpassed the U.S. in number of warheads. This quantity number was to compensate for lack of solid fuel in their missiles, besides the principle of mass, compensate for their low accuracy. The rapid decline of the Russian arsenal clearly coincides with a change in U.S. position since the events of 2001 and triggered the call Global War Against Terrorism. The withdrawal of the ABM Treaty and the decision to build the national anti-shield (NMD) are two moments of the same process for the first time since 1945, the Russian position was ignored and diplomacy seems to be playing a role only attenuator of costs in an attempt to gain time while the new correlation of forces will consolidando.Os United States, for example, is consolidating its position to develop a new generation of strategic weapons utilizing the weakening of its direct competitors (China and Russia). If the weakening in Russian strategic nuclear weapons seems to stimulate the current posture of the U.S. government to move forward with the missile batteries and radars in Poland and the Czech Republic, it seems to represent a strengthening of the paradoxical role of nuclear weapons in the definition of the type of polarity in the international system.

Therefore, studies on the international correlation of forces, the signs of change in polarity (distribution capabilities) and the degree of polarization of the system (the patterns of friendship and enmity), or even the possible rise of a new class of weapons strategic, must be done systematically. In the area of International Security and Strategic Studies we must study history, but we must also explain the current trends and prospect for the government and citizens can make decisions crucial for the international integration of the country based on more and better information.

Robert Powell has described the debate between the distribution of power and the probability of war in his article (Powell, 1996: 239 - 267). In your opinion, what remains is a divergence of views between the schools. In the Balance-of-Power argues that the distribution of power makes the system more stable, unlike the school's Preponderance-of-Power. This quarrel should be considered in the context of each particular case. In the infinite horizons of bargains between the states in the review of the status quo forever. But the author sees the true origin of a sustainable stability, the representation of the current status quo in the distribution of power. One of the factors of the imbalance between the

U.S., Russia and China is, exactly, this issue. Introducing the main working hypothesis (Hp) is that the nuclear primacy is a sufficient condition for the existence of unipolarity.

After all, the nuclear primacy become effective is necessary strategic disarmament of other powers. The main hypothesis is based on a set of auxiliary hypotheses. First, the work aims to show that even the United States achieve the disarmament strategy in China and Russia, the cost of a full use of nuclear primacy would be politically prohibitive (HA1). The second auxiliary hypothesis basically says that due to political constraints involving the Terminator, a nuclear war between the three countries would be decided in the sphere of operations (Ha2). As the U.S. maneuver in lines outside, while Chinese and Russians would have the advantage of interior lines, the communications would be a vital component in any operation or battle. Assuming that the new weapons of direct energy Russian and Chinese Americans could stop the communications, the third auxiliary hypothesis (HA3) maintains that the weapons of direct energy tend to become dominant in the field of strategy ("gun-master").

In the limit, the ability to stop the war and the digital sphere of operations is that decide the type of polarity and the degree of polarization prevailing in contemporary international system. It would be precisely this horizontalisation the capabilities of potential fighters brought by digitization and dissemination of technology for direct energy weapons (DEW) the new factor that tends to tilt the outcome of the redistribution of power underway in the international system toward multipolarity balanced.

The current priority, should it prove to be effective, it was the result of more or less coercive diplomacy. The Americans succeeded in disabling the Russian submarine of the Typhoon class, suspension by long years of building new Tupolev bombers (Tu-160), and very little, were also not dismantling the SS-18, the main intercontinental ballistic missile (ICBM) Russian endowed with multiple warheads (MIRV) still in service. [70]

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[70] The Topol-M is the most modern Russian ICBM, the solid fuel and considerably faster. But this only has a missile warhead and the Russian inventory are only 200 such missiles. The U.S. exhibit more than six thousand warheads commissioned in its inventory (Baylis et all, 2007, 256-263). While The Military Balance is one of the most respected publications in the world, also commits errors and inaccuracies. In this year, for example, it would be in service the Bulava missile. This is not correct and, given the recurring failures, there is the possibility that he never will be commissioned. In addition, the publication reaches quote two Typhoon class submarine that is supposed to be commissioned these weapons (Bulava). Indeed the two submarines are commissioned with missile cruisers. Moreover, could not be comissinados with a weapon that does not exist. Problems like this require the type of study proposed for the first chapter of the dissertation. Cf. IISS (2007) e contrastar com as bases de dados disponíveis em www.cdi.org, www.sipri.org, www.fas.org, e www.thebulletin.org.

Through negotiations and diplomatic pressure, the United States that China also managed to delay the pace of commissioning of the class ICBM Dong Feng DF-31 (of which there are between eight and twelve already installed) and obtained a postponement, no date for the construction of the DF-41, both capable of reaching the continental territory of the United States. The DF-31/DF-41 should replace the now obsolete SS-5 that, because of fuel, are not available for ready use, remaining dismantled in three different locations (warhead, and rocket fuel) and is therefore a gun little credible as a force for the second attack (Cordesman and Kleiber, 2006).

In both cases, both dealing with the Russians as with the Chinese, the United States is worth the balance of local power. After all, for the Russian government what really matters is the ex-Soviet space, and for the Chinese government, the reunification with Taiwan. These are coins of that exchange, at any time, by a slowdown of the initiative of building the anti-defense, could be decisive for trying to get the bargain diplomatic strategic disarmament of Russia and China.

The other way to get the strategic disarmament would be through a preventive nuclear war, seeking to destroy the remaining strategic weapons arsenals in Russian and Chinese through attacks with precision guided munitions (PGM), combined with a nuclear strike. The problem here is that there was then a world war with the simultaneous use of nuclear weapons and conventional forces, which would have to be defined in the sphere of operations. The second hypothesis assist thus basically says that due to constraints involving the political and destroyed due to the low probability of a strategic disarmament Russian and Chinese obtained through diplomatic channels, a war between the three countries would be decided in the sphere of operations.

Not able to use all of its strategic nuclear weapons, although probably use nuclear weapons in battle, a possible war between the major powers would be decided in the sphere of operations. Are the armies, air forces, naval squads and other armed forces to decide the future wars. This is an important counter-trend in relation to both strategic thinking dominant after World War II as soon after the end of the Cold War. After the war it was considered that nuclear weapons decide everything. This thinking was dominant until the war broke out in Korea. Similarly, after the end of the Cold War, it became dominant in the strategic thinking means that the military would only be employed in UN missions, or to impose peace-keeping. Hence the guidelines of professionalism, and reduction of effective transformation of projects and structures of power.

As the U.S. maneuver in lines outside (depending on the two oceans that separate Russia and China), while Chinese and Russians would have the advantage of interior lines, the communications would be a vital component in any operation or battle (Corpus, 2006) .

Interior lines relate to the control of the territory on which is the movement, the movement of forces, reserves and supplies. Russia and China have the field of interior lines as they may trigger strikes against Eastern Europe, Middle East and Far East from its own territory. As the United States does not have to impose absolute air supremacy in the face of conventional defense capacity of Russia and China and the vastness of its territory, the U.S. would not prevent them using their interior lines.

At the same time, the United States would have to face constraints on three fronts (Eastern Europe, Middle East and Far East) separated from its territory by three oceans, extending its lines of communications, logistics, supplies and reservations for thousands of kilometers. This creates bottlenecks that the Russians and Chinese to use their skills antinavio, anti-satellite and anti-aircraft, weakening the lines outside U.S. and then pounding on intensity on land, in front where the U.S. is weak.

For the command, control and supply lines of external operations in the communications are a vital component. Without having the vast network of satellites, networks of computers and control systems such as the battle JTIDS (*Joint Tactical Information Distribution System* [71]), JDAM (*Joint Direct Attack Munition* [72]) and JSTARS (*Joint Survellance and Target Attack Radar System*), the United States does not have to win a war against two great powers. In all wars fought by the United States since 1991, these three systems met decisive role in the outcome of the battle and operations (Boot, 2003, 38th).

The deterioration of Russian relations with member countries of the Organization of the North Atlantic Treaty (NATO) and even with the European Union over 2007 points to a new world scenario in which fears are also marked the Cold War, especially in the degree

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[71] The **JTIDS** was the direct result of the use of the computer as a board. The JTIDS become the only stations that were loaded on mobile radar early-warning aircraft to command and control systems capable of directing the interception of aircraft and missiles. See Gunston (1991).

[72] The **JDAM** replaces the expensive laser systems guiagem and technologies loaded into bombs and missiles held by the digital guiagem remote computer. Since JDAM that matters is the network, the ability to cover the theater of operations for digital communication (synthetic theater of operations). Consequently, it also makes it a priority target of weapons of direct energy, especially HPM. See Mackenzie (1990).

of hostility between the major powers and the risk of a central war in the international system.

The crisis has acquired a profile more clear from the speech delivered by President Vladimir Putin for the two houses of Russian parliament, in April 2007. At that time, Putin threatened to denounce the Treaty on Conventional Forces in Europe (CFE Agreement) agreement signed in November 1991 in the context of a series of control measures and reduction of armaments which marked the end of the Cold War.

In November 2007, in fact the Russian president endorsed a law suspending Russia's participation in the CFE, prohibiting the inspection of representatives of the Russian military installations in NATO and no longer limit itself to the number and quality of Russian conventional forces positioned to the west Urals.

The seriousness of the Russian decision can not be minimized, particularly since it is justified by the Kremlin as a direct and necessary response to the announcement by Washington in January 2007 that the U.S. government wanted to install ten batteries of missiles based in bunkers and interceptadores two radars in Poland and the Czech Republic. Such initiatives would be part of the national system of anti-defense (NMD), in development by that country since the end of the 1990s.

The U.S. initiative was considered by the Russians a violation of agreements on expansion of NATO to Eastern Europe, by which the United States and other countries have undertaken not to park permanently troops or weapons systems and vectors in the territory of the former countries members of the Warsaw Treaty Organization (Simonov, 2007).

In this sense, the threat of Putin and the statements of even tougher Russian military authorities are consistent with the repeated protests from Moscow since the United States withdrew from the ballistic missile treaty (ABM) at the end of 2001. The expansion of NATO to the East European and Western media increasingly clear to the groups and parties of the Russian government opponents in countries like Ukraine, Georgia and Russia itself have also been cited by analysts and the Russian President Putin as indicative of a more aggressive U.S. diplomacy at the expense of (Karavaev, 2007 and Ria Novosti, 2007).

The suspension of the Russian CFE also brings to light the possible denunciation of the Treaty on the Range Nuclear Forces Short and Intermediate (Intermediate Range

Nuclear Forces - INF), which had already been raised by analysts Russians in 2005, also in response to anti-Defense (NMD) developed by the Americans (Vedomosti, 2005).

The INF treaty was signed in 1987 and entered into force the following year. His main target was the Soviet SS-22 missiles and its congeners (SS-12/SS-23), which could sweep the continent of Europe from the Soviet position in Europe's east. Considered the most deadly weapon for Europeans because of their large numbers and mobility, the SS-22 were capable of hitting assestar impact of thermonuclear explosion equivalent to half a million tons of TNT. These missiles and their warheads were a major strategic weapons systems and in the Soviet arsenal were dismantled in 1988, in compliance with the INF treaty. For the termination of the NPI, as provided in Article 15, just one party notifies the other to six months in advance. And without the NPI, Europe could again be a central theater of operations in the event of a thermonuclear war.

The official statement of the Secretary of State Condoleezza Rice in May 2007, that the radars and missile batteries in Eastern Europe is warranted by the threat posed by Iran and North Korea, does not convince the Russian government, creating an impasse between the two deep countries.

A more precise reason for the Russian reaction was presented by Alexandr Jramchijin (2007), an analyst at RIA Novosti news agency. The author claims that the batteries to be installed in Poland in fact not be a serious threat to Russian nuclear forces. The biggest problem would be to the radar station on Czech territory, because it could monitor the airspace by Russian Moscow. Sooner or later, Jramchijin reason, this monitoring would be accompanied by the military means that would allow Americans to take advantage of the new informational advantage. Anticipating this possibility, the Ria Novosti analyst believes the most likely trigger a new arms race. If this happens according to what was the quest for strategic parity during the Cold War, the limits, Russia tend to collapse as a state project, and obtaining nuclear primacy of the United States would be achieved at the beginning of this century.

Thus, due to the prohibitive costs of a new nuclear arms race, the more likely response from Russia to attempt a more definitive U.S. nuclear primacy in obtaining the type would be asymmetrical, using nuclear and conventional means, military and economic, to make front of the U.S. NMD.

They include high-tech weapons, able to strategically use the electromagnetic spectrum, which only had access to Russia after the collapse of the Soviet system, when its technology to companies began to integrate to capitalism and were present in areas of

high density technology, such as Silicon Valley in California. Indeed, both the armed forces of Russia as those of China passed, recently, to use digital technologies previously available only to the United States, which had a decisive impact on the American victory in the Cold War.

The most important systems that characterize this border war digital technology are called directed energy weapons or direct (Directed Energy Weapons - DEW). This is a generic name for various types of weapons they use parts of the electromagnetic spectrum (above a wavelength in the range of lasers and microwaves) for military purposes directly related to the use of force, directing energy to power much higher than the powers applied in domestic or industrial (Beason, 2005, 21-29).

The Russians already incorporated their arsenals since the beginning of the decade, weapon systems, high-power microwave (High Power Microwave - HPM), both in ball tactics, with the system Ranets-range and up to 15 km, as in the sphere operations, with the system, and Rosa, which has range of up to 500 km. According journalists specialized in the war industry and sources within the company exporting the new weapons systems are capable of destroying the integrated circuits and chips for radar, missile cruisers and aircraft (Rosoboronexport, 2001; Stratmag, 2001).

Two events suggest that these directed energy weapons also tend to have a prominent role in the sphere of strategy: the test of a Chinese anti-satellite weapon (Anti-Satelllite Weapon - ASAT) in January 2007, with clear implications missile, and also reports that in September 2006, China had tested the high-power lasers to try to blind satellites for surveillance and reconnaissance in the United States (Stokes, 1999).

Therefore, the Russian diplomatic reaction in 2007 is hardly the only part that the media characterized as a maneuver to Putin to win the elections for the Duma and preparing his succession in 2008. The foundations of this reaction rather live in the dispute on the possibility or otherwise of the United States to obtain nuclear primacy and are a unipolar distribution of capabilities in the international system over the coming decades.

Indeed, it seems that technology precedes the polarity in the international system. Can not be forgotten that despite the amazing existing arsenal, the United States continues to develop new strategic weapons as well as Russia and China. Despite the apology of U.S. nuclear primacy Lieber and Press and fierce criticism of his opponents, the situation shows that we are experiencing a crisis in technology. Digitization expanded the capacity of countries like China, the horizontalizar costs and produce weapons of multifunctional platforms.

III.1 - Russian and Chinese capacity of second attack

Order to assess the ability of Russian and Chinese second attack, it is necessary to simulate a nuclear attack premptivo U.S. and then calculate the calculation of the simulations on the Sino-Russian response with its existing weapons. The construction of this simulation has two problems. The empirical side, the only real experience of using nuclear bombs against cities happened to the Japanese cities of Hiroshima and Nagasaki in 1945. The image of that devastation caused by bombs in total income in the range of 15kt impressed mankind. However, it can not be forgotten that the buildings made of wood and paper predominated in those cities. Not served as a shield and protection for its residents and also increased the damage to the fire. Another factor that sets the climate of controversy is disaster that generated the debate of the policy of the destroyed anos70, culminating with their representation in the movie "The Day After".[73]

This study attempts to break with this vision of catastrophic nuclear weapons. Without minimizing their damage, however, making the simulations with more realism possible. To achieve it, was used the parameters of the program Science and Global Security (S & GS) at Princeton University.[74] It consists of a book with twelve volumes, compiled and edited by Glasstone and Dolan for the Department of Defense (DoD) and U.S. Researcch Energy and Development Administration. It consists of 644 pages that deal since the general principles of the nuclear explosion to the biological effects of use of nuclear weapons. That study formed the basis for the simulations of a hypothetical nuclear war between Israel and Iran, in the book by Anthony H. Cordesman, 2007. Princeton also appealed the condensation of data in graphs which called the Computer Effects of Nuclear Bomb.

Basically, the operation is to draw a straight line from the income (Yeld) through the center of the circle. Where that line touching the graphics, indicating the number of parameter that the graph represents. Making the simulation was used, initially, the

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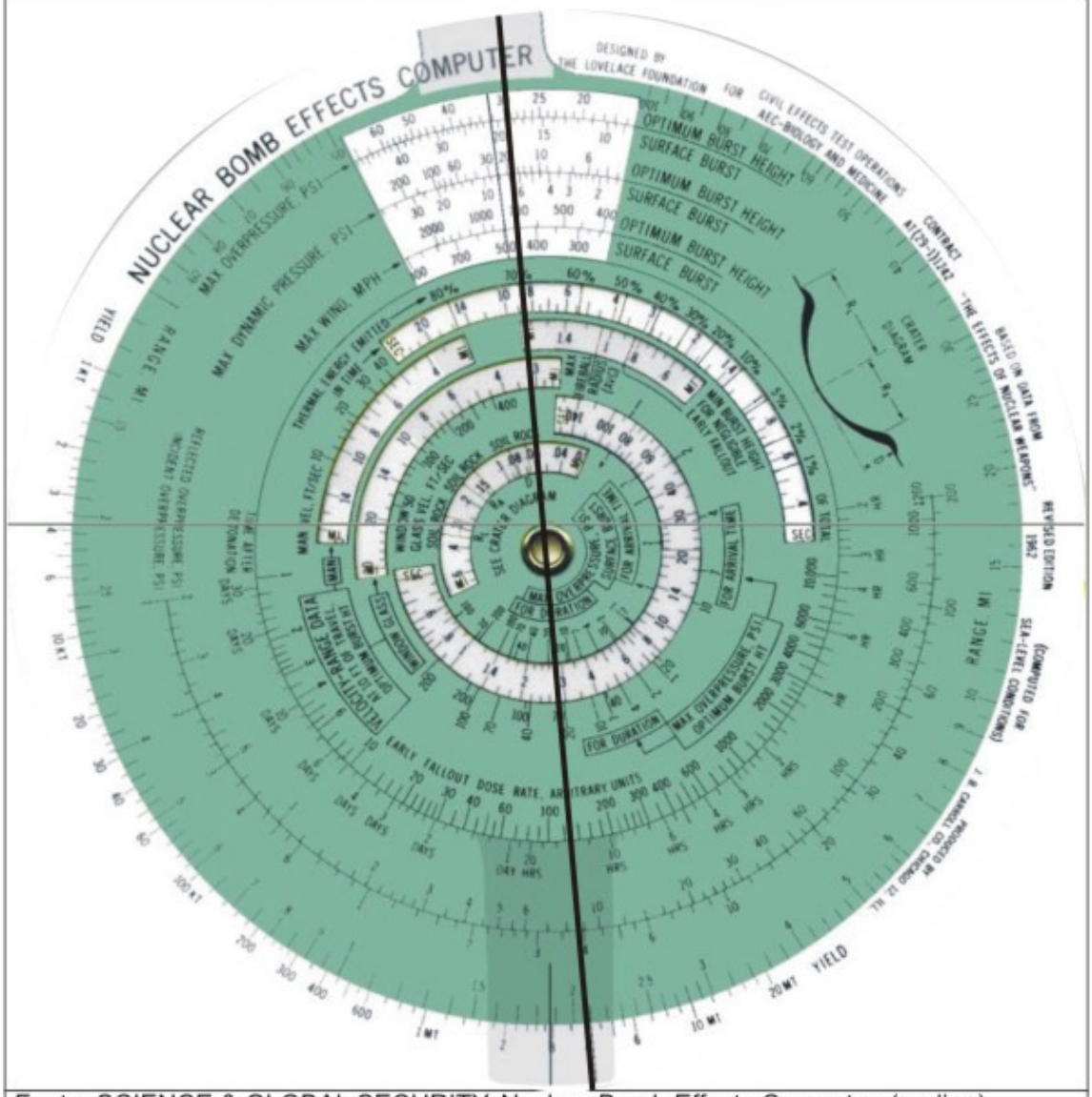
[73] The film made in 1984 became a landmark to simulate a Soviet attack the U.S. city of Kansas City. Its importance lies to the public in general to popularizazão on the debate in the long Cold War. The film of the period impresionouo U.S. president, Ronald Reagan, who used the film as justifying the need for militarization of space, with the implementation of the Strategic Defense Initiative (SDI).

[74] **GLASSTONE**, Samuel, e **DOLAN**, Philip. ***The Effects of Nuclear Weapons***. 3ª edição. Washington: U.S. Government Printing Office, 1977. 644p. (*on-line*) http://www.princeton.edu/~globsec/publications/effects/effects.shtml (06/06/2007).

parameter of the effects of a Chinese attack against the U.S. city of Los Angeles with the DF-5 missile (CSS-4 Mod 2).[75]

GRÁFICOS DOS EFEITOS DA EXPLOSÃO NUCLEAR



Fonte: SCIENCE & GLOBAL SECURITY. Nuclear Bomb Effects Computer. (on-line) http://www.fourmilab.ch/bombcala/instructions.html (06/06/2007)

Adaptação: **AVILA**, Fabrício Schiavo.

Fig. 18: Computer of the Nuclear Bomb Effects.[76]

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[75] **PIKE**, John. ***DF-5 (CSS-4 Mod 2).*** (*on-line*) http://www.globalsecurity.org/wmd/world/china/df-5.htm (09/11/2007)

[76] **SCIENCE & GLOBAL SECURITY**. ***Nuclear Bomb Effects Computer***. (*on-line*) http://www.fourmilab.ch/bombcala/instructions.html (06/06/2007)

The parameters and charges made to the study of Princeton were represented in scale, using the photos of the city of Los Angeles free program available on the Internet Google Earth.

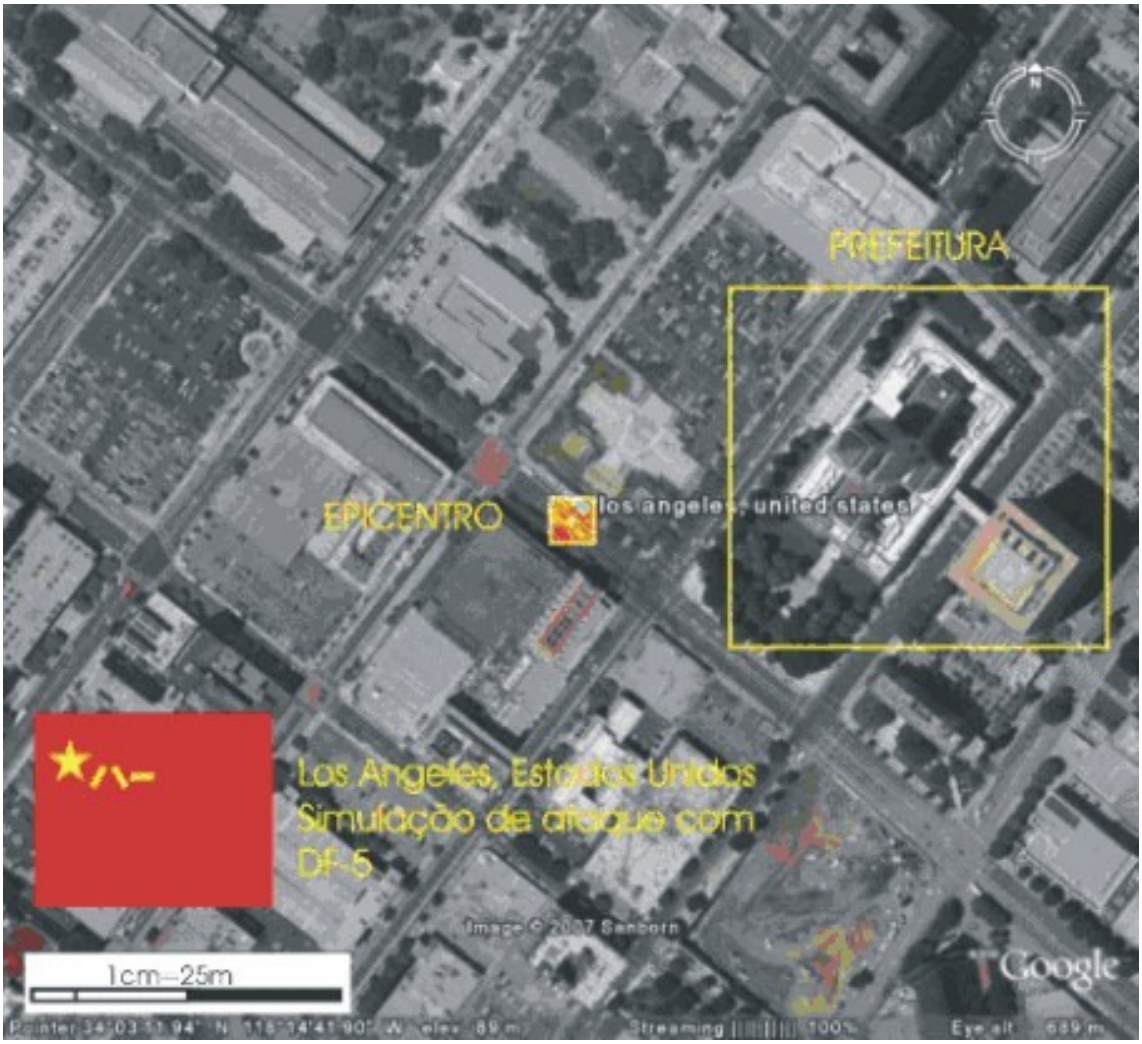

Fig. 19: Target of the simulations.

This missile commissioned in 1971 represents a time when the Chinese were within the parameters of Soviet ICBMs. It is a liquid fuel missile, three stages, which has a warhead with four Megatons of income. Its dimensions are to 32m in height by 3.32m in length. Its total weight is 183 tonnes, but the weight of the vehicle re-entry can not be larger than 3.200kg. Its maximum range is estimated to 15.000km and your zip code is 500 to 3.500m. This missile was chosen because of Chinese missiles commissioned, this would be the only one to reach the territory of the continental United States (Kristensen

and Norris, 2006: 188). According to estimates, the Chinese have about twenty of these missiles.

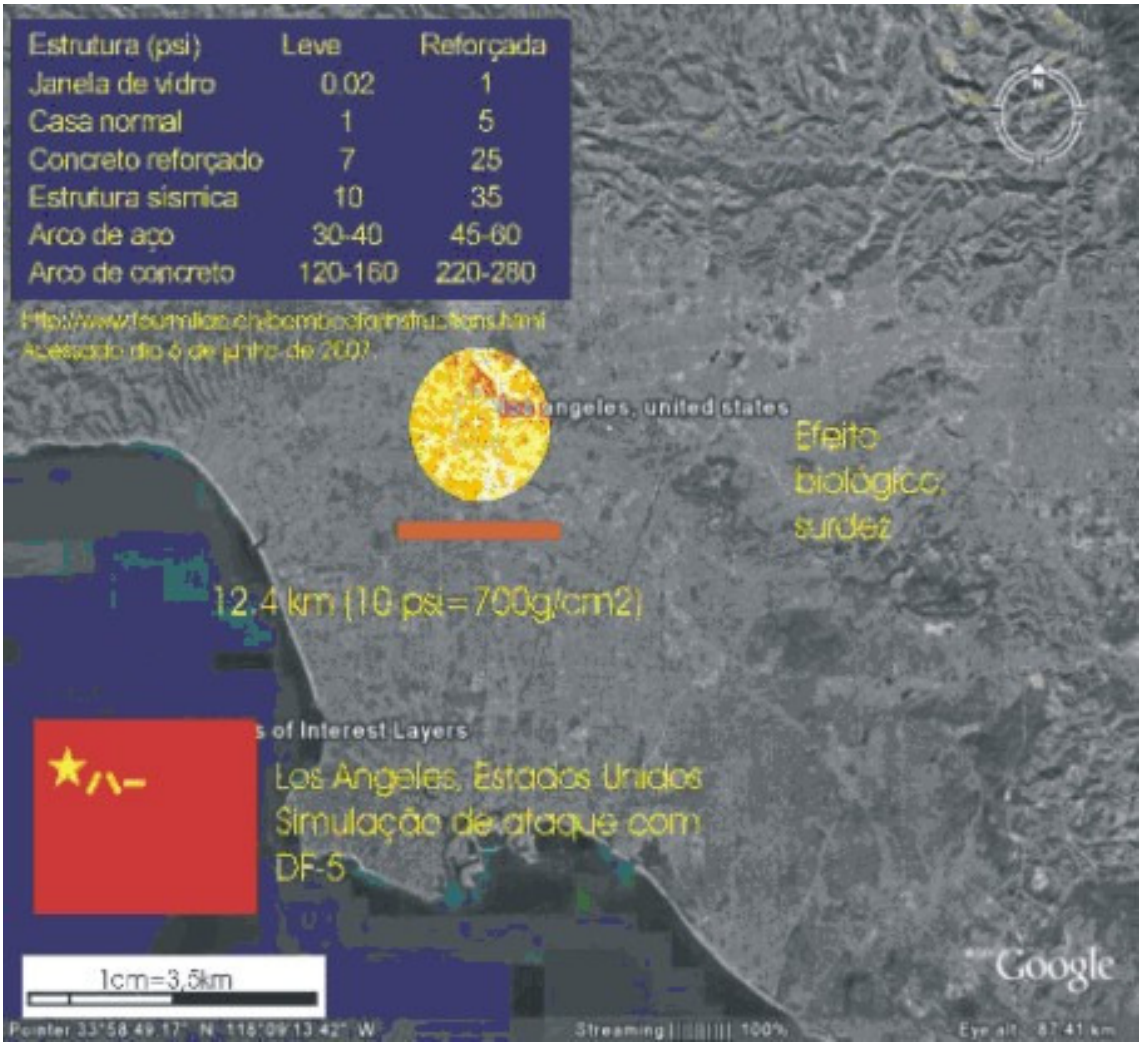

Fig. 20: área da pressão de 10psi da explosão da ogiva do DF-5A.

The figure above shows the effects of the shock wave of an explosion of the warhead of the DF-5A. A radius of 6.2 kilometers, would be exerted a pressure of 10psi, which corresponds to 0.7 kg / cm ². This pressure destroys buildings that have structures that are seismic processing that resist the earthquakes. Unlike the Japanese cities, the concrete absorb much of these effects, minimizing the losses. That pressure, cause the biological effect of permanent hearing loss in people who were in the area and could survive.

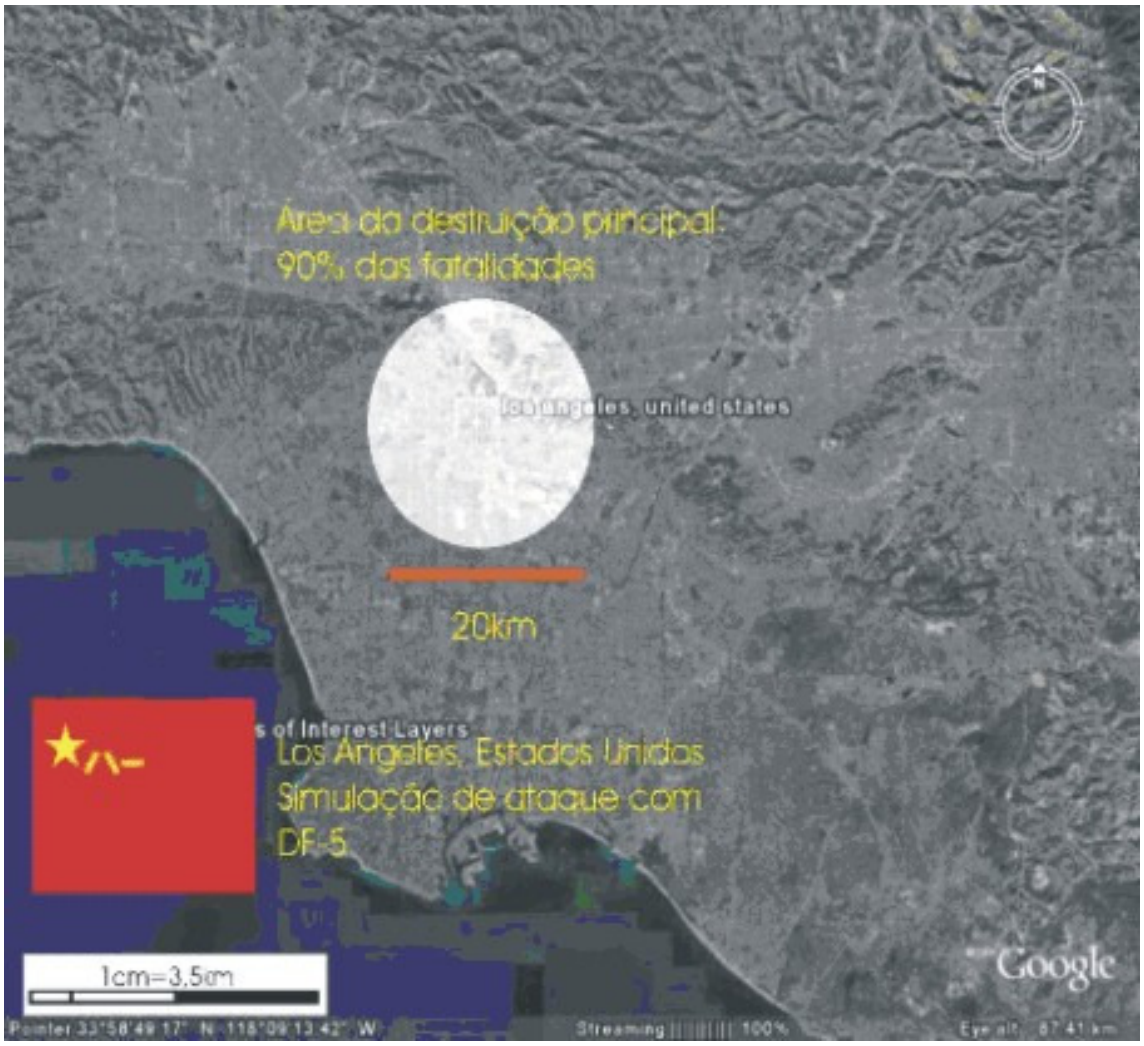

Fig. 21: Simulation of the main area of destruction of the DF-5A.

The figure above shows that the main area of destruction, where 90% of the deaths would be restricted to a radius of 10km. This was done following the parameters of use of an artifact of 4Mt of income. To that income be considered great, the warhead to explode a 3,000 time of the target. At that distance, it is the maximum radiation, shock wave and expansion of the heat. If the warhead explodes in a very low altitude is released more radiation and contaminated debris in the air and, if exploded at a height above, only benefited the fire exits. For the city of Los Angeles, are downloaded directly from the estimated 3 million and 4.8 million deaths and injuries, according to Kristensen and Norris. However, this figure must also represent the indirect deaths from a nuclear explosion. If

applied to population density of about 4,765.8 inhabitants/km ^{2}[77] which has the city in simulations, the direct impact of the explosion, would result in a lower figure.

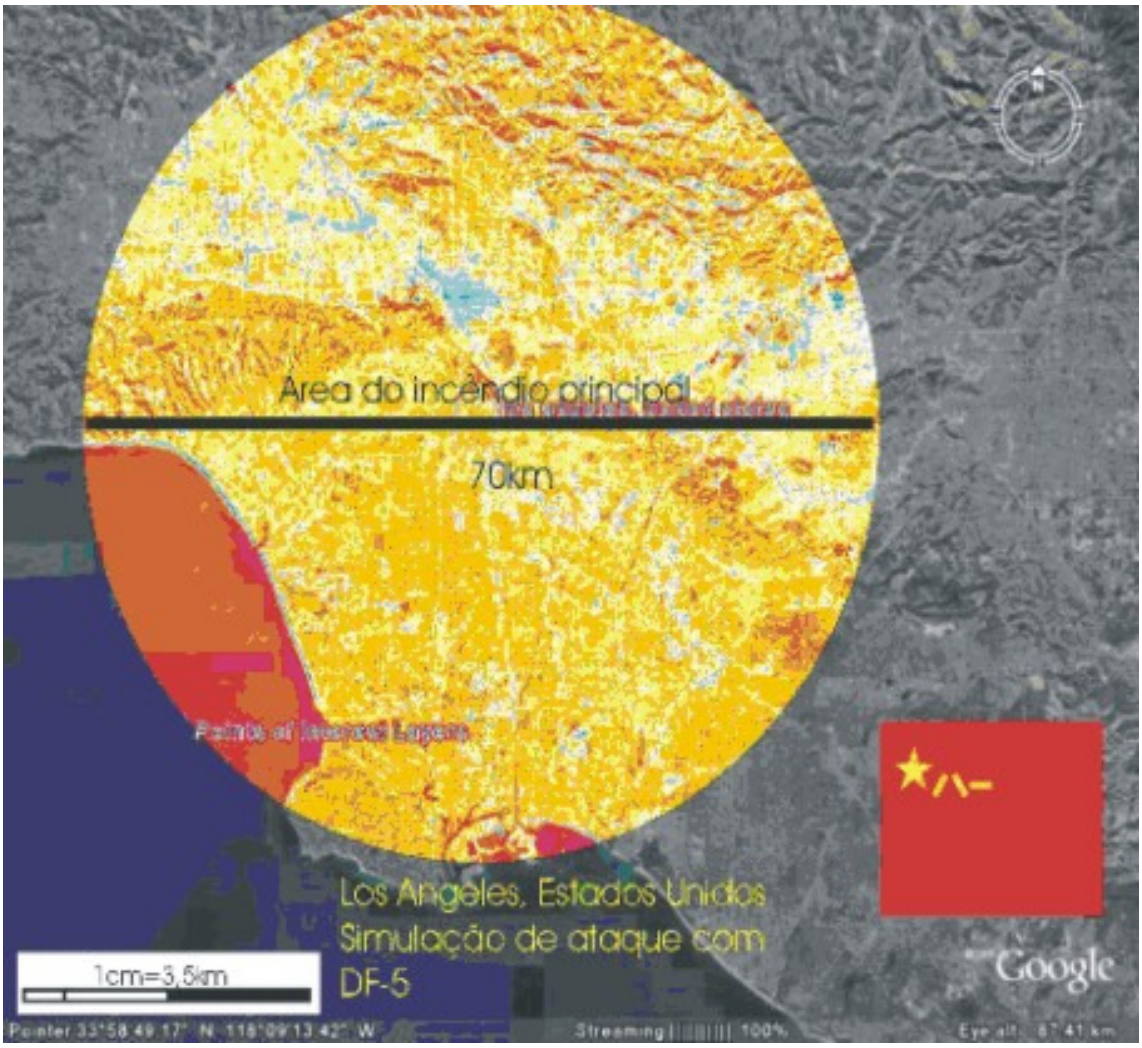

Fig. 22: Simulation of the area's main fire caused by the DF-5A.

The figure above shows the main area of the fire. The city of Los Angeles is known for its seasonal fires that occur mainly in summer. The effect of the explosion of a warhead DF-5A, especially, cause a fire would happen in an area with a radius of about 35km. It would simply be impossible to control it, despite all the knowledge of the teams of firemen from the area. That fire, certainly, a considerable increase from the low indirectly caused by the nuclear explosion.

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[77] 2006 fonts. Cf. ***The Official Web Site of The City of Los Angeles.*** (*on-line*) http://cityplanning.lacity.org/DRU/Locl/LocPfl.cfm?geo=cp&loc=Arl&yrx=06 (16/02/2008)

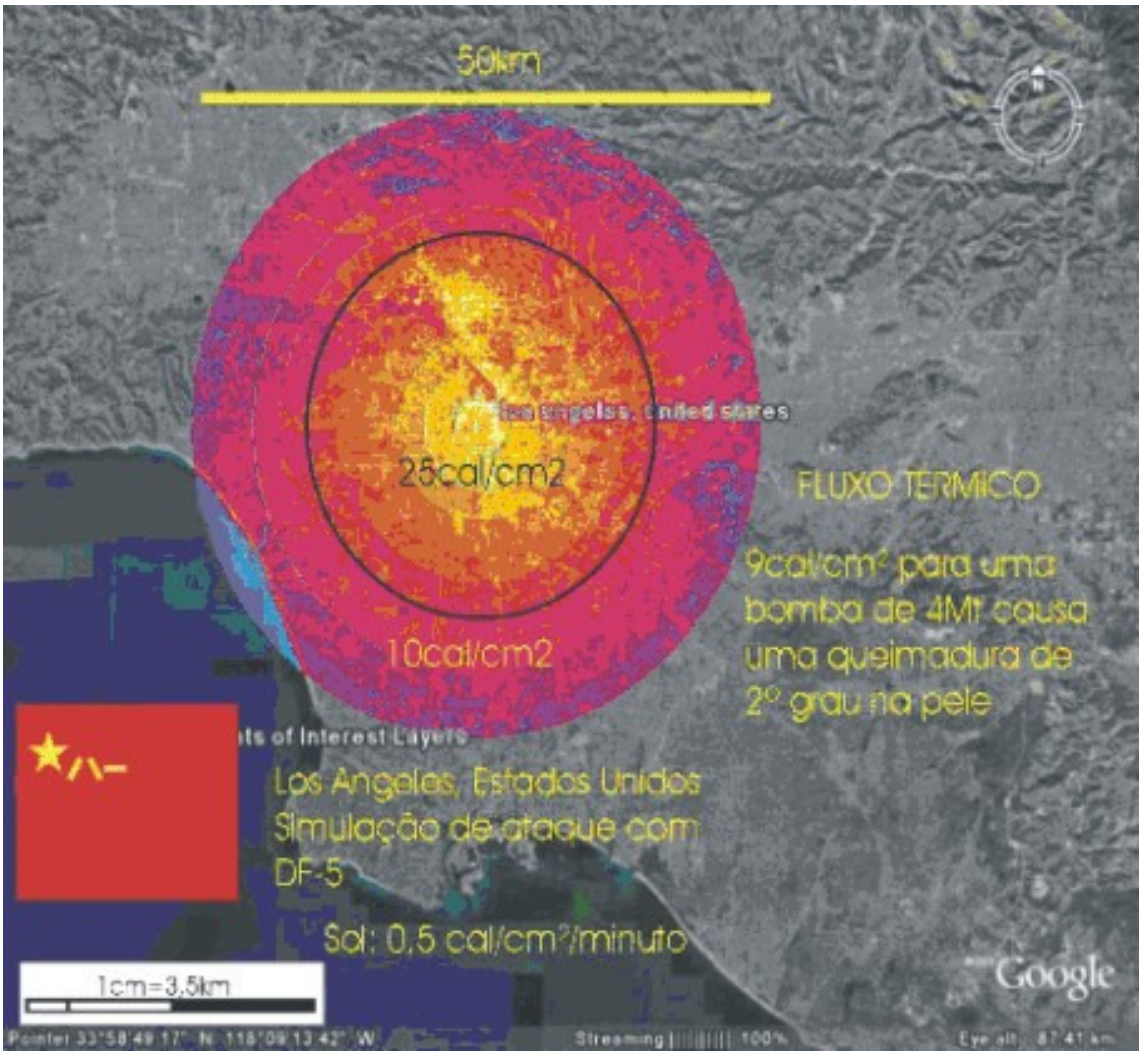

Fig. 23: Simulation of heat flow caused by the DF-5A.

The figure above shows the simulation of heat flow released in the explosion. This measure is the expansion of the heat generated by nuclear explosion. For purposes of comparison, the Sun releases about half calorie per square centimeter in a minute. In the first minutes of the explosion, about 10cal/cm² (twenty times the heat of the Sun), would reach the 25km radius of the explosion. 9cal/cm² enough to second-degree burns occur in the skin. A 15km from the explosion, the measured heat flow reaches 25cal/cm². Who were not protected, hard, to survive this flow.

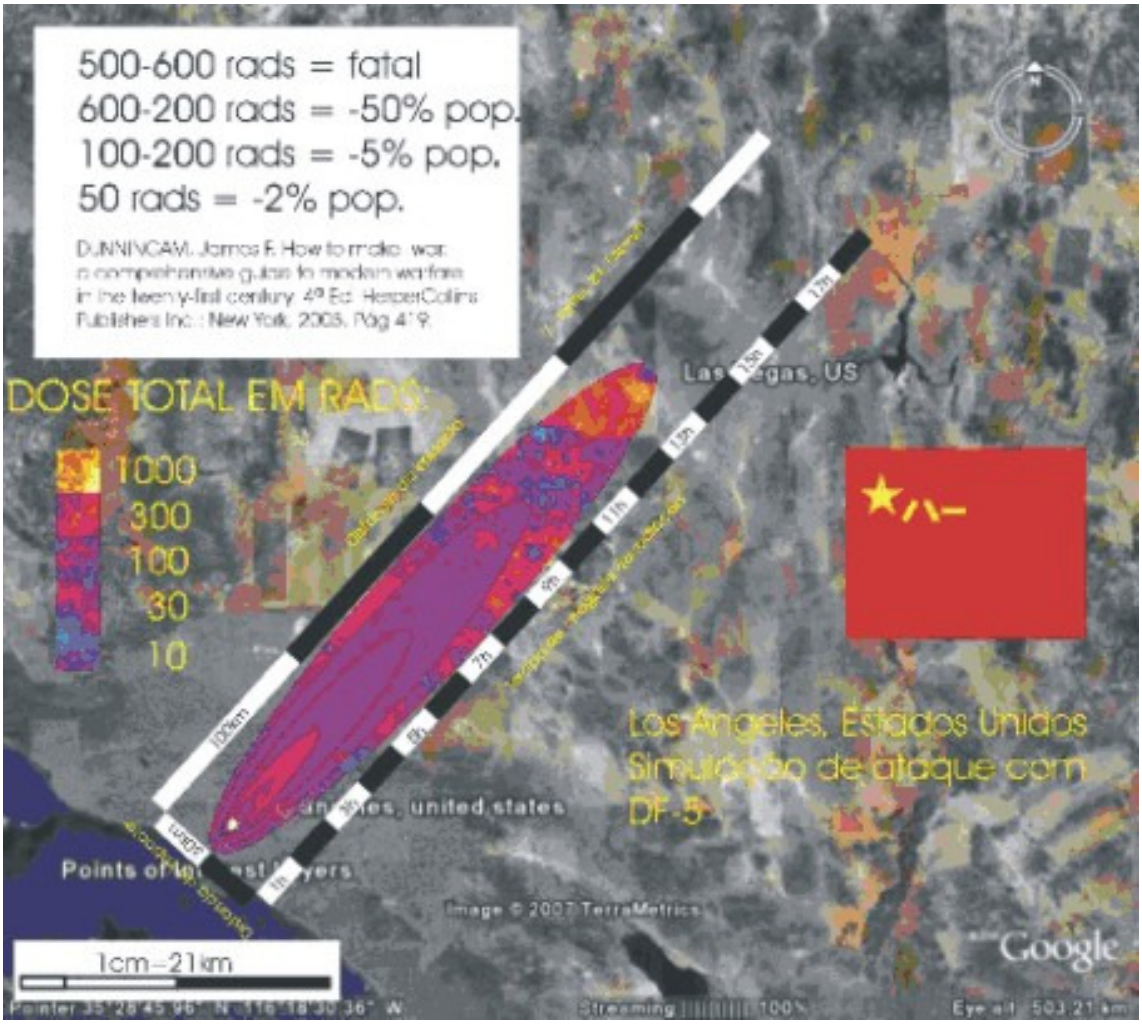

Fig. 24: Simulation of the expansion of the dose of radiation caused by the DF-5A.

The figure above shows the simulation of the expansion of the dosage of radiation. To do so, was considered the average wind speed in the summer in Los Angeles. Between the months of July through September, the average speed is 24.1km/h. A person can withstand a dose of up to 500rads, as demonstrated survived the accident in Goiania, Brazil, 1986. [78] If a warhead of DF-5A exploded at the city's mayor, thirteen hours to take a dose of 10rads travel 300km away, reaching the cloud of fallout excited the width of 60km. The lower doses of 200rads is fatal to about less than 5% of the population. The expansion of the total dosage of radiation, the doses of 300rads take around two hours to travel 50km. The plans for civil defense, if they are designed in a satisfactory way, can save a large portion of the population. According to the formula of the dose of radiation (dose = 1 / r^2) the dose of radiation is inversely proportional to the square of the distance.

[78] Rad — **R**adiation **a**bsobed **d**ose. Equivalent to absorbed dose of radiation at 0.01 J / kg.

That is, increasing the distance to the square leads to decrease the dose absorbed. The major problem of radiation are the particles emanating from the explosion that carry the radiation over long distances. The figure shows that a dose of 10rads takes thirteen hours to go around 315km. This can contaminate crops and water to reach people even more distant. The phenomenon is called the black rain, where these particles to condense into the upper atmosphere, falling in the form of rain.

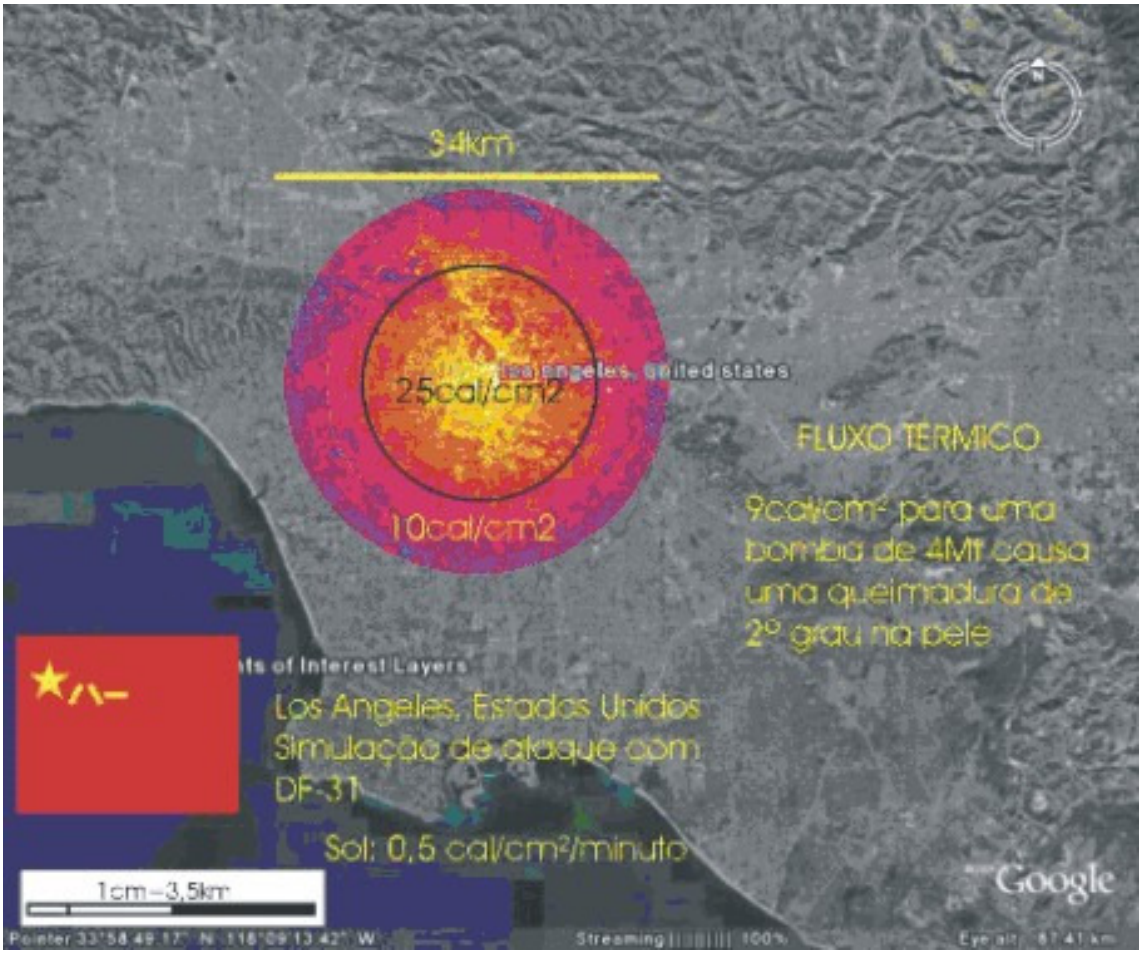

Fig. 25: Simulação do fluxo térmico causado pelo DF-31.

The other Chinese missile that enters the simulation is the DF-31.[79] It is one of three stages of missile solid fuel, which is 10m in height and 2m in diameter. Its mass is of twenty tons and its re-entry vehicle is 700kg. This can carry a warhead of income from 350kt to 1mt or three 50 to 100kt. Its scope is 3,000 to 8,000km and only reach the continental U.S. territory with guiagem the pole. Your zip code is 300 to 500m. As a

[79] **PIKE**, John. ***DF-31.*** (*on-line*) http://www.globalsecurity.org/wmd/world/china/df-31.htm (09/11/2007)

parameter of comparative purposes, was used again, the city of Los Angeles as a target of retaliation for the attack preemptivo.

The figure above shows the simulation of heat flow released in the explosion. Compared with the simulation of the DF-5A, the head of income 1mt of the DF-31 would produce about the 10cal/cm ² in a 17km radius of the explosion, in contrast with the other 25km missile. That is, China's adoption of a solid fuel missile, with a lower income, would make the second attack, also, very devastating. Noting therefore that the ability of Chinese retaliation would be ensured, even with the decline in the yield of warhead.

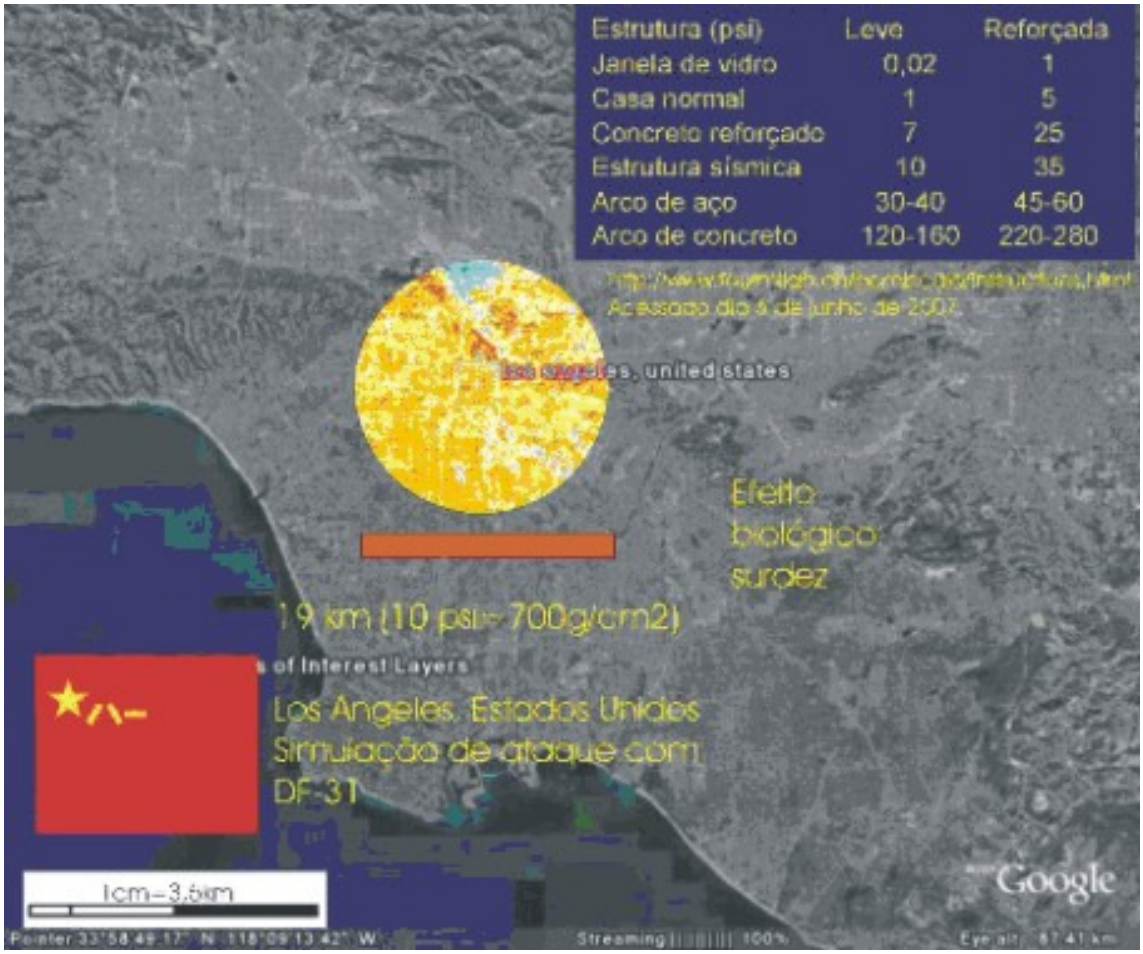

Fig. 26: Simulation of shock wave damage to the explosion of the warhead of the DF-31.

The figure above shows the effects of the shock wave of an explosion of the warhead of the DF-31. Contrary to common sense, the pressure exerted by a warhead of 1mt of income is higher than 4Mt (DF-5A). A radius of 9.5 kilometers, would be exerted a pressure of 10psi, which corresponds to 0.7 kg / cm ². This is because, generally, the yield

of 1mt of missiles explode at altitudes lower than those of 4Mt, which receives the shock, while in another, it benefited the fire.

The Soviet side, the Topol-M missiles (See Table 2, p. 49), three-stage solid fuel and will be the response to the attack preemptivo. It has a height of 21.9 m and a length of 1.9 m. The launch is the weight of 47.2 tonnes. Warhead has a yield of 550kt.

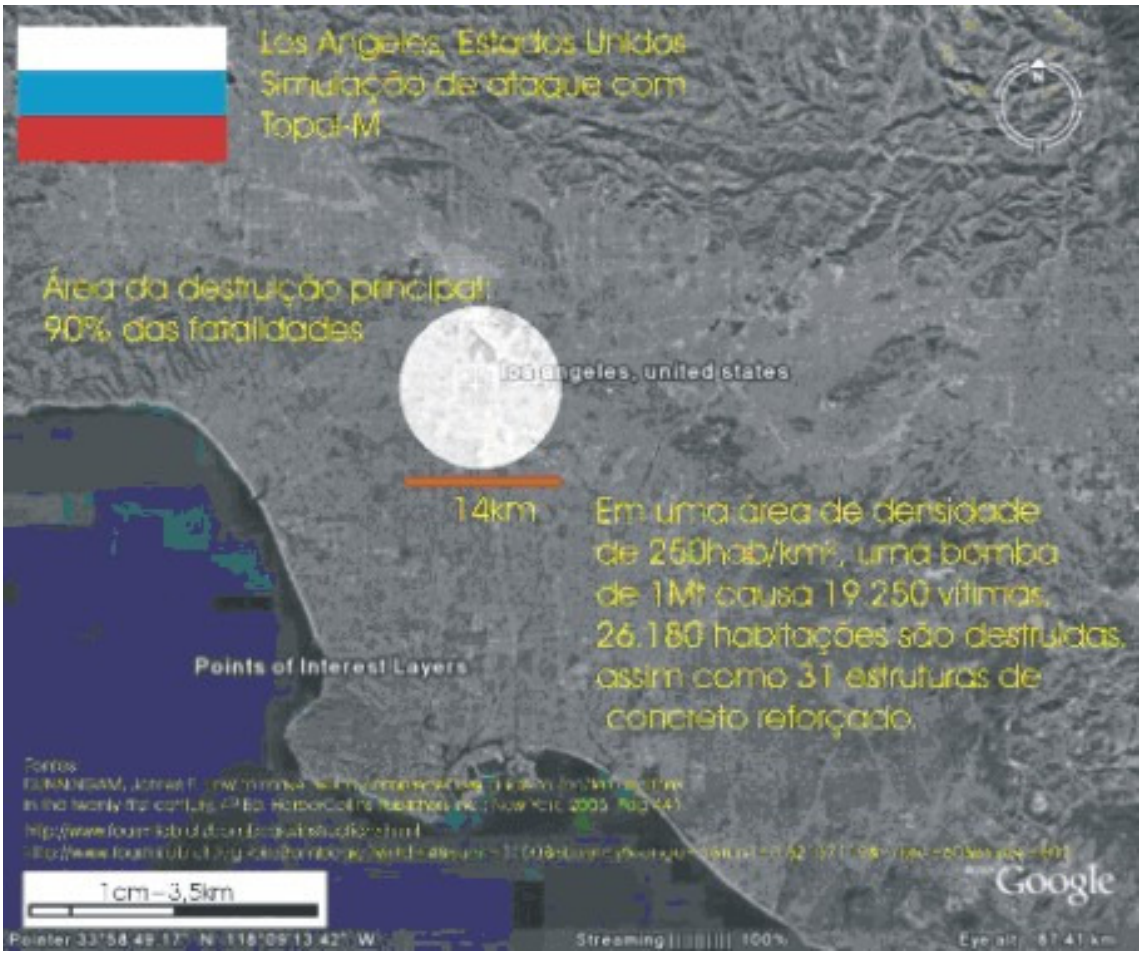

Fig. 27: Simulation of the destruction of the area's main Topol-M.

The main area of destruction, which would be 90% of deaths, reaches a radius of 7km to the Topol-M missile. The calculations were made based on the parameters of the explosion of a bomb in an area of 1mt of population density of 250hab/km ². Because the Russians can explode near the ground to cause greater impact. So, certainly, explode at a height of about 1km, where the head of 550kt can have an income similar to that of 1mt. However, the explosion near the ground will, seriously, the expansion of the dosage of radiation and reduces the scope of the effects of heat. Knowing that the density of the

center of Los Angeles is about 4,765.8 inhabitants/km² (official data of the census of 2006), the estimate is that the explosion caused one and a half million deaths.

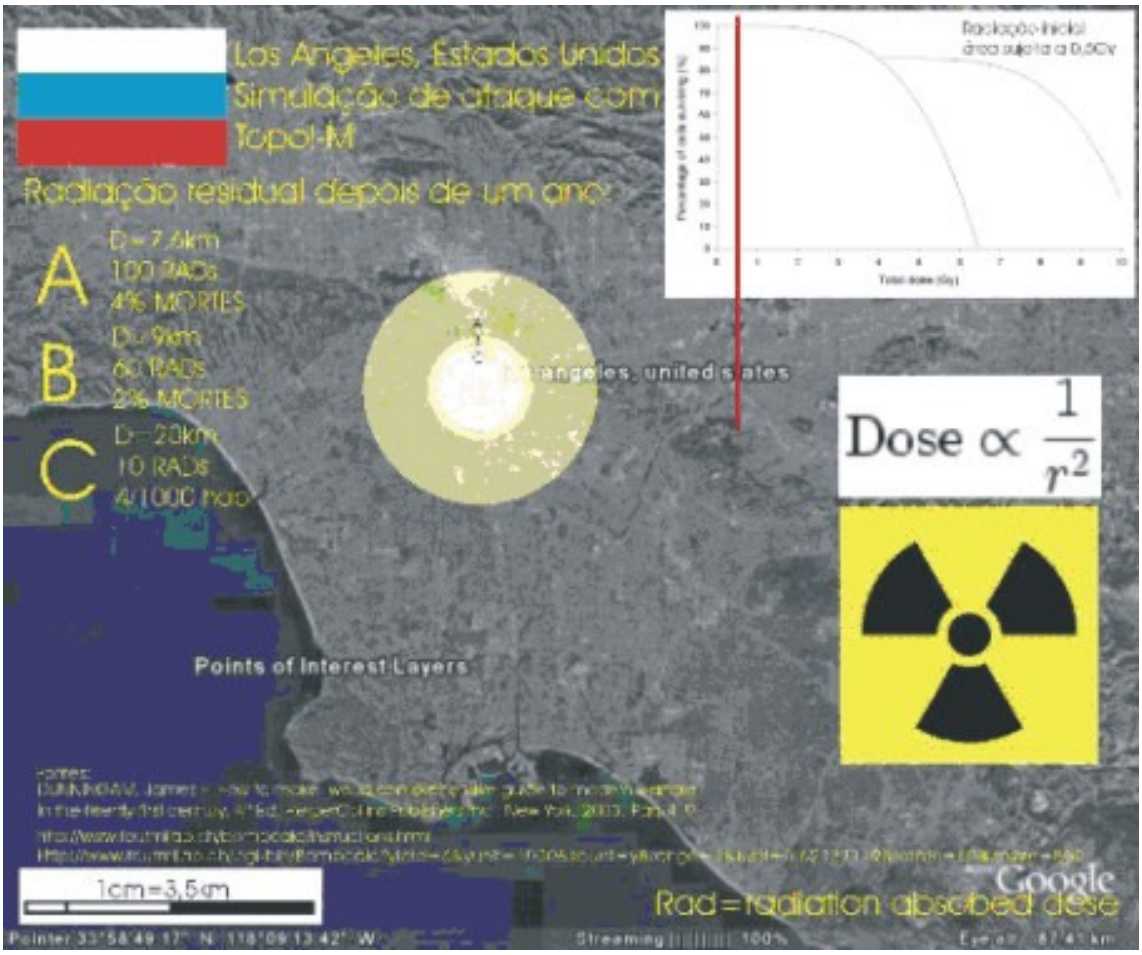

Fig. 28: Simulation of the area contaminated by radiation of the Topol-M.

The residual radiation after a year of the explosion of the Topol-M missile, would reach a radius of about 10km. In radius of 3.8 kilometers of the explosion, the dose of 100rads cause the death of 4% of the population exposed. In radius of 10km, the death would be 0.4%, or four deaths for every thousand people exposed.

The simulations were structured so as to present more clearly as possible the effects of a Russian and Chinese response to an attack preemptivo of Americans. The size of the figures had to remain unchanged to not harm the scale of simulações.O major problem may be the break with the concept of disaster that exists around the nuclear weapons. The simulations show that the impact of nuclear weapons, despite the collapse of the places hit, the country may still be able to survive and rebuild. The question of the

psychological impact that undermine the political system, thereby directly affecting the war effort.

III.2 - Impact of digitization in nuclear war

As the essay shows, Kristensen and Norris simulate the response to a Chinese attack preemptivo U.S. missile with the DF-5A. This missile represents a time when the projects were marked Chinese, strongly by Soviet influence. Large solid-fuel missile that carried a high-yield warheads to compensate for your zip code in the attacks against force, destroying the silos of enemy countries. The DF-31A, in contrast, represents a new phase, where the Chinese seek to adapt their forces to the strategic concepts the Americans.

The simulations below show the comparison of options to respond to the Chinese disarm the U.S., using the DF-31A. The commissioning of the Chinese DF-31A missile range estimated 11,200 (the Pentagon) to 14.000km, can change the assessment of the primacy of significantly.[80] This missile has multiple re-entry manoeuvrable vehicles.[81] May contain five warheads 90kt of income or income from three of 150kt. With the guiagem the pole, the Chinese can now attack the city of New York that is about 10.693km site testing of Lop Nor in China.

As the figure below shows the missile to survive the strategic defense system the U.S.. On average, the extent of the array of radars fásico Americans is 3.500km. The DF-31A, to succeed in responding to the attack preemptivo, the system needs Marv. The characteristic of maneuverability of the vehicle re-entry is, rightly, on the dribble ABM defenses of the enemy.

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[80] **Sinodefence. DF-31A (CSS-9)** (*on-line*) http://www.sinodefence.com/strategic/missile/df31a.asp (16/02/2008)

[81] **MaRV** — **Ma**neuverable **R**eentry **V**ehicle

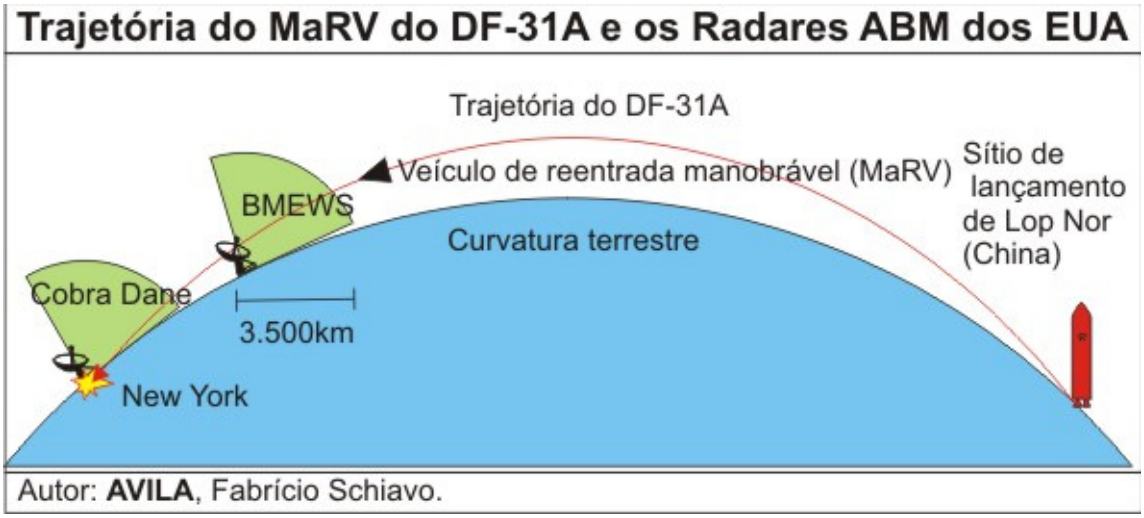

Fig. 29: Trajectory of the DF-31A and U.S. ABM defense.

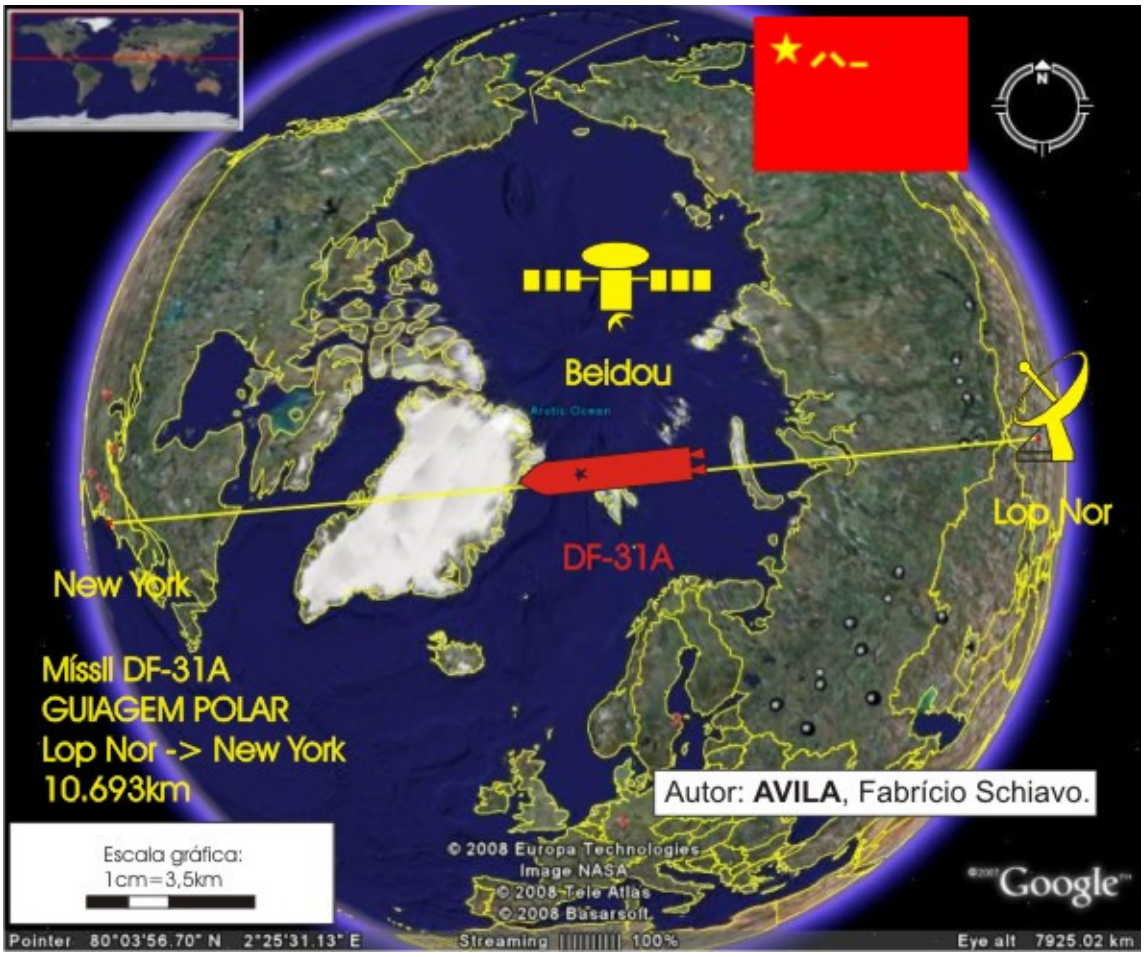

Fig. 30: Polar guidance of the DF-31A and its range.

As the figure above simulates the attack with the Chinese DF-31A missile by the pole, would only be possible with the missile guiagem through the Beidou satellite system. This satellite system as a model system similar to the U.S. GPS. The big breakthrough is that the Chinese satellite is its ability of their software be interchangeable with other systems, as the North American GPS and Galileo European. Despite being classified sources, speculated that this type of satellite offering a special type of guiagem, based on the synthetic aperture radar (SAR).[82] This technology provides for the acquisition of images through the waves emitted by the radar. This kind of image in real time can be transmitted to the missile to compensate for the difference in the time of the Commission on land, with the satellite and the missile, which complicates their guiagem.

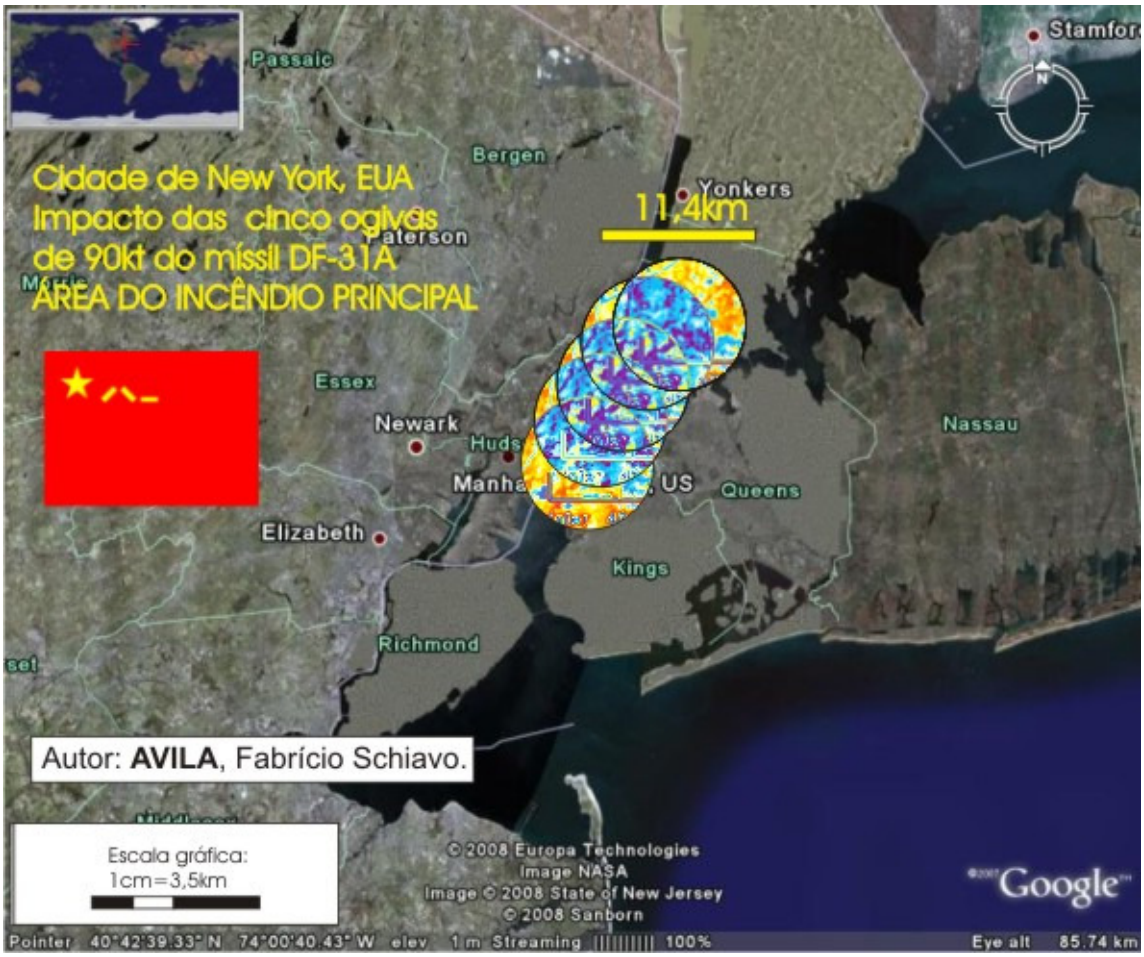

Fig. 31: Simulation of the area of the main fire.

[82] **SAR** — Synthetic Aperture Radar.

The figure above shows the simulation of the main area of the fire caused by the detonation of five warheads of DF-31A. The explosion of the warhead of 90kt of DF-31A, uncontrollable cause a fire within a radius of 5.7km from the center of the explosion. The area of the damage of the five explosions added the DF-31A, not enough to 510.09 km². The figure above shows that the fires would not be the main objective of the Chinese response to the attack preemptivo. Compared to Los Angeles, the island of Manhattan could not expand the effects of fires at a distance too great because the water is a natural barrier.

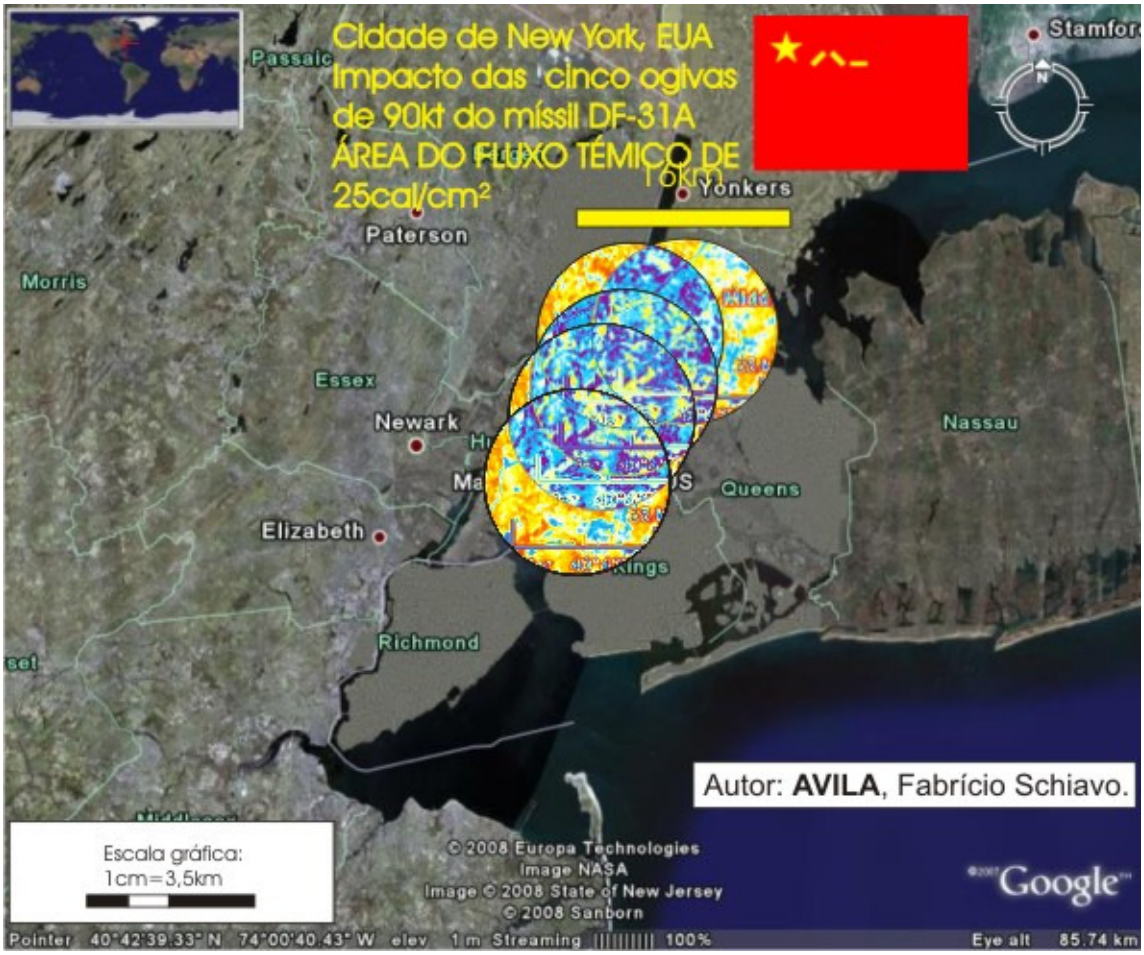

Fig. 32: Simulation of the area of heat flow.

The figure above shows the simulation area to expand the flow of heat 25cal/cm ². This flow question, invariably, third degree burns from reaching the deeper layers of skin, increasing the amount of indirect deaths. Hardly, the civil defense will be able to answer the most affected. Contrary primary observations, that would take into account only the income of warheads, the simulation shows that the areas of the flows are nearly equal.

The simulations show that a previous explosion of the warhead of the missile 4Mt DF-5A reaches a radius of 12.5km (Fig. 23), almost matching up with 8km of 90kt warhead of the DF-31A. This is because the time on the ground of explosions of nuclear devices, is calculated for their effect is exploited to the maximum. A head of DF-5A would be detonated at a height of about 3,500m. The effect of heat flow reaches a smaller area because the heat generated is spread over an area much wider. This explains the 70km across the area of the fire main DF-5A covering an area of 3,846.5 square kilometers. Paradoxically, the five areas, exposed to the flow of heat 25cal/cm², added the warheads of the DF-31A representing 1,004.8 square kilometers. The area is almost double the 490.5 square kilometers of area affected by the explosion of the DF-5A. The official data of the City of New York, in the census of 2006, show an average population density of 10,000hab/km ². Applying this data together the five explosions of warheads of the DF-31A, approximately 10 million deaths would be computed. In contrast to the three to four million dead of the simulation of Kristensen. That is, this parameter can show that the explosion of the DF-31A warheads find more damage that the warhead of the DF-5A. With this, the scan has, instead, the weapons with less weight, but of similar income.

The figure below shows the expansion of the dosage of radiation from the explosion of the missile warheads DF-31A. By comparison, the expansion of the dosage of radiation from the explosion of the missile warhead DF-5A, has a greater width (Fig. 24). A gray cloud of nuclear, represented by the particles ionizadas with the atmosphere, has a maximum width of 60km of the DF-5A in Los Angeles, contrasting with 6km of the explosion of a warhead DF-31A in New York. These particles to contact the upper atmosphere, forming colloids with steam. The colloids are inseparable atomic configurations of solid particles with water. To precipitate the pressure because the temperature in the upper atmosphere, precipitate in the phenomenon known as black rain. If a average wind speed, which in the summer in Los Angeles reaches 24km/h, the radioactive cloud from the explosion of a warhead of the DF-31A covers 70km, approximately three hours. However, the expansion of the dosage of radiation from an explosion of the warhead of the DF-31A, is about ten times lower than the yield of a warhead of the DF-5A. The new missile may show the goal of becoming weapons for use against value, however, using the same precision of an attack against strength, the destruction of specific targets. The simulation shows that concept.

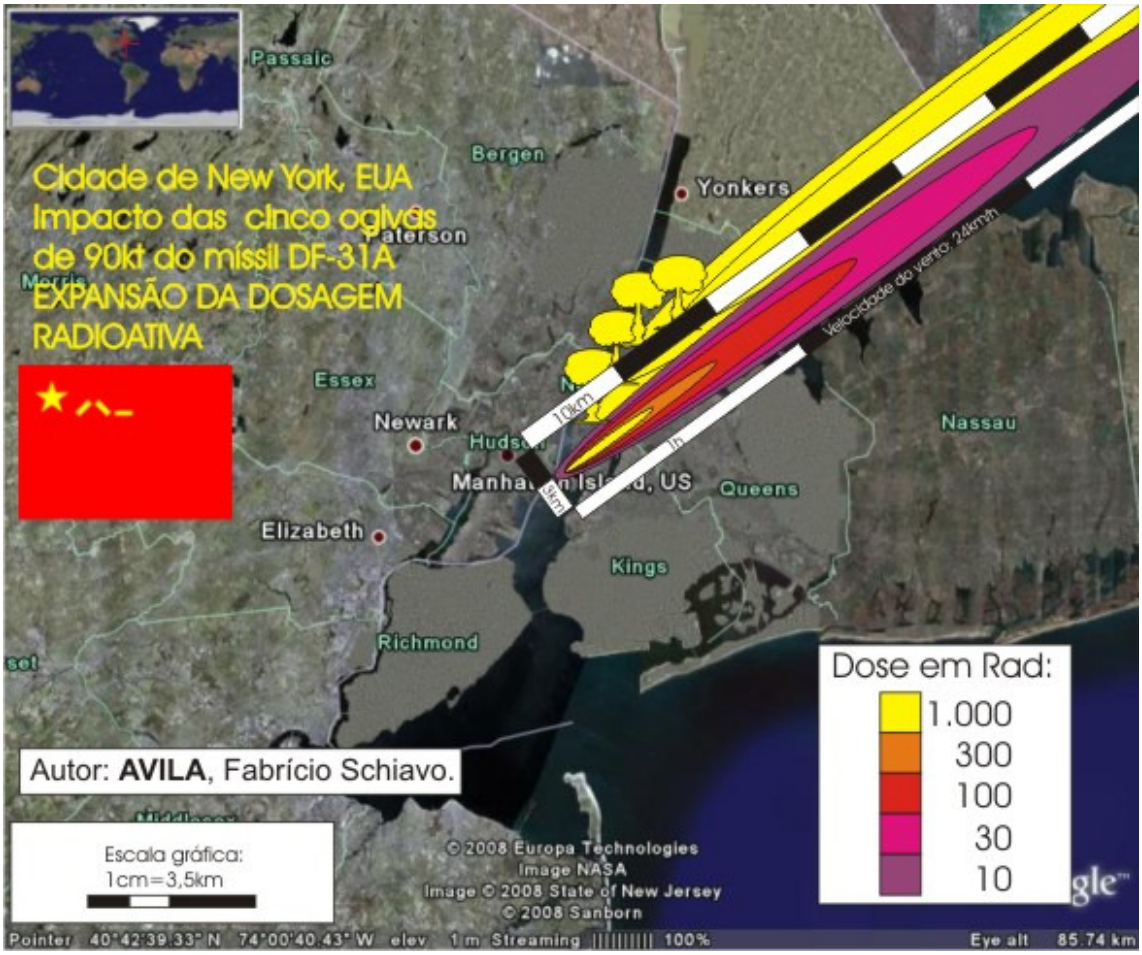

Fig. 33: Simulation of the expansion of the dosage of radiation.

The figure below shows the area under the pressure of 10psi, which is 700g/cm². This type of pressure destroys buildings and structures that are made to withstand earthquakes. Each explosion of a warhead of 90kt the DF-31A exerts a pressure of 10psi in an area of 9,076km². In the area of damage to 10psi pressure of the explosion of a warhead of 90kt the DF-31A is 110 times larger than the area of the collapse of the World Trade Center. The economic damage of an attack would be the same proportion? The financial collapse, of course, would cause a serious economic blow, on a global scale.

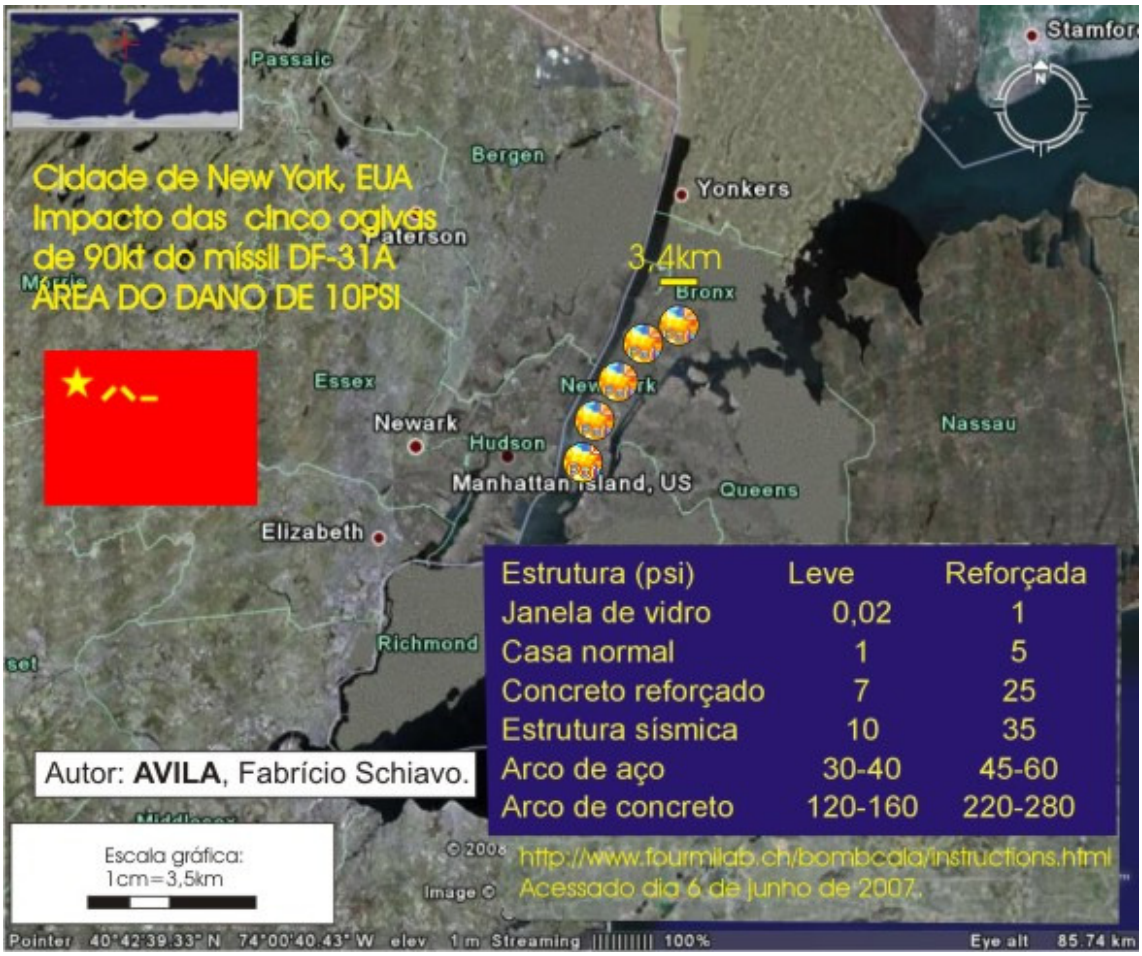

Fig. 34: Simulation of the area-pressure 10psi.

The five combined impacts of the DF-31A warheads, hit an area of 45,373km², approximately. In contrast, the explosion of the DF-5A reaches 120.7km². As a former technology, its high yield of 4Mt was to compensate for their lack of precision in the attack against the force, as in other ICBMs silos. Here enter the new concept of employment of new weapons. The comparative low income and high-precision warheads MARVs of the DF-31A used to attack specific targets such as the financial centers of New York City.

The purpose of these simulations is to show the impact of digitization in nuclear weapons. The example was chosen because the Chinese since the beginning of the decade, the scanning is being put into practice, rightly, as an asymmetric response to U.S. nuclear primacy. As the examples shown in this historical essay, the countries in strategic disadvantage, seek compensation by investing in high technology. One example is the replacement of Chinese missile technology of Soviet-style, as the DF-5A, the DF-31A which contains parameters of performance and construction similar to the U.S. missile.

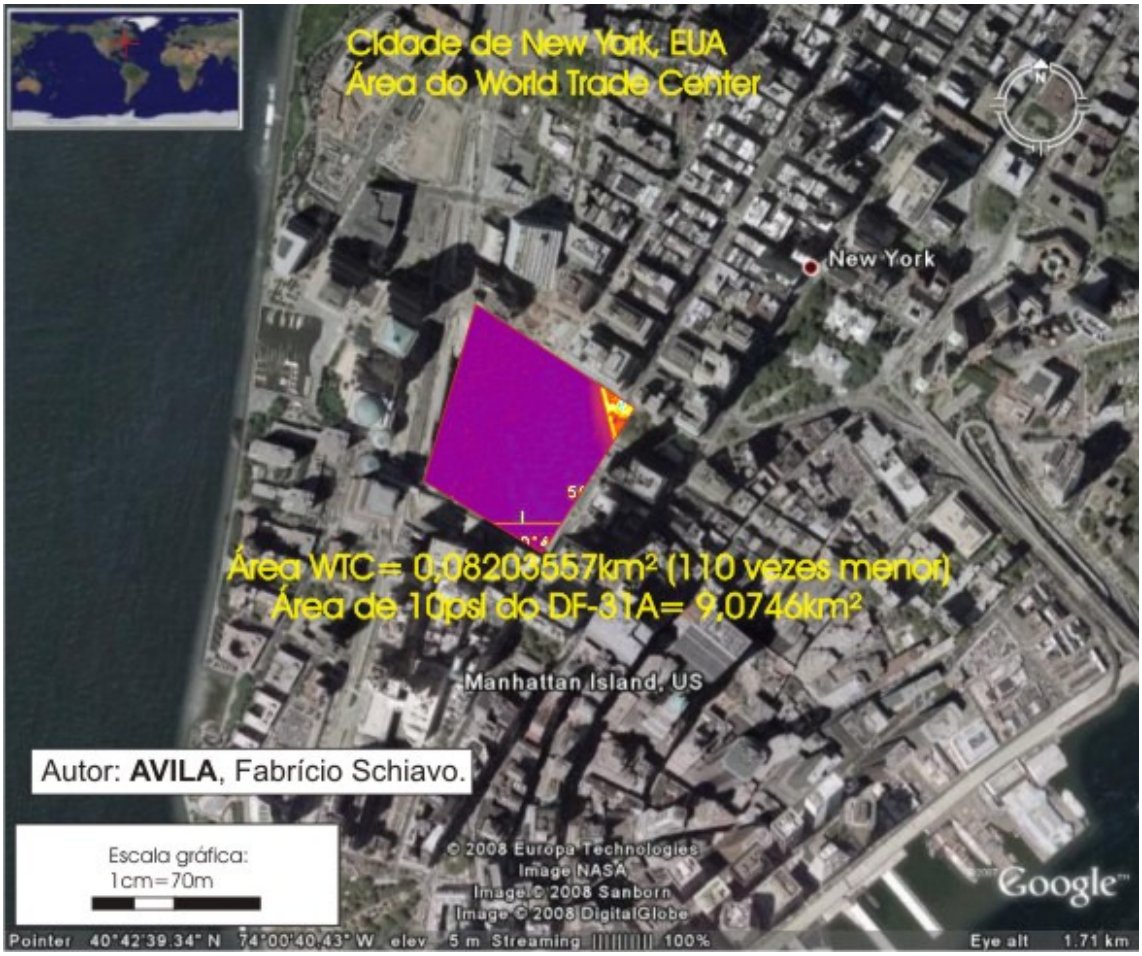

Fig. 35: Comparison of the area of the pressure of 10psi of the DF-31A with WTC ground zero.

The simulation is contained in the figures to emerge doubt the reasons for replacement, by China of a missile warhead of a single powerful 4Mt of the DF-5A, a missile with five warheads yield of 90kt. Obviously, the survival of the defense warheads anti continental U.S. is the main reason. A Chinese response to a U.S. preventive disarmament becomes credible, with solid fuel missile warheads carrying five (MARV) in income of 90kt, than the use of the twenty missiles DF-5A commissioned. Besides the size make the missile DF-5A vulnerable to interception, only his head would not have many chances in reentry.

In summary, the strategic nuclear balance at the beginning of the twenty-first century is being profoundly changed by the digitization of weapon systems, vectors and other systems of command and control of major powers. Whether the latest developments, both in relation to the command of space as on the development of new strategic weapons

systems tend to cancel out the effects of digitization equalizers, or the quest for primacy and unipolarity are likely to result from this new reality still under construction. Preliminarily evaluate these developments is the task of the next chapter.

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IV

COMMAND OF SPACE AND WEAPONS OF DIRECT ENERGY

As can be shown in the previous chapter, the strategic balance between major powers may be profoundly changed by the process of digitization, as improvements in systems guiagem and accuracy of nuclear weapons that allow even a very limited capacity of the second attack could cause catastrophic damage on the economy and the socio-political balance of a country that try to obtain nuclear supremacy by force. This chapter will be developed two themes that make more concrete the possibility that the very quest for nuclear primacy by the United States will result in the consolidation of a multipolar order balanced. This is precisely the impact of the emergence of a new class of weapons with potential strategic use (weapons of direct energy) and the issue of command of space.

In the context of a dispute that has developed since 2007, Defense Minister of Russia said in February 2008 that the U.S. plans to overthrow a spy satellite the U.S. at the end of its useful life that Washington would actually try a anti-satellite weapon (ASAT).

Besides, the Russian criticism should be considered in the context of the refusal of Washington to discuss the Sino-Russian proposal for an international treaty banning weapons in space, basically repeating the stance already adopted in 2005 by the U.S. government and Israel. The joint proposal of the governments of China and Russia was made at the plenary session of the Conference on Disarmament held by the United Nations in February 2008 in Geneva.[83]

The fundamental reason for a treaty banning weapons in space is as unlikely at this historic moment is that the ongoing transition of power in the international system depends largely on the ramifications of a dispute over the command of space and the uses of new strategic weapons of direct energy.

By command of space, that is about the control of commercial space for civilian purposes, commercial, military and intelligence. (...) Command of space does not mean that the opponent can not act, only means that the enemy can not interfere, seriously, in the actions. Additionally, the Command of the space is usually in dispute. "(Klein, 2004: 67). Here corbettiana, the command of the space involves activities and operations in

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[83] Original font title: *Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects*.

space, using space platforms. These actions have direct implications for national power, both in peacetime and in time of war, which include elements implications diplomatic, military, economic, technological and informational. There is a great emphasis on the interrelationship between the military operations in space and other national political interests. Any foray into space, even a small, can impact directly the balance of international power. Ie, operations in space are interdependent performed in environments of air, water and land. The war in space is only a part of the strategy and operções ball in time of war. The space forces must operate together with other military forces.[84]

So, without forgetting that military operations are only one of the dimensions of the space command, or that the technologies involved in the process of digitalization have clearly military and civilian uses that increasingly united the economic, political and military in the contemporary world, the rest of this chapter will be presented briefly the characteristics of military operations in the space of wars was a fourth-generation (section 3.1), the advent of weapons of direct energy (3.2), the differences between the two basic types of weapons of direct energy (laser HPM and in section 3.3) and the strategic use of weapons of potential energy and its direct impact on the distribution of power in the international system (section 3.4).

IV.1 - The War in Space and the Digitalization

During the Cold War, the space has become important in the sphere of strategy. The concept of deterrence based on the observation of the commissioning of weapons estratégcas through satellite-based sensors for monitoring and communication systems. Currently, the aerial surveillance can be done without the risk of implications in the sphere of strategy in most regions. UAVs operating at a high altitude, have a performance similar to satellites. These aircraft can still be used as wireless relay of data, allowing a communication beyond the horizon. Digitization has made available for many countries the use of high technology resources with relatively cheap. The operations of the navy of Iran is a proof.

Despite the spreading use of scanning technology, the command of the area has a unique feature - the free provision, and continuing coverage of a persistent, indeed, global. This continues to offer great advantages for the war of expeditionary troops, as the fight against terrorism and other examples of environments of asymmetric warfare. The concept

[84] About the Julian Corbett theory, see.: PROENÇA & DINIZ & RAZA (1999).

of active control of a global strategy of containment ploriferação of weapons of mass destruction (WMD - Weapons of Mass Destruction) would have been unthinkable before the era of command of space.

From a rational perspective, the strategy of the activities in space have changed significantly. The value of the control of space is derived from its role of support for the elements of military and political nature beyond the reach of their respective tasks of defense and security. However, its capacity should lead to consistent use of different technologies, military and scientific. The main challenge is, currently, the best use of space platforms in each specific type of operation in the area of defense and security, supporting and sharing responsibility for the intelligence, warning and rapid response, even in a campaign against another eventual power.[85]

The benefits provided by operating surveillance systems, reconnaissance and intelligence satellites of signals (SIGINT) is still limited and designed for the demands of the Cold War. Over the past eight years the United States is trying to define and develop the space of comonentes its future architecture of a fully integrated control. The goal is to replace the current system of satellites for more versatile equipment that costs less. This implies the principle of mass around the war in space. These same costs involved in the miniaturization of devices for the possible use of elements of war in space tactical level. The promise is the integrated operation of the network space with tactical UAVs and other systems. Currently, the U.S. military planning for communications in space, remains in large artifacts that consume large periods of testing and construction. Other countries, like China, can achieve a much more favorable position with the launch of small satellites for the use of communications technology, together, do not even have the tradition of space exploration. The barrier is still princpal in civil infrastructure of the country to use such technology. The requests usually are the installed capacity of communications networks for high technology, capacity development and production of advanced electronic componenentes; qualified and trained professionals in the country and on an interpretation of the capacity for coordination of operations. If these decisions are found in a country, even of modest resources, the space can count on other actors.

Meanwhile, even with the debate on horizontalisation caused by scanning in command of space, the issue is not yet the proper size in the institutions of the countries, especially the United States. Part of the discrimination is, the ratio of high investment, with the possible failures in the development of new technologies. As an example, the failure of

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[85] **Cf**. IISS (2007). Military Space and Netowork-Centric Operations.

the second flight to launch the Japanese reconnaissance satellite in 2003, eroded the political support for such ventures. Even the U.S. policy since 1993, to deliberate marketing world of images, high resolution, satellite, inhibits investment in other countries to build their own network of surveillance.

Often, the launch of satellite is only one dimension of the space command, despite being the most stressed. For a truly operational use of outer space, the country needs a capacity to maintain the satellite in space and communications systems based on land that garamtem its effectiveness.

On average, life expectancy of the satellites is fifteen years. The fatigue of the material is one of the factors. For example, one type of satellite that requires a replacement is often a low orbit, which, by its low altitude, you need to maintain a high speed does not return, wearing the device so irreversible. Another factor is the overcoming of the technology that makes the device obsolete. The impact of direct costs may decide the implementation of a constellation of satellites for guidance as the U.S. GPS and Russian Glonass. Therefore, the Chinese decided to do a type of use compatible with other existing ones, to launch the Beidou.

Possession of satellites is still considered a symbol of status for many countries, which can lead China to another type of position in the international arena. However, in the current context of the concept of combined operations in all spheres, the importance shifted from satellite systems operating as for the interests of the network of information. For example, certain types of communications platforms require space for the fulfillment of their mission. But now it matters little who owns this type of technology, because the Americans themselves benefit many countries with classified information. If on one side the Americans try to obtain funding for their projects, sharing costs with other countries, nothing prevents the same countries can pass information to others in times of crisis. Given the huge asymmetry between the United States and its allies, this type of approach if it is delicate.

One example is the implementation of the constellation of satellites of the type German SAR-Lupe. This platform is expected to give a decisive contribution to the capacdades European security, defense and intelligence cooperation. A major problem is the threat, perceived by Americans in Germany to unify Europe with the means of payment, the Russian military as a partner, showed how the joint military exercise between the paratroopers of the two countries. This network of satellites can enable Europe to conduct military exercises in the division level. But the monopoly of the infrastructure of command, control, communications intelligence (C ^{3} I), is in charge of NATO. The

American release only part considered essential for the maintenance. Knowing this, French and Italians are investing in projects of satellite surveillance and communication that have interface with the German system. Meanwhile, England and the Netherlands announced its intention to participate in the program and improvements in the frequency of American EHF satellites, which allow for secure communication. Despite the European governments adopt a cautious stance on the military use of civilian platforms, by comparison, in Russia it is impossible to do so. Response to natural disasters, humanitarian missions, coast guard and border guards need a militarized structure. The Galileo positioning system can create a civil-military interface, even being created, initially, for the marketing of data. The reason is the high cost of the platforms they need to have more than one use and the political risk of encouraging the militarization of space. The United States make use of space platforms for military and civilian use.

The new technologies raise a debate on the new risks and vulnerabilities. In an environment of interconnected infrastructure that sends data to the entire globe, using satellites as relays, the vulnerability increases significantly. The Americans are concerned with a preventive strike on its platform space, especially after the Rumsfeld Commission report of January 2001. The paradox is that the possibility of a U.S. preventive disarm the Russian and Chinese raises the same if the space is militarized.

IV.2 - The advent of weapons of direct energy

The advent of the direct energy weapons (lasers and high power microwave) tends to produce effects which are strategic in contemporary international system. More than a technological innovation point, the emergence of this new type of weapon occurs in a context of three macro-transformations that characterize our times: the transition of the energy matrix (overrun of fossil fuels), the demographic transition (in the scale of billions) and a technological transition (digitization of knowledge and industry). As these transitions produce profound results, but still uncertain of the ecological point of view, economic, political and institutional (see the processes of regional integration in progress), the new strategic weapons also tend to change the distribution of power in the international system, even that the direction of this transformation is still controversial.

A more precise reason for the Russian reaction was presented by Alexandr Jramchijin (2007), an analyst at RIA Novosti news agency. The author claims that the batteries to be installed in Poland in fact not be a serious threat to Russian nuclear forces. The biggest problem would be to the radar station on Czech territory, because it could

monitor the airspace by Russian Moscow. Sooner or later, Jramchijin reason, this monitoring would be accompanied by the military means that would allow Americans to take advantage of the new informational advantage. Anticipating this possibility, the Ria Novosti analyst believes the most likely trigger a new arms race. If this happens according to what was the quest for strategic parity during the Cold War, the limits, Russia tend to collapse as a state project, and obtaining nuclear primacy of the United States would be achieved at the beginning of this century.

Thus, due to the prohibitive costs of a new nuclear arms race, the more likely response from Russia to attempt a more definitive U.S. nuclear primacy in obtaining the type would be asymmetrical, using nuclear and conventional means, military and economic, to make front of the U.S. NMD.

They include high-tech weapons, able to strategically use the electromagnetic spectrum, which only had access to Russia after the collapse of the Soviet system, when its technology to companies began to integrate to capitalism and were present in areas of high density technology, such as Silicon Valley in California. Indeed, both the armed forces of Russia as those of China passed, recently, to use digital technologies previously available only to the United States, which had a decisive impact on the American victory in the Cold War.

The most important systems that characterize this border war digital technology are called directed energy weapons or direct (Directed Energy Weapons - DEW). This is a generic name for various types of weapons they use parts of the electromagnetic spectrum (above a wavelength in the range of lasers and microwaves) for military purposes directly related to the use of force, directing energy to power much higher than the powers applied in domestic or industrial (Beason, 2005, 21-29).

The Russians already incorporated their arsenals since the beginning of the decade, weapon systems, high-power microwave (High Power Microwave - HPM), both in ball tactics, with the system Ranets-range and up to 15 km, as in the sphere operations, with the system, and Rosa, which has range of up to 500 km. According journalists specialized in the war industry and sources within the company exporting the new weapons systems are capable of destroying the integrated circuits and chips for radar, missile cruisers and aircraft (Rosoboronexport, 2001; Stratmag, 2001).

Two events suggest that these directed energy weapons also tend to have a prominent role in the sphere of strategy: the test of a Chinese anti-satellite weapon (Anti-Satelllite Weapon - ASAT) in January 2007, with clear implications missile, and also

reports that in September 2006, China had tested the high-power lasers to try to blind satellites for surveillance and reconnaissance in the United States (Stokes, 1999).

Therefore, the Russian diplomatic reaction in 2007 is hardly the only part that the media characterized as a maneuver to Putin to win the elections for the Duma and preparing his succession in 2008. The foundations of this reaction rather live in the dispute on the possibility or otherwise of the United States to obtain nuclear primacy and are a unipolar distribution of capabilities in the international system over the coming decades.

The evolution of the control of nuclear weapons and schemes associated with these controls seemed to summarize the research inherited agenda of discussions on nuclear deterrence in the 1990s (March and Almeida, 2006). A breakdown of the important discussion about the desirability or otherwise of horizontal proliferation controlled was the role of deterrence of chemical and biological weapons (WMD) in relation to the nuclear arsenals of the major powers (Sagan and Waltz, 1995; Lavoy, Sagan, and Wirtz, 2000; Rajain, 2005).

However, the development of national defense of anti-United States (National Missile Defense - NMD), and the development of the tense political and military relations between this country, China and Russia, are still recent events that have placed on the agenda again, the reflection on the conditions of possibility of deterrence. A deterrence-based strategic nuclear forces both protected (hardened) and dispersed (mobile) enough to make a credible threat of punishment in response to an aggression.

As in the Cold War, the beginning of the XXI century this response capacity is still possible by operating a triad formed by ICBMs, SLBMs and strategic bombers. However, the digitization, the emergence of weapons of direct energy, systems for guiagem, control, communications, it could not fail to raise questions about the place of this new class of weapons in what some call the Revolution in Military Affairs (RMA).

The literature about the so-called Revolution in Military Affairs (RMA) is huge and controversial and whatever aspect which can be solved using as your gateway to it (eg communication technologies, information or weapons of war direct energy) tends to generate many other possibilities for research beyond the topic of this article.

A more focused use of the literature on RMA could consider the parameters of the different armed forces about the scope, lethality, speed and potential to obtain information on targets of conventional weapons throughout history, applying them to the development of systems of nuclear weapons of war. Moreover, in Baylis et all (2006:107-110), rather than a new technology or weapon alone create a revolutionary rupture with the past, which seems to indicate the breakdown is actually the integration of new weapons systems in

terms of employment and operational doctrines for new weapons combined. Earnings before transformational (as opposed to gains scalars) in scope, lethality, speed and details of new offensive weapons made over the past centuries, the armed forces which are not adapted quickly were punished on the battlefield with increasing severity.

The more lethal weapons have become and the more capable they have become the target of acquisition systems, have become more demanding of deterrence and the countermeasures to prepare for a defense proficient in terms of coverage, disinformation, combined arms and suppressive fire. The more rapid and greater scope became transport systems and vectors of attack, became more potentially catastrophic failure to adopt a defense in depth and maintenance of large stocks with relatively high levels of readiness.

The theory of the so-called fourth generation of war out, in a complementary manner, the role fulfilled by the communication and information capacity in a possible RMA currently underway. For Szafranski (1995), for example, to date there were three kinds of war. The war defined by the human body (infantry), the war defined by the power of fire (artillery) and the wars decided by mechanization (armor, aviation and marine). The war would be the fourth generation of war defined by the use of computer and network.

However, here the literature of Revolution in Military Affairs to serve two essential purposes: apart from pointing out the role of technological changes that are linked to base the weight of increasing knowledge and awareness in the cycle of praxis, it also enables a rigorous critical analysis on how to integrate new weapons systems in projects of power, doctrines and tactics.

In addition to providing parameters for an assessment of the potential for technological breakthroughs presented by weapons of direct energy in the performance of other conventional weapons systems and nuclear, the two bodies of literature (Theory of deterrence and RMA) seek to explain how a system of weapons any reaches to become a gun-master. One should take into consideration that the concept here is used differently in the way he was used by Fuller (1966:235-239) to defend the role of the tank in the ground war, or by Seversky (1988:270-274) to advocate the role of the airplane as an instrument of decisive victory in the Second World War.

Indeed, as occurred with the tanks and aircraft, weapons and laser HPM (DEW) will not abolish nuclear weapons and their vectors, or even many of the conventional weapons systems currently prevailing. But, and this is a hypothesis to be tested in larger studies, the DEW tend to be weapons of deterrence and operational employment of the more credible that nuclear weapons, allowing more control of the human costs of war. But also have economic costs and technological barriers to access lower than the thermonuclear

arsenals combined with other capabilities of the weapons could have a direct energy horizontalizar and equalize the competition in the sphere of military strategy, a stable distribution of power in the system more balanced multipolar internationally.

The U.S. nuclear primacy, even if it were to become effective, would be sufficient to sustain a unipolar distribution of power. The missing element in the evaluations of authors such as Presser and Lieber (2006) is that new weapons systems for direct energy, integrated into new concepts of employment and power structures that include some capacity for the second thermonuclear attack, restore the ability of Russia dissuasive , China and regional powers and would correspond to a distribution of power more balanced multipolar (Walling, 2000).

IV.3 - Comparisons between the laser and the HPM.

Basically, the laser and high power microwave (HPM), are lights. The visibility of the laser is the main difference in the HPM. The electromagnetic spectrum shows the different types of existing frequency.

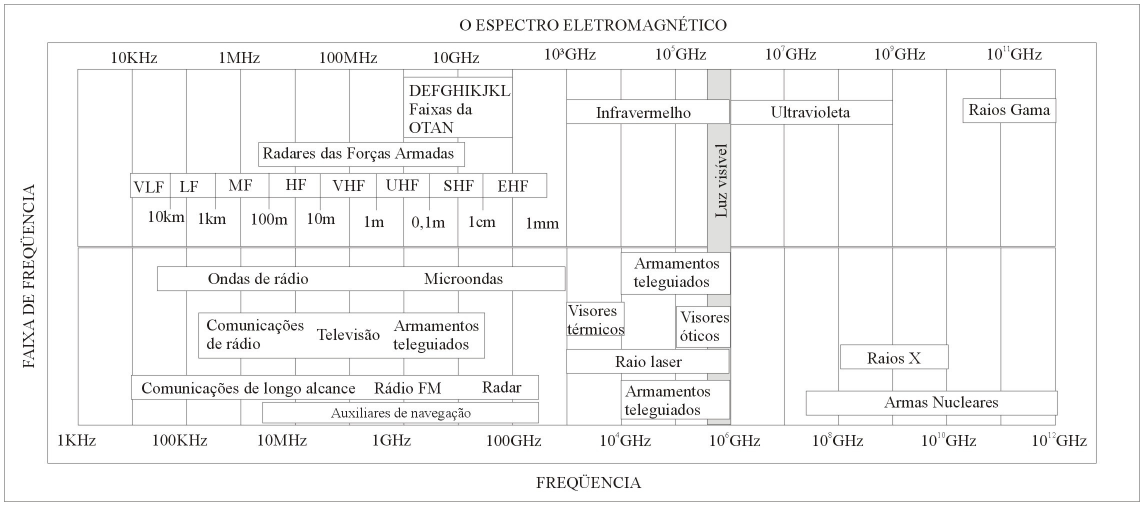

Fig. 36 - the electromagnetic spectrum.[86]

The same light when excited to fequencies above 10^3 GHz, it is laser, below, HPM. These differences reflect initial comparison across.[87]

[86] **Font**: **RICHARDSON**, Doug. ***Guerra Eletrônica. Vol. I.*** São Paulo: Nova Cultural, 1986. p. 21-22
[87] GHz: matches the frequency of billions of cycles per second.

Diference between HPM and *laser*		
	Laser	**HPM**
Velocity	Light	Light
Trajectory	Line of sight	Line of sight
Range	Kilometers	Meters
Power	Megawatts	Gigawatts
Wavelength	Short	Long
Wave	Coherent	Incoherent
Military purpose	Point	Area
Targets	Equipaments	Eletronic equipaments
Lethality	Burn	Shock
Font: **BEASON**, Doug. ***The E-Bomb***. Cambridge: Da Capo Press, 2005. p. 57.		

Tabela 4: comparison between laser and HPM.

One of the first relationship is being established between power and frequency. Generally, the higher the frequency required for the use of an electromagnetic equipment, the more power it will require. However, that power also has relationship with the scope of the arms. The applicability of the laser is the point of defense against ballistic trajectory of projectiles. However, the HPM was made in an attempt to play the nuclear pulse. In nuclear explosions, billions of watts are released without any control, causing effects on electronic equipment. Some are reversible, others not. The HPM has the characteristic of release, in an explosion, gigawatts[88] of power in nanoseconds [89]. This pulse is from 200Mhz [90] to 3Ghz. An example of its applicability in the sphere of tactics and operations, are the bombs MK. 84, for general use, launched air and also in the JSOW.

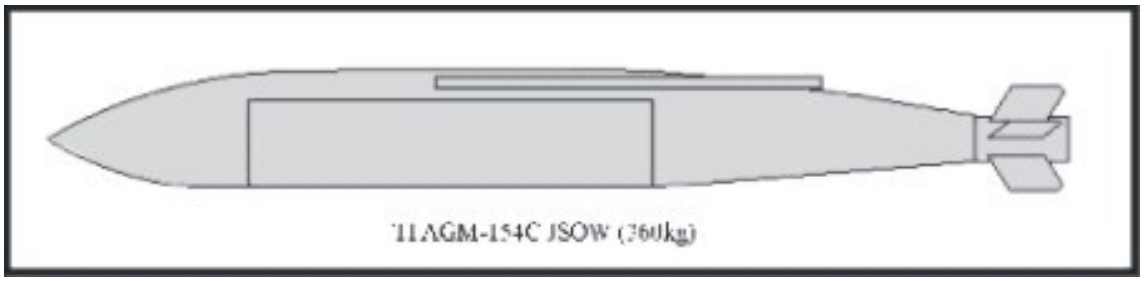

Fig. 37 - Missile AGM-154 JSOW

[88] Gigawatts — Billions of Watts.
[89] Nanosecounds — Corresponds to a second divided by a billion ($1x10^{-9}$s).
[90] MegaHertz — Million cycles per second.

These bombs are released from their planes flying, usually at a maximum altitude of 12.16 km, when up to 138.9 kilometers in range. When they arrive close to their target at a low altitude, explode and release very much power in a short time. This reaction is harmless to humans, however, damage to equipment eletromaganéticos may become irreversible.

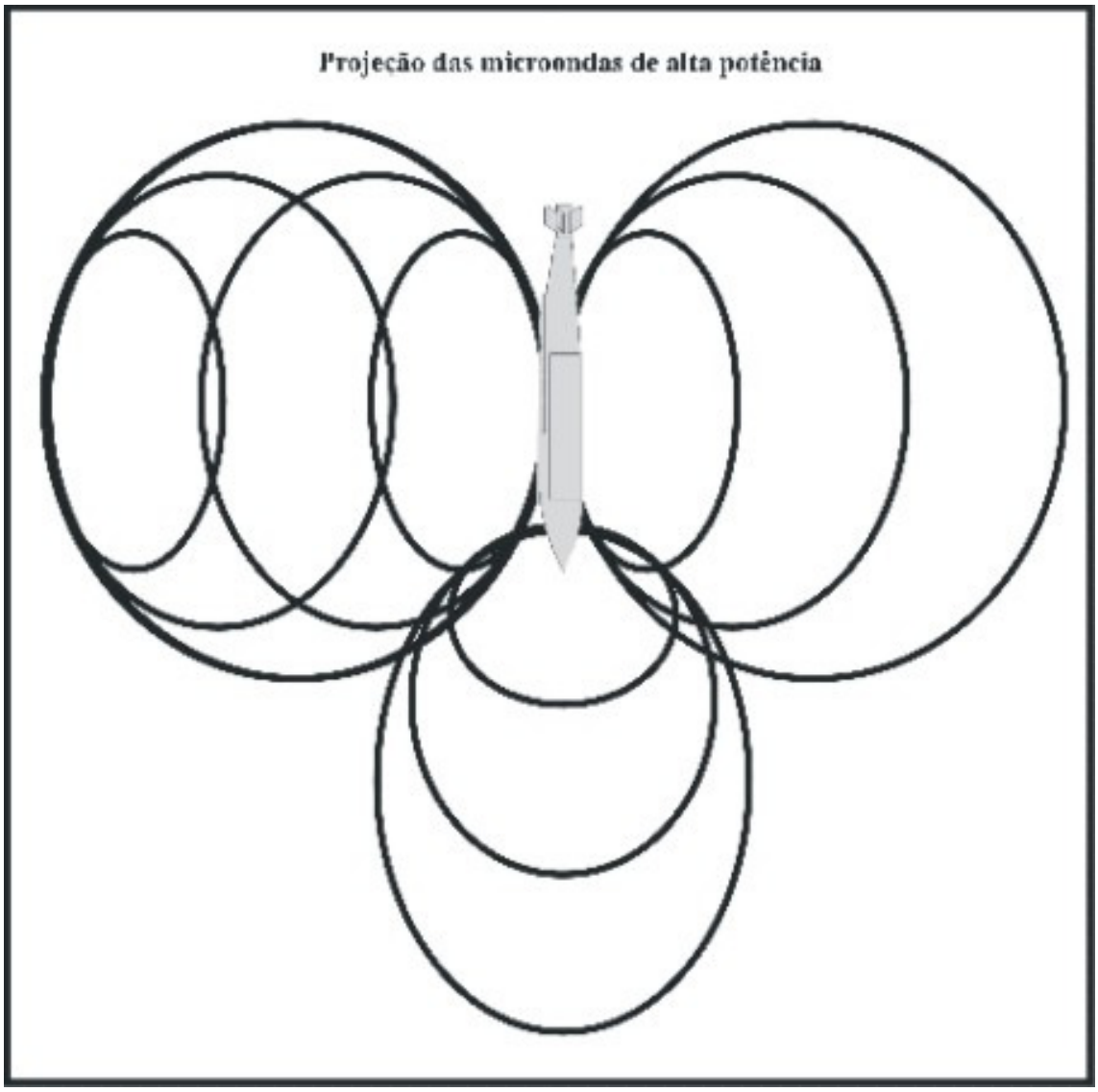

Fig. 38 - operation of the HPM in JSOW missile.

In the center of the pump, a generator of compression flow. At the time of detonation, the generator compresses the flow of chemical components in an existing pipe, as if the energy of a stack was released in a very short time. As the figure above shows, the rays are released to the inconsistent pattern of light, ie its ability to focus is very low. Post this, do not have the same capacity of the laser beam in intercepting or attack targets with precision. The saturation of microwave in a specific area destroys the

networks of communication tactics, command and control (C^3). In a fourth-generation warfare, where the network is a key component, the possibility of destruction of electronic components makes it once more plausible for the lifting of the direct energy weapons such as gun-master of the future.

IV.4 - Implementation of the DEW into strategy sphere

Carlo Kopp already see the applicability of weapons of direct energy in the sphere of strategy, as shown in the diagram below:

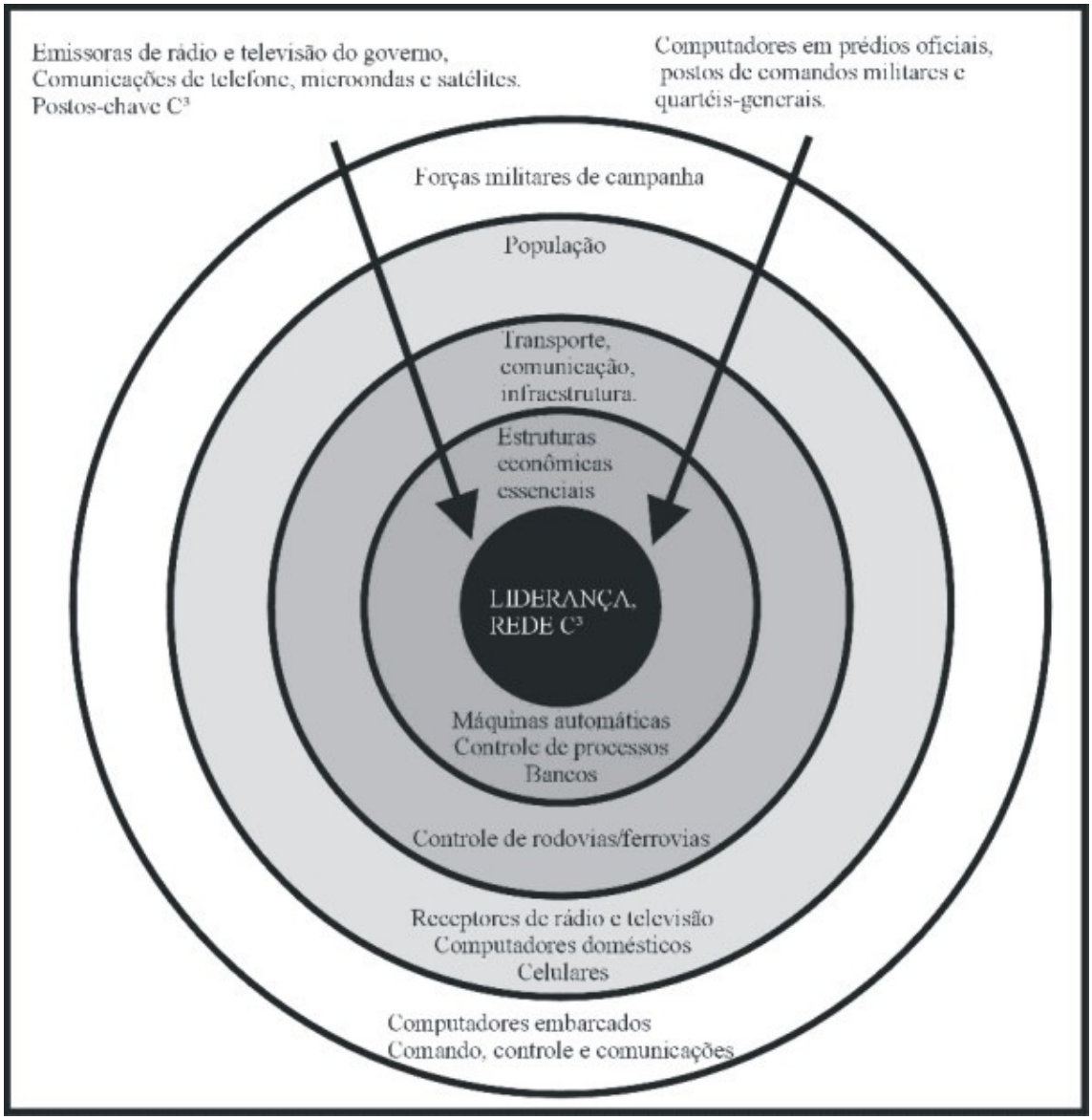

Fig. 39 - applications of HPM

In the sphere of strategy, weapons of power have a direct factor in the effort to paralyzing war enemy. Kopp, divided into five constituencies applications of weapons of direct energy in the sphere of strategy.

The first group concerns the application of weapons in troops in campaign, where the battle of tactical laser (MTHEL) can intercept joint artillery shells, in the sphere of influence tactics. And the bombs loaded with HPM launched from the aircraft can destroy tactical communications networks, influencing the sphere of operations.

The second circle, with respect to the population, where the HPMs can paralyze the functioning of receptors domestic television and radio as well as frustrate the cell phones. The third circle shows that the effect on the transport of the country may have attacked a major impact, if they were attacked their central control. The fourth circle refers to a financial paralysis if attacked its banking network. The effort of war is very committed to the financial disruption of the country. And the last circle is the central command, with regard to the whole network C ^{3} at the national level.

That is, in the strategic sphere, the use of weapons of direct energy can bring to the collapse throughout the country attacked, as if it had been shot by a nuclear attack. But the threat or use of new weapons of energy have a direct political cost infinitely less than deterrence based on nuclear weapons because the low, both for civilian and military are, comparatively, negligible.

CONCLUSION

The completion of the work points to much greater difficulties than those provided by Lieber & Press (2006) to obtain priority by the United States. Moreover, research shows that the very maintenance of priority, should this be achieved, it would be untenable. Even accounting for a larger number of nuclear warheads, conventional weaponry and early warning systems, the United States should take into account the Russian and Chinese response, which was secured with the commissioning of new missiles.

Analyzing the twentieth century, the work showed that high technology was a response to the applicant asymmetric threats. During the Second World War, the British searched the area of communications and guiagem the bombers and the Germans invested their capabilities in research and development of ballistic and cruise missiles in addition to new types of aircraft, taking advantage of its installed capacity of fine chemicals.

After the war, the nuclear weapons that showed the same pattern of asymmetric response continued. This time, the Soviets used all its capacity to launch its space race. Behind this maneuver, was the research and development of ballistic missiles. The same rocket that carried the equipment to the outer space, delivering nuclear warheads to attack the United States.

The control of outer space began to increase at the end of the sixties until the collapse of the USSR. The United States began to diversify the application of existing technology. There were various types of satellites, anti-satellite missiles, ballistic and warning systems.

However, the end of the Soviet Union changed the international political context without the platforms of arms had been radically altered by the deepening of digitization in this decade. Paradoxically, the article by Lieber and Press (2006) helped to raise concern about the nuclear weapons and the primacy of the United States not only between the Russian and Chinese elites, but even among the scientific community and citizens of all countries.

At the time of the end of the Cold War, the debate on the Terminator took account of network news. The fear of a catastrofismo was the central theme of the media. With the collapse of the Soviet Union and the number of arms control treaties, the nuclear weapons seemed doomed to oblivion of history. Nevertheless, the Russians inherited warheads and missiles from the USSR, India and Pakistan have become nuclear powers recognized, the

United States launched the National missile defense (NMD) and new technologies in Russia and China put the debate on the strategic weapons in the center reflection on the distribution of power in the international system again.

The dissertation shows that the impact of digitization in the sphere of strategy makes multipolarity irreversible by the fact that the new missiles, Russian and Chinese, provide a dissuasive capacity capable of preventing the United States win the primacy of nuclear and keep it. The simulations of the impacts of new calculations in American cities as New York and Los Angeles showed the security of the Sino-Russian response to a U.S. attack preemptivo.

The first simulation, the attack on Los Angeles with a missile Chinese DF-5A of 4Mt, are based on the calculation of Kristensen and Norris (2006). The originality of this thesis lies in part in the simulation of a missile attack with Chinese DF-31A, five of 90kt warheads, against the city of New York, clearly demonstrating the impact of digitization in the nuclear sphere. Although the yield is apparently much lower, the MIRV capability of the DF-31A and its power can destroy the city of New York and produce a global financial collapse. Another dimension of the simulations is to break the idea of catastrofismo prevalent in the 1980s, where strategic nuclear explosion would bring the end of civilization.

Furthermore, the thesis also discussed the new weapons of direct energy and its possible application in the sphere of tactics and strategy. The weapons based on laser and microwave high power tend to change again to make war in the coming decades. The horizontalisation dissuasive capacity provided by the composition of conventional forces and weapons of direct energy brought the prospect of access to strategic weapons by nations that do not have or want to have nuclear, chemical and bacteriological.

Most countries do not have capacity for steel, chemistry and technology of communications for the construction of ballistic missiles, even having access to nuclear technology for military use. One example is North Korea, whose threat of its missiles to Japan was never credible military point of view, being an instrument of diplomatic pressure rather counter-productive.

The use of new technology trends presented in accordance with the capacity of countries. For example, while Iran may use the new weapons to defend itself from invasions, the United States may direct energy commission of weapons platforms in space, and space stations artillery, utilizing the research of existing technology.

Therefore, it is not to say that the future distribution of power in the international system presents a clear outline and pre-determined, but rather to demonstrate that

multipolarity in this historic moment has become irreversible in that the scanning reduces their costs and horizontalizou dissuasive capacity of the three major powers discussed in this work.

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