"WEAPONIZATION" VS. "MILITARIZATION" OF SPACE

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Space as a Sanctuary

Currently, space is not weaponized. There are no weapons deployed in space or terrestrially (in air, sea, or on the ground) meant to attack space objects, such as satellites; nor are satellite weapons deployed against terrestrial targets. At the same time, space is an increasingly vital part of our military activities from which the US obtains great advantages with respect to other nations. We use space for communication; for surveillance and targeting over the battlefields; for weather prediction; for precise mapping and positioning of our own and opposition military assets; for early warning of missile and air attacks; and for general military, economic, and technological intelligence worldwide. Thus space is "militarized" though not yet "weaponized."

Civil society also makes great use of space – for communications (internet, radio, telephone, TV), navigation, search and rescue, weather, resource and environmental mapping, astronomical and terrestrial research. Because of the great technological and economic strengths of our society, our civil society – like our military – gains relatively greater benefits from our use of space than do our competitors.

Thus *space is a de facto sanctuary* – a region in which we further our competitions, military and otherwise, with other nations, but without actually fighting. In both war and peace, US satellites vitally aid our military – and our civil society – in inflicting and avoiding damage without being under threat themselves. Other nations acquiesce to this sanctuary because they also benefit from it (thought not as much as we).

With some exceptions (e.g., the Reagan presidency), treating space as a sanctuary has been the policy of all US administrations from Eisenhower to Clinton. All other nations have concurred, and still do. For example, both China and Russia have recently introduced space sanctuary UN resolutions backed by over 100 nations. The US has become one of the very few opponents of such multilateral diplomatic activity. In fact, the present administration is pushing hard for the opposite, for the weaponization of space:

"America's interests in space are to: Develop and deploy the means to deter and defend against hostile acts directed at U.S. space assets and against the uses of space hostile to U.S. interests . . . weapons systems that operate in space . . . Power projection in, from, and through space." (Commission to Assess United States National Security Space Management and Organization [The "Rumsfeld Commission"], Executive Summary, 1/11/01, pp. 15, 16.)

What's Up There Now? What Could Threaten It?

Since the beginning of the "space age", roughly 5400 man-made objects have been placed in orbit around the earth, 1500 of them by the U.S., 3100 by the S.U. and its descendents. Some 580 of these satellites are believed to be still functioning as they were intended. The military have 87 of their own satellites, as well as full access to the remaining civil and mixed-use satellites.

About 270 of these functioning satellites are in LEO - "Low Earth Orbits". This region extends from the "top" of the earth's atmosphere (below which satellites would burn-up too quickly due to atmospheric drag) to the bottom of the Van Allen belts (where radiation damage may shorten satellite lifetimes), from about 100 kilometers altitude to about 1000 km. At present this region contains at least 24 U.S. military reconnaissance, electronic intelligence, and meteorological satellites – such as the Navy's GFO 1, NRO's Lacrosse and E-300 series, and the Air Forces DMSP set. France, Israel, and Russia have similar military satellites in this region, which the Russians also use for tactical military communication and navigation. In the future, the U.S. plans to place the "SBIRS Low" (Space Based Infrared System Low) network of two dozen infrared missile-tracking satellites for "TMD" and "NMD" (Theater Missile Defense and National Missile Defense) in this region. (Severe delays and cost overruns have cast doubts on these plans.)

Also in LEO are to be found some U.S. commercial systems such as: Globalstar's 48 satellites providing mobile communications (e.g., real time voice, data, fax) and telecommunications; Orbcom's 35 mobile communications satellites (e.g., providing owners the GPS determined locations of their cargo trucks or oil pipeline monitoring data). Commercial remote sensing, environmental and Earth resources monitoring is provided by U.S. companies. Earthwatch, Inc. provides one meter resolution optical images. Orbimage supplies 1-m optical images plus multispectral images of the land and sea; Space Imaging sells synthetic aperture radar as well as optical images for: agriculture; environmental and mineral resource exploration, monitoring, and planning; forestry; ocean monitoring; ice reconnaissance; mapping media; mining facilities management; oil and gas route and corridor planning; urban and land use planning; and disaster management. Similar services can be purchased from the French firm Spot, from Russia, and from others. China and the U.S. operate weather satellites in LEO. Also important for civilians are search and rescue satellites (such as the Russian Gonets), as well as those used for scientific imaging of the earth's atmosphere, land and sea surfaces: passively via infrared and visible light; actively via radar. The 500-ton, habitable, International Space Station is currently being constructed in LEO

It is this LEO region, closest to earth, which will be most vulnerable in the near future to earth-based **ASATs**, "Anti-Satellite" weapons (missiles, lasers,particle beams, etc.), currently under development by several states. For example, the American MIRACL laser has damaged orbiting satellites, as have Russian lasers. The mid-course missile interceptor currently being developed for the U.S. NMD program will be able to target satellites up to altitudes of at least 1200 kilometers. There are many countries possessing IRBMs, missiles having ranges of 3500 km or more; they will be able to reach up to all satellites in LEO. Iraq's al Hussein, a modified Scud-B, could climb to 300 km, enabling it to reach Russia's Cosmos 2370, a military satellite imaging Chehnya. The technical prowess required for great accuracy would not be necessary to harm the targeted satellite: a simple nuclear explosion, or the dispersal of a cloud of pebbles, would suffice to damage all satellites in a large region of LEO for an extended period of time. There is also research underway in the U.S on space-based ASATs – both missiles (e.g., "Brilliant Pebbles" – orbiting, self-guided, self-propelled) and lasers (SBL).

There are some 40 to 50 satellites in MEO, "Middle Earth Orbits", orbiting at altitudes between 1000 and 35786 kilometers above the surface of the earth. Presently in

this region are science satellites (e.g., the U.S. Chandra and GGS Polar, Japan's Halca and Nozomi, Europe's XMM), and navigation satellites (used for personal, commercial, and military transportation as well as for military targeting). The U.S. military/civilian NAVSTAR **G**lobal **P**ositioning **S**ystem embodies 29 of these satellites whereas the Russian Cosmos, Glonass, and Parus series totals 19 navigation satellites; some of these are non-operating spares. Also in this region are some Russian early warning satellites (Cosmos 2361 and the Oko sat). Most of these MEO satellites are in highly elliptical orbits, dipping into the LEO region during part of their travels. During these close approaches to earth, they would have the same vulnerability as do the LEO satellites.

Finally, there are about 300 satellites in GEO**,** "Geostationary Earth Orbits". These circulate easterly, precisely 35786 kilometers above the Equator with a period of 24 hours; hence they remain stationary with respect to any given position on the surface of the earth. At least 29 of these belong to the U.S. military. Other militaries owning satellites in this region are Australia, Russia, and Britain. These stationary satellites serve for communications, relay, earth observation, search and rescue, weather, and research. There are also constantly staring "early-warning-satellites" (such as the U.S. DSP, and the planned SBIRS High, and the Russian Prognos), designed to detect (and initially track) ballistic missile launchings via the intense infrared emitted by their rocket engines. Some examples of U.S. commercial systems in this region are: DIRECTV, Inc. selling direct-to-home TV broadcasting; Echostar, offering business services; GE American Communications, providing broadcasting, telecommunications, cable programming, business services, direct-to-home TV broadcasting, internet access. Intelsat, Lockheed Martin Global Telecommunications, Loral Skynet, Motient Corp., PanAmSat Corp., and WorldSpace Corp sell similar services. Non-American firms selling such services are based in Japan, Germany, Brazil, France, Spain, UK, Korea, Philippines, Argentina, Netherlands, Indonesia, China, Luxembourg, Israel, Norway, Canada, and Turkey.

For the foreseeable future, the only threats to such "far-out" satellites would come either from other such satellites (firing lasers or missiles such as "Brilliant Pebbles") or from the rockets capable of launching such satellites from ground to GEO (releasing conventional or nuclear space mines or gravel clouds). At present only China, France, India, Japan, Russia, Ukraine, and the U.S. possess such rocketry.

Space Sanctuary or Space War?

It should be abundantly clear by now that U.S. civil life and prosperity is bound up with the smooth functioning and predictability of commercial satellite systems (ground and launching stations, satellites, command and control communication links), internationally and American owned and operated. Also increasingly evident (e.g., Gulf War, Balkan Wars, Afghanistan) is the dependence of the U.S. military, and the resultant discomfort of its opponents, upon space systems– its own, and civil ones. For example, many of the aerial munitions used in Afghanistan were guided to their targets by GPS. America's opponents in any future conflict would like to obstruct its use of space. Hence the U.S. would like to protect its space assets while simultaneously hindering access to space by its opponents.

One possible U.S. policy is the development and deployment of *active* defense and offense in space – the ability to conduct war in space. Terrestrial and satellite based

ASATs would be intended to target enemy ASATs as well as the opponent's militarily relevant satellites. If the opponents are not technologically advanced nations (or non-national groups), they will not have their own space assets – just rely upon commercial space systems. Then the U.S. would have no space targets against which to deploy unless it wished to threaten civil space assets. It would then be creating a space-arms-race against itself as well as hindering the development of space commerce – insurance and investment capital does not freely flow to war zones. Such a policy would also antagonize other nations – technically backward or advanced, perhaps creating opponents where none previously existed; no one likes a hegemon. If, on the other hand, the opponent is technologically able to wage war in space (Europe, Russia, China, India, ?), they may respond to a U.S. run in space by competing. In addition to harming civil space commerce, such an expensive race would obstruct the U.S.'s present free ability to use space in furtherance of its terrestrial military objectives. Opponents in such a race would be able to threaten the U.S. with nuclear weapon carrying ICBMs while also endangering its early warning satellites. We would be returned to the terror of the Cold War - without its stabilizing contribution of certain knowledge of the opponent's pre-attack actions.

The alternative is *passive* defense of space assets together with a treaty guaranteeing a space sanctuary (= no weaponization of space). Though an overwhelming majority of nations in the UN (including all of the technologically adept ones, except the U.S.) have expressed support for a treaty Preventing an Arms Race in Outer Space (PAROS), such a treaty by itself would not be sufficient. There would always be fear of surreptitious weaponization of space by the opponent. (Verification would be difficult; it's hard to determine whether what's inside another's satellite is a forbidden weapon.) Passive defense of satellites would include miniaturization, redundancy, quick re-launch capability, shielding, coding and localization of communications links, and the development of alternative means to achieve current space tasks (e.g., high-altitude drone aircraft for communication and observation). Such an approach would also be expensive – but it would further, not hinder, the development of space industry. It would also further, not hinder, international stability.

In as much as an emphasis on commerce, rather than military, has always seemed to be a preferable approach to peaceful and prosperous relations among states in the international system, it would seem that the PAROS approach to space should be the preferable one. At present, the alternative approach, weaponizing space, seems to be preferred by the American administration.

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