

The Militarisation of Space.

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Courtesy Boeing



How can the US Justify the Colossal Costs?

The United States has been openly militarising space since it began development of the Strategic Defence Initiative in 1983. Moreover, as a function of the 'peace dividend', it has been cutting conventional and nuclear forces and concentrating its efforts on economic issues such as the deficit, health care, and reducing taxes. Paradoxically, at the same time, the US has been accelerating efforts in space programmes – especially expensive military space-based surveillance and weapons systems. This article demonstrates that the US has three very good reasons for militarising space: to protect itself from ballistic missiles; to protect its new 'economic centre of gravity' ie a forecast trillion dollars worth of space-based commercial satellites; and, to provide a potent offensive aerospace power capable of instantaneous global projection. The article also raises several penetrating questions concerning the possibilities of a perpetual US hegemony.



The United States Air Force has been operating its Airborne Weapons And Control Systems (AWACS) since the mid seventies. All of its 32 platforms, based on the venerable Boeing 707 airframe have been instrumental in surveillance and weapons control operations throughout the globe. From the Cold War, Grenada, the Gulf War, Haiti, and now in South America fighting the War on Drugs, the AWACS has proven itself to be a champion force multiplier and a cornerstone to any air campaign. During the course of this 25 year period the AWACS fleet often returned to Seattle where, under the care of highly qualified aircraft specialists, it has undergone many classified improvement iterations to its radar, radios, identification – friend or foe (IFF) systems, computer memory and processing, electronic surveillance measures (ESM) etc., and it remains a potent system today.



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However, in 1991, the 707 airframe assembly line was dismantled and with the exception of several radar improvements, there is little in future programmes to enhance, extend or replace the current system.¹ Curiously, the new 767 version of the AWACS, which Japan has agreed to buy is not being considered as a follow-on to the existing USAF platform and is being built for the export market only.² Given the fact that the USAF AWACS have been in operation since 1977³ and can expect to be retired from active service in the not too distant future, and that R&D programmes for a replacement project of this magnitude should have been well under way by now, what is going to succeed this formidable asset? Clearly, the USAF cannot, and will not, allow this capability to atrophy – so what is in the works? Current, open source literature suggests that the next generation will be a space-based surveillance and control system: ‘...the biggest mistake we can make today is to impede our development as a space and air force [General Estes, Commander US Air Force Space Command]... plans are being made to migrate some air missions into space – such as aircraft early warning and control.’⁴

Precipitating from this narrow, seemingly innocuous question, this article aims at conducting the grander investigation into the status of current US space militarisation initiatives with a view to postulating their strategic significance and fiscal justification. The article begins by briefly examining historical milestones in the militarisation of space and demonstrates that the United States is, in fact, turning more and more of its military attention toward Space. For example, the development of the multi-billion dollar, strategic defence initiative (SDI) technologies have quietly continued in the recesses and obscurity of secret military programmes known as the ‘black world’.

The colossal magnitude of funding space programmes is presented as a paradoxical backdrop for the acceleration in the militarisation of space which has occurred at a time when Defence spending cuts have affected the traditional size and equipment of the US Forces. It will be demonstrated that these cuts are so severe that some in US government argue that their Forces will eventually be unable to carry out core taskings. Central to this will be the arguments for the importance of militarising space, and deductions will be made on the extent to which technology has been postured. From that end, a case is made arguing the probability of an omnipotent, offensive, space-based capability – adding punch to the rationale that the colossal costs are justifiable. In addition, as an arguable adjunct, introducing fodder for future research, this article raises the prospects of a future world which no longer sees the rise and fall of civilizations. Instead, a case is made for an evolution, that could provide for a global hegemonic order where no nation or group of nations could ever consider challenging the United States of America. Finally, an appeal is made for collaborative action aimed at tempering the unilateral degree to which the US will take control of and employ the ‘ultimate high ground’.

The militarisation of space can be traced back to 1946 when a group of RAND Corporation scientists published a report which identified the possible military applications of satellites.⁵ The report provided early examples for the use of military space identifying, for example, the use of navigation satellites (GPS) to provide prompt location and steering information for a variety of weapons systems. The report also introduced the notion of an orbiting weapons platform. Other proposed military uses for satellites included locating targets, observing weather conditions over the enemy territory, and the relaying of military communications. Since no rockets suitable for launching a satellite existed at the time, R&D was relegated to the conceptual realm. In 1954 however, as a result of a series of unexpected events – the first Soviet A-bomb test, the Korean War, and the discovery of the existence of a substantial Soviet long-range rocket program, the US decided to move from conceptual planning to applied research.⁶

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On 4 October, 1957, the launch of the first satellite, the Soviet Sputnik, shocked the Americans, prompting them to engage in a frantic expansion of their civilian space program and providing the impetus for the creation of NASA. On the military side, the still very secret military satellite program received substantially increased funding.⁷

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In the fifties and sixties, Mercury, Gemini, and Apollo, along with the corresponding Soviet projects, captured the imagination of the world. Meanwhile, both sides militarily, were launching secret satellites that would soon provide astonishing results in the areas of reconnaissance, navigation, targeting and mapping.⁸ These satellites were deployed by both sides in a balanced fashion and their presence was, for the most part, not considered by either side to be particularly menacing or hostile. Soon however, satellites such as the Soviet ocean reconnaissance satellite (RORSAT), and other systems designed to supply critical information rapidly to tactical commanders came on to the scene and these were clearly seen to be directly oriented towards warfare. Not surprisingly, both sides began to develop systems which could be used in an anti-satellite (ASAT) role to counter the other's space-based assets. The Americans were particularly motivated in their ASAT efforts for two reasons; first, the Soviets were developing an orbital bombardment system which deployed bombs on satellites in low orbits which either exploded in space or were released and detonated at specific points on the ground. Second, in 1961, the Soviets exploded an extraordinarily large nuclear device which, if exploded from an altitude of one hundred miles or so, could set fires on the ground over an area of a hundred square miles or so.⁹ It was the Americans who were the first to acquire and deploy an anti-satellite system. By the late sixties, both the US and the Soviets were capable of launching nuclear missiles into space in the ASAT role and a concerned US began efforts to de-escalate the militarisation of space by proposing ASAT disarmament. In fact, leading by example, the US exercised considerable restraint in its ASAT deployment for almost a decade.¹⁰ The Soviets, however, showed no intention of cooperating and in 1977, the Carter administration responded with the deployment of an expanded US ASAT system. Moreover, the US began to investigate means for space-based satellite defence.¹¹

Meanwhile, throughout the seventies and despite the signing of the Antiballistic Missile (ABM) Treaty, ICBM and SLBM technology was advancing at an ever-accelerating pace. Payloads and ranges increased, multiple independently targetable re-entry vehicles (MIRV) emerged, and clever countermeasures were incorporated in missile strategies. All in all, the arms race was accelerating and already both sides were in a position to annihilate each other within a matter of hours regardless of who launched the first strike. Then, on 23 March 1983, in a dramatic speech, US President Ronald Reagan announced a new effort to develop a comprehensive population defence.¹² Reagan called on the scientific community to provide the means of rendering nuclear weapons 'impotent and obsolete'.¹³ The new US objective represented a fundamental shift in the basis of security – a move away from a total reliance on offensive weapons toward a truly defensive nuclear strategy. Reagan's now famous speech introduced this new 'Strategic Defence Initiative' (SDI) which focussed heavily on the use of space-based detection and weapons to neutralise the ballistic missile threat. SDI, commonly called 'Star Wars' captured the collective American, if not global, imagination as it began to believe that its security did not have to rest upon the threat of instant US retaliation to deter a Soviet attack.¹⁴

As technology and capability increased over time so did the associated costs, and understanding the magnitude of these costs is the key to understanding the importance of militarising space. Early estimates suggested that SDI would cost between \$670 billion and \$1000 billion (one trillion).¹⁵ The next several years saw tens of billions of dollars spent on research and development and testing of engineering prototypes.¹⁶ It is interesting to note that there was very little new in SDI and that: 'approximately 90 per cent of the 1985 SDI budget is devoted to continuing the development of devices and the exploration of ideas that were already programmed before the SDI was introduced in March 1983.'¹⁷ This means that much of SDI was already funded. SDI was innovative however, in that it brought together under a single project many unrelated programmes from various defence research laboratories i.e., the so-called 'Third Generation Weapons'¹⁸ including particle beams, lasers and kinetic energy weapons.

For those worried about the colossal costs of SDI, the end of the Cold War could not have come sooner. The 'peace dividend' saw numerous cuts to defence spending and space initiatives. There was clearly a collective sigh of relief amongst the American tax-payers and as the extent of the break-up of the former Soviet Union became clear, the urgency for implementing SDI seemed to evaporate. Military space programmes quickly retreated to the comfort and security of their 'black world' and everyone watched in amazement as the two 'superpowers' began to dismantle much of their nuclear weapons arsenals. It would, therefore, have been reasonable to assume that SDI had been shelved.

The 90s saw the American people turn their attention to reducing their multi-trillion-dollar national debt¹⁹ and to concentrating on realising the peace dividend in the form of tax relief. The Department of Defence (DOD) became a particularly attractive target. In 1994, House Republican leaders wanted to freeze defence spending for the next six years arguing that Congress' primary goal should be 'cutting taxes and the deficit'.²⁰ Literature on defence spending during this period is riddled with dramatic headlines such as: 'More Bases Face Chopping Block'²¹ 'US Coming to Grips With R&D Crisis'²² and 'Defence Review Slashes F22, F/A-18E/F Buy'.²³ And the cuts were real – by March 1995, Pentagon had reduced force structure by more than 30% with promises of more cuts to come.²⁴ President Clinton further cut the budget in 1996 by 16%, saving \$39.4 billion – most savings accrued by postponing modernisation and recapitalisation.²⁵ So comprehensive were cuts to military spending that a study by the Centre for Strategic &



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International Studies and Systems Planning Corp suggested that if the US did not change its course, ie lift restrictions on spending, the 'US military would be rendered obsolete between 2005 and 2010'.²⁶

Despite this bleak warning, the cuts continued, for example, current and forecast base closures are expected to provide annual savings of \$14 billion by 2001, total manning of the Air Force and Navy will drop by another 21,000 in 1998,²⁷ and the Army is due to lose another 15,000 personnel.²⁸ On the equipment side, the US Air Force is slated to lose an entire fighter wing including almost 100 of its new Lockheed Martin F-22s while the Navy has been hit with a 215 aircraft cut to its F/A – 18E/F purchase, the loss of 15 surface ships and two submarines.²⁹ Moreover, the 1997 Quadrennial Defence Review (QDR) is geared to satisfy Defence Secretary William Cohen's goal of saving \$15 billion per year for the foreseeable future.³⁰ All in all, since the end of the cold war, the US has undergone massive cuts – the following startling statistics speak volumes: defence budget down from \$400 billion to \$250 billion; defence budget share of US budget down from 28% to 15%; total active-duty US troops down from 2.2 million to 1.45 million; permanent overseas troops down from 500,000 to 200,000; and DOD procurement budget down from \$120 billion to 44 billion.³¹ In terms of the near future, the 1997 QDR identifies the following additional manpower and equipment cuts which will be realised by 2003: total troops down to 1.36 million; heavy bombers down from 202 to 187, fighter wings down from 20 to 18; air defence squadrons down from 10 to 4; attack submarines down from 73 to 50 and; surface combat ships down from 128 to 116.³²

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At face value, the US clearly appears to be cashing in its 'peace dividend' by reducing its military manpower, infrastructure, modernisation and recapitalisation. But is it? Paradoxically, research indicates that, in fact, the US has increased, often substantially, its military spending in space-based weapons and supporting military systems. It is important to note that whilst there is a plethora of information bemoaning the loss of military budgets, there is much less on the movement of cash for the militarisation of space. Yet it is there and, ironically, often embedded as sides or juxtaposed to reduction details in the literature extolling cutbacks. This is most likely explained because, as mentioned earlier, efforts towards the militarisation of space have slipped quietly from

the limelight, brought by the Reagan 'Star Wars' speech, into the quiet obscurity of the 'black world' where budget details remain amorphous. Nonetheless, open source snippets of space-related funding provide for revealing insight into the magnitude of projects ongoing. For example, in 1995, the Air Force Space and Missile Systems Centre selected a team to proceed with the design of 'Brilliant Eyes', a low Earth orbit ballistic missile detection/intelligence system. The project design work, valued at \$484 million, would lay the groundwork for a constellation of up to 24 cross-linked satellites.³³

At about the same time, an article entitled 'Underfunded Programmes Mar Defence Budget' appeared which warned of impending defence cuts yet stated that, 'multiple missile sites and space-based weapons are considered by many as part of the 'Republican Contract With America', implying that they 'would not be touched. This double entendre also implies that a space-based weapons program exists. Even more revealing, the article continued to discuss the fiscal immunity of a directed energy weapon programme in space.³⁴ In February 1997, in an article entitled 'Pentagon Budget Suffers New Cuts', David Fulghum notes that \$1.3 billion was added to space-based infrared satellite and Milstar communications satellite projects. Moreover, funding would be made available to further accelerate the fielding of 'Brilliant Eyes'.³⁵ On the quasi-civilian front, even NASA is now seeing substantial funding increases – the 1998 budget is up by \$2 billion reflecting what NASA Administrator Daniel S Goldin says is 'Bill Clinton's commitment to science and technology and confidence in the space community'.³⁶

Other compelling evidence of space funding increases comes from a recent interview with Congressman George E Brown, ranking minority member on the House Science Committee, who, when discussing reductions to the annual \$80 billion R&D budget, states that there will be a 'redirection of money from aircraft to space technologies'.³⁷ Along the same vein, the Air Force Scientific Advisory Board recommended that 15 per cent of USAF science and technology funds be shifted, for a five year period, to develop and field new space warfare technologies.³⁸

Further evidence concerning increased funding for the militarisation of space comes in the May 1997 proposal to add as much as \$2 billion for US National Missile Defence (NMD);³⁹ (NMD, sometimes referred to as BMD (Ballistic Missile Defence) is the 1990s term for SDI or 'Star Wars'). The \$2 billion additional

funding has been earmarked to expedite testing of the exo-atmospheric kill vehicles (EKVs) – interceptors which track, acquire and kill incoming missiles and are able to discriminate between the medium re-entry vehicle and eight decoy targets.⁴⁰ Even more astounding is the August 1997 announcement to double the BMD additional funding in an effort to ensure a full deployment capability by 2003 – no easy feat, says Brig General Joseph M Cosumano, Jr., the NMD program manager, 'I've been charged to do in six years what most programmes do in 12-16 years'.⁴¹

Clearly, open source material shows that the United States is spending money on militarising space whilst cutting in more conventional military areas. As has been demonstrated, military cutbacks have levelled off at garnering approximately \$15 billion per year. What is interesting is that in just the sampling of examples aimed at supporting one of this paper's proposals – that spending in the area of militarisation of space is increasing, one could easily argue that there was a very substantial redirection of the military savings into space programmes. In fact, if one were able to do a thorough analysis of all open source literature, there would likely be overwhelming evidence to suggest that truly impressive funds have been redirected/assigned toward military space projects. Moreover, military space projects are predominantly 'black programmes' therefore only a fraction of their real nature and magnitude is known, suggesting the total costs of military space programmes is truly colossal.

As already mentioned, Ronald Reagan's vision of SDI was motivated by a need to defend the United States against Soviet attack. SDI permitted the US to believe that its security could move from a reliance on offensive weapons toward a defensive strategy that did not rest upon the threat of instant retaliation. Since that time however, the Soviet Union no longer exists and it is generally accepted that there is no real threat to the United States today. So why then, is the US committed to SDI in another name – NMD? Why, given the colossal costs, is the US charging ahead to militarise space?

First of all, it is important to recognise that the US economy is booming. The deficit is now under control, income taxes are dropping and now, harvesting the fruit of recent cutbacks and restraint, there is a cumulative \$1.1 trillion in fiscal surpluses forecast for the next decade.⁴² That means that Congress and the American public will be receptive to funding important programmes. But 'just because they can' is hardly reason for the Americans to rally around space programmes. Clearly there will have to be a well understood need and tremendous benefit to funding projects of these magnitudes – 'Star Wars' price tag was \$1 trillion in 1983 dollars.

Open literature reveals that in broad terms, the reasons for militarising space fall into two logic paths. One suggests that commercial space assets have now become a vital national economic centre that must be protected. The second, more complex argument involves national defence against a wide range of military threat.

With respect to protecting economic assets, Pentagon and congressional officials have acknowledged for years the importance of space-based assets to US and allied 'economic security'⁴³ and 'demand those resources be protected'.⁴⁴ One US Army official suggests that there are more than 200 US satellites in orbit (worth in excess of \$100 billion), over 500 international and allied platforms in Earth orbit and many more in preparation for flight.⁴⁵ General HM Estes, the four-star Commander of US Air Force Space Command (with responsibility for 38,000 Space Command

personnel and a \$2 billion annual operating budget⁴⁶) states, 'As these assets become more crucial to national welfare and economic strength, I, as a military commander, have to say that somebody is going to threaten them. And when they do, we should have armed forces to protect them'.⁴⁷ In a later interview with *Aviation Week and Space Technology*, Estes states: "A tremendous amount of our economic strength is migrating to space....government agencies and private concerns are going to put 1,800 satellites into orbit valued at a trillion dollars or more....we as a nation are going to protect the investment. One of the main reasons for having a military is to make damn sure that economic investment survives".⁴⁸

The second reason to militarise space ie to provide for national defence, is less straightforward. Arguments are far-ranging and include: providing for military anti-ASAT; protecting one's population from ballistic missiles⁴⁹ monitoring activities and communications of adversaries who possess ICBM/SLBMs;⁵⁰ countering the rogue/terrorist cruise missile threat,⁵¹ and protecting the key vital space-based Command and Control nodes which form part of the 'Meta-System'.

Clearly, these two broad areas provide excellent rationale to militarise space. But do they justify the colossal costs? Perhaps. Not surprisingly, the plethora of information extolling the need to militarise space invariably stresses the 'defensive' nature of military space. Interestingly however, and usually imbedded in the articles, interviews and columns, there are snippets of curious commentary which advocate an offensive capability. There are words such as 'space control', 'space supremacy', 'the ultimate high ground' and 'space warfighters' which all conjure up something quite different – certainly more than a lexicon one would associate with simply protecting one's economic space-based assets. At the same time, descriptions of actual military programmes underway often allude to remarkable offensive capabilities such as space-based weapons capable of striking terrestrial targets – again hardly the system of choice to provide for defence of a satellite. Could it be that there is a third broad area which completes the rationale and cost justification for militarising space, ie to provide for an ultimate, omnipotent offensive capability against space and terrestrial targets?

Investigating this hypothesis begins with a sampling of the current rhetoric and programme initiatives which imply an offensive space capability. In terms of rhetoric, General Estes (Commander US Space Command) suggests that space power will accomplish many of the same functions that air power accomplishes today 'space power will encompass space superiority, space control, space surveillance missions,I envision a day when space control, space power will also represent the ultimate in rapid global mobility and global precision attack.⁵³ *AIR FORCE Magazine* defines space controls as: 'Control and exploit space using offensive and defensive measures to ensure that friendly forces can use space capabilities, while denying their use to the enemy. This mission is assigned to USCINCSpace....⁵⁴ USAF Space Command Officials suggest that space warfighters need to start thinking beyond the destruction of spacecraft and toward 'influencing, deterring, compelling and defeating adversaries [from space]'.⁵⁵ Applying military force from space to terrestrial targets is now appearing more frequently in open source literature and is commonly called 'space force application'. In a 1995 interview, General J A Ashy, Commander of North American Air Defence Command (NORAD) confirmed that space force application is an already 'assigned mission'⁵⁶ and a year later stated, 'We'll expand into these two missions [space control and space force application] – we will engage terrestrial targets....ships, airplanes, land targets –

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from space...it's politically sensitive, but it's going to happen...that's why the US has development programmes in [space-based] directed energy and hit-to-kill mechanisms.¹⁵⁷ General Estes, in a 1997 interview, called for a robust investment in space control and force application-related science to protect the new space-based 'economic centre of gravity'.⁵⁸ In a 1995-2005 forecast study, the USAF Scientific Advisory board produced the concept of 'New World Vistas' (NWW) which declared: 'The future force will eventually contain space weapons that can project photon energy, kinetic energy and information against space and ground assets.'⁵⁹ The findings of a separate 3,300-page Air University Study entitled 'Air Force 2025' have been merged with the NWW study under the USAF's Long Range Planning project.⁶⁰ Together the studies advocate systems that will see space-based hypervelocity micromunitions, and space-based solar-powered high energy lasers.

In real programme terms, there is much hard evidence to support the validity of the rhetoric. For example, space battle laboratories (USAF operates six space battlelabs⁶¹) and space operations centres are being set-up by all three Services to examine space infrastructure and technology issues with a view to amalgamate and collate data in a global information context.⁶² The Space Operations Centre (SOC) activated at Vandenberg AFB California mirrors (in space matters) the three main divisions of an Air Operations Centre (AOC) – strategy, combat operations and combat plans.⁶³ Operational control of space forces have been integrated in the centre and operations such as moving a satellite in orbit or altering ballistic missile warning radar coverage will be communicated by the centre through a new Space Tasking Order (STO) similar to the Air Tasking Orders (ATO) now used by combat forces to synchronize air assets and missions.⁶⁴

Other real program evidence comes in the implementation of the new multi-billion dollar Space-Based Infrared System (SBIRS) missile warning network. SBIRS, expected to begin partial operations in 1999, will replace the existing Defence Support Program (DSP) satellites which were placed in orbit in the early 70s.⁶⁵ On more of a tactical warfighting front, major 1999 funding has been approved to develop small satellites that would carry a sensor combining synthetic aperture radar and moving target indicator (MTI).

This constellation of at least 20 satellites, code-named 'Starlight', will supplement USAF's E-8 Joint-STARS airborne radar, providing surveillance of moving ground targets ranging from columns of vehicles to isolated mobile launchers.⁶⁶

Another exciting programme, which has seen recent increases in funding and has been told to 'start preparing support for a 'wedge' of funding in the service's Fiscal 2000 planning documents',⁶⁷ is the USAF spaceplane project. The spaceplane will be a re-usable, unmanned vehicle capable of



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remaining in space for up to a year. The Air Force acknowledges the platform for missions such as reconnaissance and spacelift, however it 'clearly expects to evolve the vehicles into 'space fighters' capable of a full range of tactical applications....to deny an adversary space-based information, fire kinetic energy or other weapons against orbiting or terrestrial targets.'⁶⁸

Space Doctrine development, on the premise that one would not develop doctrine unless one possessed or projected the capability which required it, also suggests tangible offensive interests. For example, US Space Command has proposed the establishment of a separate military Area of Responsibility (AOR) equivalent to those associated with air, land and sea operations: 'If you're going to have a warfighting mission, you have to have an area in which to fight....Once a space AOR is defined, then we can start developing tactics, techniques, doctrine and so forth.'⁶⁹

Moreover, USAF Space Command has established a Space Warfare Centre (SWC) which is now in the process of publishing a Multi-Command Manual (MCM) for space, referred to as Vol 28 of MCM 3-1.⁷⁰ The publication aims at being a primary information source on space systems' capabilities, tactics and characteristics and will include sections on space control and force application.

The SWC employs 18 people (in the Space Battlelab) who serve as a space community 'think-tank' and 43 more people in modelling, simulation and analysis. These groups are responsible for creating realistic computer models of space systems, both

current and future, and are instrumental in wargame development.⁷¹ Wargames such as GLOBAL ENGAGEMENT 97 may be good indicators of how technology in the militarisation of space has progressed. 'Global Engagement 97' for example, was set in 2010 and employed the use of military spaceplanes, armed Space Manoeuvring Vehicles (SMVs), and space-based lasers.⁷²

Whilst current programmes and exercises provide valuable deductive insight, it is the capability and nature of the potential space-based weapons themselves which shed the most light on the question of whether there is much to be gained from pursuing an offensive, space-based capability. To that end, the following paragraphs are dedicated to describing the types and capabilities of space-based weapons currently under development according to an Air Force 2025 submission describing a 'Global Area Strike System:GLASS'.⁷³ The weapons include: directed-energy incoherent light, lasers, neutral particle beams, electromagnetic pulse, high-power microwave, kinetic energy projectile weapons and space-borne transatmospheric vehicles (TAVs).

Directed-Energy Weapons – Incoherent Light use a constellation of 10-to-100-metre class focusing mirrors equipped with pointing and tracking/manoeuvring systems to intercept and redirect the enormous flux of natural (incoherent) solar light onto the battlefield. The simplest use of the system would be to provide night search and rescue or battlefield illumination on demand. This system could provide emergency electrical power, raise battlefield temperature (weather modification), blind optical sensors (including human eyes) and melt single hardened targets. The system is attractive in that it accesses an endlessly available power supply, and offers an excellent range of lethality at speed of light timeliness.⁷⁴

Directed-Energy Weapons – Coherent Light (Lasers) can be built as either continuous wave (CW) or pulsed devices. The systems could be entirely space-based or use a system of reflective mirrors to redirect a beam generated from the earth. Whilst not all-weather systems, lasers offer remarkable capability. At low power laser beams could provide battlefield illumination in either visible or near infrared wave bands. At a low to medium power, lasers could designate targets, blind sensors, ignite exposed flammable objects, raise local region temperatures and facilitate emergency high-bandwidth communications. At slightly higher powers, sensitive electronics could be targeted for overheating, sensor and antenna arrays could be damaged, containerized flammable and explosive materials ignited and exposed power/communications lines severed. The full-power beam can successfully attack ground or airborne targets by melting/cracking cockpit canopies, destroying control cables, exploding fuel tanks, melting or burning sensor assemblies, antenna arrays, munitions pods, ground communications, and destroying (even vapourising) numerous strategic targets such as dams, industrial and defence facilities, munitions factories etc – all in a fraction of a second. Clearly, the highly responsive precision laser with its full range of selective lethality is an extremely attractive space-strike weapon.⁷⁵

Neutral Particle Beam (NPB) weapons produce a beam of near-light-speed atomic particles by accelerating negatively charged ions and stripping them of their electrons. The resulting neutral particle beam delivers its kinetic energy directly into the atomic and sub-atomic structure of a target causing it to heat up from deep within. Affected by passage through atmosphere, a space-based NPB would be most useful against high flying airborne or space-borne targets. At low power, the NPB can disrupt platforms and enter payloads, producing considerable heat and uncontrollable ionization. At higher powers, it easily damages or destroys sensitive electronics and is capable of

melting solid metals and igniting fuel and explosives. The NPB could also be used to penetrate a ballistic missile causing emissions that would permit discrimination against decoys in a BMD defence scenario.⁷⁶

Electromagnetic Pulse (EMP) weapons are available in both the conventional and the nuclear variety. EMP is a sudden, high-intensity burst of broad-band electromagnetic radiation. Nuclear EMP produces long duration, strong, low-frequency (below 100 MHz) components, including gamma radiation which interact with the atmosphere creating a large region of positive and negative charges. The resulting pulse enters unshielded circuits causing damage which can range from circuit malfunction and memory loss to overheating and melting. Conventional EMP devices employ explosively driven, high-power microwave technology to produce less intense, very short bursts composed primarily of microwave frequencies. Conventional EMP systems can be focused in a particular direction and because most modern electronics operate primarily in microwave bands, they offer excellent potential against enemies' command and control and communications centres, air defences and modern high-performance fighters. Unfortunately, conventional EMP offers a lethal range measured in only thousands of metres.⁷⁷

High-Power Microwave (HPMW) weapons also rely on electromagnetic radiation for their destructive effect. By coupling fast, high energy pulsed power supplies to microwave antenna arrays, all-weather (not affected by atmosphere) microwave electromagnetic radiation beams are produced. The result is a light speed microwave 'floodlight' that showers targets in microwave radiation. HPMWs are more controllable than EMP weapons and their effects persist long after the 'floodlight' is turned off. At lower powers they are fully capable of temporarily disrupting circuits and jamming communications, while at high powers electronic destruction/melting would be achieved similar to EMP weapons. Finally, since water molecules absorb microwave frequencies, a properly designed HPMW weapon system could be used to modify the temperature of terrestrial water.⁷⁸

Projectile weapons (other than ballistic missiles), often called kinetic energy weapons (KEWs), are predicated on delivering a mass at extremely high velocities to a target. The high velocities would be generated by using rockets or electromagnetically by means of a 'rail gun' which uses a long tube containing conducting rails inside high-power electromagnets. KEWs are sub-divided into two classes based on their velocity – the kinetic energy penetrator (KEP) and the Hydrodynamic Penetrator (HP). The KEP is projected at speeds of 3 kilofeet per second and destroys its targets by shattering it on impact. The hydrodynamic penetrator impacts its target at speeds in excess of 8 kilofeet per second, causing the molecular composition of the target to spread the dense impact shocks at incredible speed and both the penetrator and the target react to the collision as if they were fluids. Future KEW weapons will incorporate a pre-fired laser to combat the problems of heat and shock on re-entry: 'it is possible to create a laser supported detonation wave (called an 'air spike') that partially shields the KEW...decreasing the effects of shock and heat on a hypervelocity object by over 75 per cent (making Mach 25 seem like Mach 3).⁷⁹ With high speed fuses and variants which include dense rods or flechettes this weapon offers remarkable potential. It is an all weather, precision-guided missile that could reside in relatively small satellites and reach terrestrial targets within minutes.⁸⁰

The final weapon to be introduced is the TAV. GLASS describes this as a manned, space-borne platform which offers great flexibility in that it is under continuous human control and can deliver

special operations teams, high-value equipment or a wide variety of munitions anywhere on Earth within 60 minutes from ground launch.⁸¹

This begs the question: could the US be interested in militarising space to provide for an ultimate offensive capability against space and terrestrial targets? To that end, the evidence is overwhelming. From rhetoric advocating space control, space supremacy, space force application, to real fielded programmes introducing battle labs, space operations centres, a warfighting space AOR, STOs, space-based radars, small tactical radar/MTI satellites, armed transatmospheric vehicles etc., the offensive infrastructure is there. Moreover the doctrine, tactics manual, wargaming and training programmes are all in place to support the space force application warfighter. But most revealing is the offensive capability offered by already proven⁸² potential space-based weapons such as directed-energy incoherent light, lasers, neutral particle beams, electromagnetic pulse, high-power microwave, kinetic energy projectile weapons and space-borne TAVs. How could the US resist the temptation to incorporate: weapons that would permit speed of light, direct offensive action capable of the full spectrum of lethality ie from lighting up the battle field to vapourising targets; weapons whose effects were deliverable with centimeter precision and in a manner that did not risk American lives; weapons that were spaceborne and, therefore, not subject to foreign policy pressures concerning deployed systems?

In sum, these are weapons which not only personify the strengths of air power ie height, speed, reach, ubiquity, flexibility, responsiveness and concentration,⁸³ they obviate the limitations of impermanence, limited payloads and fragility. Moreover, because they are in space, these weapons offer considerable potential for exercising global power which the United States Air Force openly advocates as the key objective. The USAF official letter-head, for example, is emblazoned with the caveat 'Global Power For America'. The same motto, inscribed in huge letters, is proudly displayed on an impressive stone monument just outside the restricted area in Tinker AFB where the USAF operates its 32 E3 AWACS aircraft. It follows, therefore, that the Americans are also militarising space to produce an offensive, space-strike weapon system that will support its overarching goal for global power.

In the final analysis, this research has demonstrated that the US is weaponising space for not two, but three reasons; to protect a projected (predominantly economic) trillion dollar space investment, to provide for national security against ballistic missiles and, finally, to pursue an offensive space-based capability in aid of securing global power for America. Clearly, in combination, they offer much to justify the colossal costs.

In most research, the journey to answer one question often only produces a starting point for continued research on the inevitable tantalising follow-on-questions – before summarising, and although arguably superfluous to this thesis, it is impossible not to explore some of the implications of a potent space-based weapon system. To begin, what would have been the impact during the recent Gulf War had the United States been in a position to exercise its influence using space-based systems? Especially given that in 1993, a CIA-commissioned RAND report suggested some leaders will not be deterred or coerced and that conflict is inevitable. The report claims that Saddam Hussein is the quintessential 'Hubris Nemesis' leader, ie that he suffers from a complex described in Greek mythology as 'hubris' – a pretension toward an arrogant form of godliness and 'nemesis' – a vengeful desire to confront, defeat, humiliate and punish an adversary.⁸⁴ The study suggests that

the Hubris-Nemesis exhibits a destructive, high-risk behaviour and a rationality that differs from an ordinary cost-benefit rationality – one that thrives on defiance, confrontation and explosive moments. The Hubris-Nemesis leader sees himself as a virtual Messiah, able to overcome terrible odds – coercion and deterrence are not effective in that they provide the opportunity for confrontation which in turn feeds their energy and strength.⁸⁵ If conflict is therefore inevitable with this type of leader, could space-based weapons have been used to destroy strategic targets before allied lives were put at risk?

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General Thomas Kelly, a Gulf War Pentagon official quoted in a chapter entitled 'Stealth and Smart Bombs: Will Star Wars Work?', said: 'High tech made the difference between slow success and a quick victory'.⁸⁶ General Kelly was referring to the impact of stealth, laser-designated precision guided missiles, infrared range finding devices etc. One can only imagine the impact on the speed of victory had the US been able to demonstrate even a fraction of the capability alluded to earlier.

Consider the effect of the following, graduated, space-based response. The date is 3 August 1990 – the day after Saddam Hussein invaded Kuwait. Instead of setting in motion the multinational reaction (leading to a massive build-up in the region which eventually unleashed more conventional explosives on Iraq than the Allies dropped in the whole of World War II⁸⁷ and costing Iraqi and Coalition casualties of between sixty and one hundred thousand dead), the Americans simply send a message via the United Nations. The message is for the Hubris-Nemesis leader Saddam Hussein and it explains that in 24 hours, at 0200hrs local time, in the dark hours of the night, two simultaneous demonstrations will take place – one at the headquarters of the Republican Guard Unit straddling the Iraq/Kuwait border near Basra, the second at the Ministry of Defence in the centre of Baghdad itself. Both areas are to be evacuated by 300 metres. At precisely 0200hrs, to the astonishment of the two separate Iraqi audiences, a series of lasers illuminate a one kilometre radius around the targets. Within 15 seconds, the Ministry of Defence is rocked by the earsplitting, devastating effects of a hypervelocity munition which demolishes the Iraqi Chief of Staff's executive offices. Concurrently, the mobile republican guard headquarters begins to glow bright red, then white as the battlefield illumination lasers begin to focus and concentrate their energy on the unit. Within 30 seconds the headquarters is reduced to a pool of white-hot fiery molten metal.

The Iraqi leader, incensed by US interference, calls for retaliatory measures and directs the incarceration of all American nationals. Again, the Americans send a message via the United Nations warning that devastating action will follow unless the Iraqi forces withdraw from Kuwait within twenty-four hours. Twenty-four hours go by and the defiant Hubris Nemesis, intoxicated by the limelight of the world stage, heats up the confrontational rhetoric. At 0800hrs local time, on the third day, Saddam Hussein is addressing an excited crowd in Baghdad, when, in front of everyone, he is struck by an intense beam of light and instantly incinerated. The frightened, frenzied crowd flees to escape any follow-on destruction but none follows. One hour later, the UN is informed that the new President of Iraq has ordered his forces to begin a complete withdrawal from Kuwait and the release of all US hostages. Within 48 hours the withdrawal is complete, the status quo regained – at the cost of one life.

The above scenario provides several thought-provoking implications. First, it evokes an omnipotence, across the entire spectrum of war, that would give new meaning to the words superpower and hegemony. Second, it suggests a capability that would be difficult if not impossible to match or surpass given current trends. These factors, in turn raise further interesting questions. When the US attains this status/capability, coupled with the original defensive potency, it suggests that the US, and any Allies it agrees to protect, would be immune from outside military aggression. Does it follow that the rise and fall of civilisations, which is arguably a function of a dynasty's ability to protect its wealth, society and culture, is a thing of the past? That is, will the new millennium mark the beginning of a world permanently dominated by the United States? Arguably, hegemonies dictate morality – but is the American morality something worth emulating? America, for all its wonderful accomplishments, is a society predicated on a 'survival of the fittest' ethos and still has

yet to come to terms with many endemic problems such as violent crime, racism and the lack of effective social medical and welfare systems which would relieve the suffering of its poor, just to mention a few. Will allies eventually become quasi-subjugated, much like Canada already has been, to the new superpower, letting their own forces atrophy knowing they would be safe under US protection? And if so, what might happen if the Americans decided to turn inwards globally? US international isolationism, survival of the fittest on a macro level – what would it mean for the rest of the world?

No matter how much power space weapons offer the United States, it is difficult to imagine an isolationist America who has abandoned her allies. Still, it is apparent that the United States is prepared to go it alone in the effort to militarise space and therefore be in a position to unilaterally decide on employment strategies. But surely the world would benefit from a collaborative allied approach to the militarisation of space – an approach that would see partnerships in the development of doctrine and systems deployment. Moreover, it would introduce a balanced approach to the interpretation and evolution of space treaties and law which do little to define real limitations on the exploitation of space. Collaboration would mean shared ownership and a diffusion of power from one to several partners. Most importantly, it would introduce a welcome inertia through consensus leadership in the space weapons employment decision process. Unfortunately, most countries have been occupied collecting the 'peace dividend' by restructuring, reducing and re-rolling their militaries. Perhaps it is now time to invest some of that dividend in a future collective space-based security. The militarisation of space is still in its infancy. The US population's global sense of consciousness means that their political elite are very much dependent on allies' political support in exercising global objectives. Therefore, the present climate for a US acceptance on a group approach toward the militarisation of space is excellent. Will it always be so? Can the world allow the US to go it alone? Can countries afford the bill to become partners? Can they afford not to in the long run?

In summary, the catalyst for this article was a question concerning the apparent lack of any replacement for the venerable E3 AWACS which is coming to the end of its life cycle. A review of relevant military research and development literature suggests that the roles of aircraft such as AWACS and Joint STARS, the battlefield surveillance platform, will be migrating into space. From there, the larger question, has emerged: how can the US justify the colossal costs of militarising space?

A canter through the history of the military use of space showed that the US was galvanized by the 1954 Soviet atomic bomb tests and successful long range rocket tests. The ensuing space race and nuclear programmes saw ever increasing capabilities for mutually assured destruction eliciting the famous, 1983, Reagan speech which introduced SDI and the goal to make nuclear weapons impotent and obsolete. In 1989, the Cold War ended, nuclear arsenals were reduced, and militaries all over the world tried to realise a 'peace dividend'. As the US turned its attention toward reducing taxes and the deficit, military spending was cut from \$400 billion annually to \$250 billion, bases closed, programmes cut and troops reduced from 2.2 million to 1.36 million.

At the same time, paradoxically, there was a huge redirection of funds from aircraft programmes to space technologies. SDI had not disappeared, it had merely slipped into the secrecy and obscurity of the 'black world'. In fact, hundreds of billions were directed for the fielding of projects such as

space-based radar, space-based weapons, exo-atmospheric vehicles, military navigation and communication satellites.

This article demonstrates that the US could justify the investment costs for several reasons. Partly because it could afford to with a booming economy forecasting \$1.1 trillion in fiscal surpluses over the next decade. Militarily, the US felt it needed to continue SDI providing for a protective umbrella against ballistic weapons, cruise missiles and ASAT systems. Moreover, the US saw a requirement to protect a new economic centre of gravity – a projected \$1 trillion worth of commercial assets being placed in space. Finally, impressed by the full spectrum of offensive lethality offered by potential space-based weapons (lasers, neutral particle beams, conventional EMP, kinetic energy projectiles, etc), from lighting up the battlefield to vapourising terrestrial targets with pinpoint accuracy, the US was able to add space-based weapons to its arsenal in support of its goal to achieve 'global power for America'.

As an irresistible adjunct, the article concludes by exploring a hypothetical scenario where the tragic losses of the Gulf War are averted through the use of space-based offensive weapons. From there, a number of penetrating issues are raised concerning the invulnerability of a future United States and ramifications of a perpetual hegemony. The article ends with an appeal for a collaborative investment along with the Americans in an effort to provide a balanced hand on the reins of space power.

Clearly, the US are militarising 'the ultimate high ground' to provide an omnipotent weapons system of unimaginable offensive and defensive capability and they believe the costs of militarising space are justified. Perhaps the most fitting last word as a means of underscoring the US resolve in space matters comes from a recent interview with General Estes who, when discussing changing the name of the United States Air Force stated: 'there will come a time, I think, when you may see the word 'space' in our title. And there may be a time when there is nothing but 'space' in our title'.⁸⁸

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