Acronym Institute for Disarmament Diplomacy

24, Colvestone Crescent, London E8 2LH, England, U.K. Tel/Fax: +44 (0) 207 503 8857
Website: www.acronym.org.uk email: rej@acronym.org.uk
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Safeguarding Space Security: missile defence and the challenge for Europe

Rebecca Johnson

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The whole world now relies on space for such security and development purposes as meteorology, environmental monitoring and disaster prevention, communications, education, entertainment, arms control, surveillance, and treaty verification. Though space has not yet been specifically weaponised, it is already heavily militarised, with a range of force-supporting technologies associated with the "revolution in military affairs" (RMA). Space security approaches are further complicated because commercial systems may also have strategic, safety or arms control (monitoring, confidence-building and verification) value, and military uses are often combined with or utilise commercial space systems.

This paper gives a brief overview of some key security questions and then focuses on the challenges posed for Europe by the US drive for ballistic missile defence (BMD).[1] It concludes that if missile defence collaboration among the countries of the North Atlantic Treaty Organisation (NATO) is expanded along the lines the United States favours, it will be put on a collision course with European Space Policy. Though many Europeans are sceptical of missile defence, they are anxious to avoid a confrontation with the United States. However, they believe that without a serious commitment to reducing and prohibiting weapons of mass destruction (WMD), the Bush administration's planned architecture for ballistic missile defences will fail to respond to more immediate security risks, and is likely to exacerbate insecurity and provoke greater threats for the future.

WMD, Missiles and Missile Defence Approaches

Much attention has been focused in recent years on the threats arising from ballistic missile-delivered WMD. Missiles, which may be constructed to deliver conventional weapons or WMD, encompass a range of technologies, from ground, sea or air-launched cruise missiles to land or sea-launched ballistic missiles. Ballistic missiles are particularly attractive as a means to deliver a nuclear payload, and all countries which have pursued nuclear weapons programmes have also pursued ballistic missile technologies, whether through importation or indigenous development. Long range ballistic missile technology is also the prerequisite for launching space vehicles, which may be for the purposes of military or peaceful programmes.

While US advocates of missile defence tend to argue that developing a BMD system is warranted by the very possibility of a missile attack, an exaggerated emphasis on the threat of ballistic missile delivery of WMD risks blinding strategic planners to more likely threats arising from lower tech delivery means, including: land attack cruise missiles and armed unmanned air vehicles (UAVs), converted recreational aircraft, crop-dusting aircraft (particularly for BW delivery) or surplus anti-ship missiles. Any state or terrorist organisation wanting to attack using

nuclear, chemical or biological weapons would be far more likely to organise secret delivery by ship, truck or aeroplane, as acknowledged, for example, in the US National Intelligence Estimate (NIE) in 2002. In addition, man portable air defence systems (MANPADS), which are a form of surface to air missile (SAM) that are mobile and easily acquired on the black market, have the potential to accomplish mass destruction by shooting civilian aircraft out of the sky. Though originally designed for states to use against military aircraft, they have been employed by terrorists against civilian aircraft, most notably in November 2002, when an Israeli passenger plane was fired on as it took off from a Kenyan airport.

With regard to ballistic missiles, some 38 to 40 states are known to have acquired or developed ballistic missiles, but the majority currently have only short range capabilities. Up to 11 possess medium (1000 - 1300 km) range capabilities or programmes, including China, Russia, the United States, India, Iran, Israel, Pakistan and North Korea. The United States, Russia and China have long range ballistic missile capabilities, both land-based and sea-based. France deploys long range ballistic missiles on Triomphant which, like Trident, is submarine based. Britain leases Trident D-5 missiles from the United States for delivery of the UK nuclear warheads.

From this, the connection between nuclear weapons and missile concerns becomes clearer: while not every country with a ballistic missile programme seeks nuclear weapons, any state with a programme or ambition to develop nuclear weapons will be likely to have a missile programme. The CIA has also assessed that missile development does not necessarily equate with operational or aggressive capabilities, but are also viewed "as strategic tools of deterrence [and] coercive deployment".[2] Though missile development should not be dismissed as cause for concern, the current assessment is that ballistic missile development is actually rather confined. In assessing threats, a state's current missile capabilities and intentions are key, but also relevant are its missile infrastructure, including programmes, resource investment, military and operational factors, as well as warhead capabilities and design and, indeed, export potential.[3]

Various developments in recent years have intensified concerns and fuelled support in several countries either for missile defence or for 'deterrent' or equalising capabilities, including nuclear weapons. These include: North Korea's launch of a Taepo-dong three-stage missile across Japan in 1998; the accelerated development and testing of missiles by Iran, Israel, India and Pakistan; China's build-up of missiles close to Taiwan; the sharing of long-range Trident II missiles between the United States and United Kingdom; and the great reliance placed on conventionally armed (but essentially dual-use) cruise missiles by the United States for a wide range of military purposes, including in Iraq, Former Yugoslavia, and Afghanistan. The fact that cruise missiles and missile defences both require heavy reliance on space-based guidance, targeting and positioning, have added to the complex relationship between missile programmes, defences and the risk of weapons being deployed in outer space.

Whereas ballistic missiles would be out of the economic or technological purview of non-state actors and most states, cruise missiles or UAVs, sometimes described as 'the poor man's air force' are more attractive because, compared with ballistic missiles, they are lower cost (from $50,000 to $200,000, depending on type); easier to acquire; UAVs are more widely available due "to the quantum leap in dual-use navigation and guidance technologies over the past decade"; and more accurate and reliable, for example, UAVs have a flight stability that would permit them to spray chemical or biological weapons over a targeted area or line. Compared with ballistic missile delivery, cruise missiles and UAVs can greatly enlarge the lethal area of bioweapons. This may also apply to the dispersal of certain radiological contaminants. It should also be noted that defences for such delivery modes are poorly developed and inefficient. For example, in 2003, Patriot PAC-2 and PAC-3 missile defence batteries proved successful in intercepting and destroying Iraq's SCUD ballistic missiles but failed to detect or engage the five Seersucker cruise missiles that were also fired. Recent missile defence failures include the 'friendly fire'

destruction of a British Tornado and a US Navy F-18 during the early phase of the war on Iraq in 2003.

Proponents of missile defence highlight the specific dangers of missiles delivering WMD. Since a threat assessment must take into account capabilities, infrastructure and intention, the threat of missiles armed with WMD is rather lower than the perception fostered by some media and politicians. In fact, very few states and no non-state actors are in a position to pose such a threat to the United States or Europe, and none of these has any identifiable intention or motivation to do so. Because the actual threat is rather low, serious questions need to be asked about why ballistic missiles have been so elevated above other delivery means in the US-led push for ballistic missile defences, and what the consequences of miscalculation of the threats might be.

There are in fact several different kinds of missile defence architectures that may be envisaged, with differing security and environmental considerations. Theatre missile defence (TMD) systems already exist, including Patriot, MEADS (NATO's Medium Extended Air Defence) and the Surface to Air medium range air defence system (SAMP/T). Further collaboration and developments in TMD are envisaged. Assessment of these developments needs to be carefully distinguished from the multi-tiered ballistic missile defence system proposed by President George W. Bush on May 1, 2001.

BMD is envisaged with four distinct missions: i) to detect attacking missiles; ii) to track missiles and, where relevant, re-entry vehicles and warheads; iii) to discriminate between warheads and decoys; and iv) to destroy attacking missiles and/or warheads. Each of these mission requirements presents particular technological, military and financial challenges. As confirmed in numerous official statements, the four tiers envisaged for US BMD are land, sea, air and space. The current US multi-tiered, multi-layered architecture plans intercepts at boost/ascent, mid-course, and terminal phases, using kinetic kill, laser or, potentially, nuclear-tipped interceptors.

Following its withdrawal from the Anti-Ballistic Missile Treaty in 2002, the United States has undertaken the first, land-based phase with the testing and deployment of mid-course interceptors based in Alaska and California. Any system relying on ground-based midcourse or terminal interception would have to deal with counter-measures, such as decoys mimicking the warhead, saturation, through multiple independently-targeted re-entry vehicles (MIRVs) or biological bomblet warheads or "simple and cheap" chaff released to confuse the interceptor. A fixed, ground-based system would leave key detection and tracking components, such as the X-band radars, vulnerable to pre-emptive or asymmetric attack. There is the danger, therefore, that the process of developing missile defences will increase the vulnerability of various components supporting the system to pre-emptive attack (which may be electronic rather than physical) and lead all the way up to pre-emptive blacking out of satellite support systems for missile defences and targeting. A destabilising asymmetric offence-defence spiral cannot be discounted.
Two types of boost-phase missile defence are also under consideration: sea-based, most likely on Aegis cruisers; and airborne lasers. The attraction of boost-phase interception is the clear signature of hot gases and irrelevance of decoys or chaff, but there are also many disadvantages, including the vulnerability of the launch platforms. In particular, for there to be any chance of an intercept in the window of opportunity of less than five minutes of ascent, decision-making would probably need to be computerised and automatic or devolved to field commanders, each option carrying high risks of accidental or inadvertent launch.[4]

Europe, NATO and Missile Defence

In past decades, the Europeans had been deeply sceptical of President Reagan's Star Wars - which even the British Prime Minister, Margaret Thatcher, regarded as unrealistic - and its subsequent National Missile Defence (NMD) reincarnation in the 1990s. It should be recalled

that as a result of Mrs Thatcher's concerns, a joint US-UK communiqué promulgated the four principles that i) missile defences should enhance and not undercut deterrence and the international security; ii) there should be negotiations with Moscow [and other key countries]; iii) the goal should be balance, and not superiority; and iv) arms control and disarmament negotiations should continue. Years later these principles were mirrored in the considerations put forward by President Clinton, who added that there should be a genuine threat that missile defence would be appropriate for addressing, and that it should be cost-effective. Later still, the German Foreign Minister, Joschka Fischer, also emphasised the necessity of ensuring that missile defences should not trigger an arms race and that the United States should commit itself to continuing with arms control. Despite considerable scepticism about the need, risks and technological feasibility, the United States has managed since 2001 to put missile defence on the agenda for European states, most notably, the 24 European members of NATO.

In March 2005, the NATO Council agreed to cooperate on an "Active Layered Theatre Ballistic Missile Defence" (ALTBMD) capability, portrayed in terms of protecting troops on the battlefield from shorter range ballistic missiles. The target date for deploying this capability is 2012. The decision follows from the Missile Defence Feasibility Study, launched by the Prague Summit of 2002 and subsequent agreements made at the Istanbul Summit in June 2004.

NATO underlines that ALTBMD is intended to be separate from other initiatives to develop defences against longer range missiles, and that it will integrate different TMD systems, such as PATRIOT, MEADS (NATO's Medium Extended Air Defence) and the Surface to Air medium range air defence system (SAMP/T), into a single, coherent and deployable system capable of giving layered protection against incoming missiles. Although NATO may have modest intentions, the Bush administration does not. In the speeches of proponents of BMD, it is clear that they see the multilayered system as offering a way of mitigating the limitations of the individual systems. At the same time, the multi-tiered, layered concept blurs the distinction between what were previously known as "theatre missile defences", some systems of which, like Patriot, have been deployed for years, and NMD, which had made Russia, China and many US allies very nervous.[5]

The Bush architecture holds out the prospect of "seamless" defence cover, whether of lower tier threats from cruise missiles, UAVs and even bombers, or from ballistic missiles of the shortest range (60 km) right up to long range ballistic missiles. Such an approach may shorten the odds of actually hitting an incoming missile, but it would carry a huge financial, environmental and, Europeans fear, security cost. Nevertheless, whether technologically feasible or affordable, the concept theoretically holds out the attractive and powerful promise of providing total protection, at least for the intended targets.[6] But would it?

European experts doubt that such a multilateral architecture is actually economically or technically feasible, even if it were fully backed politically. Moreover, such systems also have the potential to cause warheads on intercepted missiles to fall short of their targets. Depending on the trajectory and intercept phase, the promise of protection for some turns into a deadly rain of, potentially, nuclear, chemical or biological agents on untargeted but unfortunately-located populations en route. If the US is targeting missile sites in the Middle East, then for parts of Europe the risks from becoming an unintended target may be very much more real and devastating than the original threat that missile defence is supposed to protect against.[7] Such a consequence flies in the face of NATO's commitment to the indivisibility of alliance defences and the promise to defend allies as well as the US homeland.[8]

Two more aspects of the layered approach also need to be emphasised. NATO debates appear to studiously ignore that the fourth missile defence tier, space, is also regarded as the fourth 'medium of warfare' by the Pentagon, after land, sea and air.[9] By 2003, the Missile Defence

Agency was making budget requests on this basis. As General Ronald Kadish told a Senate Armed Services Committee hearing, the "given the constraints of geography surrounding the boost phase… we intend to pursue a space interceptor test bed…"[10] The purpose was "to demonstrate intercepts from interceptors that would be in orbit" and "to work out all the difficulties involved with having a constellation of that size potentially in orbit… but only in a test mode."[11] Questioned about the space component in relation to airborne lasers, Kadish argued that "space solves your geography problem… because you can use those weapons more effectively from the high ground of space."[12] Though the US Congress has for three years denied most of the Pentagon's funding requests for space-based missile defence, the Pentagon's persistence indicates clearly that space weaponisation is not a form of mission creep but, in the eyes of BMD's most ardent champions, intrinsic to US missile defence plans.

Much has been made of the threat of a "Space Pearl Harbour". Undoubtedly, as RMA increases dependency on satellites for communications, command, control, intelligence, tracking and targeting, any actor with the capabilities to launch long range ballistic missiles, put satellites in space, or deploy ballistic missile defences would also be capable of launching an ASAT attack. However, the investment and infrastructure requirements make it highly improbable that a direct attack on satellite assets could be conducted by anyone other than a developed state or group of states. Since they would be likely to have space assets of their own in orbit, launching such an ASAT attack could well put their own assets at serious risk. Though the Pearl Harbour scenario of a disarming, pre-emptive ASAT attack on US military assets in space cannot be wholly discounted, it should not be exaggerated either.

European Developments in Space Policy

Europe has traditionally coordinated its peaceful space activities through the 15-member European Space Agency [ESA, comprising 13 European Union (EU) countries – Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom – plus Norway and Switzerland]. The objectives of the ESA are preeminently peaceful, officially summarised as follows:

- a new European frontier for an expanding space
- independent access to space
- a strong and competitive space industry
- new applications meeting real needs
- a strong space science programme
- strong international partnerships.

After various reports generated by European Parliament members and committees, the EU in 2003 initiated a Green Paper, which was then published as a White Paper after several months of consultations and seminars. Entitled "Space: a new European Frontier for an Expanding Union", the White Paper described itself as "an action plan for implementing the European space policy".[13] The reasons and objectives for why Europe was in need of an extended space policy included: faster economic growth; job creation and industrial competitiveness; enlargement and cohesion; sustainable development; and security and defence. In its consultation process the EU received a number of analyses warning about the dangers of missile defence leading to the weaponisation of space, as well as considerable information about US plans for further militarising space, which makes it all the more significant that the White Paper does not once mention either 'missile defence' or the word 'weapon'. Yet disquiet with US plans seeped into one telling paragraph. "The long-standing space partnership with the United States is a valuable one. Although the US space policy aims at establishing US space dominance, this partnership could be further deepened in a number of areas including space science, human spaceflight, and sustainable developments. However, the possibilities may well be altered by the ongoing revision

of US space policy involving fundamental questions to do with the future of space access systems and human space flight."[14]

Two aspects of this brief reference to the US are particularly noteworthy. First, the assumptions and apparent resignation implied in the bald statement that "US space policy aims at establishing US space dominance". Secondly, the omission of US military policy as a factor that might alter the possibilities for EU-US partnership, despite the clashes that have already occurred over Galileo. Since the writers of the White Paper cannot be dismissed as breathtakingly naive, it is likely that sensitive transatlantic politics have dictated that they ignore the impact of missile defence and US military policy on European space cooperation and developments.

In fact, Europeans are concerned about three broad aspects of the US obsession with a multi-layered BMD system: that it is driven by ideology rather than sober threat assessments; that it fails to address, and in fact diverts attention from, more real and immediate security policy issues relating to terrorism and WMD; and that the unintended consequences of deploying such defences would be likely to create far greater WMD risks than currently posed by the missiles themselves, both physically and politically.

European countries that participated in the 2003 Report of the UN Secretary General on "The issue of missiles in all its aspects" agreed with the concerns that it raised about the strategic and security consequences of missile defences, especially: "the implications of missile defences for arms control and disarmament; the effects of missile defences as well as of missile defence cooperation on the further spread and refinement of missiles; the effects of missile defences on the weaponisation of space; and the effects of missile defences in addressing growing vulnerabilities to missile threats and attacks."[15]

In addition to concerns about inadvertent fallout from semi-destroyed warheads harming civilians on the ground, a further consideration that needs to be taken into account is the renewed interest being shown by the Pentagon in nuclear tipped interceptors for BMD. It should be noted that Russia's cold-war 'Galosh' ABM system, deployed around Moscow with nuclear warheads, has been updated. Many Russian and American scientists continue to argue that nuclear interceptors are technically more reliable and efficient at hitting a ballistic missile target; nuclear tests in space are banned under the 1963 Partial Test Ban Treaty and reinforced by the 1967 Outer Space Treaty. Due to the consequences of earlier nuclear tests in space, the United States rightly abandoned the option of nuclear detonations in space because of the electromagnatic pulse (EMP), environmental and collateral damage that would arise, harming US interests as much if not more than any putative adversary. The pursuit of missile defences could also increase WMD threats by creating a destabilising offence-defence spiral, not only in production, but in operations, For example, in computer wargame scenarios trialed by the Pentagon, the use of weapons in space (including anti-satellite weapons) led inevitably to the use of nuclear weapons and nuclear war on the ground.

Strengthening Existing International Mechanisms for Space Security

There are already a number of international treaties and instruments with jurisdiction over space activities, but they do not adequately cover the challenges posed by space-based weapons and BMD. In particular, though some prohibit or restrict the deployment of weapons or use of force in outer space, the provisions are limited in scope and coverage. Moreover, none of the existing legal instruments unequivocally prevents the testing, deployment and use of weapons other than nuclear, chemical and biological, in outer space. Nor does any relevant legal instrument cover the use of force or threat of use of force against a country's assets in outer space.

The 1932 International Telecommunication Union (ITU) Convention, as amended in 1992 and 1994**,** protects civilian satellites from interference. The 1963 Partial Test Ban Treaty (PTBT) bans nuclear testing in outer space. As the space race began to take off, the United States and Soviet Union spearheaded negotiations on what became the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (the Outer Space Treaty). With 98 states parties and a further 27 signatories, the Outer Space Treaty provides a basic framework with the principles of free exploration, use and benefit of space for all. It prohibits the stationing of weapons of mass destruction, including nuclear weapons, in space, but does not cover the transit of nuclear weapons (on ballistic missiles) through space or nuclear weapons launched from earth into space for the purposes of destroying incoming missiles. It also says nothing about ASAT or the placement of conventionally armed weapons in space.

In the 1960s and 1970s, the US and Soviet Union negotiated further agreements, including the Astronauts Rescue Agreement (1968). Important prohibitions on interfering with national technical means operated for verification purposes were enshrined in the 1972 Anti-Ballistic Missile (ABM) Treaty - now void following US withdrawal in June 2002. The principle of non-interference with national technical means and verification satellites was also enshrined in the 1987 Intermediate Nuclear Forces (INF) Treaty and the 1991 Strategic Arms Reduction Treaty (START I). The 1972 Convention on International Liability for Damage Caused by Space Objects, and the 1975 Convention on Registration of Objects Launched into Outer Space (the Registration Convention), which entered into force in 1976 were also worthy confidence-building measures, though neither agreement has received much attention. The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the Moon Agreement) was signed in December 1979 and entered into force in 1984. It confirms many of the provisions of the Outer Space Treaty, with specific reference to the Moon. It also prohibits the threat or use of force on the Moon or the use of the Moon to commit hostile acts in relation to the Earth or space assets, although the placing of conventional weapons in orbit around the Moon is not prohibited.

START I prohibits the production, testing and deployment of systems, including missiles, for placing any kinds of weapons of mass destruction into Earth orbit or a fraction of an Earth orbit. It also contains transparency and confidence-building provisions, and reinforces the provisions of the 1988 Ballistic Missile Launch Notification Agreement, providing for advance launch notification of ballistic missiles used as boosters to put objects into the upper atmosphere or space. Article XV of the 1990 Conventional Armed Forces in Europe (CFE) Treaty commits its 30 NATO and former Warsaw Pact parties not to interfere with national or multinational technical means of verification, a provision interpreted as including space-based assets. International bodies dealing with space issues include the Committee on the Peaceful Uses of Outer Space (COPUOS), attached to the General Assembly's Fourth Committee, the UN Office for Outer Space Activities (OOSA) and UNISPACE. The mandate and terms for these fora limit them to consideration of the peaceful uses of space. Additionally, the Conference on Disarmament (CD) in Geneva has the issue "prevention of an arms race in outer space" (PAROS) as part of its agenda, but the CD has been unproductively deadlocked over its programme of work since completing the CTBT in 1996.

As concerns about the potentially destabilising consequences of offensive forces being deployed in and from outer space have risen, several states and NGOs have put forward proposals for making progress on this issue. The necessity for a comprehensive-incremental approach to build a space security regime, comprising negotiations and measures to prohibit the deployment of weapons in and from outer space, ban the use of ASATs and develop a code of conduct for the peace-supporting, non-offensive and non-aggressive uses of space has become widely accepted internationally, especially among European states, although there are differing emphases put on the practicality or urgency of particular elements or mechanisms. While all EU members have

for years consistently voted for the UN General Assembly resolution on Prevention of an Arms Race in Outer Space, this is now regarded as more of a priority than in earlier years, when some EU states would attach caveats to their votes. However, some CD members are still inclined to view the fissban (or fissile materials cut-off treaty) and PAROS as competitors for CD time and resources. This is a mistake, as the proliferation and security threats associated with each are moving forward on separate, but equally dangerous tracks.

Conclusion

As with NATO, the European Union is in denial about the need to improve space security. In fact, European Space Policy and NATO missile defence objectives may well be on a collision course, yet both are trying to ignore the other. Anxious not to offend the US government, Europeans are trying to avoid a confrontation, although they believe that without a serious commitment to arms control and the progressive elimination of WMD and their delivery systems, missile defences are likely to exacerbate insecurity and provoke greater threats for the future. This passivity could prove dangerous: Europeans cannot sit back and wait for all the decisions to be taken before they react to protect their interests in space.

Insecurity has many facets, causes, potential threats and connections. Policies aimed at increasing security need to take into account the range of different type of threats, whether natural or human. If largely natural, such as with weather systems, the first step is to learn how to identify, track and, where possible predict location, direction and-or magnitude; the second step is to look for ways to prevent or deflect the danger; simultaneously with this, steps have to be taken to be as prepared as possible to deal with and mitigate the effects, as it may not be possible to predict with sufficient accuracy or prevent with sufficient effectiveness. Being prepared requires putting in place planning, public education and emergency procedures, training medical and response-personnel, and so on. Even when threats are largely natural, such as hurricanes and floods, they may have human factors that increase the frequency, severity or influence location.[16]

When security threats are primarily from human causes, as with WMD, war or terrorism, the first step is to make a realistic assessment of the threat, paying particular attention to capabilities, infrastructure and intention. If a real threat exists, a defence policy should not focus narrowly on military responses, particularly as the potential complexities of the threat increase the risk that the remedy would be worse for US and international security than the putative threat. While military preparedness may form part of the response, much can be done to avoid or mitigate the effects of a biological or chemical weapon, which are also both banned by international treaties. Much more could be done to reduce dangers from nuclear weapons and ensure that neither devices nor materials could ever fall into terrorist hands. While the current mechanisms for controlling missiles, represented by the Missile Technology Control Regime (MTCR) and the Hague Code of Conduct (HCoC) are woefully inadequate, more could be done to reduce missile threats, with due regard for the dual use character of missiles and space launch vehicles.

While in the long term, a comprehensive space security regime will need to be developed, the following measures would increase US and space security in the interim:

- A concerted effort to universalise the Outer Space Treaty would reinforce the basic space security regime and help to educate and involve all nations in protecting space as a shared resource for peaceful development and the enhancement of global security.
- The legal obligation not to interfere with the peacefully-deployed space assets of other countries, currently contained in the 30-member Treaty on Conventional Armed Forces in Europe (CFE), should be multilateralised.
- Russia should retire its nuclear-based ‘Galosh’ ABM system, and all states with nuclear weapons should pledge not to develop, test or deploy nuclear-tipped interceptors or weapons technology and equipment for deployment or use in or from space.

- Russia has given a public undertaking not to be the first to deploy weapons in space. All countries should be encouraged to make such unilateral declarations pending negotiations and conclusion of a multilateral space security treaty.
- Establishment of a Group of Verification Experts to examine the ways and means of verifying space security agreements, which Canada has suggested in the past, would enhance cooperation and the sharing of expertise.
- Finally, I would like to propose a collaborative study conducted by or under the auspices of NATO, the EU and ESA into the future of space uses and space security, which needs honestly and openly to address the conflicts and challenges for military, political, commercial and development uses of space.

Dr Rebecca Johnson is the Executive Director of the Acronym Institute for Disarmament Diplomacy, based in London, and has written widely on nonproliferation, arms control and space security policy.

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[1] While recognising that Russia is both a European and an Asian power, Russia's space programme is not included within the purview of this paper.

[2] Robert Walpole, quoted in Col. Daniel Smith, USA (Ret'd), "The Ballistic Missile Threat", in National Missile Defense: What Does it All Mean, Center for Defense Information (Washington DC, 2000).

[3] Joseph Cirincione, "The Declining Ballistic Missile Threat", Carnegie Endowment for International Peace, Nonproliferation Issue Brief, col. VI, No. 7, April 28, 2003.

[4] See the author's publications on 'Security without weapons in space: challenges and options', UN Institute for Disarmament Research (*Disarmament Forum,* March 2003); and "Missile Defence and the Weaponisation of Space", ISIS Policy Paper, No. 11 (January 2003).

[5] In addition, choosing a vague, multilayered concept also renders BMD less susceptible to detailed rational analysis, and makes it easier for missile defence proponents to avoid discussing the counter-measures dilemmas or other well-aimed criticisms of the technology, testing, military appropriateness, feasibility and cost that bedevilled both the specific NMD concept and Reagan's grandiose Star Wars projection. Hence it serves to depoliticise the debate.

[6] See General Sir Hugh Beach, "Negotiating New Controls on Missile Defences", *ISIS Policy Paper on Ballistic Missile Defence, No 9* (London: October 2002), p 7.

[7] See, for example, Geoffrey Forden, "Laser Defenses: What if they work?", *Bulletin of the Atomic Scientists* (September/October 2002) pp 49-53.

[8] See Prague Summit Declaration Issued by the Heads of State and Government participating in the meeting of the North Atlantic Council in Prague on 21 November 2002. Paragraph 4 g particularly states that Alliance efforts to study the feasibility of missile defence cooperation for NATO would need to be "consistent with the indivisibility of Allied security".

[9] US Space Command made this explicit in a 1997 promotional document, which declared that "the medium of space is the fourth medium of warfare – along with land, sea and air." United States Space Command, *Vision for 2020*, February 1997.

[10] Lt. General Ronald T. Kadish, USAF, Director, Missile Defense Agency, Hearing of the Senate Armed Services Committee, Ballistic Missile Defense in Review of the Defense Authorization Request for Fiscal Tear 2004, March 18, 2003.

[11] ibid.

[12] ibid.

[13] European Commission, "Space: a new European Frontier for an Expanding Union", Luxembourg, Office for Official Publications of the European Community, COM (2003) 673, available from http://europa.eu.int.

[14] Ibid. p 21.

[15] Report of the UN Secretary General on "The issue of missiles in all its aspects", The United Nations, 2003, (A/57/229).

[16] Industrially-produced climate change, for example, exacerbates natural meteorological phenomena, Similarly, deforestation or building on flood plains may result in loss of lives and property from avalanches or floods: human action may not have created the propensity for avalanches or floods in that area, but it can change the impact and severity when such events occur.