

Military Dimensions in the Future of the Indian Presence in Space

DR V SIDDHARTHA

Ever since the Cold War ended, the new patterns of geo-political, geo-strategic, geo-economic and geo-technological alignments in the world have manifested new assertions of race-based supremacy that were hitherto only implicit in North-on-South relations since the White colonising powers began their reluctant territorial withdrawal at the end of World War II. This trend towards a new hegemony can be characterised as establishment of the International Varna Order (IVO), which is representable thus:

@ Japanese, Koreans, Taiwanese

• Whites
• Yellows@
.....
• Browns
• Blacks

~ One billion people; numbers starting to decline
~ Five billion people; numbers rising

The IVO has operational components, pithily stated by Samuel P Huntington in his 1993 article in *Foreign Affairs*:

Global political and security issues are effectively settled by a directorate of the United States, Britain and France; world economic issues by a directorate of the United States, Germany and Japan, all of which maintain extraordinarily close relations with each other... The West in effect is using international institutions, military power and economic resources to run the world in ways that will maintain Western predominance, protect Western economic interests and promote Western political and economic values.

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These operational components seek to pre-empt and counter the new threat thus (italicisation mine):

...And as the power of the West ebbs, "the rest" will become more and more assertive. *For the West to survive...it must...close ranks.* Its future depends on its unity. The people of the West must hang together, or they will hang separately.

But Huntington should not really worry; the triumph of the West has been very durable. The West has hung together very well; with assets, tools and goals arranged in a triad, which may be represented thus:

Assets

Social Assets : Mass basic education; egalitarian vocational training for field competency; merit-based access to higher education with affirmative action for those in need; norm of gender equality enshrined in law.

Economic Assets : Protected domestic markets; man-made 'designer' materials and alternatives to energy sources to reduce dependency on resources under Brown-Black control.

Technology Assets : Science-based technology.

Hegemonistic foreign policies supporting:

- (a) Control over reserve currencies.
- (b) Prised-open foreign markets.
- (c) Extra-territorially enforced rights to intellectual property.
- (d) Maintaining un-interferable access to inexpensive raw materials and energy sources, particularly oil.
- (e) Military intervention, *in extremis*.

Nuclear
Weapons

Maintaining
hegemony.
Shaping architec-
ture of global power:
Economic, Techno-
logical, Military,
Institutional, Affiliational.

Goals

Tools

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The above triad manifests itself in many ways: maintaining and enlarging the gap between the West and the Rest are only two of these ways. In the words of Xerxes Sapur Desai, Vice Chairman and Managing Director of Titan Industries Ltd (April 1999):

After the cold war, the WTO has become a tool in the hands of industrial, military powers for imposing certain ways of doing things on the rest of the world. Tell me, if these policies were not advantageous to the US, would they be pursued? Very clearly not. Self-interest is emerging in the garb of developmental models and new economic ideologies.

And those of an official of the US Bureau of Export Administration in February 1999:

Maintaining military superiority means maintaining the gap in capabilities between ourselves and our adversaries, and that gap is maintained and *enlarged* both through policies that retard our adversaries' progress, such as export control, and through those that help us run faster — increased research, development and acquisition of advanced technologies here at home.

What the West calls 'export controls', and the Rest experiences as 'technology denial', have been through three epochs in which fear has been the common key.

Epochs of Technology Denial

World War I to World War II. Fear of entanglement in others wars, and fear of domestic (US) food and material shortages dominate export controls (Trading With the Enemy Act, 1917; Neutrality Act, 1935).

World War II to the end of Cold War. Fear of communist 'expansion' caused Western allies and Japan to practice (variably) moderate to severe 'dual-use' technology denial on the former Soviet Union and Warsaw Pact countries. The Co-ordination Committee for multilateral export controls (COCOM) was formed in 1949 as a secret organisation.

End-of-Cold War and Beyond. Axis of West-towards-East technology-denial regimes has rotated 90 degrees towards South.

All-White North fears the economic and military rise of Brown-Black South. Full scope safeguards for nuclear technology; Missile Technology Control Regime (MTCR) for Missile/Space technology; 'dual-use' for other technology.

It is no coincidence that the membership of technology cartels and denial regimes is almost wholly White or White-controlled. These are :

- | | |
|--|--|
| (a) Nuclear Suppliers Group
(Established: 1978) | 32
+ Argentina
+ Japan
+ Russia
+ South Africa |
| (b) Australia Group
(Established: Mid-1985) | 28
+ Argentina
+ Japan
+ South Africa |
| (c) MTCR
(Established: 1987) | 29
+ Argentina
+ Brazil
+ South Africa |
| (d) Wassenaar Arrangement
(Established: 1996) | 31
+ Russia
+ Turkey |

India : The 'Instigator'

The formation and policies of these technology cartels and denial regimes have been identifiably triggered by Indian efforts and activities in the corresponding technological areas. Thus, in the space and missile area:

- | | | |
|------------------------|---|--|
| (a) Mid-to Late 1970's | 'Space' profile evolved. Indo-Soviet, Indo-French and Indo-German collaborative arrangements. | Missile and 'space' item transfers placed on agenda of East-West conventional arms limitation talks of 1970's. |
| (b) July 1980 | SLV-3 Launch | US Arms Control and Disarmament Agency (ACDA) Annual Report for 1980 summarises "dual-use |

(c) April 1983 RS

(d) Mid-1980's Inte Dev (IG) pub

(e) March 1987 ASI

(f) May 1989 Firs

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(a) May 1974 Pokhrai

(b) 1975 Heavyw construi with imp equipme France German

(c) 1977 Power F Plutoniui Plant (P Tarapur

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| | | missile technology proliferation problem". |
| (c) April 1983 | RS-D2/SLV-3 | Mid-1983: Negotiations towards MTCR begin amongst G7. |
| (d) Mid-1980's | Integrated Guided Missile Development Programme (IGMDP) becomes public knowledge. | MTCR negotiations speeded-up. |
| (e) March 1987 | ASLV Launch | April 1987: MTCR promulgated. |
| (f) May 1989 | First 'Agni' launch | |
| (g) August 1990 | Kalam's 'Brahm Prakash' Memorial lecture reveals SLV-3 basis of Agni, Space-DRDO links and academia-industry networking. | November 1990: US enacts PL:101-510, "Missile Technology Controls" and promulgates the Enhanced Proliferation Control Initiative (EPCI). |
| (h) Feb-August 1991 | Prithvi 03-05 tests | November 1991: MTCR revised. |
| (j) August 1992 | Extended range (250 km) Prithvi test | January 1993: Tightening of MTCR (Range-Payload trade-off). |

The Nuclear Field:

- | | | |
|--------------|--|--|
| (a) May 1974 | Pokhran | September 1974: Select NPT-members committee promulgates Zangger 'Trigger' List. |
| (b) 1975 | Heavywater Plants construction begun with imported equipment from France and West Germany. | 'London Club' formed to control nuclear-related exports and later expanded into Nuclear Suppliers Group (NSG) to include France and East Bloc countries. |
| (c) 1977 | Power Reactor Plutonium Recovery Plant (PREFRE) at Tarapur commissioned. | 1978: Nuclear technology export conditionalities made more stringent and IAEA safeguards requirement added. |

(d) Late 1970's	Heavywater Plants start to come on stream.	1978: NSG adds heavy water production items to Zangger Trigger list.
(e) Through 1980's	Fuel reprocessing plant expanded at Tarapur, new one at Kalpakkam. Fast Breeder Test Reactor commissioned.	1990: Uranium reprocessing equipment added to expanded Zangger Trigger List. Japan and Germany require full-scope safeguards on nuclear exports.
(f) 1990-91	Indian Uranium enrichment capability reliably reported. Post-Soviet revival with Russia of negotiations on Kudankulam reactors.	1992: Nuclear-related 'dual-use' transfers restricted by NSG. 1993: NSG requires full-scope safeguards on all nuclear transfers.

But members of denial regimes have got the net message from Pokhran-II and Agni-II that through technology denials India can at the most be delayed, but not stopped, from eventually 'catching up'. And, if India can overcome, will other Brown-Blacks be far behind? And for how long? Fearful of their own answers to these questions, the upper Varnas in the IVO covet exclusivity in their occupation of the hegemon's last remaining 'high-ground': Space. Thus:

- Military-nuclear status has been the *de facto* criterion for a place at the world's hegemonic governing top-table: namely, the P5 of the UN Security Council.
- Expanded permanent membership (P5 to P7/9) will be on combination nuclear-military-economic power criteria, *judged by the P5, led by the US*.
- Because other nuclear-missile-economic challengers are not far behind, India cannot hope to raise permanently its caste status in the IVO, merely by an emulatory process of

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- Therefore hegemon's an active there.

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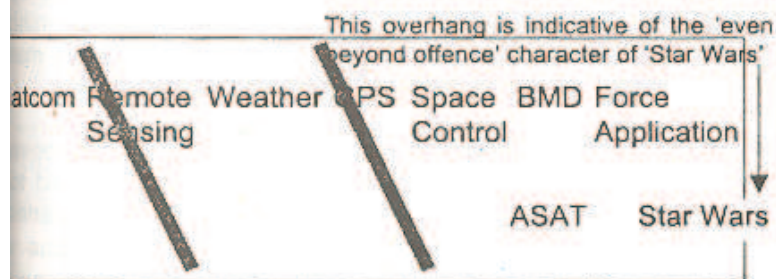
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* 'Sanskritisation' Indian sociologist low caste or trit ideology and sty caste.

"technological sanskritisation".

Therefore India has, willy-nilly, to co-occupy militarily the hegemon's last remaining 'High Ground' – *Space*, and establish an active (i.e. not merely reconnaissance) military presence there.

Investments to reach and use Space have yielded non-space pay-offs on ground. This is now a commonplace. What is much more evident is the spread-spectrum of spin-in military returns from investments in Space, as represented in the following diagram:



Commercial → Civil non-commercial → Dual-use → Defence → Offence →



Source: Modified and extended from: RAND PM-433-JS, May 1995
(Reference 16)

India's Presence in Space

The credit for India's current one-of-six presence in Space

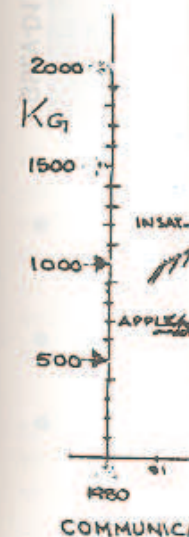
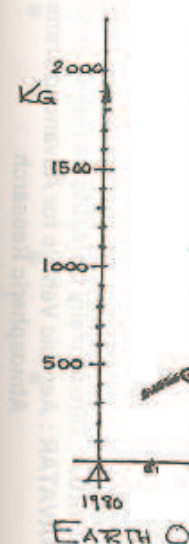
'sanskritisation', as defined by the originator of the term and doyen of Indian sociologists – the late Prof MN Srinivas, is the process by which a caste or tribe or other group takes over the customs, ritual, beliefs, ideology and style of life of a high and, in particular, a 'twice-born' (dwija) caste.

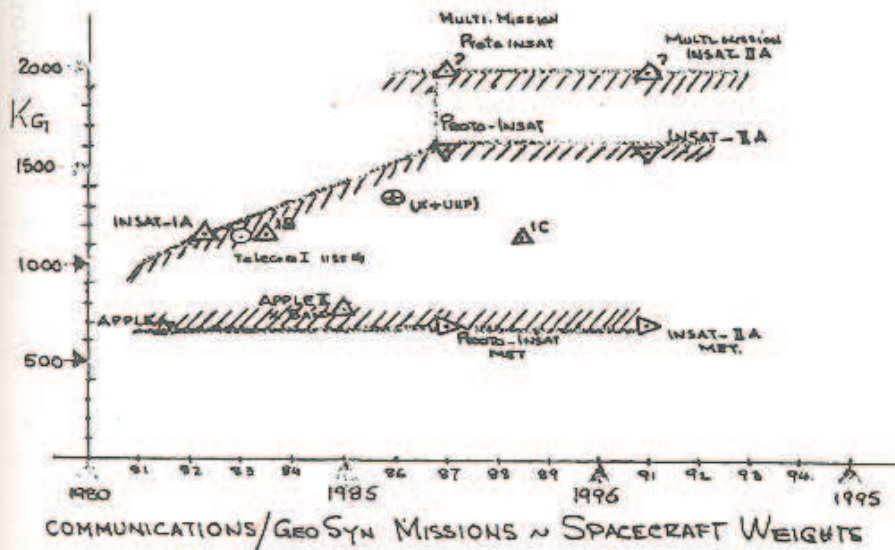
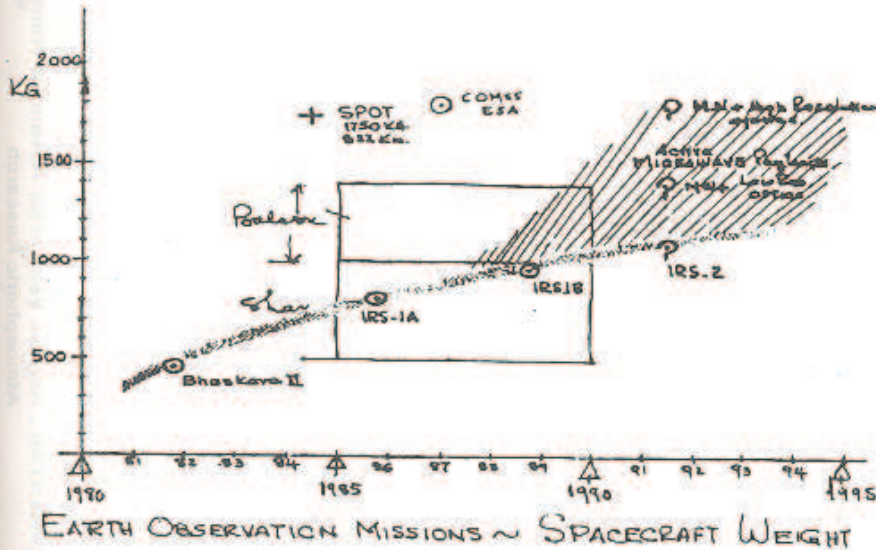
has often been mis-attributed to the 'vision' of Vikram Sarabhai. Actually it took his successor, Satish Dhawan, several years to bring the needed skills, systems-engineering discipline, patient attention to detail, and wide-ranging administrative reform into the institutions that Sarabhai left behind. It was only through this effort that Dhawan was able to bring his accumulated aeronautics design insight and engineering 'feel' to bear on the technological tasks – as distinct from mere 'visions' – that needed to be accomplished. It also took the extremely fine judgement of Brahm Prakash (brought in after his retirement from the Bhabha Atomic Research Centre (BARC) by Dhawan as Director of Vikram Sarabhai Space Centre in Thiruvananthapuram) to make choices for leadership in technology development from amongst the raw human material that Sarabhai had inducted.

The portfolio of assets that India today has in space-reach, space technology and space applications can be traced to the systematic execution of a nested hierarchy of systems-analysis-based master-plans.* The parameters of these plans were encapsulated into the following two techno-scenario diagrams, drawn by Dhawan himself. (see next page)

Dhawan's other techno-scenario diagram is contained in a lecture he delivered to the Astronautical Society of India in 1996. A slightly modified version of this diagram is presented here. (NEWARS stands for National Early Warning And Response System – a wholly benign space-sensor and communications based integrated space-ground system meant exclusively for peaceful purposes). I have superposed on this diagram a scenario-line marked 'New Wars 2020: UNCLES'. Also superposed are military event-markers on the Dhawan line. Annotations to these superpositions and additions follows:

* The Dhawan definition of a 'master-plan' should be incorporated into management texts. A master-plan is not an 'outline plan' or an 'indicative plan' but a very detailed plan. However, after the detailing is done, certain parts of the plan are held to be inviolable and constitute the 'master' part of the plan. Only around this 'master' part are other originally-fixed details allowed to be changed, depending upon changing requirements.





Dhawan Diagrams, Cauvery Bhavan, 31 May 1982

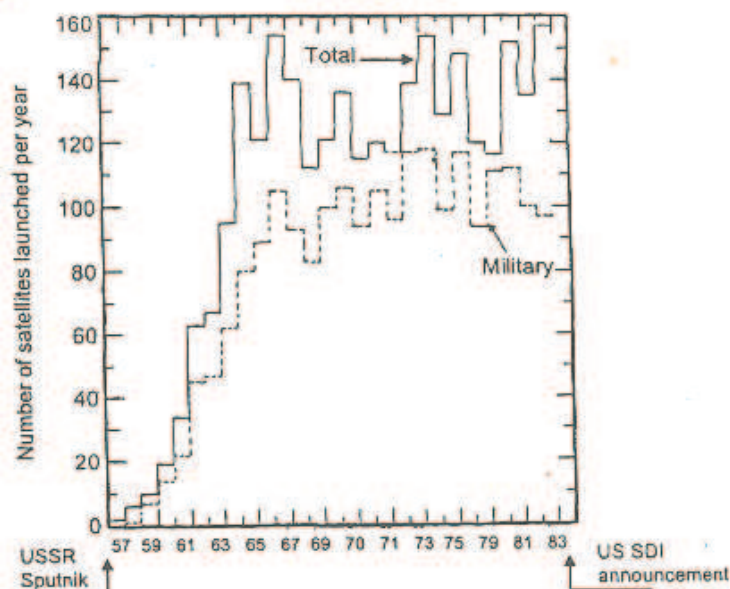
(Reference 12)



#KALI : Kinetic Attack Loitering Interceptor
*DURGA : Directionally Unrestricted Ray-Gun Array
@AVATAR : Aerobic Vehicle for Advanced Trans-
Atmospheric Research

- ASR 5/71 of June 1971 is a remarkably prescient Air Staff Requirement issued by Air Headquarters six months before the Bangladesh War. It sets out the qualitative requirements of an Indian military reconnaissance satellite, at a time when only aircraft-based special colour film cameras were being tried-out by ISRO (Indian Space Research Organisation) for civil remote-sensing experiments.
- A much-heightened appreciation of the need for space-based military reconnaissance has come in the aftermath of Kargil (1999).
- The first developmental flight of ISRO's Geo-Stationary Launch Vehicle (GSLV D-1) will mark India's significant transition to acquiring an autonomous capability to lift into low-earth orbit heavy payloads of 'dual-use'. This transition is identified as the 'Milspace dual-use crossover.'
- On the 'New Wars' line, the *Sanjaya* series of operational military reconnaissance satellites is marked into a very realisable time-frame. However, as one traces the line upwards, the 'event times' marked on it stretch further out into 'just-about-do-able' and then into rather speculative end-of-decade events. Horizontal 'bubbles' signify dual-use capability for servicing both the scenarios on the 'New Wars' and 'Newars' lines.
- CAT is the Centre for Advanced Technology – the laser and particle accelerator laboratory in Indore of the Department of Atomic Energy.
- *Vamana* is a 'dual-use' experimental hypersonic lifting-body vehicle.
- The acronym AVATAR is owed to Air Commodore R Gopalswami (Retd), the former CMD of Bharat Dynamics.

Although the militarisation of Outer Space has been, till the mid-1980s, passive, it must not be forgotten that some two-thirds of all satellites launched into space since Sputnik have had either military or dual-use missions, as shown below.



Dependence of military forces on space assets has grown to the point where: 'All US military weapons above the level of rifle or automatic weapon rely on space to function effectively... Space is a key element of all modern weapons systems'. (Reference 10)

Such passive militarisation became active after the US Strategic Defence Initiative (SDI) sought space-denial and space-control. In his speech launching the SDI, President Ronald Reagan concluded that "tonight we're launching an effort which holds the promise of changing the course of human history." The "course of human history" was changed a decade later by the collapse of the Soviet Union, caused in part by its attempts to counter SDI *using its existing politico-economic-technological system*.

The first large-scale use for military operations of space-based assets was extensively tested and demonstrated during the Gulf War. Post Gulf War, the fashionable buzz-phrase in geo-military concepts is 'Revolution in Military Affairs (RMA)'. Unchangeably, what is 'buzz' amongst the two upper castes in the IVO becomes 'buzz' in our mimic-culture some years later. So, before the following phrase (which is not mine) becomes 'buzz', let me set it down:

Space Dominance: Next Century's Geo-military Doctrine

- "...just as by the year 1500 it was apparent that the European experience of power would be its domination of the global seas, it does not take much to see that the American experience of power will rest on the domination of space... Just as Europe shaped the world for half a millennium...and expanded war and its power to the global oceans, the United States is expanding war and its power into space and to the planets." – George and Meredith Friedman, 1998.
- "With regard to space dominance, we have it, we like it, and we're going to keep it." – Keith Hall, US Assistant Secretary of the Air Force and Director, US National Reconnaissance Office, 1998.

It is not difficult to foresee that, just as the 'nuclear dominance' doctrine has been sanctified by the P5 in the UN Security Council, so too will the new doctrine of Space Dominance have a UN 'cover'; possibly a: United Nations Command for Law Enforcement in Space (UNCLES).

In its foresight for the creation and Indian use of space-based assets, ASR 5/71 was possibly too early. One can only hope that the following call by Air Chief Marshal S K Sareen on 8 October 1998 is not too late:

- I have often emphasised that in the years ahead, the exploitation of space-based resources for the conduct of air operations will assume increasing importance. Success in future wars will depend on the ability to deploy space-based resources for tasks such as surveillance, battlefield management and communications. The necessity to progress from an 'Air Force' to an 'Air and Space Force' by deploying space-based systems, is growing in importance everyday.

References

1. AAAS, "Space Weapons and Defense, Part II," in *Science and Security: The Future of Arms Control*, No. 86-16 (AAAS, Washington, DC, 1986).
2. Assembly of Western European Union, *A European Space-based Observation System: Colloquy, Official Record* (Office of the Clerk of the Assembly of WEU, San Agustin, Gran Canaria, 24-25 March 1995).
3. Lt Col Kenneth W Barker, USAF, *Airborne and Space-based Lasers: An Analysis of Technological and Operational Compatibility* (Occasional Paper No.9, Center for Strategy and Technology, Air War College, Air University, Maxwell Air Force Base, Alabama 36112, June 1999).
4. Angathevar Baskaran, *Technology Development in India's Space Programme 1965-1995: The Impact of the Missile Technology Control Regime* (Thesis submitted to the University of Sussex for the degree of Doctor of Philosophy, Science Policy Research Unit, University of Sussex, UK, April 1998).
5. Ashton B Carter, *Directed Energy Missile Defense in Space* (Congress of the United States, Office of Technology Assessment, OTA-BP-ISC-26, Washington, DC, April 1984).
6. Tom Clancy with General Chuck Horner (Retd), *Every Man a Tiger* (GP Putnam's Sons, New York, 1999).
7. Satish Dhawan, *Whither Space and Astronautics* (Lecture delivered at The Astronautical Society of India, Bangalore, 6 September 1996).
8. George and Meredith Friedman, *The Future of War: Power, Technology and American World Dominance in the 21st Century* (St Martin's Press, March 1998).
9. Fusion Energy Foundation, *The Strategic Defense Initiative: Its scientific, economic and strategic dimensions. Proceedings of the conference sponsored by the Fusion Energy Foundation and the Schiller Institute* (22-23 April 1986, Tokyo).
10. IANUS, Conference on *Space Use and Space Ethics: Criteria*

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for the Assessment of Future Space Projects (organised by the Research Group Science, Technology and Security (IANUS) at the Darmstadt University of Technology, Germany, 3-5 March 1999).

11. Nandasiri Jasentuliyana, ed., *Maintaining Outer Space for Peaceful Uses: Proceedings of a Symposium held in The Hague, March 1984* (GLDB-1/UNUP-537, The United Nations University, Tokyo, 1984).
12. APJ Abdul Kalam and R Narasimha, eds., "Foreword", in *Developments in Fluid Mechanics and Space Technology* (Indian Academy of Sciences, Bangalore, 1988).
13. APJ Abdul Kalam, *Some Experiences from Aerospace Technology and Programme*, The Sixth Prof Brahm Prakash Memorial Lecture (The Indian Institute of Metals, Bangalore Chapter, 21 August 1990).
14. Air Marshal Bharat Kumar (Retd), *The Impact of Emerging Technologies on Air Power* (United Service Institution of India Paper 1/98, New Delhi, 1998).
15. Michael McGwire, *Perestroika and Soviet National Security* (The Brookings Institution, Washington, DC, 1991).
16. Scott Pace, *Economic Interests and Military Space Systems* (RAND PM-433-JS, May 1995).
17. RUSI, Conference on *The Military Use of Space*, organised by the Royal United Services Institute for Defence Studies (London, 22 September 1999).
18. Air Chief Marshal Satish Kumar Sareen, *CAS' Address at the Air Force Day Parade* (New Delhi, 8 October 1998).
19. The Scientific Staff of the Fusion Energy Foundation, *Beam Defense: An Alternative to Nuclear Destruction* (Aero Publishers, Inc, California, 1983).
20. Lawrence C Trost, *Ballistic Missile Control and Monitoring Options* (Arms Control Studies Department, Sandia National Laboratories, USA, July 1996). Available at <http://www.cmc.sandia.gov/issues/papers/trostA/index.html>.

21. United State Congress, Office of Technology Assessment, *Ballistic Missile Defense Technologies*, OTA-ISC-254 (US Government Printing Office, Washington, DC, September 1985). Available at <http://www.wws.princeton.edu/~ota/>.
22. United States General Accounting Office, *Ballistic Missile Defense: Evolution and Current Issues*, GAO/NSIAD-93-229 (Washington, July 1993). (Also search combination "NSIAD" and "Ballistic Missile Defense" at <http://www.gao.gov>).
23. United States, Ballistic Missile Defence Organization, <http://www.acq.osd.mil/bmdo/bmdolink/html/>.
24. United States Space Command, <http://www.peterson.af.mil/usspace/>.

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