



SPACE & SECURITY

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NASA Earthlights



OUTLINE

- **Space Basics**
- **What is it about Space that warrants special consideration?**
- **Space as a Strategic Asset**
- **How much “Space” can you Afford?**
- **What are the current military space missions?**
- **What “tools for the warfighter” does space provide/enhance?**
- **What are other countries doing to enhance their Space capabilities?**
- **Strategic Space Issues**



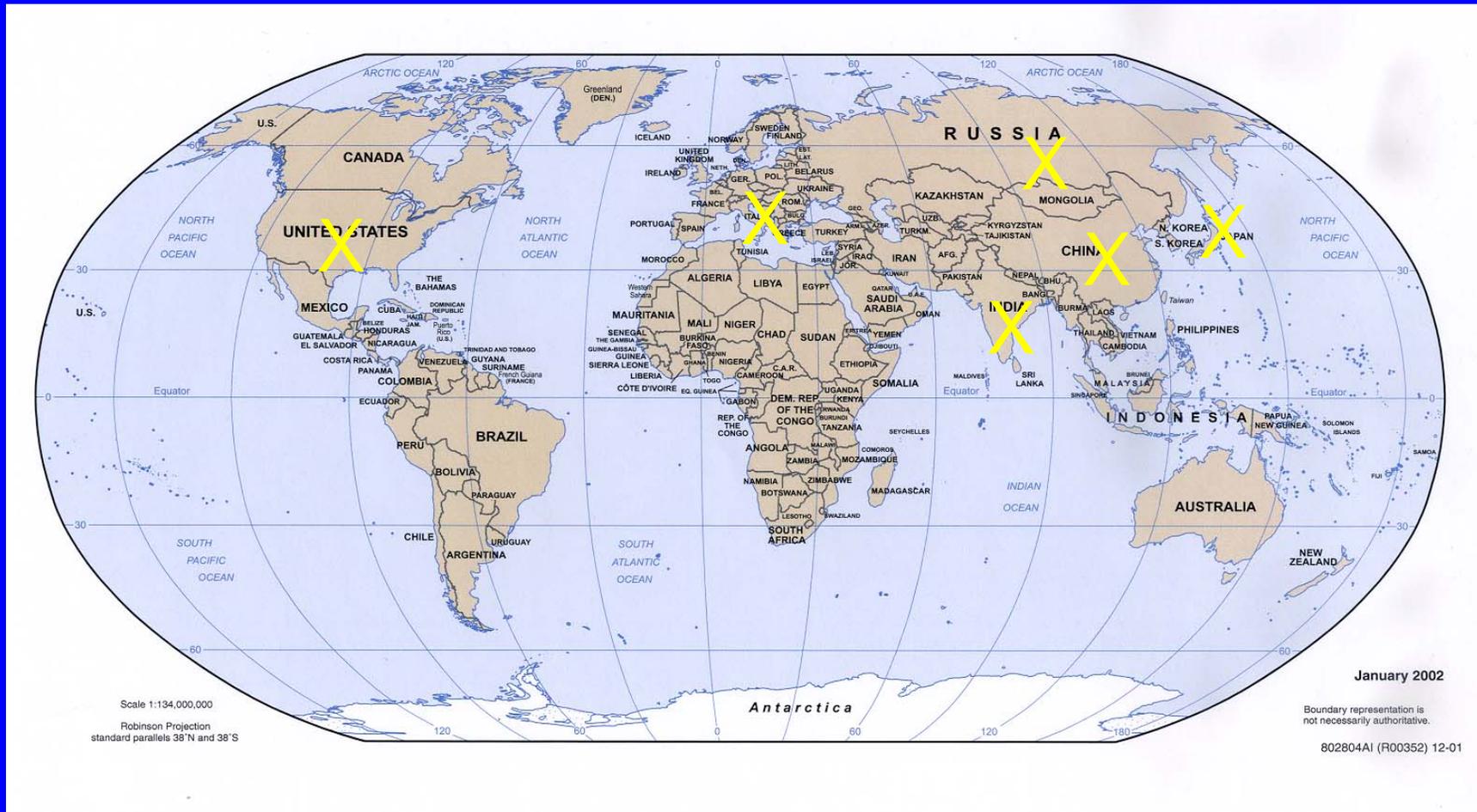
U.S. Dominance

"We are so dominant in space that I pity a country that would come up against us," said Maj. Gen. Franklin Blaisdell, director of space operations for the Air Force, eight days before Operation Iraqi Freedom began.

Jack Kelly, "US the Leader in War Plans for Space: Gaining the Ultimate Highground," *Pittsburgh Post-Gazette*, 28 July 2003.



SPACE POWERS

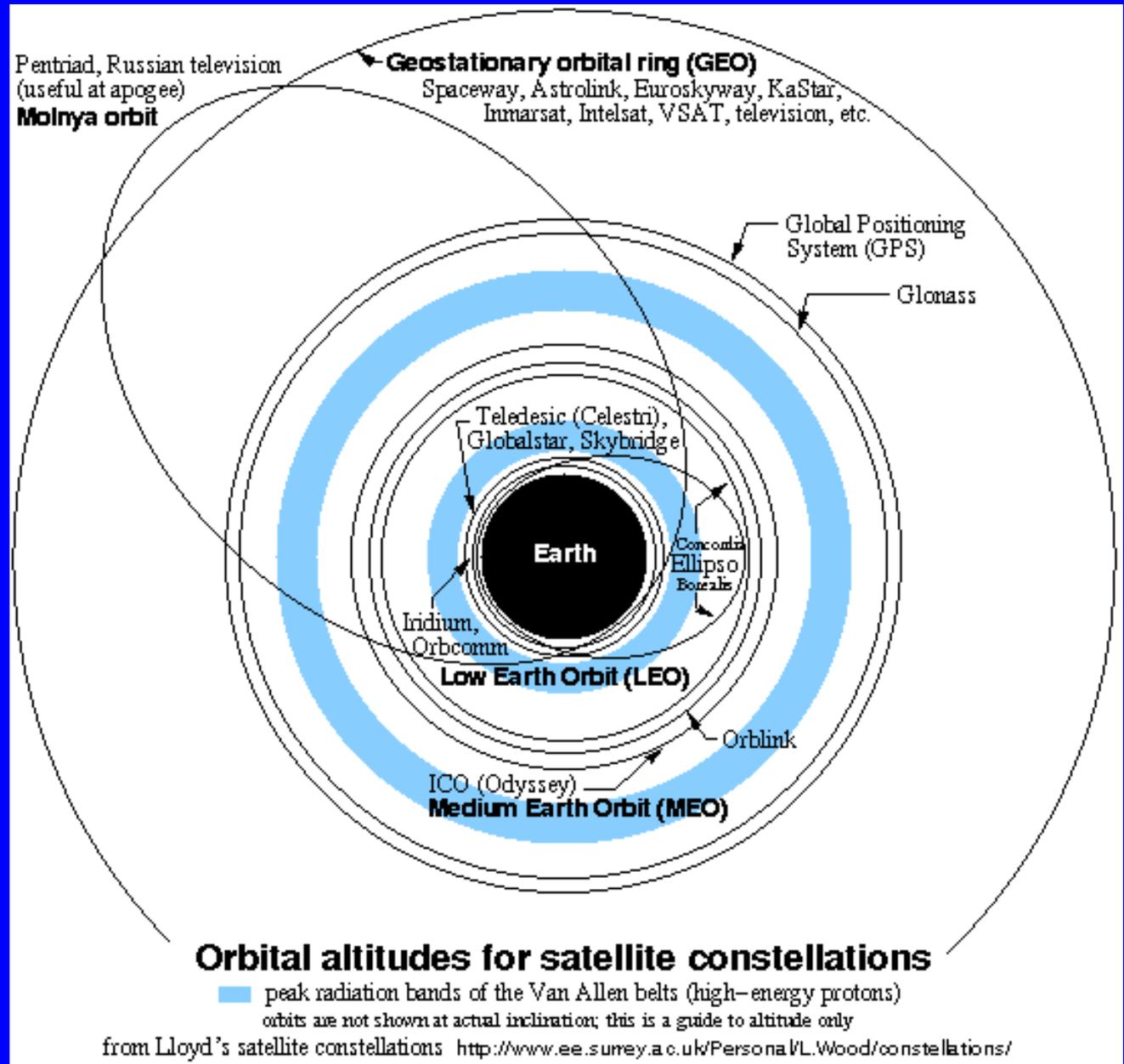




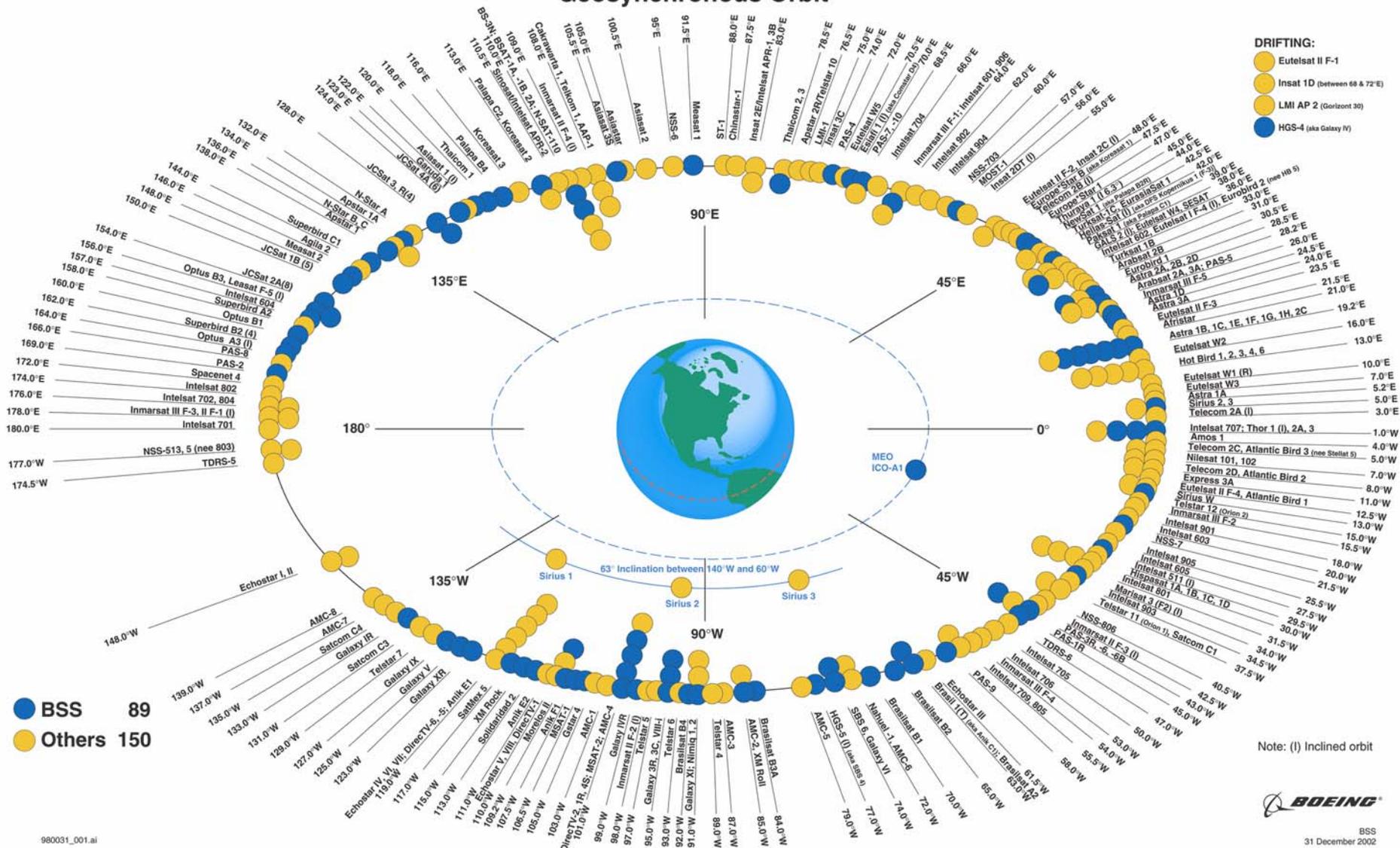
**LEO = 100/200
miles**

**GEO = 22,300
miles**

**Earth to Moon =
238,700 miles**



Commercial Communications Satellites Geosynchronous Orbit





WHAT IS IT ABOUT SPACE THAT WARRANTS SPECIAL CONSIDERATION?

Allure

Uncertainty

Scale/Magnitude

Action-Reaction

Dual-Use Technology



ALLURE

Today as in much of America's military history, two key problems exist. One is the fascination with technology, to the detriment of understanding morale and initiative. American security planners ought to consider... less costly weapon systems rather than always planning for changes of greater technological complexity.

Christopher van Aller, *The Culture of Defense*, 2001.



RUMSFELD'S TRANSFORMATIONAL OBJECTIVES

...shed outmoded thinking, skip a generation of **technology**...cancel obsolete systems, cut entrenched force structure and forge a quicker, smarter, more mobile force to meet the threats of the future...

Bush campaign, Rumsfeld
Confirmation Hearings



RUMSFELD'S TRANSFORMATIONAL OBJECTIVES

- **Protect US homeland & bases overseas**
- **Protect & Sustain US power around the world**
- **Deny sanctuaries to US enemies anywhere on Earth**
- **Protect US information networks, telecommunications, computer systems, Internet links & the like from attack**
- **Use Information Technology to all different kinds of US forces to communicate with each other and fight jointly**
- **Maintain “unhindered access to space & protect our *space* assets from attack.”**

Nov 2002



UNCERTAINTY

Are often initially unclear or even misunderstood/ Are often the source of significant suspicion and trepidation

***640K ought to be enough for anybody.* Bill Gates, 1981.**

I hope none of you gentlemen so foolish as to think that aeroplanes will be usefully employed for reconnaissance from the air. There is only one way for a commander to get information by reconnaissance and that is by the use of cavalry. General Douglas Haig, 1914

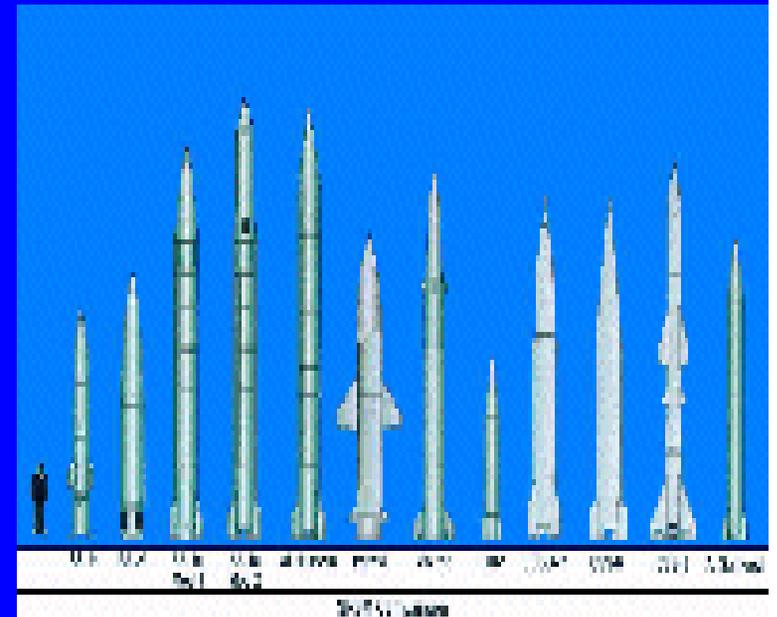
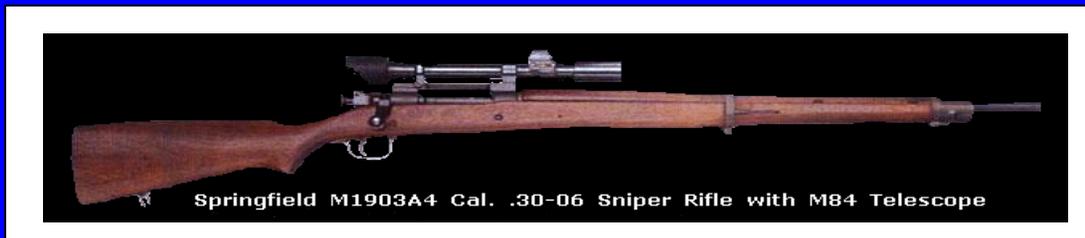


SCALE & MAGNITUDE

Increase the potential impact of military actions by orders of magnitude

Never fight the U.S. without nuclear weapons.

The answer of the Indian army chief of staff when asked in 1991 what he learned from the Gulf War.





ACTION-REACTION

Subsequently, there is an increase in the possibility of an inappropriate or even counterproductive response to technology acquisition or development in one country by another country.

Dependence

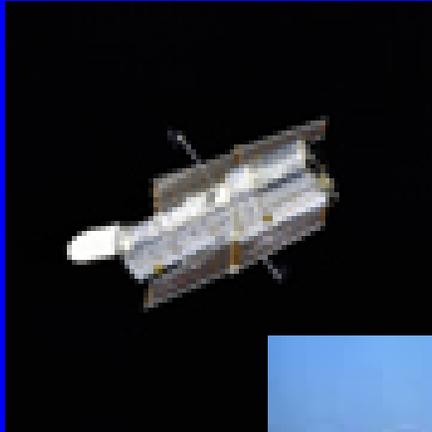
Security by Accepting Certain Insecurities



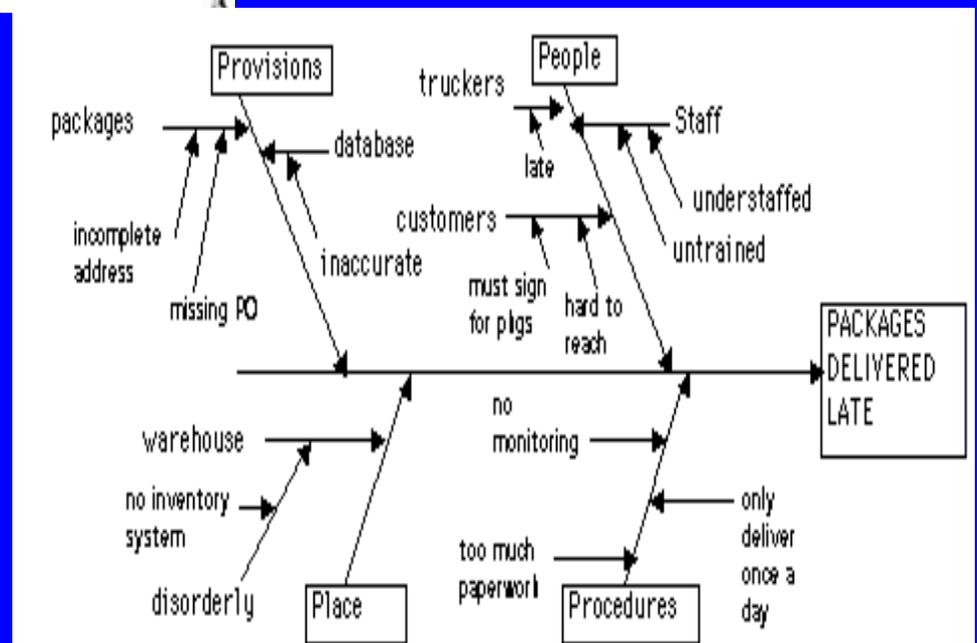
DILEMMA OF DUAL-USE



San Pedro, Belize



kilometers





SPACE AS A STRATEGIC ASSET

- **Development of a knowledge-based economy**
- **Support integrated transport policies**
- **Protect populations, resources and territories**
- **Maintain the integrity and capabilities of the technological base**
- **Space-based crop monitoring or water management networks**

“Space & Security Policy in Europe”, EU Institute for Security Studies, December 2003

“In the United States, space technology is “military oriented” due to a military strategy increasingly based on the concept of ‘information dominance’. European Space technology is more ‘civilian oriented; in fact, it is dual-use.”

DoD Budget by Service

(Discretionary budget authority, \$ in Billions)



	<u>FY 04</u>	<u>FY 05</u>	<u>Change</u>
• Army	95.4	97.2	+1.8
• Navy/Marine Corps	115.1	119.3	+4.2
• Air Force	110.9	120.5	+9.6
• Defense Wide	<u>53.9*</u>	<u>64.7</u>	<u>+10.8</u>
Total	375.3**	401.7	+26.4

* Includes \$3.5B rescission to the FY03 Iraq Freedom Fund and \$1.8B rescission to DoD appropriations in the FY04 Omnibus Appropriations Act

** Also Includes \$0.8B in prior-year program rescissions

Totals may not add due to rounding

FY 2005 Budget by Title

(Discretionary budget authority \$ in Billions)



	<u>FY 04</u>	<u>FY 05</u>	<u>FY 06</u>	<u>FY 07</u>	<u>FY 08</u>	<u>FY 09</u>
Military Personnel	97.9	104.8	109.4	113.1	116.8	120.4
O&M	127.6*	140.6	146.1	151.2	156.3	163.9
Procurement	75.3	74.9	80.4	90.6	105.1	114.0
RDT&E	64.3	68.9	71.0	70.7	71.6	70.7
Military Construction	5.5	5.3	8.8	12.1	10.8	10.2
Family Housing	3.8	4.2	4.6	4.5	3.6	3.5
Other	<u>0.8**</u>	<u>3.0</u>	<u>2.3</u>	<u>1.6</u>	<u>1.4</u>	<u>4.9</u>
TOTAL	375.3***	401.7	422.7	443.9	465.7	487.7

* Includes \$3.5B rescission to FY03 Iraq Freedom Fund; 2-year spending account rescinded in FY04

** Includes \$1.8B rescission to DoD appropriations in the FY04 Omnibus Appropriations Act

*** Also includes \$0.8B in prior-year program rescissions to Procurement, RDT&E, Military Construction, Family Housing, and National Defense Sealift Fund. Totals may not add due to rounding.



COMPARATIVE COSTS

- **Milstar = \$17B, satellites cost about \$1 B each, launched on Titan IV's at about \$500 M per launch**
- **Milstar = Approx. 3 carriers @6B each**
 - **Milstar = Approx. 19 B-2's @ \$872 each**
- **Defense Meteorological Satellite Program (DMSP) = \$84M each, launched on Atlas at about \$75 M per launch**
- **DMSP (including launch) = Approx 5 F/A 18's @ \$30 M each**
 - **DMSP (including launch) = Approx. 26 M-1 A-1 tanks @ \$5.9 M each**



WHAT ARE THE CURRENT MILITARY SPACE MISSIONS?

- **Space Support**
- **Force Enhancement**
- **Space Control**
- **Force Application**



SPACE SUPPORT

- Operations required to ensure that space control and support of terrestrial forces are maintained. They include activities such as *launching and deploying space vehicles, maintaining and sustaining space vehicles while on orbit, and recovering space vehicles if required.*



LAUNCH

- **Cost**
- **Time (Access)**
- **EELV first launch (Atlas V)
– Aug 2002 (+5 since then)**
- **\$6B overall launch savings
between 2002-2020**
- **\$4000 per lb to orbit**
- **Savings thru acquisition**
- **Russian engine**





Bush Space Vision 1/04

- Robotic missions to Moon in 2008/Moon base by 2015/"Beyond" by 2020
- Crew Exploration Vehicle to replace shuttle
- No mention of new heavy lift capability (military?)
- \$12 Billion/\$1 Billion to NASA in new money



Satellite Operations



CONTROLLER AT SCHRIEVER AFB



DIEGO GARCIA

1996 AF GPS Control Center – error transmitted for 6 seconds. >100 cell phone networks down.

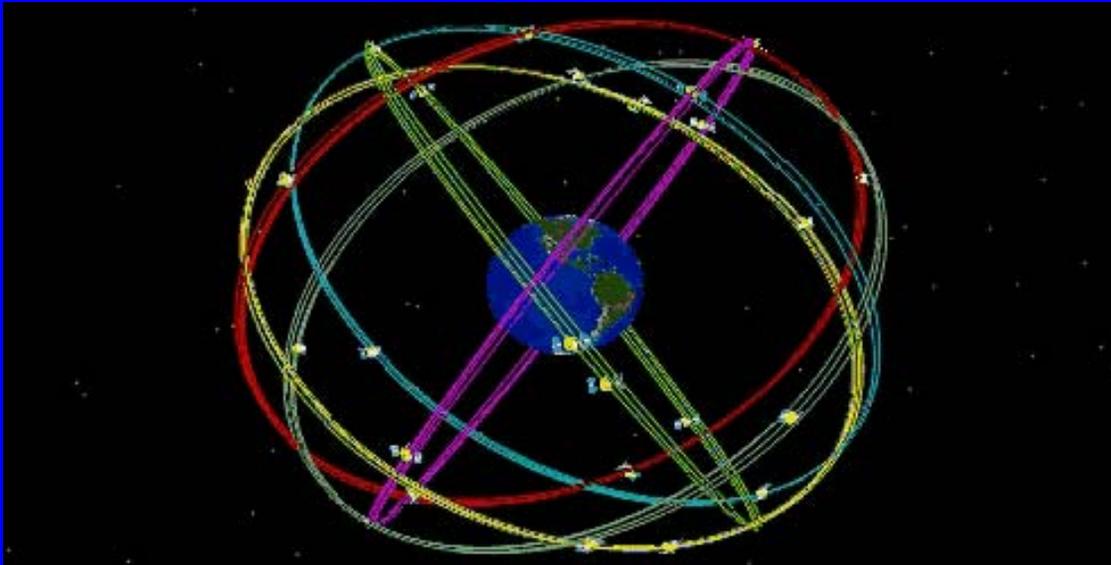


FORCE ENHANCEMENT

- A capability that, when added to and employed by a combat force, *significantly increases the combat potential of that force and thus enhances the probability of successful mission accomplishment.*



Navigation Global Positioning System (GPS)



- **24 Satellite Constellation**
- **24 Hour, Worldwide “3D” Coverage**
 - **Latitude**
 - **Longitude**
 - **Altitude**
 - **Time**
- **Civil - Military**



Space Control

- **Space Control** - Operations that provide *freedom of action in space for friendly forces while, when directed, denying it to an enemy*, and include the broad aspects of protection of US and US allied space systems and negation of enemy space systems. Space control operations encompass all elements of the space defense mission.



Space Control

Surveillance

- **Detect, Identify, and Track Man-made Space Objects**
- **Worldwide Network**
 - **Radar**
 - **Optical Trackers**

Prevent

Prevent Adversaries from Exploiting US or Allies Space Services

- **Shutter Control**

Protect

- **Ensure Use of Space Assets**
- **Enhance Survivability**
 - **Maneuver**
 - **Harden**
 - **Redundancy**

Negate

Negate the Ability for Adversaries to Exploit Their Space Forces



Remotely Sensed Data



IKONOS imagery featuring
Enduring Freedom
post-strike damage to airfield
in Kandahar, Afghanistan



- Ikonos/1 meter resolution
- Oct 2001: Images purchased in perpetuity –v- Shutter control
- 1st Amendment Issue



FORCE APPLICATION

- **Weaponization**
 - Policy from Kennedy to Reagan
 - Reagan, SDI
 - Clinton



WEAPONIZATION OF SPACE

- Traditional notions of Deterrence are now outdated
- Rumsfeld Commission Warns Against "Space Pearl Harbor", January 2001
 - ***Air, Land and Sea all have become battlegrounds...inevitable space will too...US would be remiss not to prepare ...***
- Global Utilities...



“The nation must prepare now for inevitable conflict in space, according to Peter B. Teets, Undersecretary of the Air Force and director of the National Reconnaissance Office...Teets noted that the nation must find ‘ways to get a vehicle rapidly off the pad to any orbit on short notice...It’s easy to see how such a responsive capability could be useful for rapid constellation replenishment...but I leave it to your imagination to find other ways to employ such a capability to achieved desired warfighting effects.”

Air Force Magazine
January 2003



WHAT “TOOLS FOR THE WARFIGHTER” DOES SPACE PROVIDE OR ENHANCE?

See It, State It, Stop It



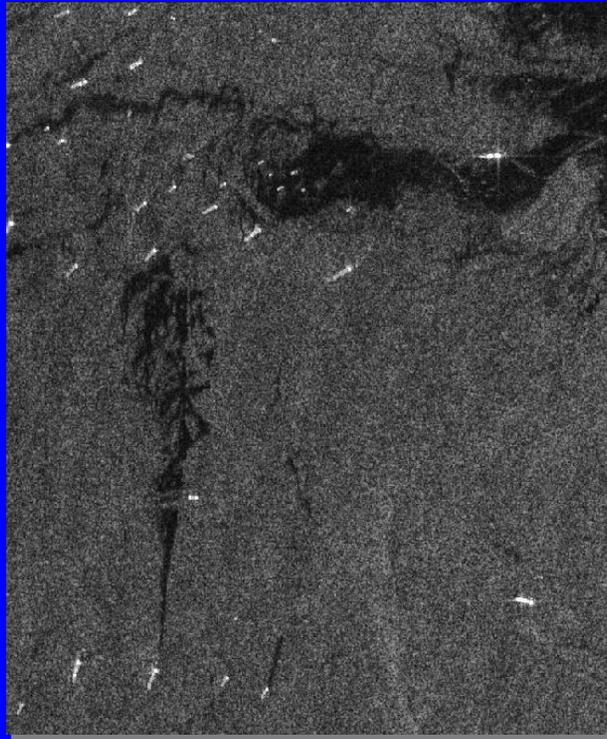
See It

- **Universal Situational Awareness**
 - **Space-based Sensors**
 - **Airborne Sensors (UAVs, AWACs, JSTARS)**
 - **Surface-based Sensors (AEGIS)**
 - **Fused, Real-time Data**
 - **Global Positioning System (GPS)**
 - **Radar (SAR) satellites**





TRANSPARENCY



<http://www.crisp.nus.edu.sg>

spaceimaging.com





Defense Support Program (DSP)

- October 15, 2001: U.S. bombed village of Khorum in Afghanistan. Reports later of heavy casualties.
 - Secondary explosions
 - Tunnel filled with Scud and FROG missiles
 - DSP picked up one of the ***largest heat signatures*** ever spotted (not real time, serendipitous)



State It

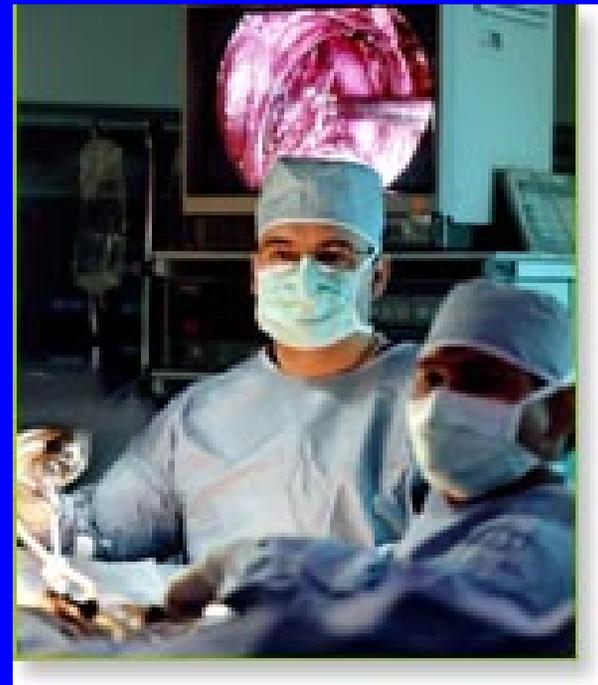
- **Advanced C4I**
 - **Command and Control Integration between services and between allies is key**
 - **Information technology**
 - **Commercially Driven**





Stop It

- **Precision Engagement**
 - Precision Guided Munitions (PGM)
 - Stand-off attack capability
 - Non-lethal technologies
 - Stun guns on airliners
 - 12 gauge shotguns, non-lethal rounds
 - Missile Defense
 - Space Based weapons





Missile Defense

- 10 ground-based interceptor missiles deployed in Alaska by 2004, +6 by 2005/06. Four missiles at Vandenberg AFB by 2005.
 - **Further system definition to follow as we learn**
- Skipping operational testing phase (8/19 developmental tests done, 5 successful)



TECHNICAL “RATCHETING”

Regarding EP-3 incident... “China faces a narrow range of options in a relationship tilted toward the politically, economically and militarily stronger U.S. Analysts say reprisals could range from a more symbolic withdrawal of China's ambassador to a subtler tit-for-tat -- perhaps selling missile technology to Iran, Pakistan and other nations in Washington's disfavor.” *WSJ, 4/27/01*



International Issues: Technical “Ratcheting” in Asia-Pacific

**Pakistan will increase
its missile arsenal**

**India will increase its
missile arsenal**

**China increases its
missile arsenal**

Missile defense

Threat Assessments

QUALITATIVE AND/OR QUANTITATIVE



TECHNICAL “RATCHETING”

Pakistan will increase its missile arsenal

India will increase its missile arsenal

China increases its missile arsenal

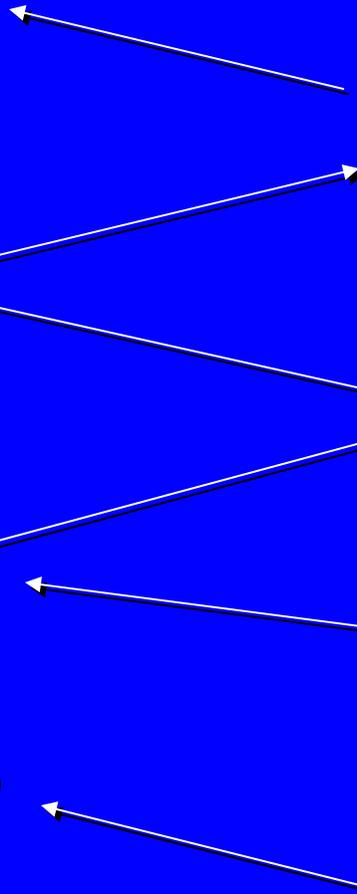
NMD/TMD

Threat Assessments

China increases its missile arsenal

China Sells Missiles to Pakistan

F-16s to Taiwan





Other Countries Enhancing Their Own Capabilities

- **Japan**
 - **Information Gathering Satellite (IGS) system**
 - **Dual-Use**
 - **\$2 Billion +**
 - **Primary Benefit = Autonomous capability**



Other Countries Enhancing Their Own Capabilities

- **Europe – Common Foreign & Security Policy / European Security & Defense Policy**
 - **Global Monitoring for Environment & Security (GMES)**
 - 2008/100 ME
 - **Galileo navigation system: Alternative to GPS**
 - 2004 first launch, operational 2007/100 ME



Other Countries Enhancing Their Own Capabilities

- **India**
 - **GEO Launch capability/remote sensing**
 - **\$78 M program to send an unmanned lunar spacecraft**

...could showcase India's scientific prowess and stake its claim to join a select club for future planetary missions, a top Indian space official said. K. Kasturirangan, chairman of the Indian Space Research Organisation, said the mission would enhance India's status as a potential partner in future space exploration.

ABC news, 4/29/03



Other Countries Enhancing Their Own Capabilities

- China
 - Manned launch October 15, 2003

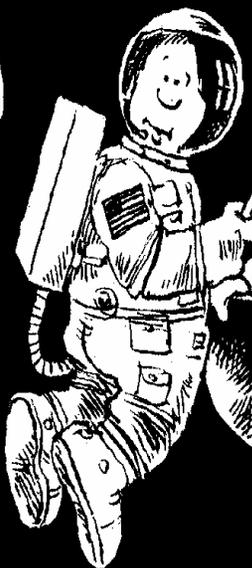
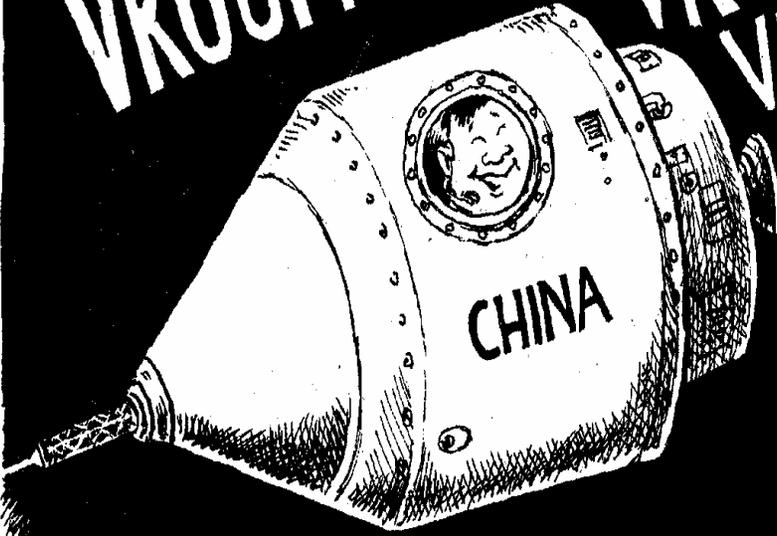


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WANNA
RACE ?

VROOM!

VROOM!
VROOM!





STRATEGIC SPACE ISSUES



Force Planning: Missiles or Machetes?

What level of technology
is appropriate?



**Not everything that can be counted counts, and not
everything that counts can be counted. Albert Einstein**



Technology/Dependence

- **Vulnerability**
- **Susceptibility of technology to countermeasures**
 - **Internet available GPS “jammers” for \$39.99**



Multilateral Considerations

- **Technology gaps**
- **Interoperability**
- **Knowing how to use the technology**
- **Security Issues**



Cooperation v Competition

- **China-U.S. zero-sum attitude**
- **U.S. is not the only potential “partner” in space activity**
 - **China is a partner in European Galileo program**



Export Controls

- **Control versus stopping spread of space technology**
- **Dissemination of space technology industry, versus final product, to avoid dependency**
- **U.S. in danger of having 100% control of nothing**

Questions?