

Three Dimensionality in Chinese Views on India and Space

**INDIA'S FIRST MISSION TO MOON
CHANDRAYAAN-1**

100 km Lunar Polar Orbit.
1750 kg in GTO of 240 x 36000 km.
Total mass of 523 kg with 2 year life time.
Scientific payload 55 kg.

Lunar Insertion Manoeuvre
Final Orbit 100 km Polar
Lunar Transfer Trajectory
Initial Orbit ~ 1000 km
ETO
GTO

Shape of ISRO's Human Spaceflight Ambitions

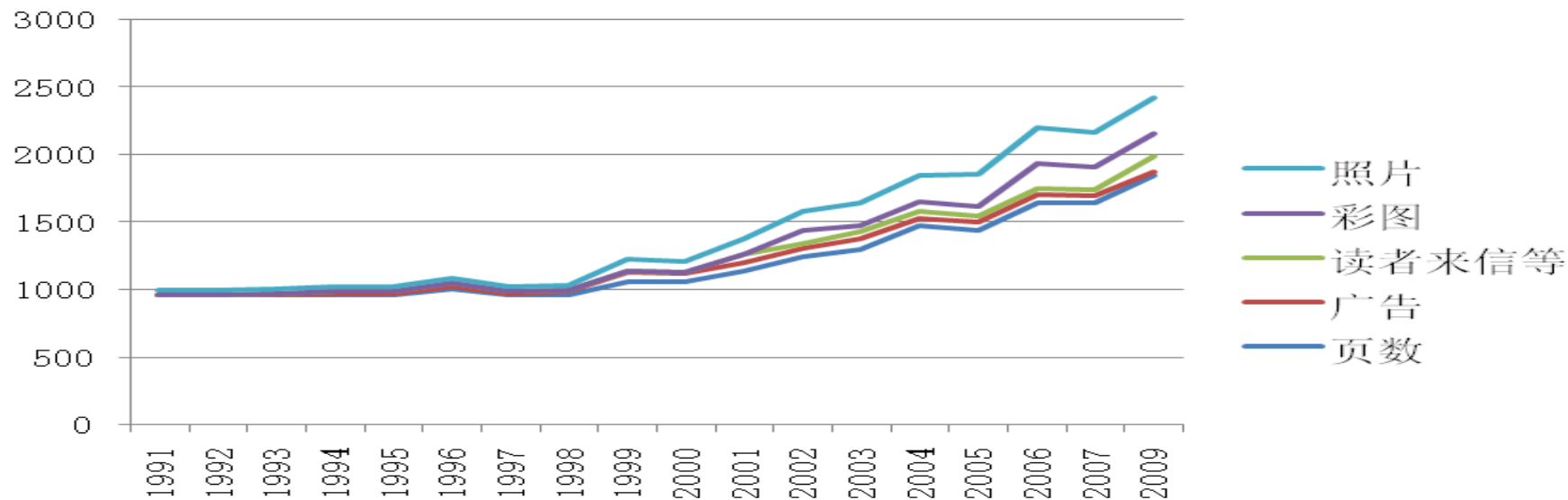
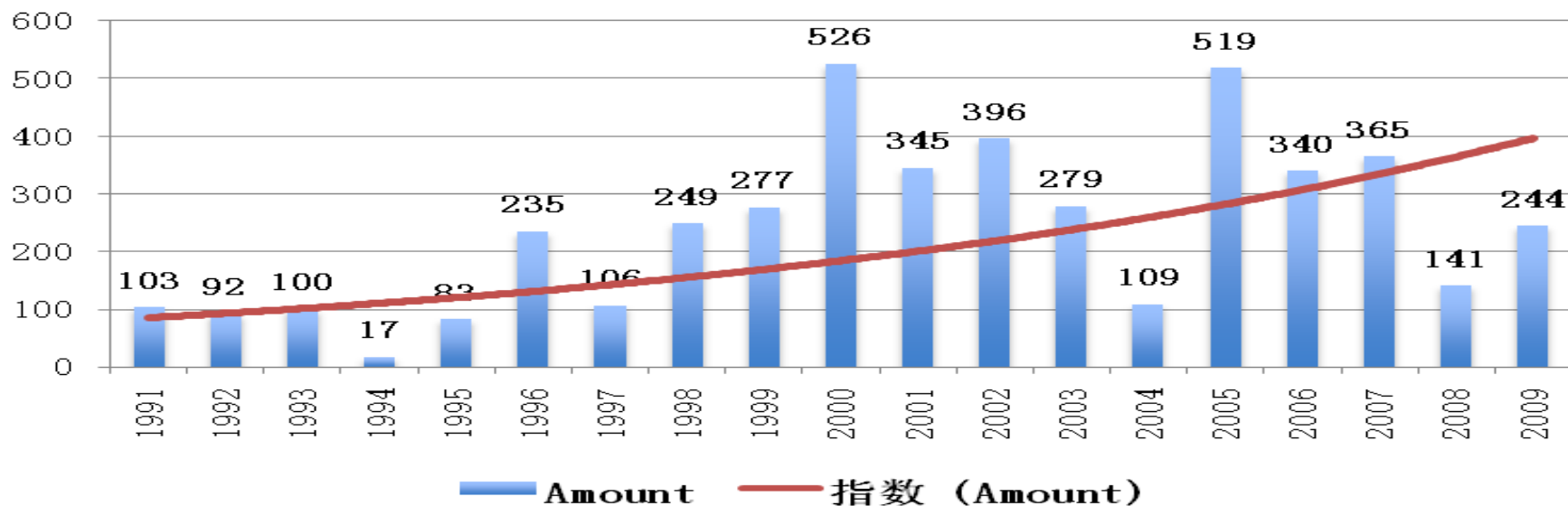
Indian Space Research Organisation (ISRO) has design illustrations of the size and rocket it plans to use for the nation's first manned orbital mission, expected to be launched in 2015. The capsule is designed to accommodate up to two astronauts, but the initial mission will carry a one-person crew. The rocket is a variant of ISRO's Geosynchronous Launch Vehicle Mark 2, chosen for its safety and reliability.

Launch vehicle
Orbital vehicle
Cutaway view showing three-person crew and environmental control elements.

ISRO ISRO

Lora Saalman, PhD
Carnegie-Tsinghua Center for Global Policy

China's Gaze Towards India



Sources

Bingqi zhishi (Ordnance Knowledge), Xiandai bingqi (Modern Weaponry), Junshi jianshe (Military Building), Junshi jishu (Military Technology), Binggong keji (Ordnance Industry Science and Technology), Junshi lilun yanjiu (Military Theory Study), Shijie junshi (World Military Affairs), Xiandai junshi (Modern Military), Bingqi (Ordnance), Hangkong bingqi (Aviation Weaponry), Jianchuan zhishi (Naval and Merchant Ships), Xiandai jianchuan (Modern Ships Magazine), Zhongguo hangtian (Aerospace China), Binggong keji (Weapons Engineering Technology), Junshi jishu (Military Tech), Daodan yu hangtian yunzai jishu (Missile and Aerospace Delivery Tech), Hangtian (Space), Hangtian dianzi duikang (Aerospace Electronic Countermeasures), Hangtianqi gongcheng (Spacecraft Engineering), Gutu huojian jishu (Solid Rocket Technology), Feihang daodan (Cruise Missile), Guoji hangkong (Intl Aviation), Hangkong zhishi (Aviation Knowledge), Hangkong kexue jishu (Aerospace Science and Technology), Hangkong yu hangtian (Air and Space), Hangkong jingmi zhizao jishu (Aviation Precision Manufacturing Tech), Hangkong jingmi jishu yu gongcheng (Aviation Precision Tech and Engineering), Hangkong ceshi jishu (Aviation Test Technology), Hangkong dongli xuebao (Aerospace Propulsion Journal), Hangkong jisuan jishu (Aeronautical Computing Technology), Hangkong jice jishu (Aviation Measurement Technology), Jianchuan dianzi duikang (Maritime Electronic Countermeasures), Tanke zhuangjia cheliang (Tanks and Armored Vehicles), Bingqi keji yu gongcheng (Weapons Tech and Engineering), Dangdai yatai (Journal of Contemporary Asia-Pacific Studies), Guoji zhengzhi kexue (Intl Political Science), Zhongguo waijiao (China's Diplomacy), Yafei zongheng (Asia and Africa Review), Guoji luntan (International Forum), Xiandai guoji guanxi (Contemporary Intl Relations), Junbei kongzhi yu anquan (Arms Control and Security), Guoji zhanlue yanjiu (International Strategic Studies), Nanya yanjiu (South Asian Studies), Nanya yanjiu likan (South Asian Studies Quarterly)

Overall Shift in Gaze

- More numerous and lengthy articles on India's military modernization
- Increasing de-hyphenation of Pakistan and India
- More in-depth analysis of Indian military equipment and systems
- Comparison of Chinese and Indian developments and implications for China
- Inclusion of India in articles devoted to China's own military modernization

Gaze Towards Aerospace 1991 - 2009

印度载人航天任务的雏形

印度太空研究组织 (ISRO) 已宣布了为其首次载人太空飞行任务设计的大空舱和火箭的图例。预计该任务将于2015年发射。太空舱设计可容纳3名宇航员。但首次太空飞行将只携带2名宇航员。

执行发射任务的火箭是印度的地球同步卫星运载火箭 (GSLV-3)。该型火箭能够执行载人发射任务，具有极高的安全性和可靠性。



运载火箭



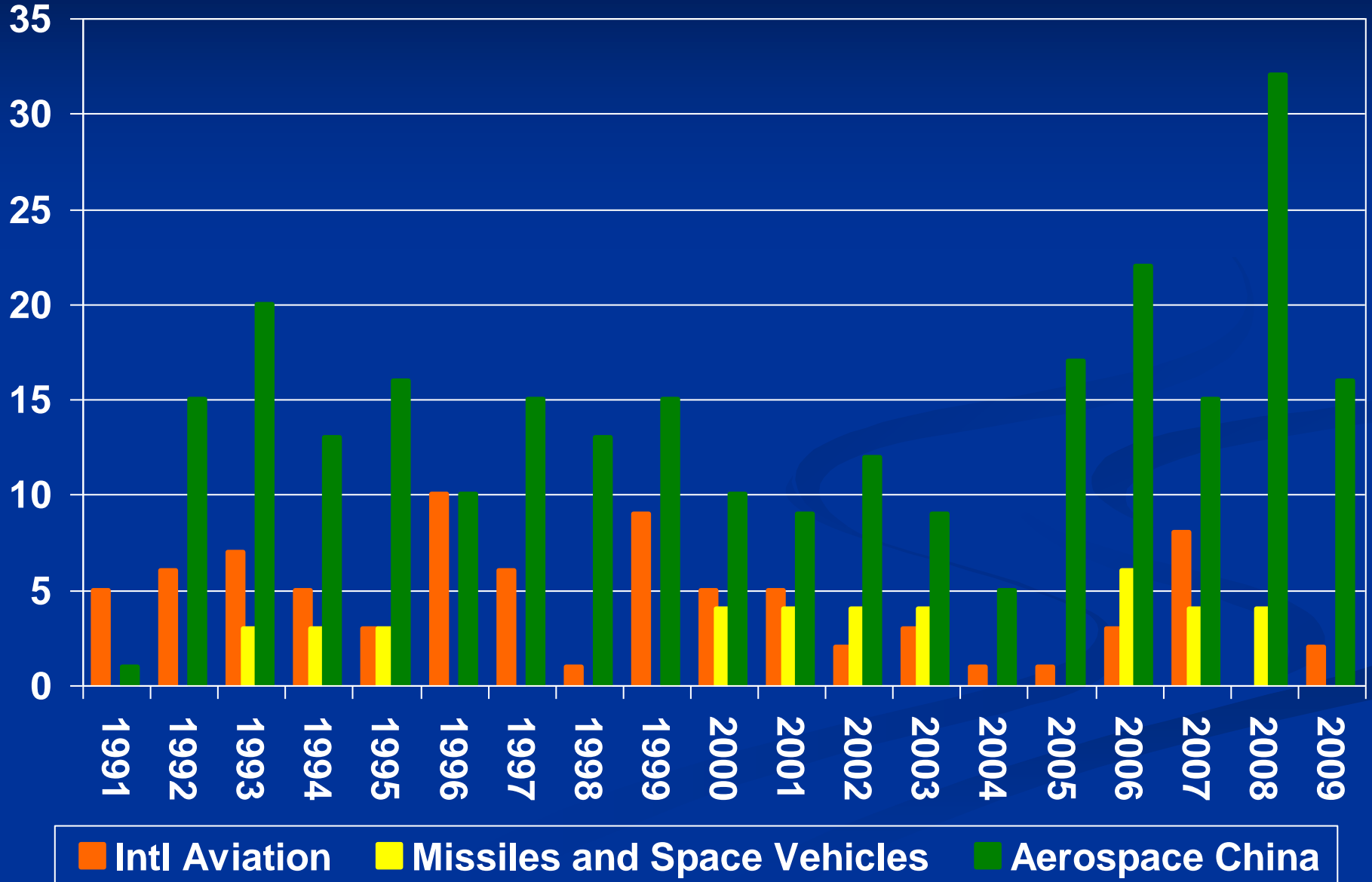
载人舱



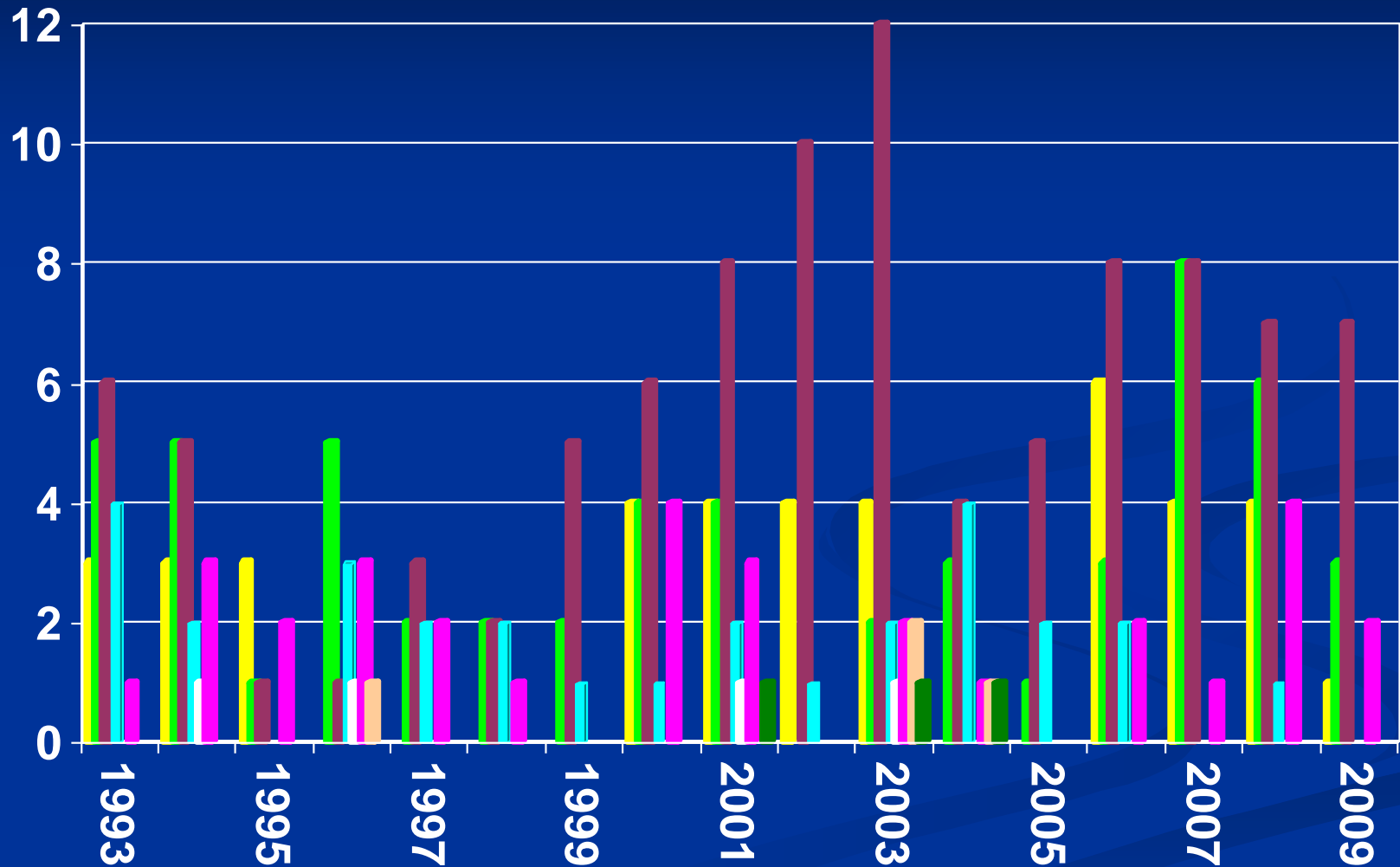
3人座舱及舱内环境控制组件

结构图

Aerospace Journals



Aerospace Countries



Strategic, Scientific, Academic Systems

Prithvi	117	Agni	47	Prithvi	4
Agni	110	GSLV	43	Chandrayaan	3
Surya	23	Prithvi	28	Space Tech	2
GPS	34	PSLV	14	IT	2
C4ISR	12	Cryogenic Engine	14	Optoelectronic	1
SLV	11	GPS	11	GPS	1
PSLV	9	INSAT	7	SLV	1
Remote Sensing	9	C4ISR	4	C4ISR	1
Laser Rnge Finder	9	SLV	3	Satellites	1
GSLV	7	3D Battle System	3	Simulation	1

Strategic, Scientific, Academic Themes

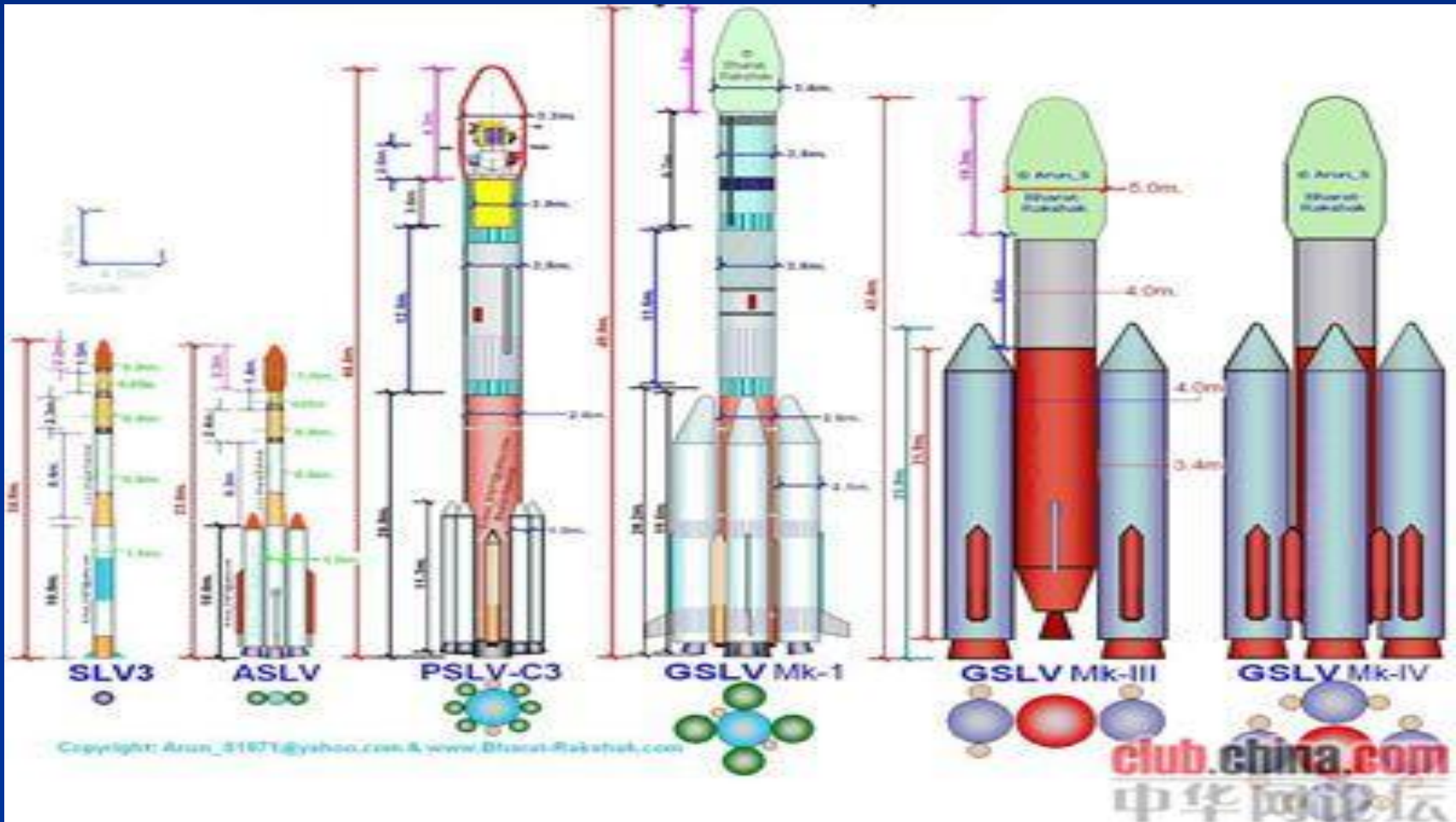
Strategic Triad	23	Strategic Triad	9	“Great Power”	42
Lunar Spacecraft	17	Navigation	9	“China Threat”	36
AAD、 PAD	13	“Great Power”	8	Ind-US Strat Enc	35
Fire and Forget	6	GPS	5	Expan, Hegemon	25
Space Weaponizat	3	AAD、 PAD	3	Nation/Militaris	19
IT Superpower	2	Info, Space War	3	Stability, Coop	13
Space Devel Strat	2	Nation/Militaris	2	NAM	5
Integ Guid Missile	2	“China Threat”	2	Power Res Power	4
Utilit, Appropriate	2	Indo-US Strat	2	Joint Exercise	4
ASAT Program	1	MIRV	1	IT Superpower	3

Sources

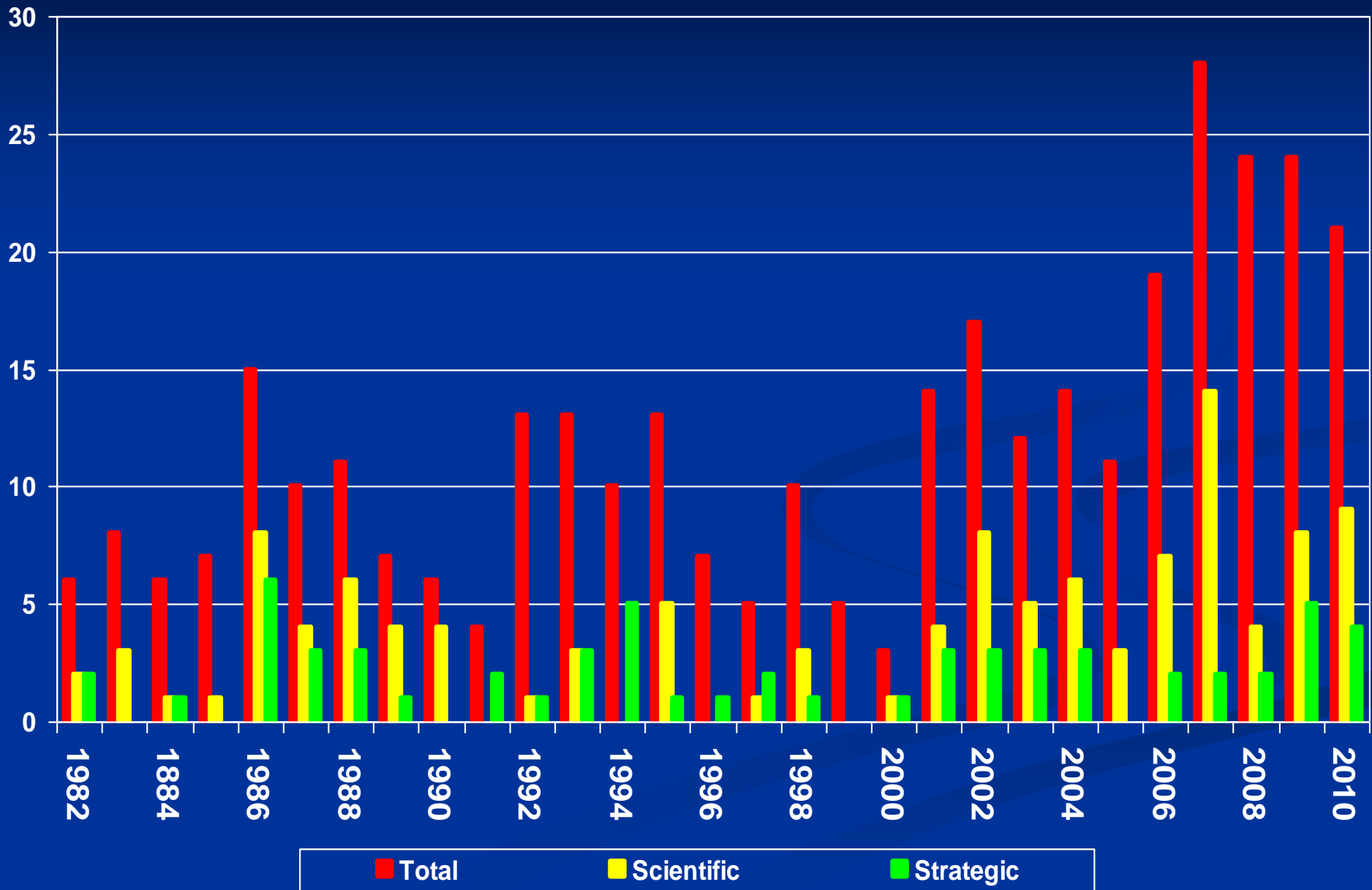
Bingqi zhishi (Ordnance Knowledge), Xiandai bingqi (Modern Weaponry), Bingong keji (Ordnance Industry Science Technology), Junshi jishu (Military Technology), Dangdai yatai (Journal of Contemporary Asia-Pacific Studies), Guoji zhengzhi yanjiu (International Politics Quarterly)

Discussions in China were conducted with experts at the Academy of Military Sciences, Beihang University, National Defense University, People's Liberation Army and People's Liberation Navy, China Atomic Energy Institute, Northwest Nuclear Tech Institute, Beijing Institute of Physical Engineering and Computational Mathematics, National Defense Science and Technology University, China's Nuclear Engineering Institute, China's Physical Engineering Institute, Chinese Academy of Social Sciences, China Reform Forum, Tsinghua University, Beijing University, China South Asia Studies Forum, Nanjing University, China Institute of Contemporary International Relations, Dalian Foreign Language University, Henan Teachers University, Sichuan University, Yunnan University, Fudan University, Shanghai Institute of International Studies, Hunan Teachers University, Shandong University, Guangdong Foreign Languages University, Renmin University and Tongji University

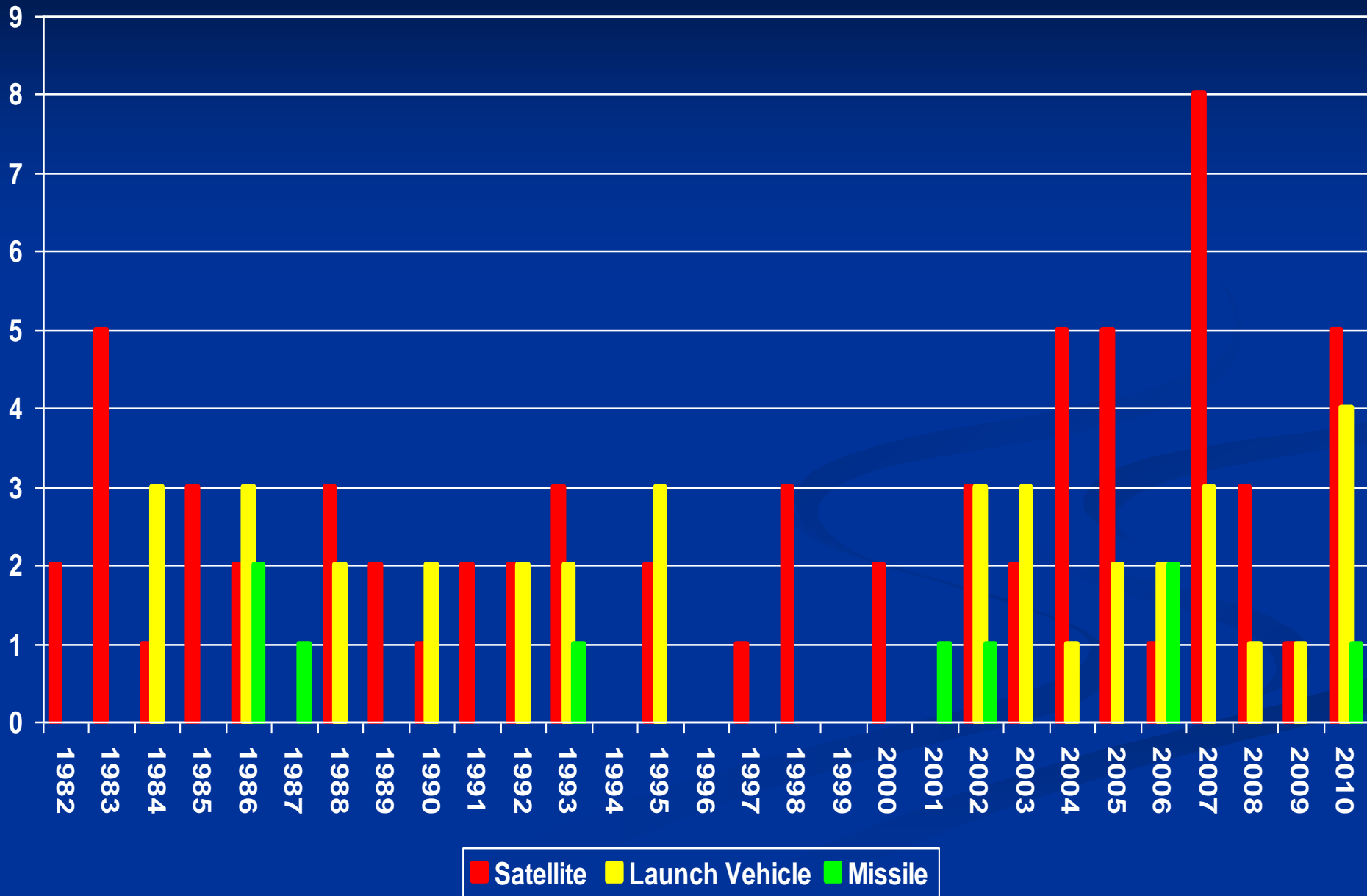
Strategic vs. Scientific 1991 - 2010



Journals



Articles



Topic Range

- Analysis of Service Performance of Indian Regional Navigation Satellite System (*Tiandi celiang yu diqiu dongli xue*, 2010)
- Application of Metal Matrix Composites to Aerospace (*Beijing gongye jishu xueyuan xuebao*, 2007)
- Agni Ballistic Missile Penetration and Performance (*Hangtian dianzi duikang*, 2008)
- India Announces ASAT Capabilities (*Daodan yu hangtian yunzai jishu*, 2008)
- India Pushes Forward on Ballistic Missile Defense Plan (*Daodan yu hangtian yunzai jishu*, 2009)
- Remote sensing, Cryogenic engines, Launcher and missile tests and failures, Microsatellites, Cooperation...

Perception and Practice Today and Future



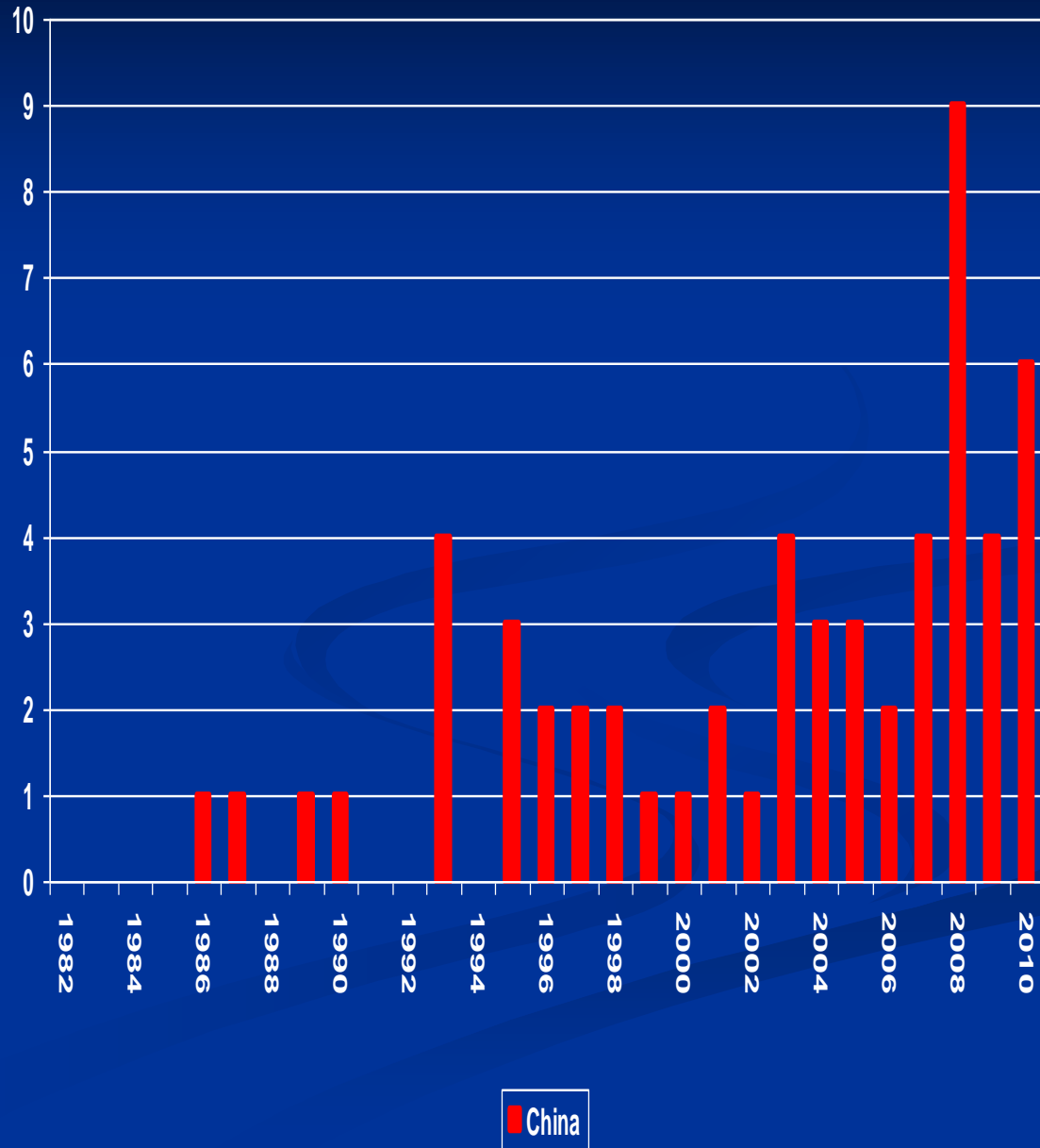
Outward Perceptions

Relative Deprivation:
Brahmos, Space Coop
with US, Missile Defense

**Expressed vs. Hidden
Attitudes:** AAD and
PAD

Overconfidence Phenom:
“Great Power Dream”,
Resource Drain, Petulant

Instrumental Aggression:
C4ISR, Remote sensing,
ASAT



Inward Perceptions

■ ASAT

Scientific, satellite experiment (*weixing shiyan*),
demonstrate capabilities to avoid “science surprise”

Political, bring US back to negotiating table at CD

Surprise by strong negative reaction towards China,
point to longer standing US and Russian programs

Reaction, pushed down path (*beidong*), much like nuclear
program

Not same level of adulation as over Shenzhou, largely
lacking in discussion

Practice and Future

Interaction: Scientist Gap, Strategist-Scientist-Scholar Divergence, Visas

Space Cooperation: 2002, 2006 cooperation MOUs, Reduction of Space Debris, Solar Power, Moon and Mars Exploration, Environmental and Meteorological Surveys, India-China High Tech Working Group

Joint Studies: Space Power, Aerospace Strategy, MD Implications, Space Policy Dialogue, Glossary of Space Weaponization, Militarization, etc.

Codes of Conduct: Space Navigation, Notification of Space Launch, Safe Traffic Management Procedures, Non-Interference Rule for Satellites

Confidence Building Measures: “Keep-out zones,” Missile and Space-Related Hotline, Info Exchange on Debris Management and Navigation

Future: US centripetal force, Indian ASAT/MD Impact, Not Unidirectional nor One Dimensional