



Yearbook on Space Policy

2008/2009: Setting New Trends



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Yearbook on Space Policy

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Kai-Uwe Schrogl, Wolfgang Rathgeber,
Blandina Baranes, Christophe Venet (eds.)

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Setting New Trends

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European Space Policy Institute, Vienna, Austria
Kai-Uwe Schrogl
Wolfgang Rathgeber
Blandina Baranes
Christophe Venet

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© 2010 Springer-Verlag/Wien
Printed in Germany

SpringerWienNewYork is a part of
Springer Science + Business Media
springer.at

Cover illustration: "Satellite of the SAR-Lupe satellite system, completed by the launch of the fifth satellite on 22 July 2008 (Grafik: OHB-System AG)"

Typesetting: Thomson Press (India) Ltd., Chennai
Printing: Holzhausen Druck GmbH, 1140 Wien

Printed on acid-free and chlorine-free bleached paper

SPIN: 80016141

With 31 Figures and 7 Tables

CIP data applied for

ISSN 1866-8305

ISBN 978-3-7091-0317-3 SpringerWienNewYork

Preface

The current global financial and economic crisis does not leave the space sector unaffected. The concrete effects, however, are different from what might have been expected. First of all, no sudden decline in the space market or in programme development took place. This is mainly due to the long-term planning and the long duration of project implementation. Secondly, and this is even more striking, space emerged in the high-level political debates to counter the crises as one promising area to focus on. The European Council of December 2008 stressed this and promoted that space as a “lead market” should be an important element in the European Economic Recovery Plan and the European Plan for Innovation. The 5th European Space Council already in September 2008 had emphasised the contribution of space to implement the Lisbon Strategy and the ESA Council at Ministerial Level in November 2008 had initiated substantive new programmes. Through this, space emerged from the crisis with an even stronger political standing and reputation highlighting its economic potential as never before. The coming months, way into 2011, will show whether this promise can be kept and whether governments actually maintain their high engagement in space programmes and as contractors for satellite systems facing a huge wave of replacements during the next years.

This incidence-driven trend of highlighting the economic potential of space is currently complemented by an already longer-lasting but now thriving tendency. It is the use of space assets for Europe’s security, where the quest for European approaches, concepts and policies gained considerable momentum during the past year: from the growing use of satellite data for European military missions to the establishment of a “structured dialogue” between the European Commission, the European Space Agency (ESA) and the European Defence Agency (EDA) up to the identification of new areas in need for European concepts like space for internal security. In order to stress and signify this accelerating movement the cover of this edition pinpoints at the potential of space assets for Europe’s security.

These are the two most significant new trends in space policy which this new edition of the “Yearbook on Space Policy” analyses in a thorough way. Many more smaller trends and developments have shown up in the reporting period between July 2008 and June 2009. They are all reflected in this Yearbook, which is consequently subtitled “New Trends in Space Policy”. Based on its European focus, the Yearbook also identifies the most notable developments around the world comprising the leading as well as the emerging space powers. Now, with this third edition, the “Yearbook on Space Policy” can present to the reader a multi-

year development of space activities, the governmental and commercial sectors as well as policies, programmes and technologies. This continuous inspection is laid out in the first and the third part of the Yearbook, with the first providing the description and analysis and the latter data and chronology. These two parts are prepared in-house by ESPI.

The second part of the Yearbook again brings in the views of ten distinguished analysts in the field of space policy touching topics or events which stirred the space sector between mid-2008 and mid-2009. Of course, the two mega-trends outlined above are covered by specific contributions, but new types of programmes (like the integrated applications) or regulatory issues of particular timeliness and relevance (like national space legislation) are discussed as well. This Yearbook also contains in its second part more contributions from abroad Europe than ever before. Scholars from the U.S., Canada and India have accepted to share their analyses of particularly important issues like the expectations in the new U.S. administration's space policy making. This multitude of issues and views has by now also become a trademark of the Yearbook, enhancing an intellectual dialogue between Europe and abroad. This dialogue was not a virtual one, since an authors' conference in the framework of ESPI's Autumn Conference of its European Space Policy Research and Academic Network (ESPRAN) in September 2009 provided for an extensive in-depth exchange of ideas and views on the draft manuscripts. This served as an efficient instrument for attuning the contributions to this edition.

The ten contributors of the articles for part 2 are also the persons ESPI would like to thank in a particular way for their engagement in this project. In addition to that, the editorial team is indebted to the members of the Advisory Council of the Institute, chaired by Herbert Allgeier, which in this composition acts as the Editorial Advisory Board to the Yearbook series. Thanks are also due to Wendelin Pohl for his zestful support.

Kai-Uwe Schrogl, Wolfgang Rathgeber, Blandina Baranes, Christophe Venet
ESPI editorial team

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PART 3
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List of acronyms

3D: 3 Dimensions

3DTV: 3 Dimensions Television

A

AATSR: Advanced Along Track Scanning Radiometer

ACI: Airports Council International

ADF: Australian Defence Force

ADM: Atmospheric Dynamics Mission

AEHS: Advanced Extremely High Frequency Satellite

AFRL: Air Force Research Laboratory

AIS: Automatic Identification System

ALC: African Leadership Conference on Space Science and Technology for Sustainable Development

ALOS: Advanced Land Observing Satellite

APRSAF: Asia-Pacific Regional Space Agency Forum

APSCO: Asia-Pacific Space Cooperation Organisation

ARATS: Association for Relations Across the Taiwan Straits

ARMC: African Resource Management and Environmental Constellation

ARTA: Ariane 5 Research and Technology Accompaniment Programme

ARTES: Advanced Research in Telecommunications Systems

AR5: 5th Assessment Report

ARV: Advanced Re-entry Vehicle

ASAL: Agence Spatiale Algérienne (Algerian Space Agency)

ASAT: Anti-Satellite

ASI: Agenzia Spaziale Italiana (Italian Space Agency)

ATM: Air Traffic Management

ATV: Automated Transfer Vehicle

AU: African Union

AVIC: Aviation Industries of China

B

BAE: British Aerospace

BGAN: Broadband Global Area Network

BLS: Boeing Launch Services

BNSC: British National Space Centre

BRIC: Brazil Russia India China

C

C4ISR: Computerised Command, Control, Communications, Intelligence, Surveillance, Reconnaissance

CALT: China Academy of Launch Vehicle Technology

CASA: Construcciones Aeronáuticas Sociedad Anónima

CASC: China Aerospace Corporation

CASTC: China Aerospace Science and Technology Corporation

CBERS: China Brazil Earth Resources Satellites

CD: Conference on Disarmament

CDR: Critical Design Review

CEA: Commissariat à l'Énergie Atomique (French Atomic Energy Commissariat)

CEO: Chief Executive Officer

CEOS: Committee on Earth Observation Satellites

CFE: Commercial and Foreign Entities

CFSP: Common Foreign and Security Policy

CGEA: Community General Export Authorization

CGWIC: China Great Wall Industry Corporation

CHAMP: Challenging Mini-Satellite Payload

CIP: Competitiveness and Innovation Framework Programme

CMA: China Meteorological Administration

CMSEO: China Manned Space Engineering Office

CNES: Centre National d'Études Spatiales (French Space Agency)

CNNC: China National Nuclear Corporation

CNSA: China National Space Administration

CoC: Code of Conduct

COF: Columbus Orbital Facility

COFUR: Cost Of Fulfilling User Requests

COPUOS: Committee on the Peaceful Uses of Outer Space

CoReH₂O: Cold Regions Hydrology High-resolution Observatory

CORONAS: Complex ORbital Observations Near-Earth of Activity of the Sun

COSMO-Skymed: Constellation of small Satellites for the Mediterranean basin Observation

COSTIND: Commission for Science, Technology and Industry

COTS: Commercial Orbital Transportation Services

CSA: Canadian Space Agency

CSIS: Center for Strategic and International Studies

CSSC: China State Shipbuilding Corporation

D

DARPA: Defense Advanced Research Projects Agency

DBS: Direct Broadcast Services

DGA: Direction Générale de l'Armement (French Military Procurement Agency)

DHS: Department for Homeland Security

DLR: Deutsches Zentrum für Luft- und Raumfahrt (German Space Agency)

DMO: Defence Material Organisation

DMSF: Defense Meteorological Satellite Program

DOC: Department of Commerce

DoD: Department of Defense

DOR: Differential One-way Range

DRC: Democratic Republic of Congo

DSP: Defense Support Program

DSTO: Defence Science and Technology Organisation

DTH: Direct-to-Home

E

EADS: European Aeronautic Defence and Space Company

EarthCARE: Earth Clouds, Aerosol and Radiation Explorer

EC: European Commission

ECA: Evolution Cryotechnique Type A

ECB: European Central Bank

e-CORCE: e-Constellation of Observation by Recurrent Cellular Environment

EDA: European Defence Agency

EDEM: European Defence Equipment Market

EDRS: European Data Relay Satellite

EEA: European Environment Agency

EELV: Evolved Expandable Launch Vehicle

EERP: European Economic Recovery Plan

EGB: EUROBOT Ground Prototype

EGNOS: European Geostationary Navigation Overlay Service

EISC: European Interparliamentary Space Conference

EJSM: Europa Jupiter System Mission

ELINT: Electronic signals Intelligence

eLORAN: enhanced LOng RANGE Navigation
ELV: Expandable Launch Vehicle
EMS: Electromagnetic Sciences
EnMAP: Environmental Mapping and Analysis Programme
EO: Earth Observation
EPS: EUMETSAT Polar System
ERA: European Research Area
ERC: European Research Council
ERS: European Remote Sensing Satellite
ESA: European Space Agency
ESDP: European Security and Defence Policy
ESP: European Space Policy
ESPI: European Space Policy Institute
ESTRACK: ESA Tracking Network
EU: European Union
EUFOR: European Union Force
EULEX: European Union Rule of Law Mission in Kosovo
EUMETSAT: European Organisation for the Exploitation of Meteorological Satellites
EU NAVFOR: European Union Naval Force Somalia
EUSC: European Union Satellite Centre
EVA: Extravehicular Activity

F

FAA: Federal Aviation Administration
FAO: Food and Agricultural Organisation
FBI: Federal Bureau of Investigations
FCC: Federal Communications Commission
FLPP: Future Launcher Preparatory Programme
FOC: Full Operational Capability
FP7: Framework Programme for research and technological development 7
FSS: Fixed Satellite Services
FY: Fiscal Year
FY: Feng Yung

G

GAC: GMES Advisory Council
GAD: General Armaments Department
GAGAN: GPS-Aided Geosynchronous Augmented Navigation System
GAO: Government Accountability Office

GBAORD: Government Budget Appropriations or Outlay on R&D
GCM: GMES Contributing Missions
GDP: Gross Domestic Product
GEMS: Gravity and Extreme Magnetism Small Explorer
GEO: Geostationary Orbit
GEO: Group on Earth Observations
GEOSS: Global Earth Observation System of Systems
GERD: Gross Domestic Expenditure on R&D
GES: Global Exploration Strategy
GES: Growth Environment Score
GIANUS: Global Integrated Architecture for iNnovative Utilisation of space for Security
GIO: GMES Initial Operations
GIOVE: Galileo In-Orbit Validation Element
GIP: Galileo Interinstitutional Panel
GIS: Geographic Information System
GJU: Galileo Joint Undertaking
GLONASS: Global Navigation Satellite System
GMES: Global Monitoring for Environment and Security
G-MOSAIC: GMES services for Management of Operations, Situation Awareness and Intelligence for regional Crises
GMSK: Gaussian Minimum Shift Keying
GOCE: Gravity field and steady-state Ocean Circulation Explorer
GOES: Geostationary Operational Environmental Satellite
GOSAT: Greenhouse Gases Observing Satellite
GPS: Global Positioning System
GSA: GNSS Supervisory Authority
GSC: GMES Space Component
GSC: Guyana Space Centre
GSLV: Geosynchronous Satellite Launch Vehicle
GTO: Geostationary Transfer Orbit
G8: Group of Eight
G20: Group of Twenty

H

HDTV: High Definition Television
HR: High Resolution
HSPG: High-Level Space Policy Group
HTV: H-2 Transfer Vehicle

I

IAASS: International Association for the Advancement of Space Safety
IADC: Inter-Agency Space Debris Coordination Committee
IAEA: International Atomic Energy Agency
IBEX: Interstellar Boundary Explorer
ICAO: International Civil Aviation Organization
ICBM: Intercontinental Ballistic Missile
ICG: International Committee on Global Navigation Satellite Systems
ICT: Information and Communication Technologies
IEA: International Energy Agency
IFAD: International Fund for Agricultural Development
IGN: Institut Géographique National (French National Geographic Institute)
IGS: Integrated Geo Systems
IGT: Innovation Growth Team for Space
IGY: International Geophysical Year
IHY: International Heliophysical Year
ILS: International Launch Services
IMF: International Monetary Fund
IMINT: Imagery Intelligence
IMO: International Maritime Organisation
INMARSAT: International Maritime Satellite Organisation
INSPIRE: Infrastructure for Spatial Information in Europe
IOV: In-Orbit Validation
IP: Internet Protocol
IPCC: Intergovernmental Panel on Climate Change
IRIS: Interface Region Imaging Spectrograph
ISA: Israeli Space Agency
ISAF: International Security Assistance Force
ISC: International Space Company
ISECG: International Space Exploration Coordination Group
ISRO: Indian Space Research Organisation
ISS: International Space Station
ITAR: International Traffic in Arms Regulations
ITU: International Telecommunication Union
IXO: International X-Ray Observatory

J

JAPCC: Joint Air Power Competence Center
JAXA: Japan Aerospace Exploration Agency

JEM: Japanese Experiment Module

JMA: Japan Meteorological Agency

K

KEW: Kinetic Energy Weapon

KMA: Korea Meteorological Administration

KSLV: Korea Space Launch Vehicle

KT: Kaitouzhe

L

LaRa: Lander Radio-Science

LCD: Liquid Crystal Display

LCROSS: Lunar CRater Observing and Sensing Satellite

LEO: Low-Earth Orbit

LEOP: Launch and Early Orbit Phase

LIMES: Land and See Monitoring for Environment and Security

LM: Long March

LMCLS: Lockheed Martin Commercial Launch Services

LRO: Lunar Reconnaissance Orbiter

LWS: Living With a Star

M

MACC: Monitoring Atmospheric Composition and Climate

MAI: Moscow Aviation Institute

MAVEN: Mars Atmosphere and Volatile Evolution

MDA: Missile Defense Agency

MDG: Millennium Development Goals

MEJI: Mars Exploration Joint Initiative

MELiSSA: Micro-Ecological Life Support System Alternative

MEO: Medium Earth Orbit

MERIS: Medium Resolution Imaging Spectrometer

MHI: Mitsubishi Heavy Industries

MoD: Ministry of Defence

MONUC: Mission de l'Organisation des Nations Unies en République démocratique du Congo (UN Mission in the Democratic Republic of the Congo)

MoonLITE: Moon Lightweight Interior and Telecom Experiment

MoU: Memorandum of Understanding

MPA: Maritime Patrol Aircraft

MPLM: Multipurpose Laboratory Module

MR: Medium Resolution

MRM: Mini Research Module
MRO: Mars Reconnaissance Orbiter
MSAS: MTSAT Satellite-Based Augmentation System
MSC: Meteorological Service of Canada
MSG: Meteosat Second Generation
MSI: Multi-Spectral Imager
MSL: Mars Science Laboratory
MSS: Mobile Satellite Services
MSV: Mobile Satellite Ventures
MTCR: Missile Technology Control Regime
MTG: Meteosat Third Generation
MTI: Moving Target Indicator
MUOS: Mobile User Objective System
MUSIS: Multinational Satellite-based Imagery System

N

NAO: National Applications Office
NASA: National Aeronautics and Space Administration
NASDA: National Development Space Agency of Japan
NATO: North Atlantic Treaty Organisation
NBO: Network-Based Operations
NDPG: National Defence Program Guidelines
NEO: Near-Earth Objects
NERC: Natural Environment Research Council
NEREUS: Network of European Regions Using Space Technologies
NFIRE: Near Field Infrared Experiment
NGDI: National Geospatial Data Infrastructure
NGO: Non-governmental Organisation
NGST: New Generation Space Telescope
NOAA: National Oceanic and Atmospheric Administration
NORAD: North American Aerospace Defense Command
NPOESS: National Polar-orbiting Operational Environmental Satellite System
NRO: National Reconnaissance Office
NSSA: National Security Space Authority

O

OECD: Organisation for Economic Co-operation and Development
OHB: Orbitale Hochtechnologie Bremen
OLCI: Ocean Land Colour Instrument

OPEC: Organisation of Petroleum Exporting Countries
ORFEO: Optical and Radar Federated Earth Observation
ORS: Operationally Responsive Space
OSTM: Ocean Surface Topography Mission

P

PBEO: Programme Board for Earth Observation
PCT: Patent Cooperation Treaty
PDR: Preliminary Design Review
PFI: Public Financing Initiative
PLA: People's Liberation Army
PNT: Positioning, Navigation and Timing
POES: Polar Operational Environment Satellites
PPP: Public Private Partnership
PREMIER: Process Exploration through Measurement of Infrared Emitted Radiation
PRS: Public-Regulated Service
PSA: Programme on Space Applications
PSLV: Polar Satellite Launch Vehicle

Q

QDR: Quadrennial Defense Review

R

R&D: Research & Development
RCA: République Centrafricaine
RISAT: Radar Imaging Satellite
RLV-TD: Reusable Launch Vehicle Technology Demonstrator
RSCC: Russian Satellite Communications Company
RTD: Research and Technology Development

S

SA: Société Anonyme (Public Limited Company)
SAFER: Services and Applications for Emergency Responses
SALMON: Stand Alone Mission of Opportunity
SAR: Synthetic Aperture Radar
SAOCOM: Satellite de Observation y Comunicacion (Observation and Communications Satellite)

SBSS: Space-Based Surveillance System
SDA: Satellite Data Association
SDCM: System of Differential Corrections and Monitoring
SDI: Strategic Defense Initiative
SDO: Solar Dynamics Observatory
SDSTB: State Defense Science and Technology Bureau
SEF: Straits Exchange Foundation
SELENE: SELenological and ENgineering Explorer
SES: Single European Sky
SES: Société Européenne des Satellites
SHF: Super High Frequency
SHSP: Strategic Headquarters for Space Policy
SIA: Satellite Industry Association
SIASGE: Sistema Italo Argentina de Satelites para la Gestion de Emergencias (Italian-Argentinian Satellite System for Emergency Management)
SICRAL: Sistema Italiano per Comunicazioni Riservate ed Allarmi (Italian Military Communications System)
SIGINT: Signals Intelligence
SIPRI: Stockholm International Peace Research Institute
SLSTR: Sea Land Surface Temperature Radiometer
SMC: Space and Missile Systems Center
SMDC: Space and Missile Defense Command
SME: Small and Medium Enterprise
SMEX: Small Explorer
SMOS: Soil Moisture and Ocean Salinity
SMP: Systèmes Midi-Pyrénées
SNC: Sierra Nevada Corporation
SOHO: Solar and Heliospheric Observatory
SPOT: Satellite pour l'Observation de la Terre (Earth Observation Satellite)
SPS PS: Standard Positioning Service Performance Specification
SS2: Space Ship 2
SSA: Space Situational Awareness
SSC: Swedish Space Corporation
SSL: Space Systems/Loral
SSN: Space Surveillance Network
SSOT: Sistema Satelital para Observacion de la Tierra (Satellite System for EO)
SSTL: Surrey Satellite Technology Ltd.
S&T: Science and Technology
STAR: Satellite Technology for the Asia-Pacific Region
START: Strategic Arms Reduction Treaty

STERO: Solar TERrestrial RELations Observatory
STFC: Science and Technology Facilities Council
STSS: Space Tracking Surveillance System
SWIR: Shortwave Infrared

T

TCBM: Transparency and Confidence Building Measures
THEO: Thai Earth Observation System
TIP: Tender Information Package
TSAT: Transformation Communications Satellite
TSB: Technology Strategy Board
TSSM: Titan Saturn System Mission
TV: Television

U

UAE: United Arab Emirates
UHF: Ultra High Frequency
UK: United Kingdom
ULA: United Launch Alliances
UN: United Nations
UNCCC: United Nations Climate Change Conference
UNEP: United Nations Environment Programme
UNESCO: United Nations Educational, Scientific and Cultural Organization
UNFCCC: United Nations Framework Convention on Climate Change
UNGA: United Nations General Assembly
UNGIWG: United Nations Geographic Information Working Group
UNIDIR: United Nations Institute for Disarmament Research
UNISPACE: United Nations Conference on the Exploration and Peaceful Uses of Outer Space
UNOOSA: United Nations Office for Outer Space Affairs
UNSC: United Nations Security Council
UNSDI: United Nations Spatial Data Infrastructure
UN-SPIDER: UN Platform for Space-based Information for Disaster Management and Emergency Response
US: United States
USAF: United States Air Force
USGS: United States Geological Survey
USN: Universal Space Network
USSTRATCOM: United States Strategic Command
UV: Ultraviolet

V

VC: Venture Capital

VERTA: Vega Research and Technology Accompaniment

VHR: Very High Resolution

VN: Vereinte Nationen (United Nations)

VNIR: Visible and Near Infrared

W

WEU: Western European Union

WFP: World Food Programme

WGS: Wideband Global Satcom

WHO: World Health Organisation

WIPO: World Intellectual Property Organisation

WK2: White Knight 2

WRS: World Radiocommunication Seminar

WTSA: World Telecommunication Standardisation Assembly

PART 1

THE YEAR IN SPACE
2008/2009

European space activities in the global context

Wolfgang Rathgeber and Christophe Venet

1. Global political and economic trends

The most striking issue in 2008/2009 was the financial and economic crisis with its worldwide consequences, affecting both advanced economies and emerging countries. The period was also marked by the confirmation of several ongoing trends, such as the political and economic rise of China, the resurgence of Russia on the international scene and the limited growth of Western economies. By contrast, the election of Barack Obama as the 44th American President unleashed new expectations about U.S. international policies. Finally, central transnational problems, such as climate change, the energy crisis or terrorism, remained at the top of policy agendas. In the following sections, global challenges and their respective global responses will be considered and analysed for their impact on space activities and space policies. A particular focus will be put on Europe.

1.1. Global economic outlook

In 2008 and in the first half of 2009, the world economy witnessed its most dangerous financial shock since the 1930s. Global growth slowed down substantially in 2008, and by the beginning of 2009, global economy entered in a severe recession. In addition, energy and commodity prices remained very high in the first part of 2008, before declining sharply in the second half of the year. The International Monetary Fund (IMF) kept revising its projections downwards throughout the period. The world output in 2008 was estimated at 3.2%, compared to 5% in 2007. The world output is projected to decline by 1.3% in 2009 and to recover only gradually starting from 2010 (+1.9%).¹ Advanced economies were hit the hardest, witnessing a 7.5% decline in real GDP in the fourth quarter of 2008, but emerging economies are badly suffering as well (−4% real GDP growth in the fourth quarter of 2008).² As a whole, the IMF predicts that the stabilisation of financial markets will take longer than previously envisaged. The low confidence in the markets will

continue to limit access to credit in 2009 and 2010, in both developed and emerging economies.

Extraordinary measures were taken by governments to stabilise the markets and support demand, both at national and international levels. State intervention was widely used as a regulating tool, on the background of growing criticism towards the neoliberal economic model and pressure from the IMF. In October 2008, six central banks injected 180 billion U.S. dollars into the monetary markets in a concerted action.³ An emergency G20 meeting was held in November 2008 and participants committed themselves to increase the transparency, the reliability and the effective regulation of the financial markets, to improve the confidence in and for the markets, to increase international cooperation and to reform the IMF, the World Bank and other financial institutions.⁴ In February 2009, G7 finance ministers further affirmed their rejection of protectionism to fight the crisis⁵ and in April 2009, a global plan for recovery and reform as well as the largest fiscal and monetary stimulus in modern times was adopted at the London G20 Summit.⁶ These concerted actions were supplemented by national stimulus measures in all the important economies, but these policy responses have only had a limited effect so far.

The financial and economic crisis has a potential impact on the space sector, even if its scope is difficult to assess. One has to consider institutional spending and commercial activities separately. As a whole, the institutional demand does not seem to have been affected by the crisis and institutional space budgets for the Fiscal Year (FY) 2009 increased in almost all the space faring nations. Even more, space was considered a useful tool to fight the crisis, as it is an R&D intensive sector and therefore represents an investment in the future. This was testified by the decisions taken at the Brussels European Council of 11–12 December 2008 and at the 6th Space Council of 29 May 2009 in Europe,⁷ and by the allocation of additional 1 billion U.S. dollars to NASA (National Aeronautics and Space Agency) as part of the stimulus bill in the U.S. In the commercial sector, the main actors seemed to have remained unaffected by the crisis, as shown by the robust 2008 results in the areas of satellite manufacturing and satellite services. Prolonged difficulties to access credit and investment could however hamper the activity of actors in the space sectors, especially SMEs.

1.2. Political developments

In order to exemplify the links between major global political trends and space policy, a specific focus will be put on six key issue-areas: security, environment, energy, resources, knowledge and mobility.⁸ This conceptual approach emphasises