

Yearbook on Space Policy

Cenan Al-Ekabi
Blandina Baranes
Peter Hulsroj
Arne Lahcen *Editors*

Yearbook on Space Policy 2012/2013

Space in a Changing World

 | **ESPI**
European Space Policy Institute

 Springer

Yearbook on Space Policy

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Peter Hulsroj • Arne Lahcen
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Editors

Cenan Al-Ekabi
Blandina Baranes
Peter Hulsroj
Arne Lahcen
ESPI - European Space Policy Institute
Vienna, Austria

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Preface ESPI Yearbook 2013

Space in a Changing World

In line with the nature of technological and social progress, the context in which space activities are embedded is subject to constant change. As a theme for the ESPI Yearbook 2013, we have chosen to focus specifically on the nature of these diverse changes, their driving forces and their future impacts. This choice is motivated not by the fact that changes to the space environment are novel per se, but because they are accelerating and their impact is starting to initiate a chain reaction of secondary effects that affects nearly all players and segments of space sector.

The changing dynamics currently affecting the space sector are noticeable in a number of fields and ways. A major element in this respect is the increased interest in space activities worldwide. Thanks to declining costs of space technologies and the ever increasing benefits space assets provide, many countries around the world are developing capabilities for the first time, while others are expanding their existing programmes. As a result, the amount of actors and activities in outer space increases. Although this increased involvement is a positive evolution, it will also require new ways to address and regulate, for instance, issues in terms of space utilisation, security and sustainability in the future. At the same time, space sectors and technologies are becoming more connected worldwide. This implies that established players have to revise their approaches in order to continue to best leverage their strengths in space. In addition, this tendency is making space technologies more subject to the laws that dictate other fields of the economy, and as a result, concepts like competitiveness and innovation are becoming much more relevant than in the past. From an overall perspective it seems that many of these changes are interconnected and thus self-reinforcing, furthering their impacts on governments, industry and society.

As the world around us is changing so is the nature of the yearbook, which will cover yearly time spans corresponding to calendar years from now onwards. We believe this to be simpler for the reader and will allow us to report on recent events with less time delay. What stays the same is the threefold structure of the yearbook.

Traditionally, the first part seeks to set out a comprehensive overview of the economic, political, technological and institutional trends that affect space activities. It is prepared in-house in ESPI, and while its perspective is European, it also provides a comparative analysis of space efforts around the world.

The second part of the ESPI Yearbook approaches the overall theme from a more analytical perspective. This year it includes eight external contributions that bring together the views of various professionals in the space field. To cover the worldwide changes affecting space in a sensible and comprehensive manner, the included contributions have a wide-ranging perspective. On the one hand, there is a focus on the geographical impact of change as illustrated by the rise of China, Russia's reorientation in space and the evolving programmes of India and a number of South American countries. On the other hand, some contributions focus on the structural implications of a changing world. This includes the evolution of major global trends, the future regulation of the outer space environment and the changing nature of security issues. Finally, one contribution analyses the interconnected nature of space from an overall perspective in order to assess what their implications for Europe will be. An important milestone in the idea forming behind the analysis offered in the second part was again the ESPI Autumn Conference, where authors met for an exchange on the content of their contributions. Having taken place in Vienna in September 2013, it provided a forum for constructive exchange and coordination of the contributions.

The third part of the Yearbook carries forward the character of the Yearbook as an archive of space activities. Again prepared in-house by ESPI, a bibliography, chronology and data about institutions are provided where readers of the now seven volumes of the Yearbook can identify statistical development and evolutions.

In closing, we would like to thank the contributors of the articles in Part II for their engagement in this publication, as well as the ESPI staff that has been instrumental for its production.

In particular, we are very grateful to Frances Brown, former editor-in-chief of Space Policy and member of the ESPI Advisory Council, for her support and inspiration as we prepared the ESPI Autumn Conference 2013.

Vienna, Austria

Cenan Al-Ekabi
Blandina Baranes
Peter Hulsroj
Arne Lahcen

List of Acronyms

ACE	Advanced Composition Explorer
ACS	Alcântara Cyclone Space
AEB	Brazilian Space Agency
AIA	Atmospheric Imaging Assembly
AIN	Arab Institute of Navigation
ALASA	Airborne Launch Assist Space Access
AO	Announcement of Opportunity
APL	Applied Physics Laboratory
Ariane 5 ME	Ariane 5 Midlife Evolution
ARM	Asteroid Redirect Mission
ASAT	Anti-Satellite Missile Test
ASI	Agenzia Spaziale Italiana (Italian Space Agency)
ATV	Automated Transfer Vehicle
BAFA	Federal Office of Economics and Export Control of Germany
BMD	Ballistic Missile Defence
CAA	Continuing Appropriations Act
CAGR	Compound Annual Growth Rate
CALT	China Academy of Launch Vehicle Technology
Caltech	California Institute of Technology
Casbaa	Cable and Satellite Broadcasting Association of Asia
CAST	China Academy of Space Technology
CBERS	Brazil Earth Resources Satellite
CCDev	Commercial Crew Development
CCiCap	Commercial Crew integrated Capability
CCL	Commerce Control List
CCP	Commercial Crew Programme
CCtCap	Commercial Crew Transport Capability
CD	Conference on Disarmament
CDI	Call for Declarations of Interest
CHF	Swiss franc

CHIRP	Commercially Hosted InfraRed Payload
CLA	Alcântara Launch Center
CMB	Cosmic Microwave Background
CME	Coronal Mass Ejection
CMG	Control Moment Gyroscope
CNES	Centre National d'Etudes Spatiales (French Space Agency)
CNSA	China National Space Administration
CONCORD	Conference on Coporate Research and Development
COROT	COvention, ROtation and Planetary Transits
COTS	Commercial Orbital Transportation Services
CSA	Canadian Space Agency
CSO	Czech Space Office
CST	Commercial Space Transportation
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
CTS	Crew Transportation System
DARPA	Defense Advanced Research Project Agency
DARS	Digital Audio Radio Service
DBS	Direct Broadcast Services
DC4EU	Dream Chaser for European Utilization
Dextre	Special Purpose Dexterous Manipulator
DLR	Deutschen Zentrums für Luft-und Raumfahrt (National Aeronautics and Space Research Centre of the Federal Republic of Germany)
DoD	Department of Defense
DRDO	Defence Research and Development Organisation
DSCOVER	Deep Space Climate ObserVatoRY
DSM	Deep Space Manoeuvre
DTH	Direct To Home
DWSS	Defense Weather Satellite System
EAC	European Astronaut Centre
EADS	European Aeronautic Defence and Space Company
EAP	Environmental Action Programme
EC	European Commission
ECA	Evolution Cryotechnique type A
ECSAT	European Centre for Space Applications and Telecommunications
EDA	European Defence Agency
EDM	Entry, Descent and Landing Demonstrator Vehicle
EDRS	European Data Relay System
EELV	Evolved Expendable Launch Vehicle
EGNOS	European Geostationary Navigation Overlay Service
EIAST	Emirates Institution for Advanced Science and Technology
EJSM	Europa Jupiter System Mission
EO	Earth Observation

EPAA	European Phased Adaptive Approach
EPOXI	Extrasolar Planet Observations and characterisation/deep impact eXtended Investigation
EPS-SG	EUMETSAT Polar System—Second Generation
ERA	European Research Area
ESA	European Space Agency
ESOC	European Space Operations Center
ESPI	European Space Policy Institute
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUTELSAT	European Telecommunications Satellite Organization
EVA	Extravehicular Activity
EVE	EUV Variability Experiment
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FFC	Federal Communications Commission
FP8	Framework Programme Eight
FSS	Fixed Satellite Services
FY	Fiscal Year
GCSP	Global Collaborative Space Programme
GDP	Gross Domestic Product
GEO	Geostationary Orbit
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GERD	Gross domestic Expenditure on Research and Development
GLONASS	Global Navigation Satellite System
GLSV	Geosynchronous Satellite Launch Vehicle
GMES	Global Monitoring for Environment and Security
GNI	Gross National Income
GNSS	Global Navigation Satellite System
GPIM	Green Propellant Infusion Mission
GPS	Global Positioning System
GRAIL	Gravity Recovery and Interior Laboratory
GSLV	Geosynchronous Satellite Launch Vehicle
GTO	Geosynchronous Transfer Orbits
HDTV	High Definition Television
HFI	High Frequency Instrument
HMI	Helioseismic and Magnetic Imager
HoPS	Hostel Payload Solutions
HST	Hubble Space Telescope
HTV	H-II Transfer Vehicle
IBDM	International Berthing and Docking Mechanism
ICBM	Inter-Continental Ballistic Missile

ICG	International Committee on Global Navigation Satellite Systems
IGS	Information Gathering Satellite
IGS	Innovation and Growth Strategy
IHMC	Institute for Human and Machine Cognition
ILN	International Lunar Network
IMF	International Monetary Fund
IMO	International Maritime Organisation
Intelsat	International Telecommunications Satellite Consortium
IOV	In-Orbit Validation
IRGC	Islamic Revolution Guards Corps
IRIS	Interface Region Imaging Spectrograph
ISECG	International Space Exploration Coordination Group
ISPS	Innovative Space Propulsion Systems
ISR	Intelligence, Surveillance and Reconnaissance
ISRO	Indian Space Research Organisation
ISS	International Space Station
ITAR	International Traffic in Arms Regulation
ITU	International Telecommunication Union
JADE	Jovian Auroral Distributions Experiment
JAXA	Japan Aerospace Exploration Agency
JEDI	Jupiter Energetic Particle Detector Instrument
JEO	Jupiter Europa Orbiter
JIRAM	Jovian Infrared Auroral Mapper
JUICE	Jupiter Icy Moon Explorer
JWST	James Webb Space Telescope
KISS	Keck Institute for Space Studies
KSLV	Korea Space Launch Vehicle
LADEE	Lunar Atmosphere and Dust Environment Explorer
LAMP	Lyman Alpha Mapping Project
LEO	Low Earth Orbit
LFI	Low Frequency Instrument
LH2	Liquid Nitrogen
LRO	Lunar Reconnaissance Orbiter
LWS	Living With a Star
MAG	Magnetometer
MAVEN	Mars Atmosphere and Volatile Evolution
MDA	Missile Defense Agency
MDA	MacDonald, Dettwiler and Associates Ltd.
MDIS	Mercury Dual Imaging System
Melco	Mitsubishi Electric Corporation
MER	Mars Exploration Rover
MESSENGER	MERcury Surface, Space Environment, GEOchemistry and Ranging
MetOp-SG	MetOp Second Generation

MEXT	Ministry of Education, Culture, Sports, Science and Technology
MFF	Multiannual Financial Framework
MFG	Meteosat First Generation
MHZ	Megahertz
MIRI	Mid-Infrared Instrument
MLA	Mercury Laser Altimeter
MMO	Mercury Magnetospheric Orbiter
MOIRE	Membrane Optical Imager for Real-Time Exploitation
MOM	Mars Orbiter Mission
MPCV	Multi-Purpose Crew Vehicle
MPLM	Multi-Purpose Logistic Module
MPO	Mercury Planetary Orbiter
MRO	Mars Reconnaissance Orbiter
MSG	Meteosat Second Generation
MSL	Mars Science Laboratory
MSS	Mobile Servicing System
MTG	Meteosat Third Generation
MWR	Microwave Radiometer
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NDAA	National Defense Authorization Act
NEO	Near-Earth Orbit
NEO	Near-Earth Object
NEXT	NASA's Evolutionary Xenon Thruster
NGA	National Geospatial-Intelligence Agency
NGL	Next-Generation Launcher
NIAC	NASA's Innovative Advanced Concepts
NIRSpec	Near-Infrared Spectrograph
NOAA	National Oceanic and Atmospheric Administration
NOFBX	Nitrous Oxide Fuel Blend
NRC	National Research Council
NRO	National Reconnaissance Office
NSA	National Security Agency
NSOAS	National Satellite Ocean Application Service
OECD	Organisation for Economic Co-operation and Development
OICT	Office of Information and Communications Technology
OMAC	Orbital Manoeuvring and Attitude Control
OMB	Office of Management and Budget
ONSP	Office of National Space Policy
OPEC	Organization of the Petroleum Exporting Countries
ORU	On-orbit Replacement Unit
OSTIn	Office for Space Technology and Industry
PCW	Polar Communications and Weather
PDV	Prithvi Defence Vehicle

PLA	People's Liberation Army
PMM	Permanent Multipurpose Module
PND	Portable Navigation Device
PPP	Public Private Partnership
PSLV	Polar Satellite Launch Vehicle
PTSS	Precision Tracking Space System
PWR	Pratt and Whitney Rocketdyne
QZSS	Quasi Zenith Satellite System
R&D	Research and Development
RCM	Radarsat Constellation Mission
REACH	Registration of Evaluation Authorization and Restriction of Chemicals
RHESSI	Reuven Ramaty High Energy Solar Spectroscopic Imager
RLV	Reusable Launch Vehicle
RRM	Robotic Refuelling Mission
RSC	Rocket Space Corporation
SAC	Space Activities Commission
SAR	Synthetic Aperture Radar
SatDSiG	Germany's Satellite Data Security Act
SDO	Solar Dynamics Observatory
SecTelSat	Secure Telecom by Satellite
SHEFEX	Sharp Edge Flight Experiment
SIA	Satellite Industry Association
SLS	Space Launch System
SMEX	NASA Small Explorer
SMOS	Soil Moisture and Ocean Salinity
SNC	Sierra Nevada Corporation
SNSB	Swedish National Space Board
SOHO	Solar and Heliospheric Observatory
SpaceX	Space Exploration Technologies Corporation
SPC	Space Programme Committee
SPOT	Satellite pour l'Observation de la Terre
SS/L	Space Systems/Loral
SSA	Space Situational Awareness
SSCB	Singapore Science Centre Board
SSCG	Swedish Space Corporation Group
SSN	Space Surveillance Network
SSO	Sun-Synchronous Orbit
SST	SpaceShipTwo
SSTA	Singapore Space and Technology Association
SSTO	Single Stage To Orbit
STEREO	Solar TERrestrial RELations Observatory
STFC	Science and Technology Facilities Council
TAA	Technical Assistance Agreement

TCBM	Transparency and Confidence Building Measures
TDM	Technology Demonstration Mission
TDRS	Tracking and Data Relay Satellite
TFEU	Treaty on the Functioning of the European Union
TG	Tiangong
TGO	Trace Gas Orbiter
TH	Tianhe
TRL	Technology Readiness Level
TZ	Tianzhou
UAE	United Arab Emirates
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicle
UHF	Ultrahigh Frequency
UK	United Kingdom
ULA	United Launch Alliance
UN	United Nations
UN COPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UN FCCC/ COP	United Nations Framework Convention on Climate Change / Conference of Parties
UN OOSA	United Nations Office of Outer Space Affairs
UN REDD	United Nations Programme on Reducing Emissions from Deforestation and forest Degradation
UN SAP	United Nations Programme on Space Applications
UN SPIDER	United Nations Platform for Space-based Information for Disaster Management and Emergency Response
UNCTAD	United Nations Conference on Trade and Development
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
UNSDI	United Nations Spatial Data Infrastructure
US	United States
USAF	United States Air Force
USAT	Ultra Small Aperture Terminals
USML	United States Munitions List
UVS	Ultraviolet Imaging Spectrograph
VASIMIR	Variable Specific Impulse Magnetoplasma Rocket
VERTA	Vega Research and Technology Accompaniment
VIMS	Visual and Infrared Mapping Spectrometer
VLS-1	Brazil's Satellite Launch Vehicle
VSAT	Very Small Aperture Terminals
WGP	World Gross Product
WISE	Wide-field Infrared Survey Explorer

WMAP	Wilkinson Microwave Anisotropy Probe
WRC	World Radiocommunication Conference
WRS	World Radiocommunication Seminar
WT	Wentian
XT	Xuntian

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Part I
The Year in Space 2013

Chapter 1

European Space Activities in the Global Context

Cenan Al-Ekabi

1.1 Global Political and Economic Trends

1.1.1 *Global Economic Outlook*

According to the United Nations' Annual Report "World Economic Situation and Prospects", the thread of this reporting period, covering 2012 and 2013, was the underperformance of the world economy, which was observed across almost all regions and major economic groups.¹

The year 2012 was characterised by a considerable weakening of the world economy. Several developed nations, especially those in the Euro zone, experienced a double-dip recession, aggravated by sovereign debt crises and cumulating high unemployment, weak aggregate demand compounded by fiscal austerity, high public debt burdens, and financial fragility. These negative effects in turn spilled over to the developing nations and economies in transition through weaker demand for their exports and heightened volatility in capital flows and commodity prices. Some of the larger of these economies, including China, were not only affected externally, but also faced internal issues relating to weakened investment demand because of financing constraints in some sectors of their economies and excess production capacity elsewhere. The lower-end income countries had been shielded from these developments, but towards the end of 2012 they also started to be

¹ "World Economic Situation and Prospects 2014." 2014. United Nations 20 May 2014 http://www.un.org/en/development/desa/policy/wesp/wesp_current/wesp2014.pdf.

C. Al-Ekabi (✉)
ESPI—European Space Policy Institute, Vienna, Austria
e-mail: cenan.al-ekabi@espi.or.at

affected by the effects of the slowdown in both the developed and major middle-income countries.²

In 2013, World Gross Product (WGP) is estimated to have grown by a subdued 2.1 %, lower than the 2.4 % that had been previously forecasted. This was mainly because most developed economies experienced the lingering effects of the financial crisis, grappling in particular with the challenges of taking appropriate fiscal and monetary policy actions.³

There were however signs of improvement, partly due to the Euro zone finally rising out of the recession. Western Europe showed a positive growth inclination from the second quarter of 2013 on, owing to stronger growth of two of Europe's economic motors, Germany and the United Kingdom. The return of growth in these countries in turn led to an improvement of the situation in Eastern Europe. Moreover, the crisis in Europe's southern periphery also seems to have toned down due to increased output. Ireland, Portugal and Spain, three of the five high-spread economies ended their recession in 2013, aided by strong export growth, with Italy and Greece easing their recession periods. Even though this seems to be the coming of a new dawn for the Euro zone, output has not yet caught up with pre-crisis levels, and is still up to 10 % or more below pre-crisis levels in those economies that were struck the hardest in the European economic area. Another significant challenge that will be high up on the agenda of the decision makers is youth and long-term unemployment which remain endemic.⁴

The economy of the United States of America continued to recover, although 2013 growth was significantly lower than in 2012, as a result of fiscal tightening and a series of political gridlocks over budgetary issues, culminating in the government shutdown of October 2013. Nevertheless, US GDP is expected to grow by 2.5 % and 3.2 % for 2014 and 2015 respectively. Although unemployment levels are at their lowest since 2008, employment rates have not yet reached pre-crisis levels—due to withdrawal from the labour force of retirees, but also because of large numbers of part-time workers. Even Japan, the third member of the major high-income economies, managed to end its decade-long deflation through a set of expansionary policy packages. A key driver of growth was investment in physical assets, with several construction projects financed by the government. GDP is forecast to moderate to 1.5 % in 2014.⁵

Despite tensions on financial markets and weaker momentum in the developed world, growth in the developing countries strengthened in the second half of 2013, after a period of feeble growth at the end of 2012 and a weak start to 2013. This recovery, however, has been uneven, with growth accelerations in China, India, Malaysia, Thailand and Mexico, offsetting the less well-off countries of

²“World Economic Situation and Prospects 2013.” 2013. United Nations 20 May 2014 http://www.un.org/en/development/desa/policy/wesp/wesp_archive/2013wesp.pdf.

³“World Economic Situation and Prospects 2014.” 2014. United Nations 20 May 2014 http://www.un.org/en/development/desa/policy/wesp/wesp_current/wesp2014.pdf.

⁴Ibid.

⁵Ibid.

South Africa, Turkey, Indonesia and the contracting Brazil.⁶ Growth in the developing economies has been estimated to average 5.1 % in 2014 and 5.3 % in 2015.⁷

Overall, WGP is forecast to grow at a pace of 3.0 % and 3.3 % in 2014 and 2015, respectively. Even though 2013 was characterised by a subdued performance, some signs of improvement have emerged. Inflation remains tame worldwide, partly reflecting output gaps, high unemployment and a continued financial deleveraging in major developed economies. The global employment situation remains troublesome however, as a long-lasting problem that continues to weigh on the labour markets of many countries and regions, especially in the Euro zone.⁸

1.1.2 Political Developments

1.1.2.1 Geopolitics

The Arab Spring that saw its origins in Tunisia in December 2010, continued in 2012 while previously marginalised Islamist political forces were making dramatic gains. Parties that were once banned or fringed increasingly expanded their grip in Tunisia, Libya, and Egypt. In the case of Egypt, the Muslim Brotherhood saw its candidate Mohamed Morsi democratically elected as President, nevertheless triggering new protests by millions of Egyptians.⁹ Morsi was accused of exploiting his position to consolidate the power of the Brotherhood and was removed from office by army chief Abdul Fatah el-Sisi. This move was again followed by another series of mass protests, polarizing Egyptian society between backers of Morsi and of Sisi. The outcome was a crackdown on the Muslim Brotherhood leaders and their supporters by the military-backed interim government, resulting in the solidification of power by Sisi and the new technocratic regime. Elections are planned for 2014 with Sisi running as candidate.¹⁰

In 2013, the African continent witnessed the rise of Islamist extremist-fuelled terrorism, leading to a hostage crisis at an Algerian oil field, repeated attacks by Boko Haram in Nigeria, and the assault by Al-Shabab on a mall in Nairobi. France

⁶“Global Economic Prospects | Coping with Policy Normalization in High-Income Countries.” Jan. 2014. The World Bank 20 May 2014. <http://www.worldbank.org/content/dam/Worldbank/GEP/GEP2014a/GEP2014a.pdf>.

⁷“World Economic Situation and Prospects 2014.” 2014. United Nations 20 May 2014. http://www.un.org/en/development/desa/policy/wesp/wesp_current/wesp2014.pdf.

⁸Ibid.

⁹“Top 10 Everything of 2012 | International News.” 4 Dec. 2012. Time 19 May 2014. <http://world.time.com/2012/12/04/top-10-international-news-lists/>.

¹⁰“Top 10 International News Stories.” 4 Dec. 2013. Time 19 May 2014. <http://world.time.com/2013/12/04/world/slide/top-10-international-news-stories/>.

also intervened and took up weapons by intervening in Mali, successfully pushing back Islamist forces.¹¹

In the Middle East, Syria's civil war has shown no signs of abating. The war that has cost the lives of 100,000 people so far created the largest refugee crisis in years.¹² After a sarin gas attack on a Damascus suburb in August 2013, it was established that Syrian President Bashar Assad was behind the attack, killing at least 1,429 people. In a response to these worrying escalations, US President Barack Obama sought authorization to strike Syria's installations of chemical weapons, which was hailed as a major development by the rebels seeking to overthrow the regime since February 2011. However, with US public opinion dead set against another US military intervention in the Middle East, it never got to this point. Even though the Assad regime has reportedly been cooperating with UN inspectors aiming to eradicate the stockpile of chemical weapons, the civil war still rages on and few are optimistic that this horrifying chapter of Syria's history will soon come to an end.¹³

In Iran, new President Hassan Rouhani had a phone call with President Obama; historically noteworthy as it was the first official direct dialogue between the two states for three decades. This new rapprochement of the Islamic Republic with the Western world led to the signing of an agreement in November 2013 whereby Iran committed itself to curtailing its infamous nuclear activities in exchange for the waiving of sanctions costing billions of dollars.¹⁴

In the beginning of 2013, the world was gripped by the story evolving around the U.S. National Security Agency (NSA) whistle-blower Edward Snowden, with repercussions far outside the intelligence community. The cache of documents that Snowden exposed revealed the extent of US espionage operations in various parts of the world, thereby threatening to damage the relations between the US and some key international players. After fleeing to Hong Kong, the now-outcast Snowden was granted asylum by the Russian government which did little good for the ever-delicate relationship between Washington and Moscow.¹⁵

The United States also found itself in the first government shutdown since the mid-1990s which lasted more than two weeks in October 2013. Due to the inability to reach an agreement on federal spending levels, the federal bureaucracy ground to a halt, slowing economic growth at an estimated cost of around \$24 billion according to Standard and Poor's credit agency.¹⁶

¹¹ Ibid.

¹² "Top 10 Everything of 2012 | International News." 4 Dec. 2012. Time 19 May 2014. <http://world.time.com/2012/12/04/top-10-international-news-lists/>.

¹³ "Top 10 International News Stories." 4 Dec. 2013. Time 19 May 2014. <http://world.time.com/2013/12/04/world/slide/top-10-international-news-stories/>.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

Across the Atlantic, mass protests and strikes in 2012 became a common sight in Spain, Italy, Portugal, and elsewhere, as infuriated crowds voiced public discontent with the austerity measures resulting from bailouts that kept their countries away from bankruptcy.¹⁷ The year 2013 showcased the resiliency of the euro, partially eliminating concerns over the survival of the European currency bloc. The economy of the Euro zone got itself on the right track towards recovery, even though government debts are precariously high and unemployment has only come down slowly, remaining painfully high in much of Southern Europe.¹⁸ In this regard, long-term prospects look bleak with double digit unemployment among youth, reaching more than 50 % in Greece and Spain.¹⁹

In this reporting period, China found itself in ongoing disputes with Vietnam and the Philippines over maritime territory and the likely lucrative gas reserves that come with it. Even more intense was the situation with rival Japan, both nations contesting a string of islands that led to massive anti-Japan protests in China.²⁰ And in India, public anger was fuelled by waves of corruption scandals in which top politicians were accused of exploiting their positions for financial gain.

1.1.2.2 Environment

Space applications have an important role in the monitoring and protection of the environment. Space assets are uniquely positioned to offer a global perspective on climate change. They help to better manage disaster situations around the world, and are often a common multinational platform for collecting relevant meteorological and environmental data. These characteristics make them ideal promoters of international understanding and cooperation in this field. Satellite based systems are being used to gather information on climate change indicators e.g. the melting of the ice-caps, changes in the global sea level, and gathering data on regions most-affected by global warming. Remote sensing technologies can also be used to monitor deforestation and land use, and are important for better utilization of fresh water sources. There is no doubt that space technologies will play an important role in human and environmental security in the future, hence technical development of their capabilities is necessary.

Despite the financial crisis, climate change remains one of the commonly recognised agenda topics within the global political debate. Following the

¹⁷ “Top 10 Everything of 2012 | International News.” 4 Dec. 2012. Time 19 May 2014. <http://world.time.com/2012/12/04/top-10-international-news-lists/>.

¹⁸ “Top 10 International News Stories.” 4 Dec. 2013. Time 19 May 2014. <http://world.time.com/2013/12/04/world/slide/top-10-international-news-stories/>.

¹⁹ “Youth Unemployment Could Prolong Eurozone Crisis, Christine Lagarde Says.” 10 Dec. 2013. The Guardian 19 May 2014. <http://www.theguardian.com/business/2013/dec/10/youth-unemployment-eurozone-crisis-christine-lagarde-imf>.

²⁰ “Top 10 International News Stories.” 4 Dec. 2013. Time 19 May 2014. <http://world.time.com/2013/12/04/world/slide/top-10-international-news-stories/>.

complicated acceptance and application of the 1997 Kyoto Protocol, which was set to expire in 2012, and the “Copenhagen Accord” of 2009 establishing voluntary emissions cuts,²¹ new rounds of negotiations over the follow-up international agreement continued both in 2012 and 2013. The 18th Conference of Parties to the UN Framework Convention on Climate Change (UN FCCC/COP) took place in Doha, Qatar, from 26 November to 8 December 2012; it was followed by the 19th UN FCCC/COP in the next year, which was held in Warsaw, Poland, from 11 to 23 November 2013. In the 18th conference, a historic shift from previous meetings occurred, when the summit established for the first time that rich nations should consider compensating poor nations for losses and damages due to climate change.²² Moreover, an agreement was reached to extend the life of the Kyoto Protocol to 2020; and the conference built on the previous Durban platform to develop a successor to the Kyoto Protocol by 2015 and enter it into force by 2020. While the Kyoto Protocol is the sole legally binding climate plan, obliging about 35 industrial nations to cut their emissions significantly, with the earlier withdrawal of Russia, Japan and Canada; the remaining backers, led by the European Union and Australia, now account for only 15 % of world greenhouse gas emissions.²³ The international community showed willingness to move away from the long lasting deadlock and towards real political solutions, despite varying degrees of reservation by the big players, the US, EU, and China, on levels of emission cuts and the wording of the ‘Loss and Damage mechanism’. And traditional differences between the positions of developed and developing countries were significant and were stressed again during the conference, e.g. Russia, Ukraine and Belarus had hoped to be granted extra credit for the emissions cuts they had made when their industries collapsed, but that was ignored as an attempt to increase their emissions as other nations were obliged to cut theirs.

At the 19th conference, delegates continued negotiations towards a new global agreement on climate change. A potential deadlock emerged between industrialised and emerging nations on the limit on the level of emissions, with China giving deference to emerging nations for growth, while the US pushed for more accountability from the same in reducing emissions. The talks also led to the proposed ‘Warsaw International Mechanism for Loss and Damage’ that would provide expertise and some funds to help developing nations mitigate losses and damage from extreme environmental events (e.g. heat waves, droughts and floods), and

²¹ “United Nations Climate Change Conference kicks off in Copenhagen.” 7 Dec. 2009. United Nations Development Programme 20 Feb. 2012. <http://content.undp.org/go/newsroom/2009/december/historic-united-nations-climate-change-conference-kicks-off-in-copenhagen.en>.

²² Harrabin, Roger. “UN climate talks extend Kyoto Protocol, promise compensation.” 8 Dec. 2012. BBC 15 May 2014. <http://www.bbc.com/news/science-environment-20653018>.

²³ Doherty, Regan and Barbara Lewis. “Doha climate talks throw lifeline to Kyoto Protocol.” 8 Dec. 2012. Reuters 15 May 2014. <http://www.reuters.com/article/2012/12/08/us-climate-talks-idUSBRE8B60QU20121208>.

imminent threats (e.g. rising sea levels, and land desertification).²⁴ Moreover, the Warsaw conference saw progress in the development of the Green Climate Fund, with the initial resource mobilization process expected to begin in the second half of 2014.²⁵ This fund, planned to be a major channel of financing for developing world action, will gather and distribute \$100 billion (about 75.5 billion Euros) by 2020 to help developing countries handle the side effects of global warming and climate change. The other important outcome was the progress on the UN Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN REDD), where governments agreed on a set of measures to reduce emissions from deforestation and forest degradation, establishing the means for results-based payments if developing countries can demonstrate the protection of forests (backed by initial pledges of \$280 million). Deforestation and soil degradation are well known, not only as the negative effect of global climate change, but also as a significant contributor to it. In sum, recent progress on global climate issues has shown that the gap between leading industrialised and emerging countries is slowly narrowing, with the upcoming 2015 replacement protocol expected to be applicable to all nations involved in the climate change discussion process.

Environmental and sustainable development issues continued to be important for both internal and external EU policies. For instance, just weeks before the 19th UN FCCC/COP Poland's insistence on its use of coal to generate 88 % of the country's electricity was seen to hold the EU back in its clean-energy goals intended to reduce the greenhouse gases linked to global warming.²⁶ Nevertheless, over the course of 2012 and 2013 several important initiatives regarding environmental issues were undertaken at the EU level.²⁷ Prior to the 18th UN FCCC/COP, the EU Council set out the EU position on climate change, in which in addition to stressing the urgency of establishing an ambitious international regime to solve global climate changes, it implemented its unilateral commitment to cut its emissions by at least 20 % of 1990 levels by 2020.²⁸ At the 19th UN FCCC/COP, the EU's stance focused on the proper implementation of existing decisions and advancing work under the Durban Platform for Enhanced Action by quickly closing the gap in the pre-2020 level of

²⁴ "Deadlock broken at UN climate talks." 24 Nov. 2013. Aljazeera 15 May 2014. <http://www.aljazeera.com/news/europe/2013/11/deadlock-broken-at-un-climate-talks-20131123163641928770.html>.

²⁵ "Warsaw Outcomes." United Nations Framework Convention on Climate Change 15 May 2014. http://unfccc.int/key_steps/warsaw_outcomes/items/8006.php.

²⁶ Hakim, Danny. "Poland, Wedded to Coal, Spurns Europe on Clean Energy Targets."

²⁷ Council of the European Union. The 318th Council Meeting: Environment. Press Release 15321/11 final of 10 Oct. 2011. Brussels: European Union.

²⁸ "Environment ministers set out EU position ahead of Doha Climate Conference." 25 Oct. 2012. Council of the European Union 16 May 2014. <http://www.consilium.europa.eu/homepage/highlights/environment-ministers-set-out-eu-position-ahead-of-doha-climate-conference?lang=en>.

mitigation ambition, and preparing the ground for adopting a new legally-binding global post-2020 climate agreement by 2015.²⁹

During the Polish presidency, the EU Council adopted conclusions on the assessment of the EU's 6th Environmental Action Programme (EAP) 2002–2012. The conclusions proposed by the European Commission were seen as comprehensive and forward-looking, and took into account existing initiatives such as the Europe 2020 Strategy; the EU positions on the UN Conference on Sustainable Development (Rio +20); the post-2010 Biodiversity Strategy; and more. Regarding the 2012 Rio +20 UN Conference, the Polish Presidency significantly assisted in establishing the EU's general positions, mostly stressing the use of green energy in the context of sustainable development and poverty eradication, and the establishment of an institutional framework for sustainable development.³⁰

Furthermore, on 20 November 2013 the European Parliament and European Council adopted a decision to establish the EU's 7th EAP to 2020 "living well, within the limits of our planet", which entered into force in January 2014. It identifies three key objectives: e.g. protection, conservation and enhancement of the EU's natural capital; turning the EU into a resource-efficient, green, and competitive low-carbon economy; and safeguarding the Union's citizens from environment-related pressures and risks to health and wellbeing. It also lists four 'enablers' that will facilitate these goals: better implementation of legislation; better information by improving the knowledge base; increased and wiser investment for environment and climate policy; and full integration of environmental requirements and considerations into other policies. Its two overarching horizontal priority objectives are to make the Union's cities more sustainable, and to help the Union address international environmental and climate challenges more effectively.³¹

1.1.2.3 Energy

While economic recovery was on the uptick in 2012 and 2013, the global energy map was undergoing revision with the increase in oil and gas production in the United States, along with a retreat from nuclear power in some countries, growth in the use of wind and solar technologies, and the spread of unconventional gas

²⁹ "EU adopts its position for the UN climate change conference." 15 Oct. 2013. Council of the European Union 16 May 2014. <http://www.consilium.europa.eu/homepage/highlights/eu-adopts-its-position-for-the-un-climate-change-conference?lang=en>.

³⁰ Council of the European Union. Rio+20: Towards Achieving Sustainable Development by Greening the Economy and Improving Governance. Council Conclusion 15388/11.

³¹ European Union. Decision of the European Parliament and of the Council on a General Union Environment Action Programmes to 2020 "Living Well, Within The Limits Of Our Planet". 20 Nov. 2013, European Parliament and Council Decision PE-CONS 64/1/13 REV 1 of 20 November 2013. Strasbourg: European Union. http://ec.europa.eu/environment/newprg/pdf/PE00064_en.pdf.

production. Roles are beginning to shift among major energy importers and exporters, as decision makers attempt to reconcile their state economic, energy and environmental objectives. The next stage in global energy development will require an awareness of the dynamics underpinning energy markets to anticipate how growth may be achieved and, with the rise of unconventional oil and gas and of renewables, map where the distribution of the world's energy resources will take root.

Another recurring trend during the review period was the increasingly strong role of emerging countries in determining energy market behaviour. The tide of energy demand is beginning to flow toward emerging economies, particularly China, India, and the Middle East, which have increased global energy use by one-third. While the US is projected to become the largest oil producer by 2020, moving toward meeting all its energy needs from domestic resources by 2035, North America is expected to shift toward becoming a net oil exporter by 2030.³² On the other hand, China is poised to become the largest oil-importing country and India will be the largest importer of coal by the early 2020s, which should shift the majority of energy trade from the Atlantic region to the Asian-Pacific.³³ By 2030, China's oil consumption is expected to overtake the US, while the Middle East will do likewise with the EU, as the decline in oil use in OECD countries accelerates.³⁴ An important side effect of this trend is that significant investments in energy production and distribution will have to be made to respond to growing demand. By some estimates, as much as \$38 trillion will have to be invested in related infrastructure by 2035, of which \$20 trillion is to be for fossil fuel exploitation.³⁵ Yet energy price variations among regions are likely to affect industrial competitiveness, influencing investment decisions and company strategies. While the price of crude oil has remained high since 2011, the prices of other fuels have been subject to significant regional variations. It should be noted that energy-intensive sectors worldwide account for around one-fifth of industrial value addition, one-quarter of industrial employment and 70 % of industrial energy use.³⁶

Despite the growth in renewable low carbon sources of energy, fossil fuels remain dominant in the global energy mix, supported by six times more subsidies than subsidies to renewables in 2011. In the long run, the share of fossil fuels in the global primary energy consumption mix is projected to fall slightly from 81 % in 2010 to approximately 75 % in 2035, though natural gas is expected to increase its relative share within the fossil fuel mix. At the same time, the problem of decreasing the environmental footprint of fossil fuel energy consumption remains unsolved. With the energy sector responsible for two-thirds of global greenhouse-gas emissions, it will be pivotal in determining whether or not climate change goals

³² International Energy Agency. World Energy Outlook 2012. IAE: Paris, 2012.

³³ International Energy Agency. World Energy Outlook 2013. IAE: Paris, 2013.

³⁴ Ibid. at 4.

³⁵ International Energy Agency. World Energy Outlook 2011. IAE: Paris, 2011.

³⁶ International Energy Agency. World Energy Outlook 2013. IAE: Paris, 2013.

are achieved. In the current scenario, even with carbon abatement schemes announced by the EU, the US, China, and Japan to improve energy efficiency, support renewables, reduce fossil-fuel subsidies and, in some cases, to put a price on carbon, energy-related CO₂ emissions are expected to still rise by 20 % by 2035.³⁷

1.1.2.4 Resources

Space applications and Earth monitoring technologies play an important role in the area of resource management, as they can provide better control of and support for the utilisation of scarce natural resources. Likewise, satellite based technologies can perform indispensable tasks for international trade, e.g. by streamlining global business transactions and payments. Global navigation satellite systems (GNSS) are already relied on as an integral part of transportation and utilisation of natural, agricultural and industrial resources. And the use of meteorological and imaging satellites is making agricultural output bigger and more reliable, along with greater precision. For many developing countries the rationale for investment in space is improvement of the management of their agricultural and natural resources.

Between 2011 and the end of 2013, commodity prices continued to recede, though their effect on consumer price inflation varied between high-income and developing economies due to country-specific conditions. This tendency can be attributed to weaker global demand as a result of the economic crisis. Nevertheless, by the end of 2013, there were signs of a turning point in the global economy, as stronger growth was expected in high-income economies, which were beginning to match the growth of emerging economies that had been less scathed by the crisis. In this period, favourable weather conditions in several agriculture markets, as well as strong coal and metals production, led to price declines in these respective commodities. Oil prices eased by the end of 2013, due to the growing supply in the US and the easing of tensions surrounding Iran. Yet, there remains some uncertainty with regard to oil commodities, as potential political turmoil in the Middle East could result in substantial price increases, whereas the increase of crude-oil substitutions for other types of energy could result in the opposite outcome. Furthermore, currency fluctuations have affected domestic prices of commodities, sometimes increasing demand.³⁸

While the rate of growth of international trade was expected to return to 7–8 % in 2011, it fell below that mark, reaching 5.3 % for that year; it decelerated even further to 1.7 % in 2012. However, the return of trade to pre-crisis levels has been uneven among economies, with developed, developing and transitioning economies all experiencing a slower rate of expansion in 2012 than experienced in the previous

³⁷ Ibid.

³⁸ The World Bank. *Global Economic Prospects—Coping with policy normalization in high-income countries*. Volume 8/January 2014. Washington DC: World Bank, 2014.

year. For instance, trade in Europe has been sluggish, due partly to the nominal growth of imports in addition to its extremely weak intra-EU trade that was responsible for nearly 90 % of the slowdown in Europe's exports. Japan has not fared much better in its exports following its 2011 earthquake, though it is beginning to increase its imports. However, the US is beginning to show signs of growth, with some increase in both its import and export volumes, despite signs of deceleration of the latter in 2013. Another example is the situation in the economies in transition. While figures remained positive for most transition economies, they have decelerated considerably with export volumes increasing by 1 % in 2012 from 4.2 % in 2011, and imports dropping to 3.9 % in 2012 from 15.7 % in 2011. Developing economies also experienced diminishing growth in 2012, though the change was not quite as severe, with import growth falling to 4.5 % in 2012 from 7.4 % in 2011, and exports displaying similar results at 3.6 % in 2012 from 6 % in 2011. It would appear that the previous crisis has altered trade patterns, with the volumes of trade of most developed regions remaining below their pre-crisis levels, while imports and exports in emerging economies have exceeded their pre-crisis peaks, though even that growth appears to be slowing down recently due to decreases in demand, hinting at a less favourable trade environment in the near future.³⁹

Oil and mineral exporters experienced significant gains during the period. Oil prices remained high and relatively stable between 2012 and 2013, primarily because of decreases in production by members of the Organization of the Petroleum Exporting Countries (OPEC) in the last quarter of 2012, and geo-political tensions in Western Asia affecting oil supplies. Increased oil production in North America, and decelerating global demand growth in OPEC countries brought downward pressure on oil prices in 2013, though prices still increased at the start of the year based on expected improvement in economic conditions. To compare the situation with previous years, according to the figures of the United Nations Conference on Trade and Development (UNCTAD), crude oil market prices fluctuated in a \$99–\$111 band during the second half of 2012 and the first half of 2013, with an average price of \$105.5 per barrel for the 12-month period. While in 2011 growth in the oil trade expanded by roughly 1 %, demand for crude oil marginally increased again by 1.5 % in 2012. For 2013, growth in the demand for oil was expected to come from non-OECD countries, while it was expected to fall for OECD countries.⁴⁰

Additionally, non-oil commodity prices continued to exhibit some negative growth, due in part to improved supply conditions and a steep decline in global demand. However, there are signs of an uptick in the near future resulting in a minimal price growth in these commodities, with increasing demand coming from rapidly growing developing countries such as China. Nevertheless, whereas non-oil

³⁹ United Nations Conference on Trade and Development. Trade and Development Report, 2013. Geneva: UNCTAD, 2013. 1–10.

⁴⁰ *Ibid.* at 7–10.

commodity prices posted a 17.9 % increase in 2011, those prices decreased by 8.4 % in 2012, and showed a further reduction of 3.3 % in 2013.⁴¹ Non-oil commodities prices are forecast to begin increasing by 2016.⁴² As in previous years, uncertainty and instability have been the major distinguishing features of commodity markets, which is also reflected in the greater volatility of commodity prices. Looking at UNCTAD commodity price statistics, between the two periods 2003–2007 and 2008–2012, the simple measure of commodity groups showed medium levels of volatility in food commodity prices, with prices increases diminishing somewhat in the second period. On the other hand, vegetable oil seeds and oils, agricultural raw materials, minerals and metals and crude petroleum all showed higher levels of volatility.⁴³ Whereas metals and minerals prices rose steeply in the second half of 2010, and peaked during the first months of 2011 with relative stability in the following 18 months, prices in this market group declined sharply by mid-2013, with the index expected to decline almost 11 % in 2013. While gold, along with platinum and silver, have benefited from uncertainties about the global economy, the decline has marked a reversal from the previous 11 years of increasing precious metals prices. While still considered as safe havens, the indexes for gold, silver, and platinum declined by 15.5 %, 23.5 %, and 9.8 % respectively in 2013.⁴⁴ This is partially due to production and supply improvements, along with global recovery picking up pace, and the easing of financial tensions in Europe.⁴⁵

1.1.2.5 Knowledge

There is no doubt that sustained education and knowledge improvement is one of the necessary conditions for successful space activities, as well as for the full exploitation of their societal benefits. In general, space technology and development, drawing on multiple scientific disciplines, is one of the most difficult and challenging fields in scientific and technical research. Therefore, coherent and sustainable strategies aimed at improving higher education and supporting technical and scientific activities are particularly relevant and necessary for space sector activities.

For Europe, the expansion of its pool of highly skilled and specialised scientists and professionals should be a constant priority if it is to remain a leading actor in the

⁴¹ Ibid. at 9.

⁴² The World Bank. *Global Economic Prospects—Coping with policy normalization in high-income countries*. Volume 8/January 2014. Washington DC: World Bank, 2014.

⁴³ Instability indices and trends of free-market commodity prices for selected periods, annual, 1983–2012. UNCTADstat 13 Apr. 2014. <http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx>.

⁴⁴ World Bank Group. *Global Economic Prospects—Commodity Markets Outlook*. 2014 / April. Washington DC: World Bank, 2014: 19.

⁴⁵ The World Bank. *Global Economic Prospects—Less volatile, but slower growth*. Volume 7 / June 2013. Washington DC: World Bank, 2013: 104.