



Space activities in Italy: - National strategies and way forward

Maria Cristina Falvella
Strategic perspectives and European affairs
Italian Space Agency

A long tradition in space activities



- '40: The Italian Space Community began to organize itself



- '50: Edoardo Amaldi and Luigi Broglio started the first aerospace projects

- 1964: first Italian satellite into orbit from Wallops Island (USA)

- 1966: the first Italian satellite launched from Italian equatorial Malindi Base (Kenya)





Italian Space Agency : National History

- 1963 - National Institute for Space Researches (IRS): the first formal space coordination activity
- 1979 - first National Space Plan
- 1988 - Institution of the Italian Space Agency (ASI)



Italian Space Agency International History

- Italy is a founding Member State of the UN-COPUOS



1959: Prof. Edoardo Amaldi proposes the institution of an European body for civil space research

1964: Italy is a founding Member State of

- ELDO, European Launcher Development Organization
- ESRO, European Space Research Organization



1975: Italy is a founding Member State of the

- European Space Agency (ESA)





Italian Space Agency

www.asi.it



ASI is a public Agency, monitored by the Italian Ministry of Education, University and Research



ASI Mission

- Elaboration of national space strategies through the drafting of the National Space Plan
- Promotion and financing of Scientific and Technological Space Research
- Support of Space Education and Training of students and young professionals
- Promotion and support of national aerospace industry



ASI Mission

- to promote, coordinate and develop the scientific and technological research applied to space activities, which are implemented by the national research entities working in the space field;
- to develop and manage the national space programs;



ASI International Mission



Under the coordination of the Ministry of Foreign Affairs and International Cooperation (MAECI), the Agency:

- Coordinates the Italian participation in ESA programs and activities;
- Supports the Italian participation in European Union programs for the promotion of space research and technology;
- Negotiates and defines bilateral and multilateral space agreements with other agencies and countries;
- Maintains international relations with other space countries



ASI HQs and Centres



250 employees, 3 Centers

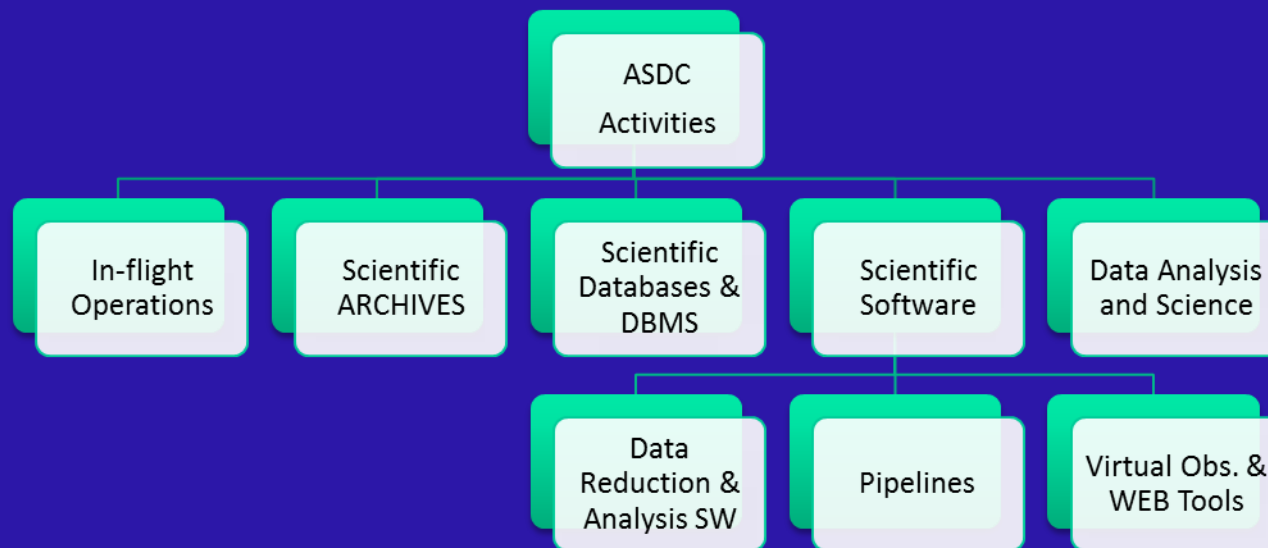
- Head Quarters in Rome
- Science Data Center in Rome
- Space Geodesy Center in Matera
- Space Center in Malindi

Participation in 5 Companies
(750 employees)



ASI Science Data Center (ASDC)

The ASI Science Data Center (ASDC) is an ASI facility operated in collaboration with INAF and INFN. ASDC is a multi-mission science operations, data processing and data archiving facility that provides support to several scientific space missions in the fields of astrophysics, cosmology, exploration of the Solar system and astroparticle physics.



❑ ASDC employs 40 scientists and engineers.

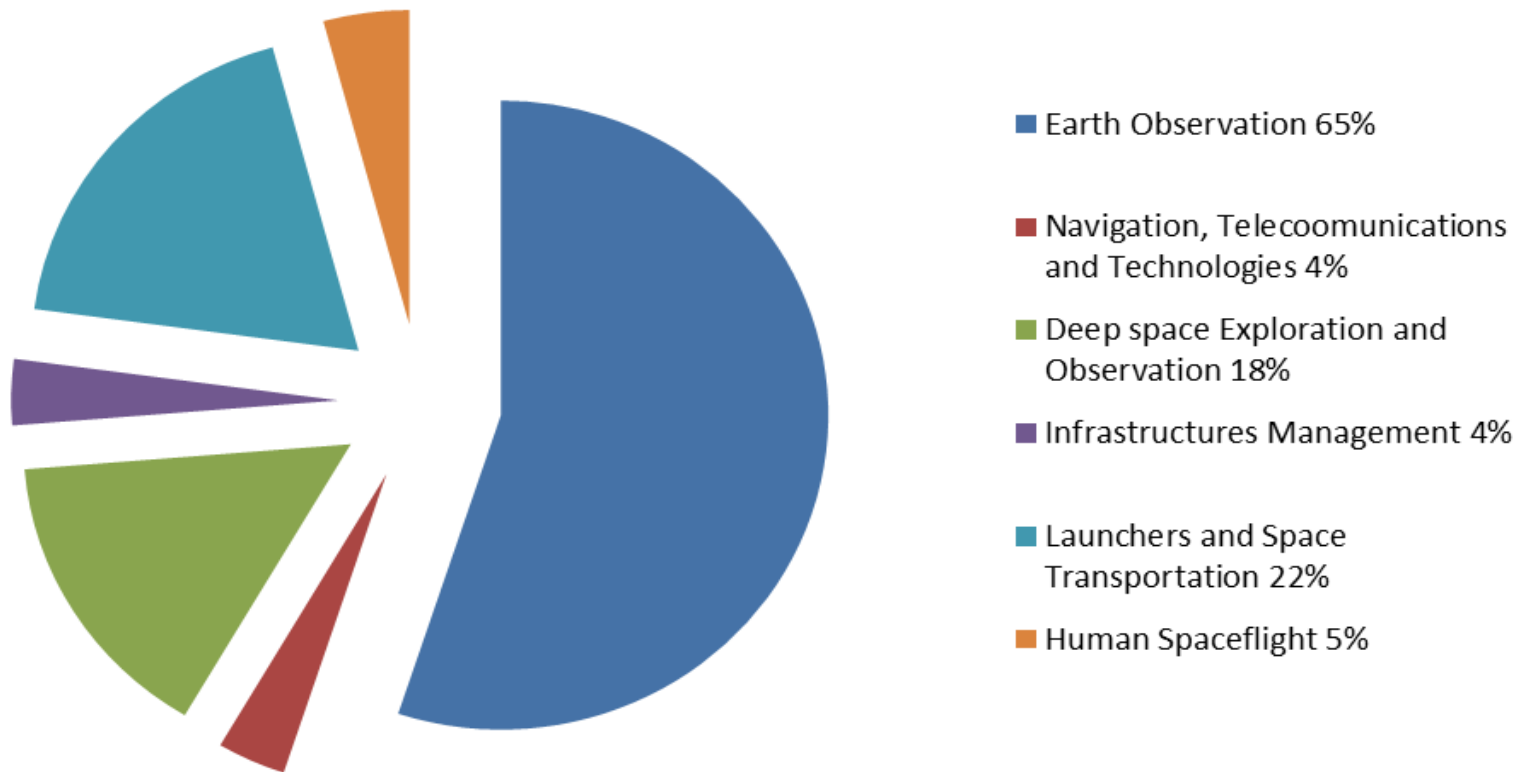
❑ Data from 20 missions or experiment in orbit are currently archived.

❑ 3 missions selected to be launched.

❑ Scientific Software for astrophysical missions is prepared and distributed

Space is a driver for innovation and economic development

ASI National allocation of funds



ASI Activities Plan 2015-2017

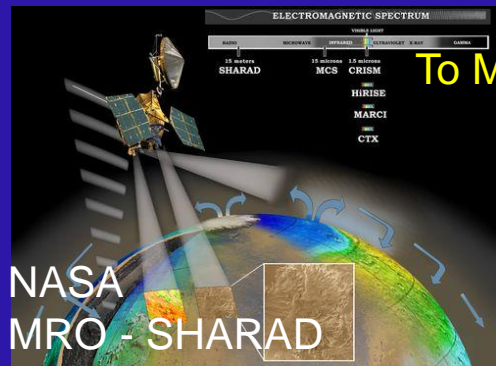
Italy in the European Space Agency

- ❑ Italy, in terms of investments, is the third country in ESA
- ❑ More than 50% of the ASI budget is devoted to ESA Programs (350M€ in 2014, 10.5% of total ESA countries contribution to activity and programs)
- ❑ ASI coordinates the Italian participation in ESA

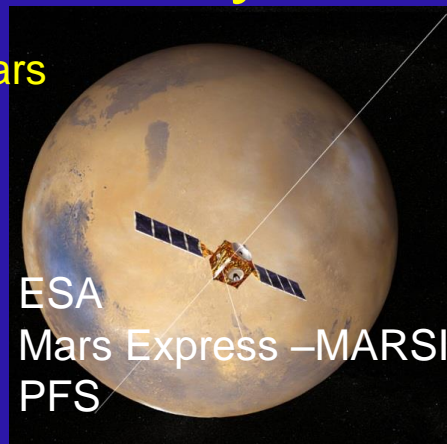


Observation of the Universe

Solar System Exploration



To Mars



ESA
Mars Express –MARSIS
PFS



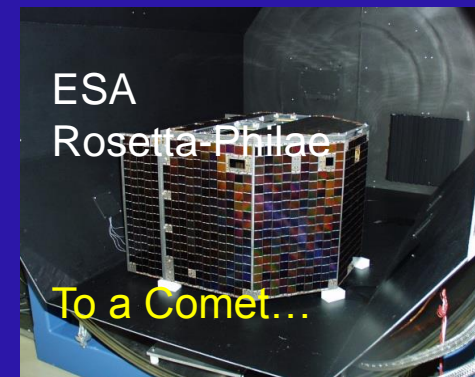
To Saturn

NASA ESA ASI
Cassini Huygens
Antenna, VIMS,
Radar, Radioscience -
HASI



To Asteroids

NASA
Dawn - VIR-MS



ESA
Rosetta-Philae

To a Comet...



To Jupiter

NASA
JUNO - JIRAM, KaT



To Venus

ESA
Venus Express –
VIRTIS, PFS



➤ In preparation

ESA
ExoMars '16 and '18

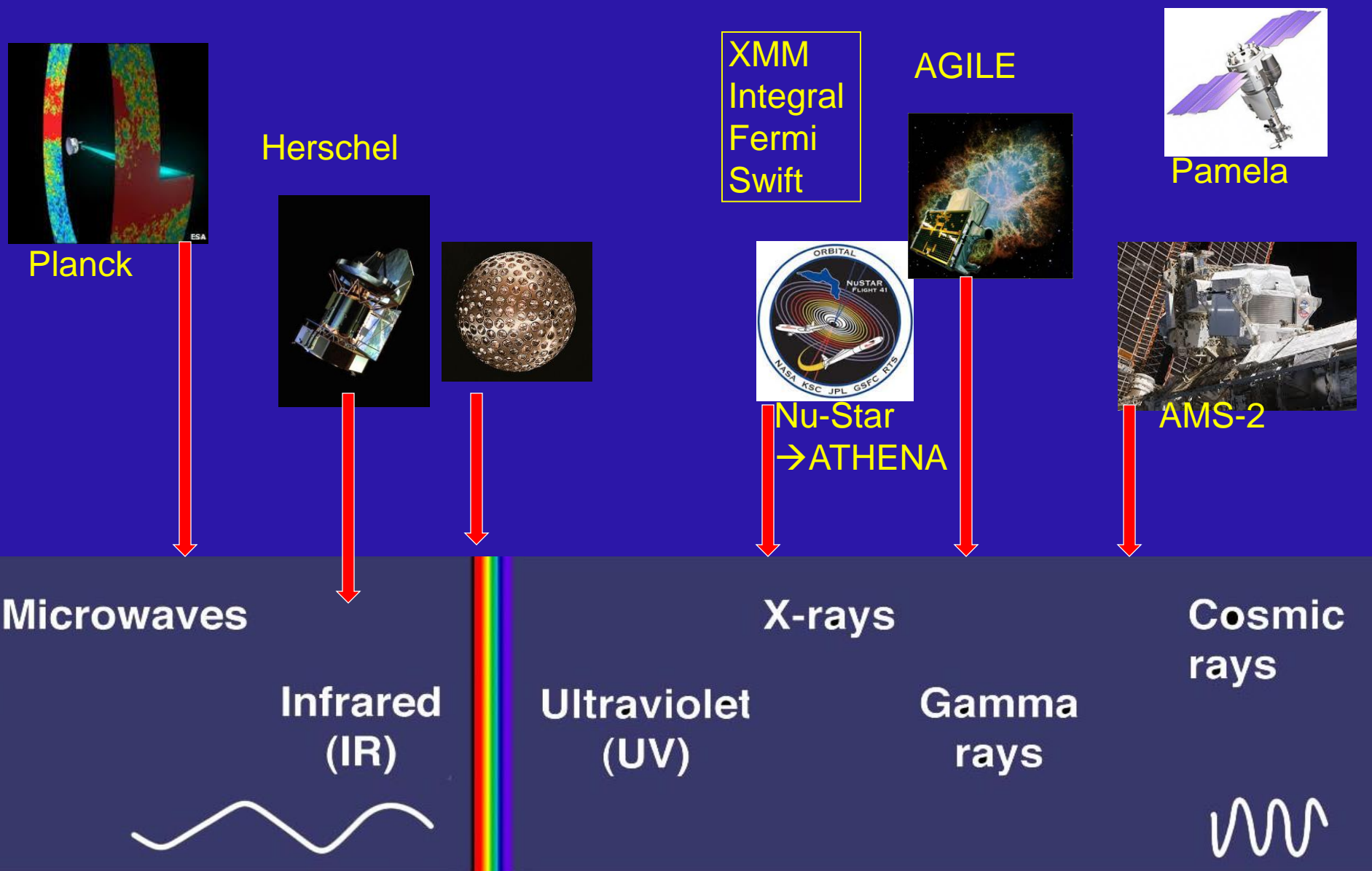
In preparation within ESA mainframe:

- BepiColombo - to Mercury launch 2016
- SOLAR ORBITER - to the Sun launch 2018
- JUICE - to Jupiter's Moons launch 2022

... and a look to extra solar planets with CHEOPS (2017) and PLATO (2019)

➤ Under evaluation other future missions with NASA

Astrophysics and Cosmology missions



Manned Exploration and ISS

Node 2 and 3



Cupola



Italy is the first country in
Europe in the ISS

More than 50% of
pressurized volume has
been built in Italy (TAS-I)



Columbus/ATV



MPLM/PMM





Since 1992 7 Italian
astronauts have flown into
Space



The first Italian woman in space



Samantha Cristoforetti reached the ISS in November 2014

120 scientists have contributed with 20 payloads and 2 scientific facilities onboard.
Here the main experiments:

- ☐ Blind and Imagined - move Short bLind plus shrINK (SLINK)
- ☐ Bone/Muscle check
- ☐ Cell Shape and Expression (Cytospace)
- ☐ Drain Brain
- ☐ Orthostatic Tolerance
- ☐ POP 3D
- ☐ Nanoparticles and Osteoporosis (NATO)
- ☐ Wearable monitoring
- ☐ ISSpresso

Communication Infrastructures

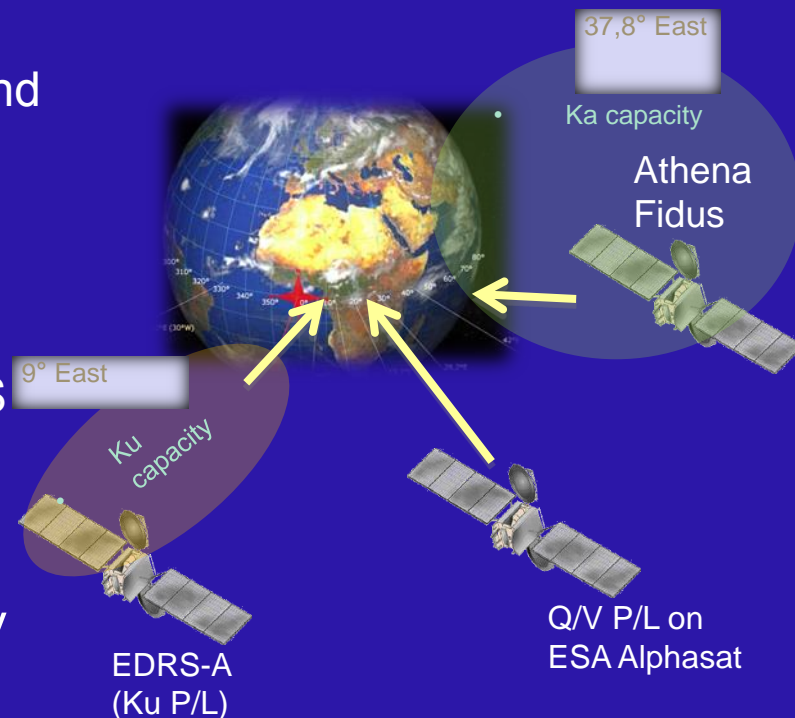
Development of programs and technologies in space communications, both in space and terrestrial components

Infrastructures

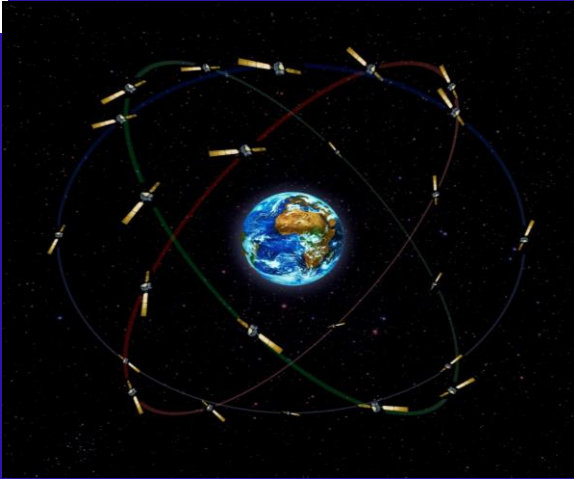
- Athena-Fidus: Italian and French Dual Use satellite in Ka band for “non-strategic” broad band connectivity (launched in 2014)
- P/L in Q/V Band on ESA Alphasat platform (launched in 2013)
- Broadcast P/L in Ku band on ESA E-DRS (launch planned : 2015)

Other Activities

- High Throughput Satellite preliminary study
- Integrated Applications and Technologies Programs (National and ESA ARTES Programs)



Navigation



- Multilateral collaboration on Navigation via ICG – International Committee on GNSS
- Italian national strategy based on use on EU systems Galileo and EGNOS and on interoperability with other GNSSs; Italy hosts one of the Galileo Control Centre

Main national programmes:

- PRESAGO project to define procedural methods and procedures required for PRS (Public Regulated Service - the Galileo classified service)
- SENECA project to promote the GNSS based innovation on Civil Aviation
- Several Application initiatives promoting GNSS to increase the Safety in the Maritime and Road Transport Sectors and to improve infomobility (ex. For disabled citizen)

Access to Space:

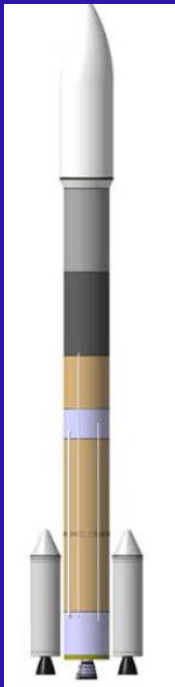
Italian participation to European programmes



Ariane launchers

Ariane 5 leading the world market since 1997 for GEO sat

Ariane 6 new development approved at CM 2014



VEGA

65% funded by Italy, lead by Italian company ELV,
qualified on February 2012

Vega C evolution programme approved at CM 2014

Re-entry vehicles

XV programme lead by Italy

flight onboard Vega, February 2015

PRIDE programme approved at CM 2014



Access to Space: ... to have a vision for the long term future

Some guideline to possible BREAKTHROUGH

- ❖ **space elevator**

→ efficiency, cost reduction for standard payloads



- ❖ **affordable reusability**

→ 'light' concept of a 'single-stage-to-orbit



- ❖ **use of the 'aero-space' segment (sub-orbital flights)**

→ to merge aeronautical and space skills for public daily benefits



- ❖ **to safe the use of nuclear power in space for "very far" frontiers**

→ for human Solar system exploration



ASI radar Technology and Programs

COSMO-SkyMed (X-Band)



X-BAND

SENTINEL-1 (C-Band)



C-BAND

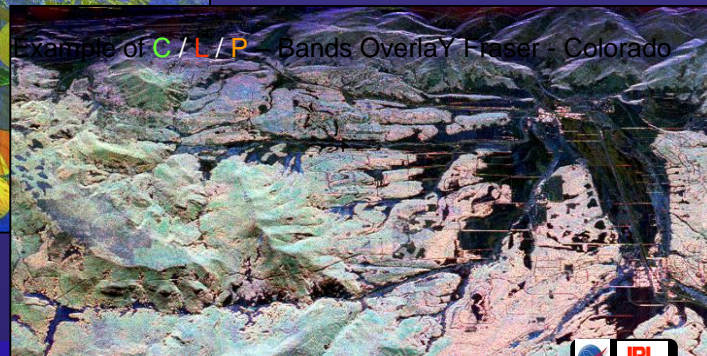
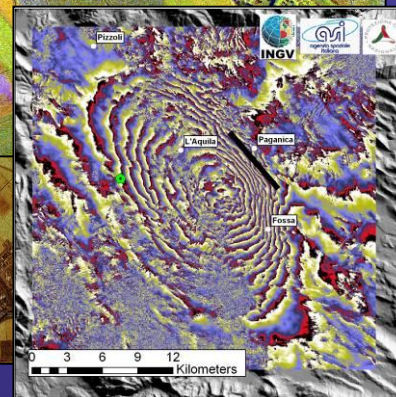
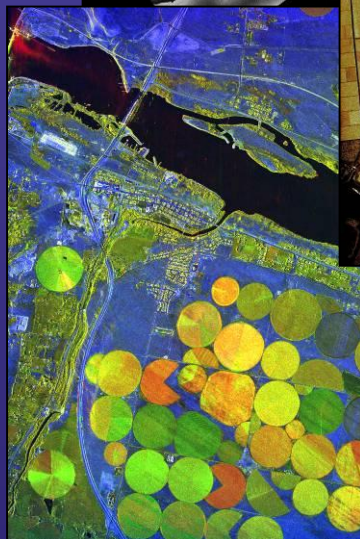
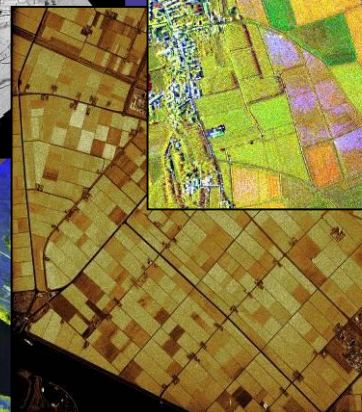
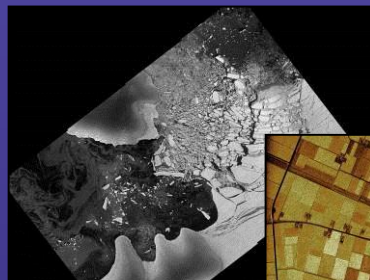
SAOCOM (L-Band)



L-BAND



P-BAND



ASI Earth Observation Missions

COSMO-SkyMed: X-Band SAR Constellation
PRISMA: hyperspectral mission demonstrator



National
missions

Earth Explorers (SMOS, Cryosat, Swarm, ADM,
Earthcare, Biomass)
Copernicus / Sentinels
Metop / Meteosat



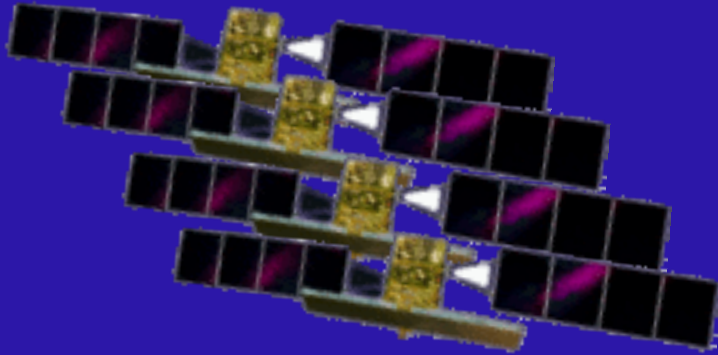
ESA/Eumetsat
missions

SIASGE/ Argentina
SHALOM/ Israel
CSES/ China



International
missions

ASI Earth Observation Ground Segment



COSMO-SkyMed Ground Segment

Copernicus IT Collaborative Ground Segment



ASI Space Geodesy Center



ASI Earth Observation Science and Applications

Data Exploitation:

- ASI COSMO-SkyMed Open Call for Science
- ASI & CSA COSMO-SkyMed /RADARSAT-2 Joint Announcement of Opportunity

Disasters Risk Management Activities (volcano, earthquake, floods, oil spill):

- Pilot Projects with Italian Civil Protection
- Bilateral cooperation with JAXA (ALOS, L-band SAR)
- CEOS DRM Pilot Projects (Volcano, Seismic, Floods)
- Geohazard Supersites and Natural Laboratories Initiative

Environmental Monitoring Activities:

- Projects with National Institutions
- GEO Global Forest Observation Initiative

WIDE APPLICATION RANGE IN A DUAL SCENARIO



RISK MONITORING AND MANAGEMENT OF EMERGENCIES

- FLOODS
- OCEAN AND ICE
- MONITORING
- LANDSLIDES
- VOLCANOES

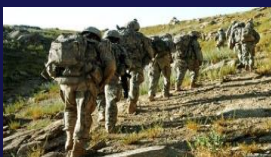
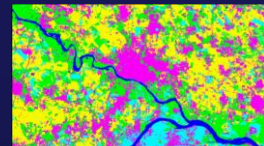
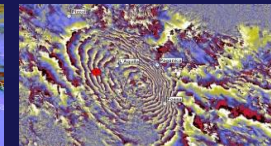
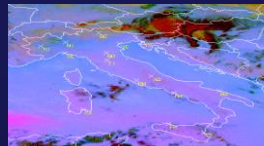
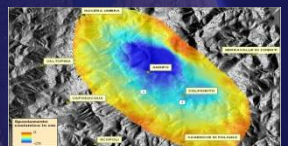
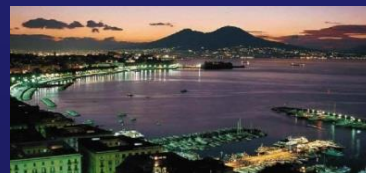
MONITORING AND MANAGEMENT OF COASTAL LINES AND INLAND WATERS

MONITORING AND MANAGEMENT OF FORESTRY AND AGRICULTURAL RESOURCES

TECHNICAL CARTOGRAPHY – URBAN PLANNING

SCIENTIFIC APPLICATIONS

SECURITY APPLICATIONS



The COSMO-SkyMed PROGRAMME



- ☐ The main Italian investment in Space System for Earth Observation

- ☐ A National Program conceived by Italian Space Agency (ASI) and funded by It. Ministry of Research & It. Ministry of Defence

DUAL USE SYSTEM

- ☐ Managed by ASI in cooperation with the It. MoD

- ☐ Developed by the Italian National Industry

ESA : many attractive, flexible and reliable ways of cooperation

- ❑ A crucial role in meeting European challenging goals that push research and technology beyond the frontier of knowledge



- ❑ A strategic tool for Member States in many policy areas (i.e. environment and security)
- ❑ The most suitable framework to implement the European Space policy and to conduct cooperations in space matter



The European Union Space Programs: Italy role

- ❑ **Galileo** (use on EU systems Galileo and EGNOS and on interoperability with other GNSSs; Italy hosts one of the Galileo Control Centre)
- ❑ **Copernicus** (IT Collaborative Ground Segment which includes the use of Matera Station)
- ❑ **Horizon 2020** (Strategic Research Clusters for electric propulsion and robotics)
- ❑ **SST** (Approved the first phase, ASI National Entity)



ESA and EU : the legal framework

- ❑ Lisbon Treaty and a political role of the European Union to provide the European space policy
- ❑ ESA/EU Framework Agreement, the joint Resolutions of the Space Council, ESA Resolutions
- ❑ Delegation agreements for the implementation of the Galileo and Copernicus as instruments to pursue a reliable and sustainable partnership between EU and ESA

ESA and EU : the fruitful way forward

- ❑ ESA as the only European space Agency
- ❑ Preserve the independency of ESA as an intergovernmental organization with its own legal personality and rules
- ❑ Guarantee the continuity in the implementation of space activities in order to provide a powerful support to economic growth



Recalling the conclusion of Space Working Party (DEC. 2014)

- ❑ Space as important platform to support the European Union policies in order to develop critical technologies at cost effective and affordable conditions
- ❑ A common vision for EU, ESA and Member States is fundamental to assure fruitful strategic solutions
- ❑ A way forward to long term strategies (assessment on possible scenarios)



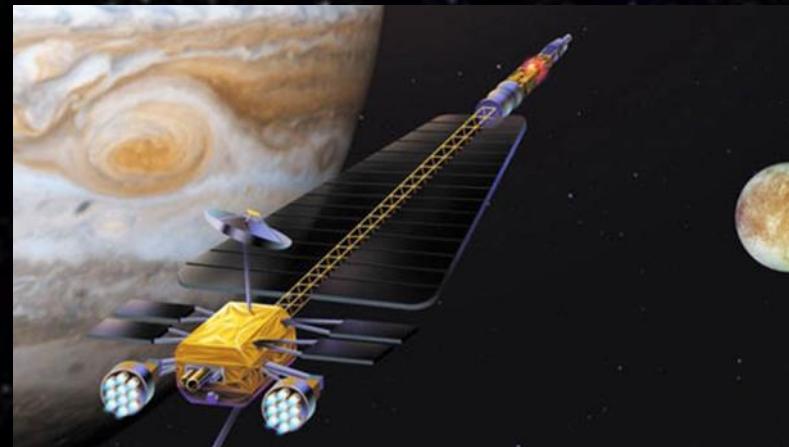
Priorities



- ❑ Exploitation of space-based technologies and system through the development of downstream applications
- ❑ Reinforcement of synergies in space, security and defence activities
- ❑ Acknowledgement of the strategic value on independent, reliable and cost effective access to space
- ❑ Promotion of research and innovation as fundamental assets for maintaining a leading role in space and providing the european citizens with the best capacities and opportunities

TOWARDS A SHARED EU-ESA VISION:

- conclusion of independent assessment on possible evolution scenarios**
- mid-term review of MFF**



THANK YOU!