

The PRISMA Mission

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- PRISMA Program
 - Context and background
 - Program overview
 - Industrial organization
- PRISMA Mission
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 - System elements
 - Key imaging and payload requirements
 - Products
 - Scientific community and final users
- Conclusion

■ Institutional context

- ❑ Established in 1988
- ❑ Governmental Agency, supervised by the Ministry of Education, University and Research (MUR)

■ Mission

- ❑ Promotion, development and diffusion of Scientific and Technological research in the fields of space and aerospace
- ❑ Coordination and management of national projects
- ❑ Participation to the European and International projects
- ❑ Elaboration and implementation of the National Aerospace Plan to be approved by the Governmental Authorities

The Italian Space Agency (ASI)



Matera

Geodesy

E.O.

Robotics



Roma

ASI HQs



Trapani

Balloon Launches

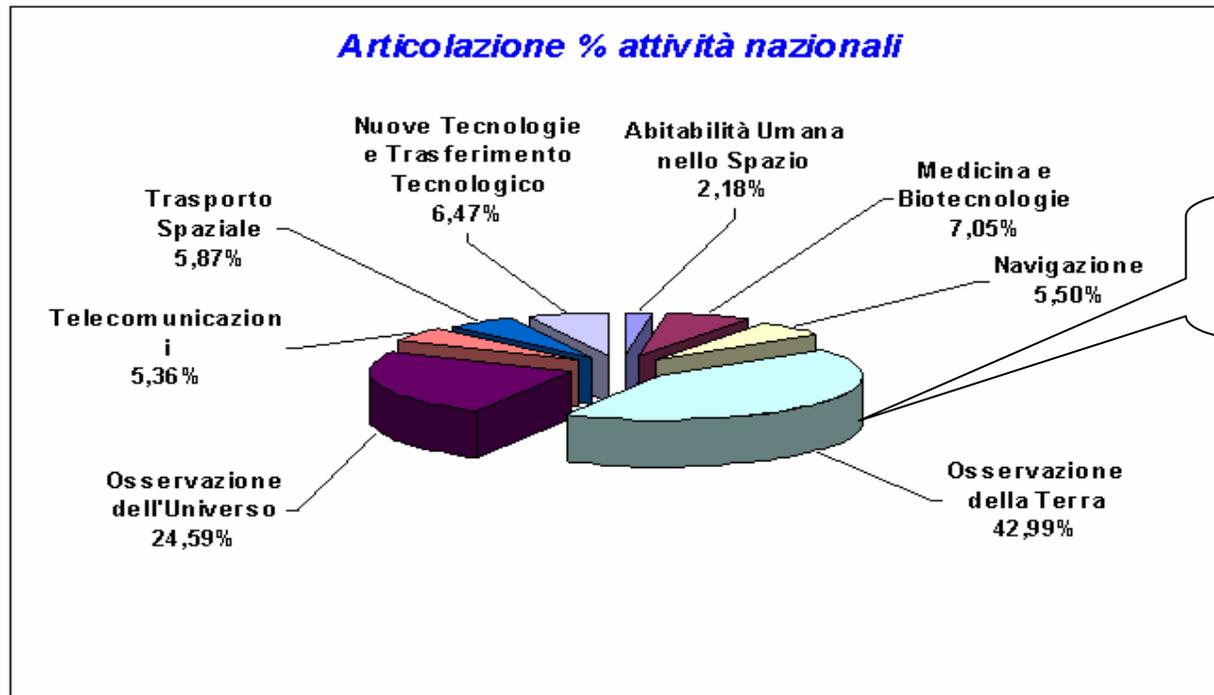


Malindi-Kenya

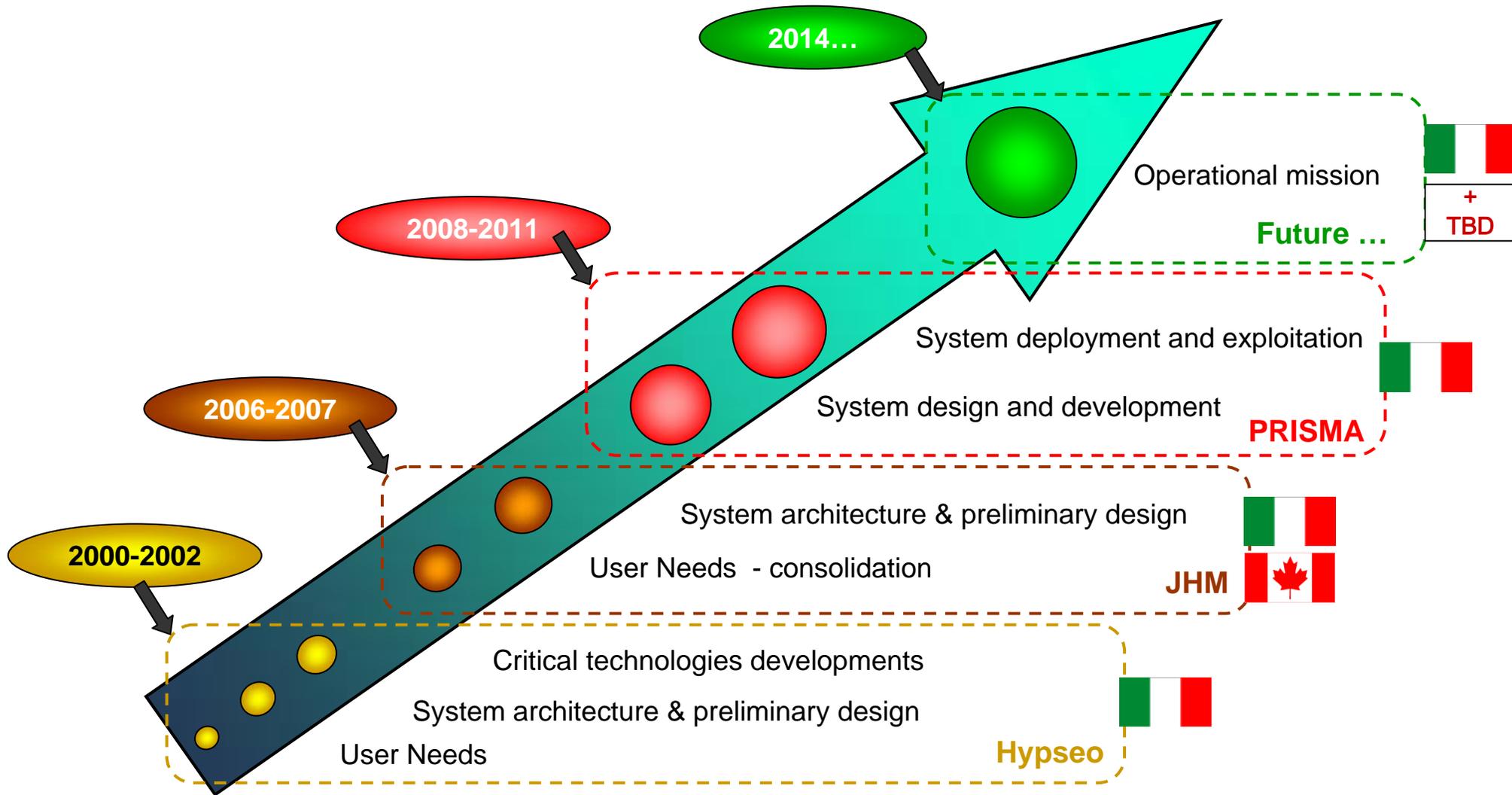


■ Key Figures

- Employees: ≈ 250
- Budget: ≈ 640 M€/year ($\approx 50\%$ to ESA)



**Earth Observation:
>40% budget**



Programme overview

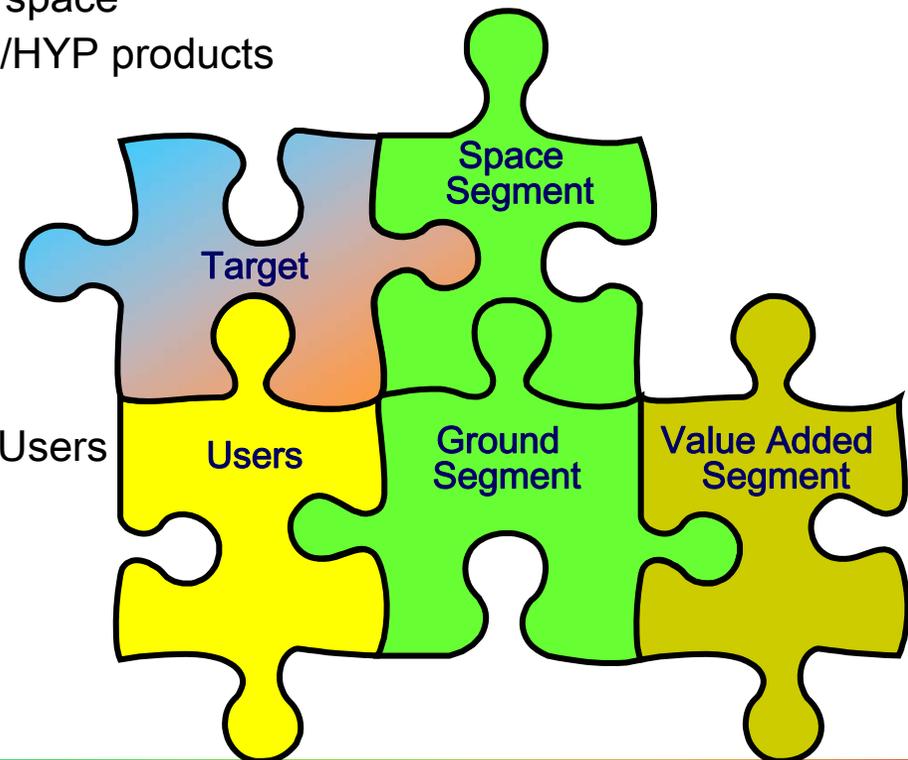
■ PRISMA = PRecursores IperSpettrale della Missione Applicativa

■ Mission Objectives:

- Pre-operational and technology demonstrator nature
- Focus on
 - qualification of PAN/HYP payload in space
 - development and production of PAN/HYP products

■ Program Highlights:

- National program
- Fully funded by ASI
- Mission includes:
 - System, interacting with Target and Users
 - Value Added Segment
- System B2/C/D/E1 contract running
- Launch: 2nd half 2011

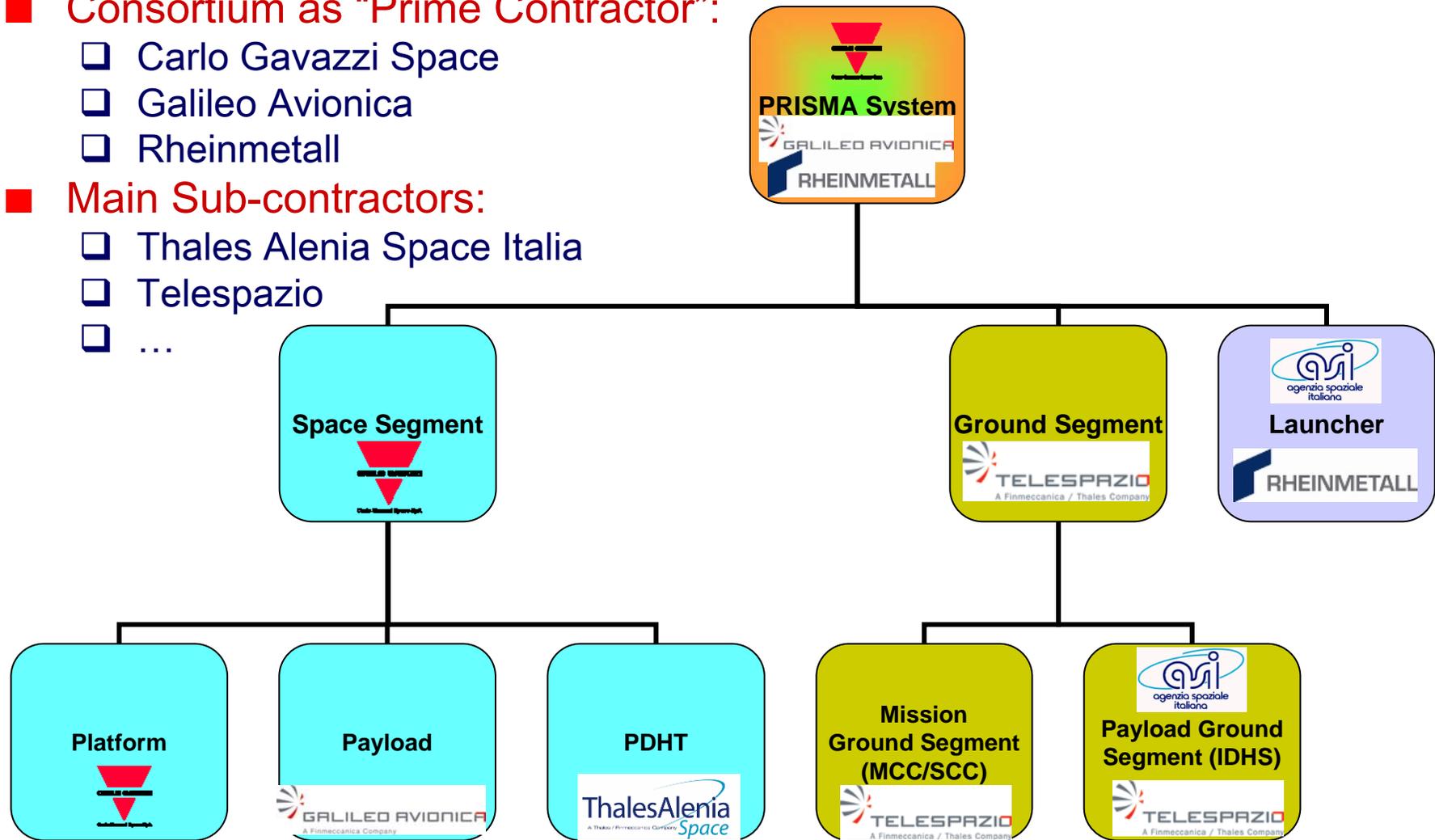


■ Consortium as “Prime Contractor”:

- Carlo Gavazzi Space
- Galileo Avionica
- Rheinmetall

■ Main Sub-contractors:

- Thales Alenia Space Italia
- Telespazio
- ...



■ Mission Statement:

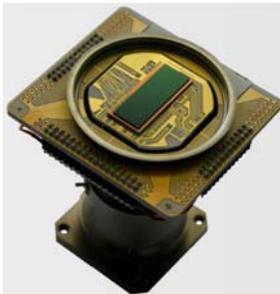
“... a pre-operative small Italian hyperspectral mission, aiming to qualify the technology, contribute to develop applications and provide products to institutional and scientific users for environmental observation and risk management ...”

■ Mission applications:

- Vegetation monitoring
- Geological mapping
- Agricultural diagnostics, agricultural indicators, land cover maps and crop inventories
- Urban and functional areas mapping and monitoring
- Coastal and inland productivity assessment of aquatic ecosystems
- Vegetation- atmosphere interactions (carbon cycle)
- Land surface hydrology and water management
- Risk Management Support (fires, landslides, volcanic, seismic hazard)
- Atmospheric Physic & Air quality
- Security
- Desertification

Mission highlights (1/2)

- High-performance “small” satellite mission that will:
 - ❑ provide products up to level 2, through acquisition of hyperspectral imaging spectrometer (HYP) and panchromatic (PAN) data
 - ❑ Support Value Added Segment
 - ❑ Capitalize heritage, leverage Italian assets, technologies and expertise
- Project activities follow ECSS definition for phases and reviews:
 - ❑ now we are in PDR
- Some ground elements (antennas, ...) already available
- Long Lead Items procurement on-going



S-Band
Fucino



X-Band
Matera

■ Coverage:

- World-wide
- Specific Italian area of interest

■ System Capacity:

- Acquired data volume:
 - Orbit: >50.000 km²
 - Daily >100.000 km²
- Daily products generation: 30 HYP/PAN

■ System Latencies:

- Re-look time: < 7 days
- Response time: < 14 days

■ Mission modes:

- Primary: User driven
- Secondary: Data driven (background mission)



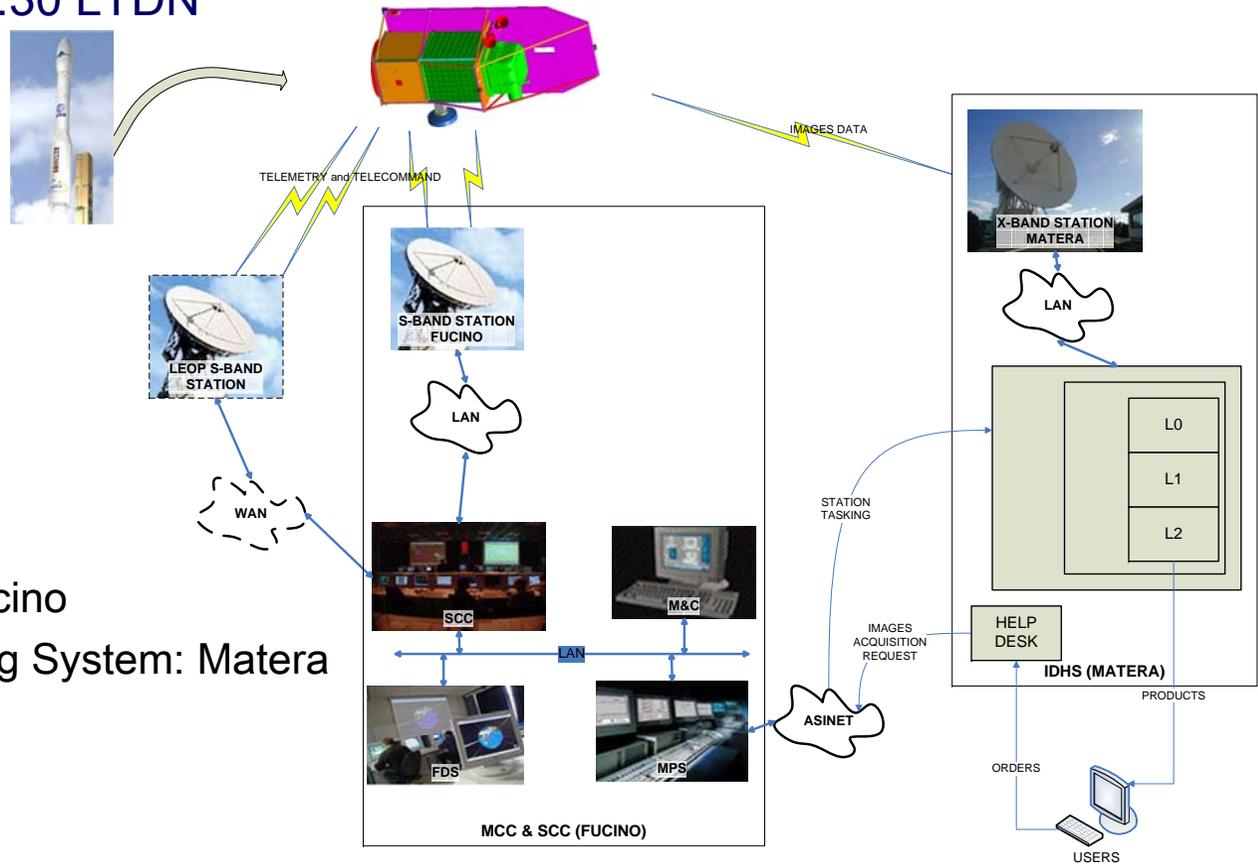
System elements

Orbit and lifetime:

- ❑ LEO SSO, 700km, 10.30 LTDN
- ❑ 3+2 years lifetime

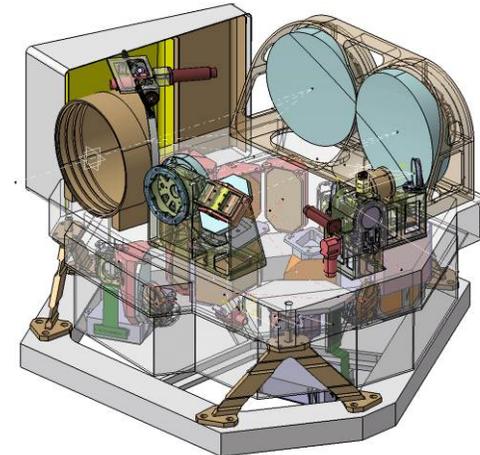
System elements:

- ❑ 1 “small” Satellite
 - Platform
 - Pan/Hyp Payload
 - PDHT
- ❑ Ground Segment
 - MCC/SCC/FDS: Fucino
 - Image Data Handling System: Matera
- ❑ Launch Segment
 - VEGA (baseline)



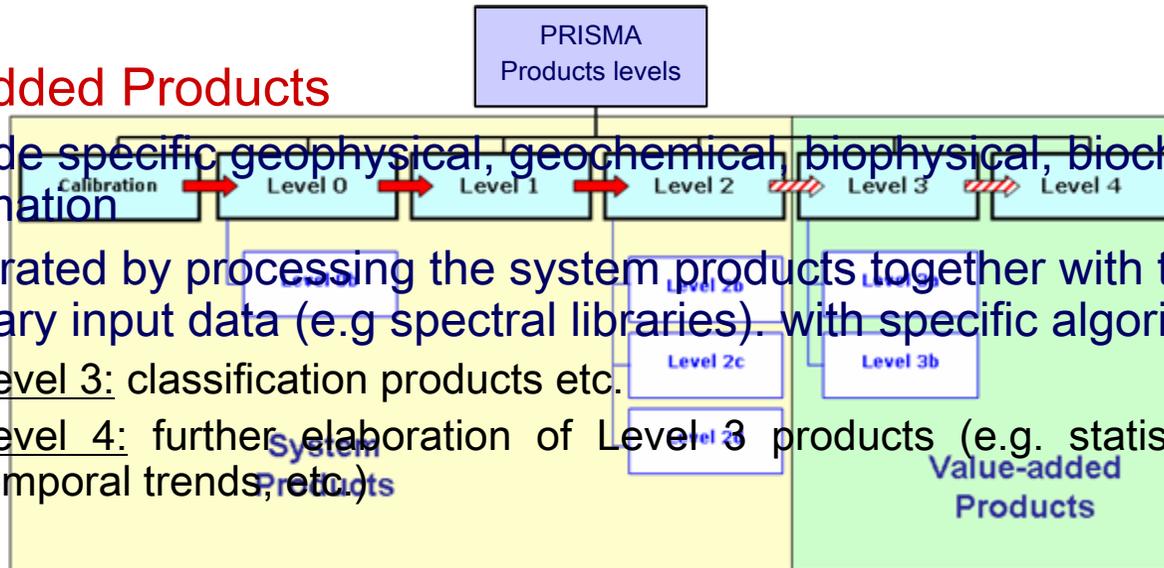
- Swath / FOV: 30 km / 2.45°
- Spatial GSD (elementary geom. FoV):
 - PAN: <5 m (2x6000 pixels)
 - HYP: <30 m (1000x256 pixels)
- Spectral ranges:
 - PAN camera: 400-700 nm
 - HYP instrument (contiguous spectrum)
 - VNIR: 400-1010 nm
 - SWIR: 920-2505 nm
- Spectral resolution: <10 nm
- Aperture diameter: 210mm

- Radiometric Quantization: 12 bit
- SNR
 - PAN: 240:1
 - VNIR: 200:1 (400-1000 nm)
600:1 (@650nm)
 - SWIR: 200:1 (1000-1750 nm)
400:1 (@1550nm)
100:1 (1950-2350 nm)
200:1 (@2100nm)
- Absolute radiometric accuracy: <5%



Value-Added Products

- ❑ Provide specific geophysical, geochemical, biophysical, biochemical information
- ❑ Generated by processing the system products together with the relevant auxiliary input data (e.g. spectral libraries) with specific algorithms
 - Level 3: classification products etc.
 - Level 4: further elaboration of Level 3 products (e.g. statistical analysis, temporal trends, etc.)



System Products

- ❑ Products which are intended to be the systematic basis for the generation of the higher level mission products
 - Level 0 processing discriminates image, housekeeping and calibration data.
 - Level 1 (Top-of-Atmosphere Spectral Radiance): process Level 0 data into radiometrically corrected and calibrated radiance data in physical units; moreover, Cloud and Sun Glint masks are generated.
 - Level 2 processing generates at-ground radiances and reflectances, which are geometrically corrected and geo-coded; atmospheric products are also provided.

PRISMA: toward the applications of the national Hyperspectral mission

- ❑ 31 march-1°april 2009, Centro di Geodesia Spaziale “G. Colombo” - Matera

Objectives:

- ❑ To present PRISMA to the Italian remote sensing community
- ❑ To investigate the state-of-the-art of the Italian reserach on hyperspectral applications
- ❑ To identify the existing gap for algorithms, products, data, applications
- ❑ To identify the priorities for research and applications
- ❑ To identify and discuss the potentialities of the PRISMA mission in comparison with the other hyperspectral mission
- ❑ To investigate on the possibilities of collaboration and cooperation with the final users

■ 2 full days

■ 37 talks

■ More than 70 people

DEADLINES

Submission of abstracts	13 November 2009
Notification of acceptance	20 December 2009
Issue of Preliminary Program	20 January 2010
Registration	1 February 2010
Issue of Final Program	At Workshop
Workshop	17-19 March 2010

CONTACT POINTS

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INTERNATIONAL WORKSHOP with ESA and DLR

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Herrmann Kaufmann	GFZ	Christoph Müller	DLR
		Thomas Schaeppmann	University of New Hampshire
		Stefan Staenz	University of Zurich University of Lethbridge



→ HYPERSPECTRAL WORKSHOP 2010

from CHRIS/Proba to PRISMA & EnMAP and beyond

1ST ANNOUNCEMENT AND CALL FOR

17 -19 March 2010

BACKGROUND

The European Space Agency (ESA), the German Aerospace Center (DLR)/ the German Research Center for Geosciences (GFZ) and the Italian Space Agency (ASI) are organising the **Hyperspectral Workshop 2010**, to be held at ESA-ESRIN, in Frascati, Italy on 17-19 March 2010. The Workshop will focus on the current and future hyperspectral/ imaging spectroscopy capacity in Europe. It aims to combine the established user community of the ESA CHRIS Proba mission with the European and International user communities in preparation for the next hyperspectral missions PRISMA (ASI) and EnMAP (DLR/GFZ).

PARTICIPATION

The Workshop is open to all European and International scientists, researchers and industry working already with or planning to work with hyperspectral data.

OBJECTIVES

The main objectives of the workshop are to: provide an overview of the current and future European hyperspectral missions, schedules, capabilities and data access. Present products and applications that will be supported by the Italian PRISMA mission and the German EnMAP mission. Provide a forum for the presentation of multi-annual results from the CHRIS Proba community and their expectations for continuity of research and application development.

- Provide a forum for the international imaging spectroscopy user community to discuss and consolidate main research areas and their data needs to be supported by the European hyperspectral missions.

ORGANISATION

The Workshop is organised around:

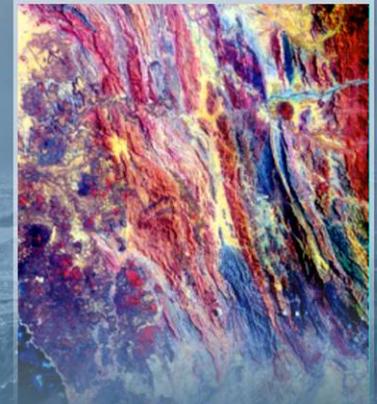
- Plenary talks
- Papers and poster sessions as selected by the Scientific Committee
- Round table discussions
- Discussion Forum science activities around future hyperspectral missions
- Demonstration of software tools
- Conference Proceedings to be published as ESA Special Proceedings

PROPOSED THEMES

- Cal/Val activities
- Image processing methods and tools
- Land cover & land surface processes
- Vegetation & forest
- Agriculture
- Urban areas
- Geology and soils
- Volcanoes
- Atmosphere
- Ocean colour & coastal zones
- Inland water and hydrology
- Global change
- Hyperspectral missions & technology
- Airborne missions



Chichester Harbour, UK - Proba CHRIS - 7*Oct-2004



Ayers Rock, Australia - Proba CHRIS - 20*Aug-2005



Ayers Rock, Australia - Proba CHRIS - 20*Aug-2005

Programme
 Event: SPIRI Workshop
 Topic: PRISMA Mission
 Date: 11-13/08/2009

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- ASI is committed to play a major role in the “hyperspectral arena”
- Public competition for the Italian scientific community
 - Research on applicative fields
 - PIs of the project will be part of the Scientific Advisory Team
 - 4 years projects
- Data Policy for scientific data distribution will be available by the end of 2009
- PRISMA mission is on going
 - Pre-operational, technology demonstration/qualification
 - Fully Funded
 - Launch 2° half of 2011

THANK YOU !

For any further information on the PRISMA mission,
please contact
the ASI Program Manager

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