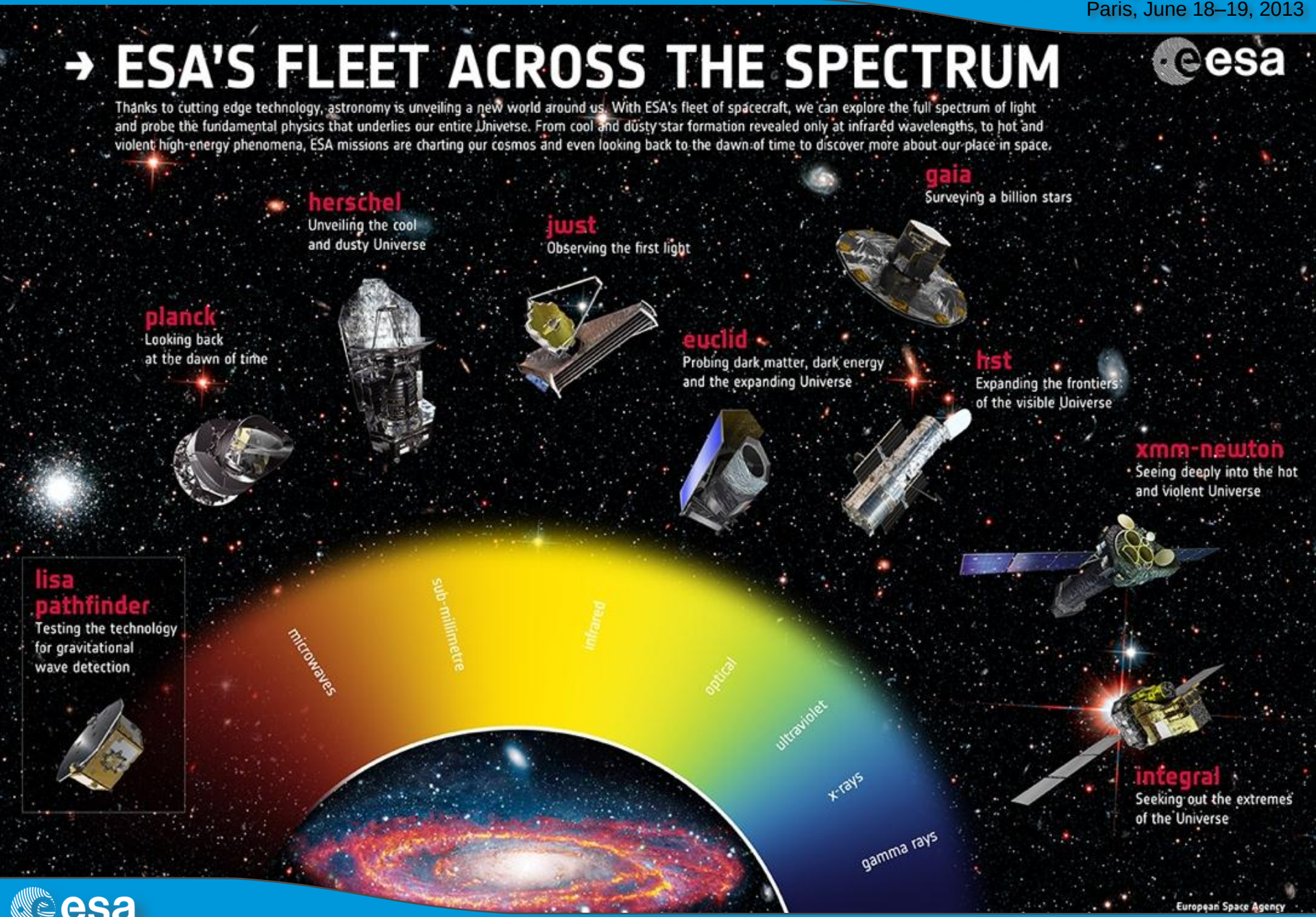
# Some highlights of 2013…

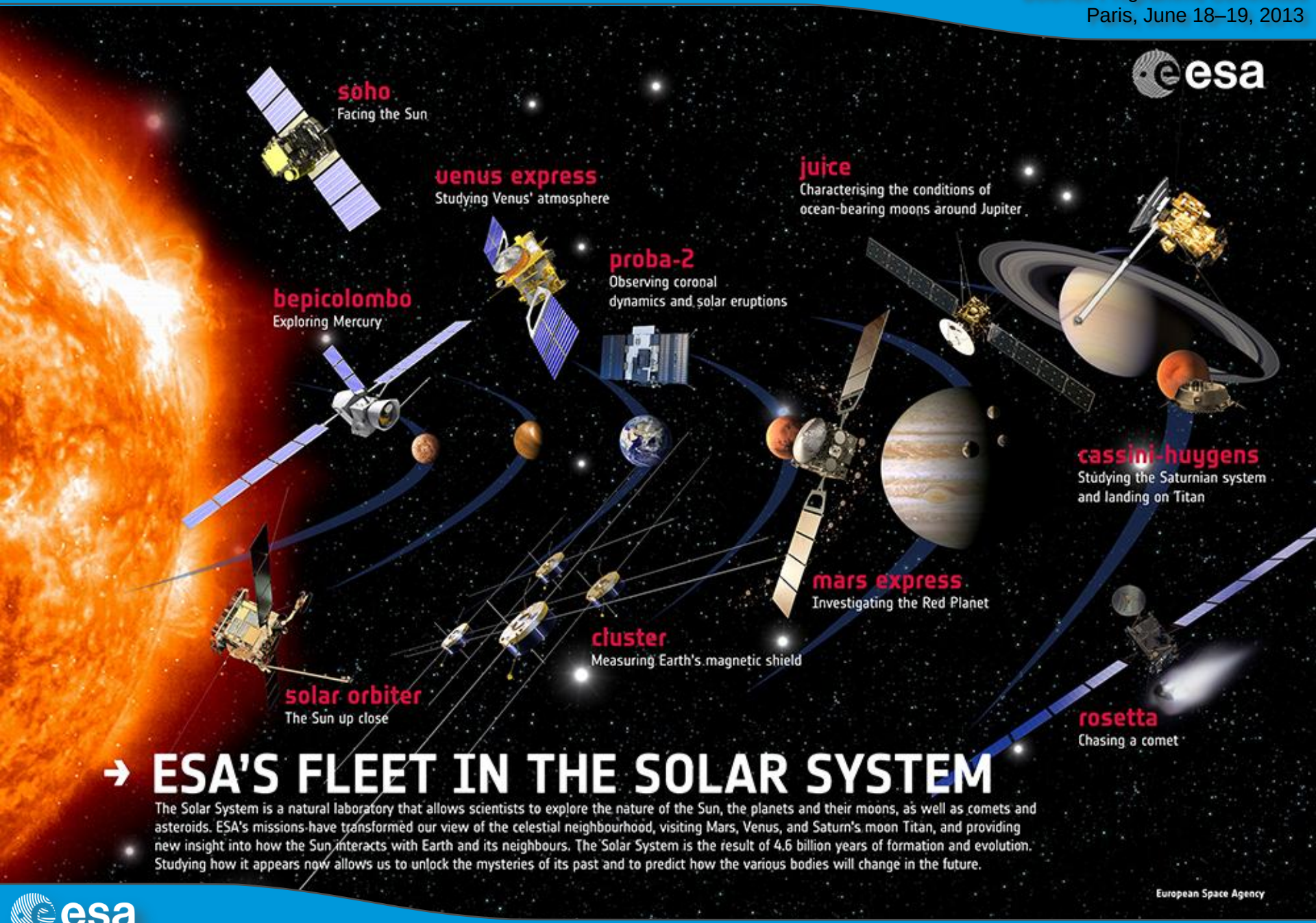
# and beyond

**M. Vaissiere**

**Head of ESA-ECSAT**

**Director Telecommunication and Integrated Applications**


ESA'S FLEET ACROSS THE SPECTRUM
esa
Thanks to cutting edge technology, astronomy is unveiling a new world around us. With ESA's fleet of spacecraft, we can explore the full spectrum of light and probe the fundamental physics that underlies our entire Universe. From cool and dusty star formation revealed only at infrared wavelengths, to hot and violent high-energy phenomena, ESA missions are charting our cosmos and even looking back to the dawn of time to discover more about our place in space.
herschel
Unveiling the cool and dusty Universe
jwst
Observing the first light
gaia
Surveying a billion stars
planck
Looking back at the dawn of time
euclid
Probing dark matter, dark energy and the expanding Universe
hst
Expanding the frontiers of the visible Universe
xmm-newton
Seeing deeply into the hot and violent Universe
lisa pathfinder
Testing the technology for gravitational wave detection
microwaves
sub-millimetre
infrared
optical
ultraviolet
x-rays
gamma rays
integral
Seeking out the extremes of the Universe
European Space Agency


esa
soho
Facing the Sun
venus express
Studying Venus' atmosphere
proba-2
Observing coronal dynamics and solar eruptions
bepicolombo
Exploring Mercury
juice
Characterising the conditions of ocean-bearing moons around Jupiter
cassini-huygens
Studying the Saturnian system and landing on Titan
mars express
Investigating the Red Planet
cluster
Measuring Earth's magnetic shield
solar orbiter
The Sun up close
rosetta
Chasing a comet
ESA'S FLEET IN THE SOLAR SYSTEM
The Solar System is a natural laboratory that allows scientists to explore the nature of the Sun, the planets and their moons, as well as comets and asteroids. ESA's missions have transformed our view of the celestial neighbourhood, visiting Mars, Venus, and Saturn's moon Titan, and providing new insight into how the Sun interacts with Earth and its neighbours. The Solar System is the result of 4.6 billion years of formation and evolution. Studying how it appears now allows us to unlock the mysteries of its past and to predict how the various bodies will change in the future.
European Space Agency

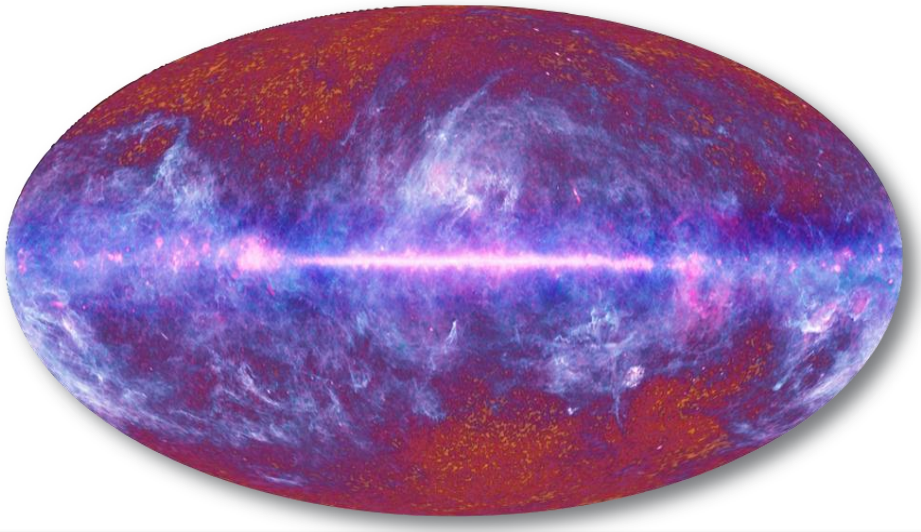
# Ending HERSCHEL and PLANCK

## Herschel – 2009

- Far infrared
- End of operations 29 April 2013
- Final command 17June 2013
- Excellent science
- Technology bonus

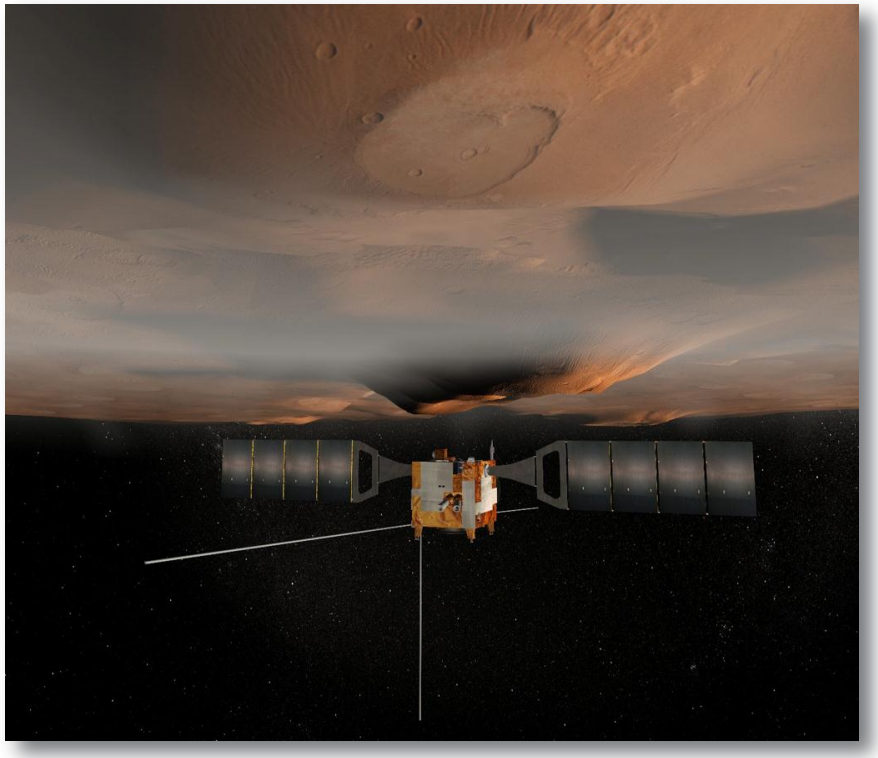
## Planck – 2009

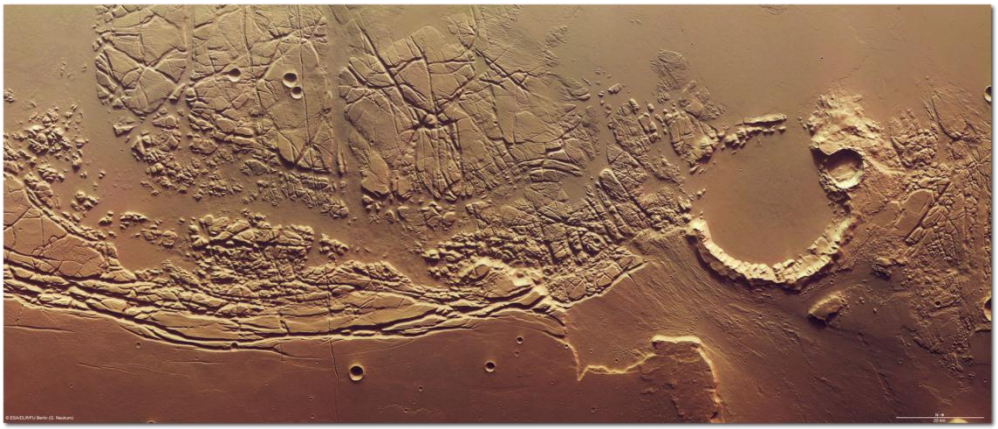
- Cosmic Microwave Background
- First all-sky image of CMB Mar13
- Most precise picture early Universe
- Still providing data until Aug 13



# MarsExpress – 10 years!

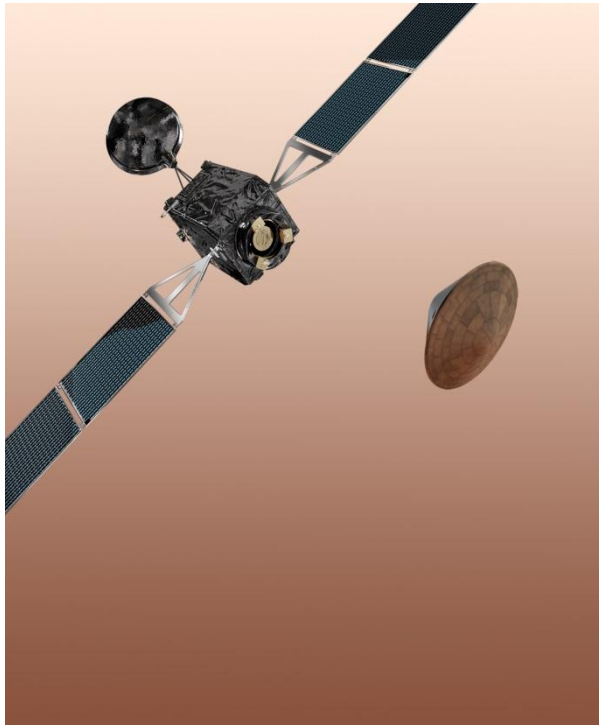
- New global mineralogical maps released
- Maps will help determine future landing site, science sites etc





# Return to Mars …. ExoMars

- 2 missions 2016 (orbiter) & 2018
- Cooperation with Roscosmos
- Investigate Martian environment
- Demonstrate new technologies for planetary exploration, with long-term view of Mars Sample Return mission



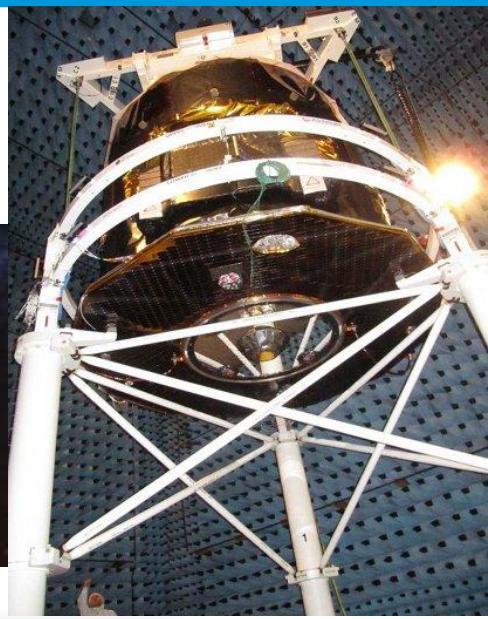
- 2016 mission entered final construction stage with contract signature @ Le Bourget

# Tim PEAKE – into space

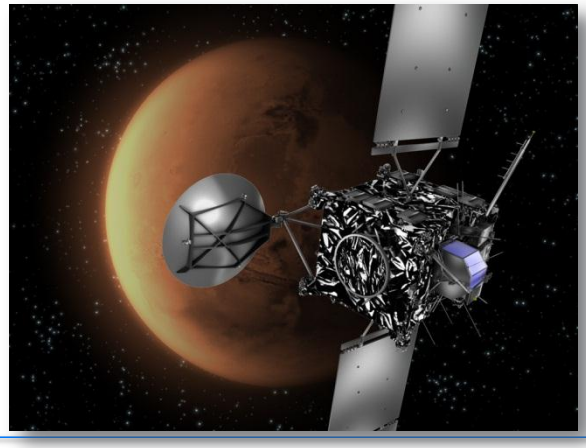
- Selected for 6-month mission to ISS in 2015
- Scientific and Engineering Programme
- Telecom technologies for ISS
- Outreach and Education

# To come ....

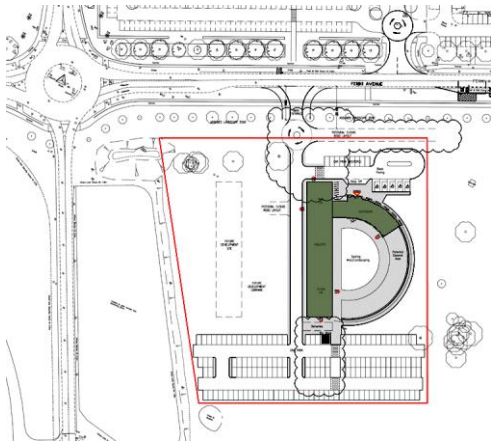
- **GAIA launch – Q3/2013**
  - Create high accuracy 3D map of Milky Way
  - Preparing for launch
  - Launch window > 19Oct13



- **Rosetta**
  - Wake up 20Jan 2014
  - Arrival comet spring
  - Deploy Philae lander Nov 2014
  - Escort comet until end 2015



# ECSAT Building, Harwell

Building available in 2015

100 people by end 2015

# The Harwell model

# ECSAT

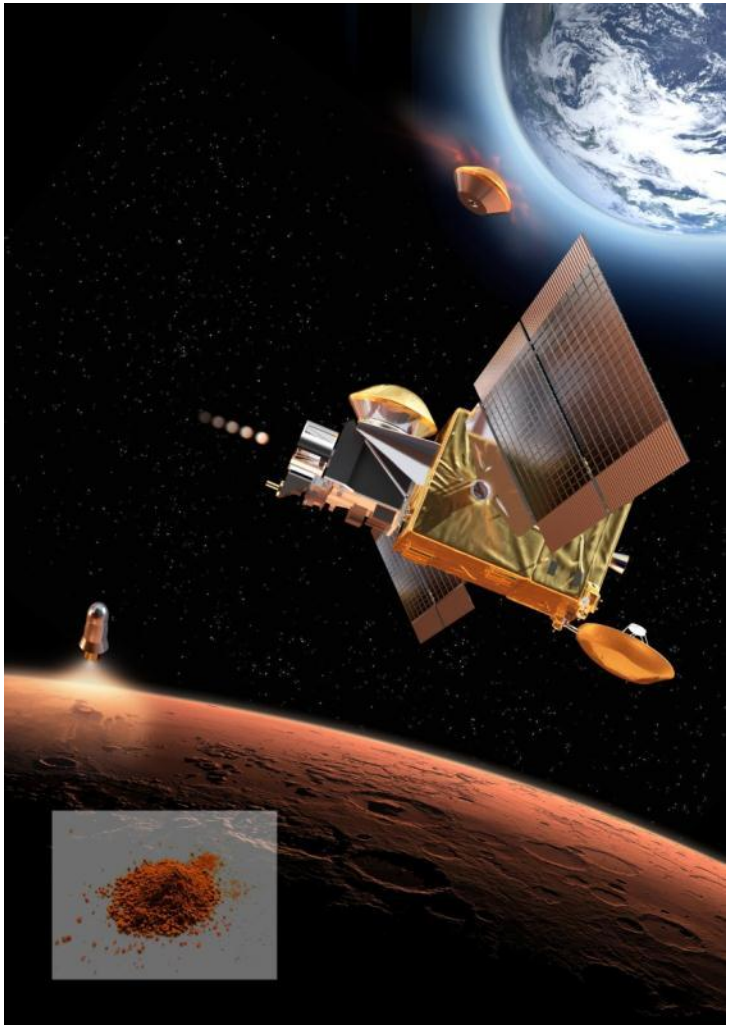
- **An ESA Centre**
  - Knowledge, Competitiveness and Growth
- **A member of the Harwell Campus "Family"**
- **A node of the UK network ( scientific community, industry, UKSA, TSB,… )**
- **A gateway to the rest of Europe and beyond**

# ECSAT – Robotic Exploration

## Future Exploration Missions

## Key Enabling Technologies

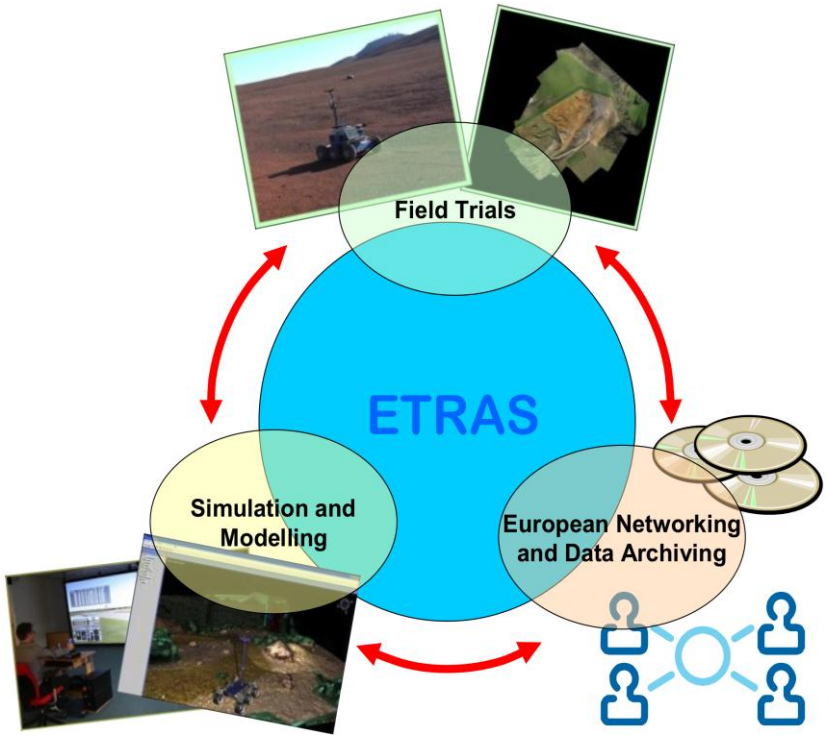
- ***Autonomy***
- ***Sample Curation***
- ***Nuclear Power Systems***



# ECSAT – Robotic Exploration

**Autonomy – Harwell Robotics and Autonomy Facility**

- Verification and Validation of Autonomous Systems
- Correlation between field trials and simulation throughout whole lifecycle of Autonomous System



# ECSAT – Robotic Exploration

## Planetary Analogue Samples

- Simulants of target body material
- Can be used for verification of exploration engineering technologies
- Preparation of sample curation methodologies and techniques

© NHM

Tissint Meteorite © NHM

# The ARTES programme

- **ARTES is an R&D programme**
  - First objective : to support the worldwide competitiveness of the European telecommunications satellite industry
  - Second objective : to support the development of new space based applications for the benefit of the European society and economy;
- **More than 85 % of the projects funded under ARTES are implemented in partnerships with private entities through co-funding schemes;**
- **ARTES programme is being implemented by teams across the two ESA centres : ESTEC and ECSAT;**

# Integrated Applications Promotion

- **Developing operational services for a wide range of users by combining different space and terrestrial systems.**

  Key characteristics:

  - User driven (responding to defined needs);
  - Engages with a wide range of stakeholders;
  - Combining multiple existing space assets with terrestrial systems;
  - Exploring the capacity of space assets beyond the current state-of-the-art;

- Focus on *sustainable* applications and services.

- Over 120 current activities and demo projects.

- Imperial Business School handle the business case for "Earth Rider".
  - This delivers mass-market edutainment via multi-media shows developed with the UK National Space Centre and Space Synapse.
  - Delivered via planetariums and the "Ovei" by McClaren (a pod that provides an all-encompassing sensory experience).
  - Aims to give audiences an experience similar to that of being in space, using material from Earth Observation and Human Space Flight (notably the ISS).
- ESA is keen to engage in additional IAP projects with Imperial.

# Alphasat


Imperial Space Lab launch event – 1 July 2013