COSMOS2020 NEWSLETTER #29

01 June 2017

"Open Market Consultation and Brokerage Event"

Lisbon, 12th July 2017

Marine-EO is the first Earth Observation Pre-Commercial Procurement (PCP) project that aims at developing a set of demand-driven EO-based services, adopted on open standards, bringing incremental or radical innovation in the fields of marine environment and security leveraging on existing Copernicus Services and other products from the Copernicus portfolio.

This all-day event is organized by the MARINE-EO Consortium in collaboration with the European Commission in order to inform potential tenderers (industries, SMEs, start-ups, research centers, universities etc.) and end-users about the project objectives and the PCP procedure, while at the same time to broach the views of the market about the intended R&D scope. The results of the event will be duly taken into account in order to fine-tune the tender specifications, so that the gap between the state-of-the art solutions and the procurement needs justifies the need to procure EO R&D services.

Participation in the event is free of charge with limited participants due to the room capacity.
Do not miss the opportunity to take part in this innovative procurement process and to contribute actively for the development of solutions in a real-life and end-user environment by integrating these in actual operational scenarios.

Information about lots:

Lot No 1: Thematic Area 1 — Copernicus Marine Environment Monitoring and Climate Change downstream services (SATOCEAN). Estimated cost excluding VAT: between 1.300.000 and 1.600.000 EUR

Lot No 2: Thematic Area 2 — Copernicus Maritime Security downstream service (SATSURVEILLANCE). Estimated cost excluding VAT: between 1.150.000 and 1.450.000 EUR

Timelines:

21 June 2017 | Registration and expression of interest to present your project ideas and competences: http://www.marine-eo.eu/event/industry-day

COSMOS2020 is financed by the European Commission, DG Enterprise and Industry within Horizon 2020, the European Union's Framework Programme for Research and Innovation

30 June 2017 | Completion of the following request for information: http://www.marine-eo.eu/request-information-rfi

12 July 2017 | Open Market Consultation and Brokerage Event

Useful links:

Prior Information Notice (also attached): http://ted.europa.eu/udl?uri=TED:NOTICE:170832-2017:TEXT:EN:HTML&tabId=1

MARINE-EO website: http://www.marine-eo.eu

Poster!

Innovation exchange- Fuel the future

The Netherlands, 8th June 2017

The Innovation exchange – Fuel the future is organized in the frame of the unique ESA Grand Challenge Initiative. This contest aims to create a new European ecosystem of entrepreneurs and start-up companies competing to develop solutions to some of society's current and future challenges, be they technical, scientific or societal.

This supports ESA's Space Exploration Strategy strengthening European excellence in scientific research knowledge through opportunities for in-situ investigations and the additional development of advanced instrumentation and relative enabling technologies for delivering benefits that impact society.

To create and capitalize on these opportunities, ESA is nurturing cross-synergies between space and terrestrial R&D, and has initiated the ESA Innovation Exchange series.

Resources matter, even those far beyond our planet.

ESA is setting up a first round of exciting sessions with experts from different fields to gather ideas on resources management on the Moon and near-Earth asteroids. The event will take place on 8 June 2017 at ESTEC, ESA's technical heart in Europe.

This is the first step towards picking the final themes that will set the stage for the first ESA Grand Challenge. The kick-off meeting will focus on in-situ resource utilization (ISRU), a topic that explores the challenge of exploiting lunar or asteroid reserves from very diverse standpoints.

Would you have ideas or solutions on how to collect and exploit water ice, produce energy or build a habitat in a space environment?

Split into several group discussions, participants of this Innovation Exchange will help ESA to understand which areas are most interesting to stakeholders. The challenge should result in a technology or ground-based solution that could be applied at a later stage to a real space mission. Participants and ESA experts will work together to identify the most promising ideas.

The core technology developed through the challenge should also demonstrate potential for spinoffs addressing needs on Earth and the potential to be commercialized in the future.

Do you have experience in resources exploitation on Earth, mining or business development? Or, are you interested in sponsoring new technologies?
If you answered yes to any of these questions, then this is your opportunity to fuel the future. Join us and contribute to the launch of the ESA Grand Challenge.

There are limited spaces available for this first Innovation Exchange on ISRU in ESTEC, the Netherlands, where most ESA projects are born and guided through their phases of development. Participants will enjoy a guided visit to the Erasmus high bay, and robotics lab.

If you are interested, please email grand.challenge@esa.int

Find the program here!

Horizon2020: Open access to scientific publications

Open access to scientific publications produced with public funding is beneficial not only for science but also for speeding up innovation and involving citizens and society.

This is why under Horizon 2020, each participant must ensure open access to all peer reviewed scientific publications relating to their results (Article 29.2. of the Model Grant Agreement).

However, we realize that there is no "one size tits all" solution, which is why participants can choose between two routes towards open access, namely:

• **Self-archiving** (also referred to as 'green' open access), meaning that a published article or the final peer-reviewed manuscript is archived (deposited) in an online repository before, alongside or after its publication. If this route is chosen, beneficiaries must ensure open access to the publication within a maximum of six months (twelve months for publications in the area of social sciences and humanities).
• **Open access publishing** (also referred to as 'gold' open access) means that an article is immediately placed in open access mode (on the publisher/journal website). Publishers often charge so called Article Processing Charges to make articles open. Such costs are eligible for reimbursement during the lifetime of the project as part of the overall project budget. For gold open access publishing, open access must be granted at the latest on the date of publication. A copy should, at the same time, be deposited in a repository.

Currently, 68% of publications produced with Horizon 2020 funding are subject to open access, the majority through the green route.

Poster!

Read more!

NASA and ESA join forces to build life-seeking Europa lander

It will take more than six years to get there. But if long-anticipated signs of life are found on Europa, a newly-proposed joint American-European trek to the enigmatic moon of Jupiter will have been worth it.

Called the Joint Europa Mission, the proposal was unveiled on 24 April by Michel Blanc from France's Research Institute in Astrophysics and Planetology in Toulouse. At the annual European Geosciences Union meeting in Vienna, Austria, Blanc suggested NASA and the European Space Agency could join forces to plan and mount the mission, which could launch in the mid-2020s.

"The whole idea is that if we think exploring Europa for life is important, it should be an international adventure," Blanc said. "The ultimate goal is to get to the surface and look for biosignatures of life."

Europa is reckoned to be a potential cauldron for life because an ocean where life could evolve is believed to lurk beneath its icy surface. Discovery of a watery plume emerging from the surface in 2013 created further excitement, and that was reinforced by the recent discovery of hydrogen in similar plumes on Saturn's moon Enceladus.

Blanc said the Joint Europa Mission would have three major elements. The most important would be planting a lander on the moon's surface for 35 days to sample and screen material for traces of life, such as biomolecules and metabolites.
Meanwhile, having delivered the lander, an orbiter craft would spend three months taking laser, magnetic and seismic measurements to unravel more about the basic structure of the planet. It would focus on the composition and thickness of the ocean, already reckoned to be briny and rich in magnesium salts following previous observations of seeps to the surface by other space probes flying nearby.

Finally, the orbiter would crash into the moon, but would gather and transmit data on the composition of Europa's tenuous atmosphere on the way down, identifying any life-related gases such as carbon dioxide and oxygen.

Joining forces
If all proceeds as hoped, the mission would last 6 and a half years. It would take the craft almost five years to reach Jupiter, and further manoeuvres in Jovian orbits to finally reach Europa. It would also need to address two key hazards when designing equipment: the intense radiation around Jupiter and the need to avoid contaminating Europa with stowaway organisms from Earth.

Blanc said the lander would be designed by NASA, and the two agencies would combine forces to build the other components using their respective strengths. NASA already has a mission to Europa under development — officially dubbed Europa Clipper last month — but the orbiter won't land.

Likewise, the ESA is planning a mission to Ganymede, another of Jupiter's moons. But the proposal unveiled this week is the first to specifically look for life and put a lander on the surface.

Although the unofficial plan is completely new, it builds on previous NASA proposals to explore Europa, including one earlier this year. "This is mainly a NASA-led idea," said Luigi Colangeli, head of solar system at ESA, who also attended the session. "We are now waiting to know the response to our proposals from the NASA side."

Winning plans for CubeSats to the Moon

If you could fly a CubeSat to the Moon, what could such a tiny satellite do there? ESA posed this question – and now four proposals will be studied in more detail for possible flight over the coming decade.

These miniature missions variously involve probing lunar radiation, surveying the radio sky over the far side of the Moon, mapping minerals and frozen gases within shadowed craters, and detecting flashes from meteoroids striking the surface.

"Built around standard 10 cm units, CubeSats are already proving their worth near to Earth," explains ESA's Roger Walker. "We are now considering their uses further afield as part of future lunar exploration."

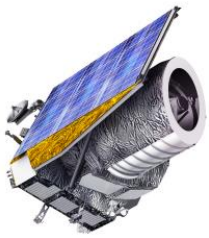
Four teams are now being funded until this autumn by ESA to develop their ideas.
MoonCARE, a trio of six-unit CubeSats, would measure the radiation environment and its effects on microorganisms with an eye to building closed-loop life support systems for future human crews.

The CubeSat Low-frequency Explorer of three 12-unit satellites would create the first radio telescope over the radio-quiet far side to image the sky below 30 MHz – not measurable from Earth – as a stepping stone to a larger array.

The 12-unit Volatile and Mineralogy Mapping Orbiter would chart the Moon's surface minerals and frozen gases such as water ice to 10 m resolution using a 'laser radar' to peer into shadowed regions at the poles.

The Lunar Meteoroid Impacts Observer would be a single 12-unit CubeSat carrying a sophisticated camera to capture the flashes of meteoroids impacting the far side to complement existing near-side monitoring and build a complete picture of the hazards facing future moonwalkers.

Read more!



Detector delivery marks another Euclid milestone

ESA's Euclid mission has passed another important milestone with the delivery of the first three state-of-the art detectors for the Near-Infrared Spectrometer and Photometer instrument.

Euclid is a pioneering mission to observe billions of faint galaxies and investigate the origin of the Universe's accelerating expansion, as well as the mysterious nature of dark energy, dark matter and gravity. The space telescope will reveal the signatures of dark energy on the 3D distribution of cosmic structures.

In order to carry out this challenging mission, Euclid must survey the sky with very high precision at visible and near-infrared wavelengths. These measurements cannot be made from the ground, due to atmospheric absorption and turbulence.

To achieve its objectives, Euclid will carry two wide-field instruments: a Visible imager (VIS) and a Near-Infrared Spectrometer and Photometer (NISP). A dichroic plate on the Euclid telescope enables incoming light to be shared by both instruments, so that the observations can be carried out in parallel through both channels.

The combined measurements by NISP and VIS will provide data on galaxy clustering and weak gravitational lensing in order to determine the distribution of dark matter and dark energy across the Universe.

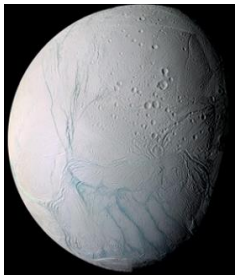
"*These detectors form the near-infrared 'retina' in Euclid's 'eye', the 1.2 metre diameter telescope and accompanying scientific instruments,*" says Rene Laureijs, ESA's project scientist for the Euclid mission.

One set of CCD detectors in the VIS instrument will map the Universe in visible light, but NISP's near-infrared detectors are sensitive to wavelengths invisible to the human eye, where very distant galaxies, 6-10 billion light years away, show their peak brightness.

"*Euclid will unlock an unknown, near-infrared view of the sky by taking images of these galaxies over more than 36% of the celestial sphere with unprecedented sharpness,*" says Giuseppe Racca, ESA's Project Manager for Euclid.

NISP is being developed under the responsibility of the Euclid Consortium, with CNES (the French space agency) and LAM / CPPM (Laboratoire d'Astrophysique de Marseille and the Centre de Physique de Particules de Marseille) as the main contributors. Other institutes and industries across Europe – in France, Italy, Germany, Spain, Norway, and Denmark – are also involved.

Read more about this amazing Instrument!



Enceladus' South Pole is warm under the frost

Over the past decade, the international Cassini mission has revealed intense activity at the southern pole of Saturn's icy moon, Enceladus, with warm fractures venting water-rich jets that hint at an underground sea. A new study, based on microwave observations of this region, shows that the moon is warmer than expected just a few metres below its icy surface. This suggests that heat is produced over a broad area in this polar region and transported under the crust, and that Enceladus' reservoir of liquid water might be lurking only a few kilometres beneath.

In 2005, observations by the NASA/ESA/ASI Cassini mission revealed plumes of water vapour and ice spraying into space from the south pole of Enceladus, the sixth-largest moon of Saturn. These jets originate from the so-called 'tiger stripes' – four warm fractures in the moon's icy surface. The salty composition of these jets points to an underground sea of liquid water that might interact with Enceladus' rocky core, similar to the sub-surface ocean that is thought to exist on Jupiter's moon, Europa.

Many of Cassini's flybys of Enceladus have been dedicated to understanding the structure of the interior of this fascinating body and its potentially habitable water reservoir. Now, a study based on data collected during a close flyby in 2011 indicates that the moon's hidden sea might be closer to the surface than previously thought.

"*During this flyby, we obtained the first and, unfortunately, only high-resolution observations of Enceladus' south pole at microwave wavelengths*," says Alice Le Gall from Laboratoire Atmosphères, Milieux, Observations Spatiales (LATMOS), and Université Versailles Saint-Quentin (UVSQ), France. Alice is an associate member of the Cassini RADAR instrument team and the lead scientist of the new study, published in *Nature Astronomy*.

"These observations provide a unique insight into what is going on beneath the surface. They show that the first few metres below the surface of the area that we investigated, although at a glacial 50-60 K, are much warmer than we had expected: likely up to 20 K warmer in some places," she adds.

"*This cannot be explained only as a result of the Sun's illumination and, to a lesser extent, Saturn's heating so there must be an additional source of heat.*" The detected heat appears to be lying under a much colder layer of frost, as no similar anomaly was found in infrared observations of the same region – these probe the temperature of the surface but are not sensitive to what is underneath.

The observations used by Alice and her collaborators cover a narrow, arc-shaped swathe of the southern polar region, about 500 km long and 25 km wide, and located just 30 km to 50 km north of the tiger-stripe fractures. Because of operational constraints of the 2011 flyby, it was not possible to obtain microwave observations of the active fractures themselves. This had the benefit of allowing the scientists to observe that the thermally anomalous terrains of Enceladus extend well beyond the tiger stripes.

"*The thermal anomaly we see at microwave wavelengths is especially pronounced over three fractures that are not unlike the tiger stripes, except that they don't seem to be the source of jets at the moment*," Alice says.

These seemingly dormant fractures lying above the warm, underground sea point to a dynamic character of Enceladus' geology: the moon may have experienced several episodes of activity at different locations during its past history.

COSMOS2020 is financed by the European Commission, DG Enterprise and Industry within Horizon 2020, the European Union's Framework Programme for Research and Innovation

Even if the observations cover only a small patch of the southern polar terrains, it is likely that the entire region is warm underneath and Enceladus' ocean could be a mere 2 km under the icy surface. The finding agrees well with the results of a recent study, led by Ondrej Cadek and published in 2016, which estimated the thickness of the crust on Enceladus. With an average depth of 18–22 km, the ice shell appears to reduce to less than 5 km at the south pole.

Read more!

Schiaparelli landing investigation completed

The inquiry into the crash-landing of the ExoMars Schiaparelli module has concluded that conflicting information in the onboard computer caused the descent sequence to end prematurely.

The Schiaparelli entry, descent and landing demonstrator module separated from its mothership, the Trace Gas Orbiter, as planned on 16 October last year, and coasted towards Mars for three days.

Much of the six-minute descent on 19 October went as expected: the module entered the atmosphere correctly, with the heatshield protecting it at supersonic speeds. Sensors on the front and back shields collected useful scientific and engineering data on the atmosphere and heatshield.

Telemetry from Schiaparelli was relayed to the main craft, which was entering orbit around the Red Planet at the same time – the first time this had been achieved in Mars exploration. This realtime transmission proved invaluable in reconstructing the unfolding chain of events. At the same time as the orbiter recorded Schiaparelli's transmissions, ESA's Mars Express orbiter also monitored the lander's carrier signal, as did the Giant Metrewave Radio Telescope in India.

In the days and weeks afterwards, NASA's Mars Reconnaissance Orbiter took a number of images identifying the module, the front shield, and the parachute still connected with the backshield, on Mars, very close to the targeted landing site.

The images suggested that these pieces of hardware had separated from the module as expected, although the arrival of Schiaparelli had clearly been at a high speed, with debris strewn around the impact site. The independent external inquiry, chaired by ESA's Inspector General, has now been completed. It identifies the circumstances and the root causes, and makes general recommendations to avoid such defects and weaknesses in the future.

The report summary can be downloaded here.