
europlanet 2024
Research Infrastructure

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871149.

Europlanet – A Distributed Research Infrastructure Building an International Community in Planetary Sciences

ChETEC INFRA meeting

6th June 2023

A brief history..

Europlanet – founded in 2004 to support planetary research in Europe.

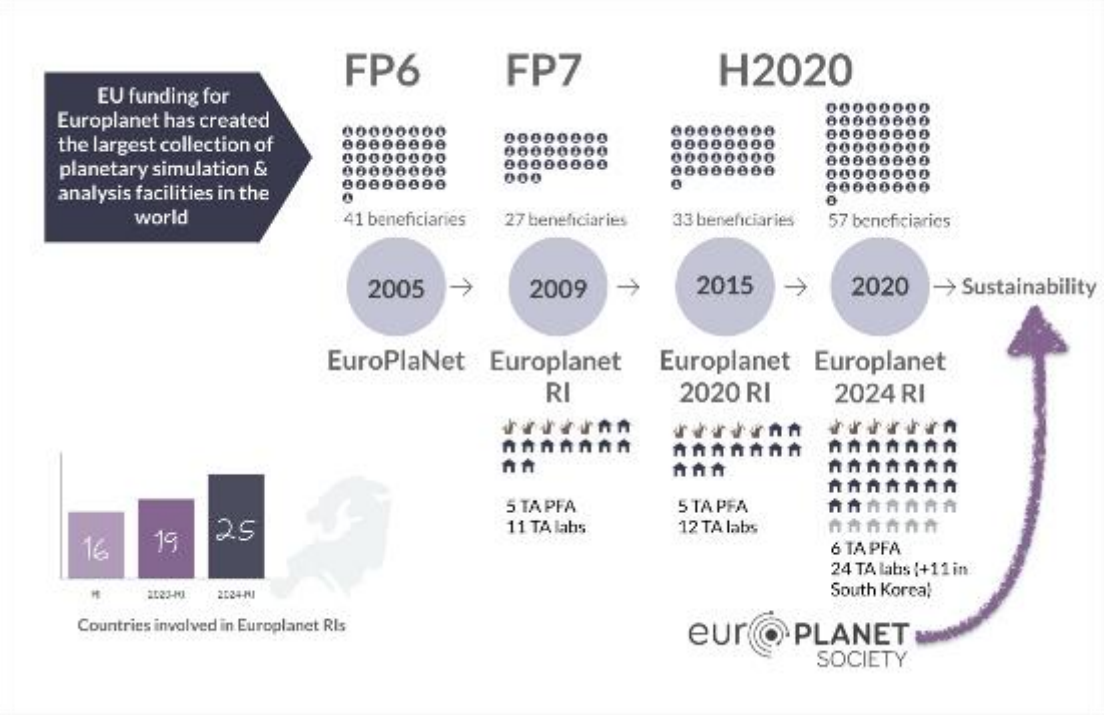
NASA/ESA/ASI Cassini-Huygens mission to Saturn from July 2004 to September 2017.

Huygens: 1st European spacecraft to the outer planets; designed to land on icy moon, Titan.

The RI programme?

Through EU programme support, Europlanet has:

- Created a pan European an international community.
- Created a unique distributed infrastructure.
- Performed world leading research by mobilising European research/innovation base.



Europlanet RIs 2009 -2024 supporting European planetary science

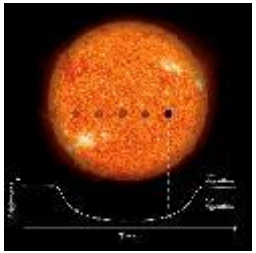
- Community support and development (**NA programme**)
  Industry, **Global Collaboration**, **Early Career**, **Media, Policy, Education, Outreach, Europlanet Telescope Network.**

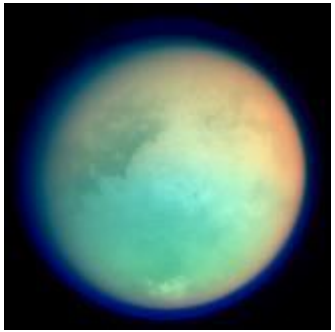
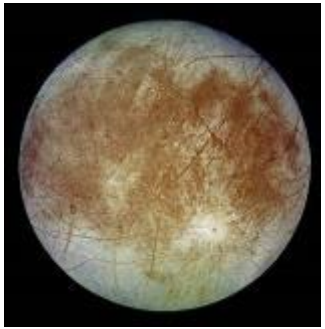
- Access to facilities for benefit of wider community (**TA programme**)
  Planetary Field Analogues, Laboratories.

- International infrastructure for OPEN data sharing/analysis (**VA programme**)
  VESPA – over 50 simulation tools/models/databases; **SPIDER** – planetary space weather services; **GMAP** – geological mapping; **Machine Learning**.

Europlanet – The Science

- Astrobiology
- Comets and Asteroids
- Early Earth
- Exoplanets
- Lunar studies
- Meteorites
- Planetary atmospheres and surfaces
- Space exploration and exploitation

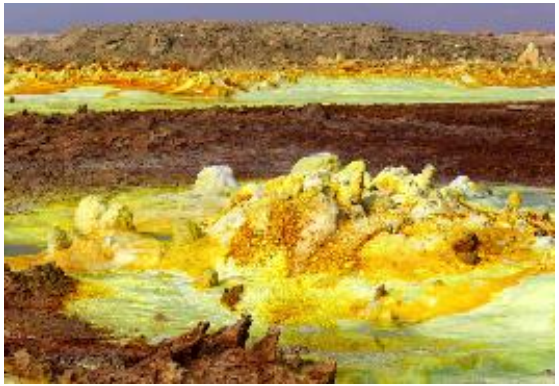




Europlanet – The Science

The Search for life Planetary Field Analogue sites

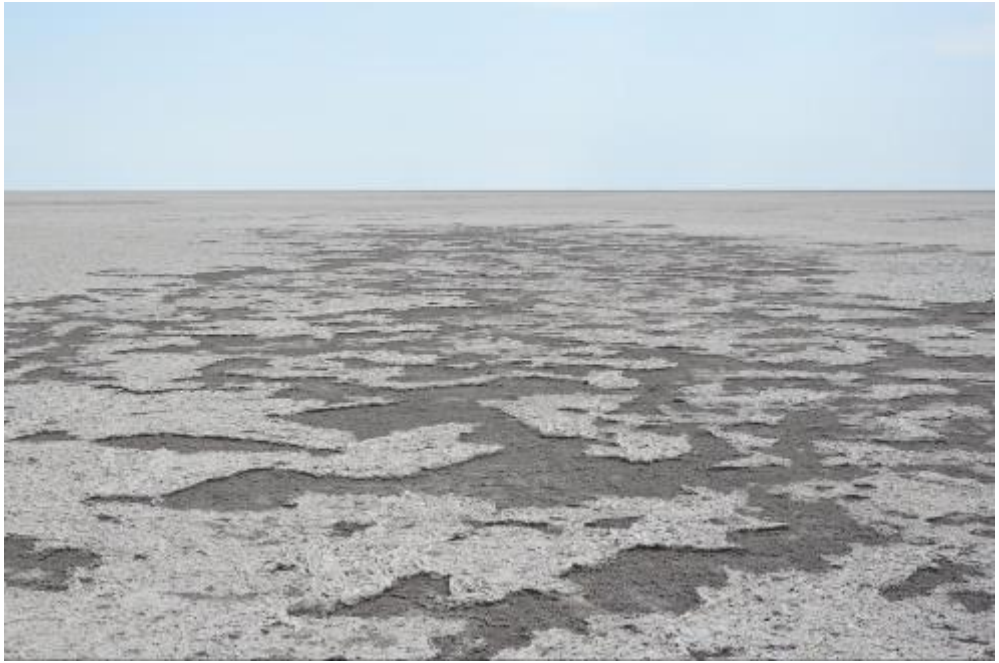
Studies of microorganisms that live in extreme salty environments with volcanic origin at Danakil Depression, Ethiopia, analogous to conditions on Mars.

Lakes under ice – Greenland, Iceland, Argentina – analogous to Jovian Moons (JUICE)



Europlanet – The Science

- Looking for clues about water circulation on Mars in the Makgadikgadi salt pans of Botswana



Europlanet – The Science

Investigations of dust in martian atmosphere and testing of instrumentation for rovers (Perseverance, ExoMars etc).

Wind Tunnel Facility Aarhus

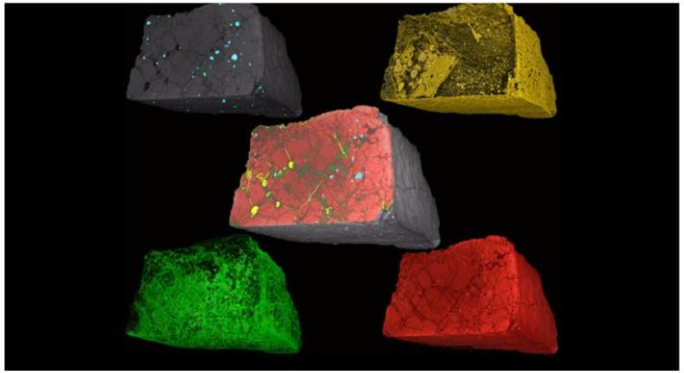
Simulations and calibrations to support spectroscopic data from missions (Tianwen-1, TGO, BepiColombo, EnVision etc)

DLR and IPAG Spectroscopic Lab Facilities

Europlanet – The Science

Techniques for non-destructive or minimally invasive characterization/analysis of meteorites/returned samples.

NHM, VU Amsterdam, ETH Zurich, OU



Elucidating the phases in the martian meteorite Chassigny: Revealing melt inclusions and different minerals of deep volcanic rock in the meterorite. © Natasha Almeida

Ground-based observation campaigns in support of missions (BepiColombo, Parker Solar Probe, Akatsuki) enable multi-level studies of the atmosphere of Venus and It transit 2022

VIRTUAL ACCESS (VA)

SPIDER (planetary space weather services)

VESPA (Virtual Observatory portal for 50+ planetary datasets

Wish to add relevant exoplanet databases

GMAP (planetary mapping services)

Machine Learning (tools tailored for planetary data)

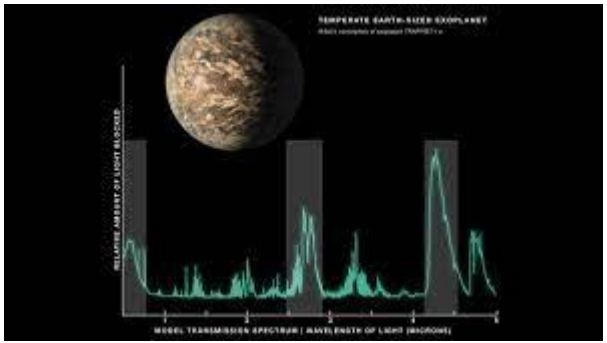
Find out more: http://europlanet-2024-ri.eu

Europlanet – The Science

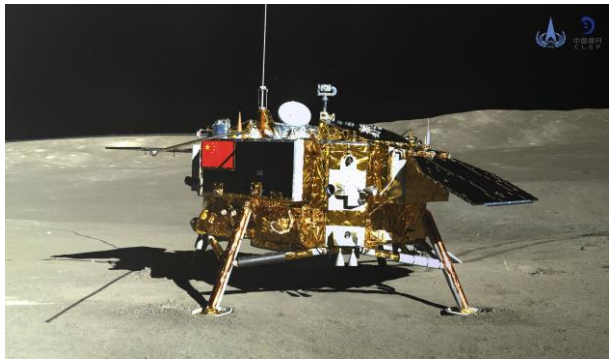
Researchers from the Know-Center and the Space Research Institute Graz are developing a prediction tool, funded through Europlanet 2024 RI, that determines the strength of solar storms.

Europlanet – The new science

- Exoplanet atmospheres – models



- The moon – return to explore



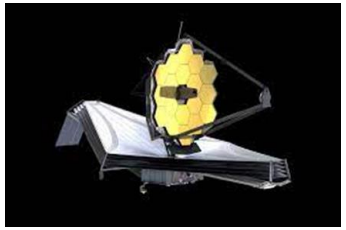
Europlanet – The new science

Space exploitation

- Development of new materials in space (no g, clean)
- Materials for space habitats lunar bases
- Drug development in space
- Space mining

Compatibilities with ChETEC-INFRA

- Chemistry in the Universe – JWST



- Meteorite analysis = Mass Spectrometry Network
- Ground based telescope network share Rozhen/Moletai - work with Opticon pilot

OPTICON RadioNet Pilot

- ATOMKI ion beam facility shared accelerator.

atomki. DEBRECEN

Collaborations with ChETEC-INFRA

- Outreach and Dissemination
- Education
- Databases (and data protocols)
- Policy, industry and future proofing.
- New Horizon Europe calls 2024

Part of the European ‘Space’ Triangle

Missions

Academia

Industry

Europlanet Strategic plan

- **Established at AISBL to give legal status**
- Build Society of members – to be voice for and representative of community.
- Spinout fTP Europlanet - for Education and outreach (Heidelberg) - commercialise tools

- Co-funding for facilities/TAs (and crowdfunding)

Extending our reach and sustainability

- **Europlanet Society**
  - **10 regional hubs**
  - **Europlanet Early Career (EPEC) Network**
  - **Europlanet Science Congress (EPSC)**
  - **Diversity Committee**
  - **Industry and Outreach Working Groups**

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We now have a series of astronomy/space infrastructures

ChETEC INFRA

EUROPLANET 2024 Research Infrastructure

ESCAPE
European Science Cluster of Astronomy & Particle physics ESFRI research Infrastructures

OPTICON RadioNet Pilot

EURO-LABS
EUROPEAN LABORATORIES FOR ACCELERATOR BASED SCIENCES

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We now have a series of astronomy/space strategies

Astronet - Roadmap
ESFRI – Landscape
ESA – HSRE and Science
COSPAR
EAS and IAU
EAI and EANA

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How do we bring these together ?

Avoid duplication & mixed messages)

Unified voice to key stakeholder

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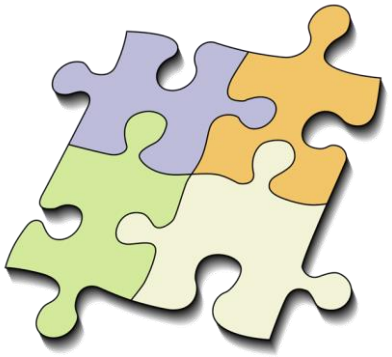
A Network of Networks

Example ARISE Analytical services

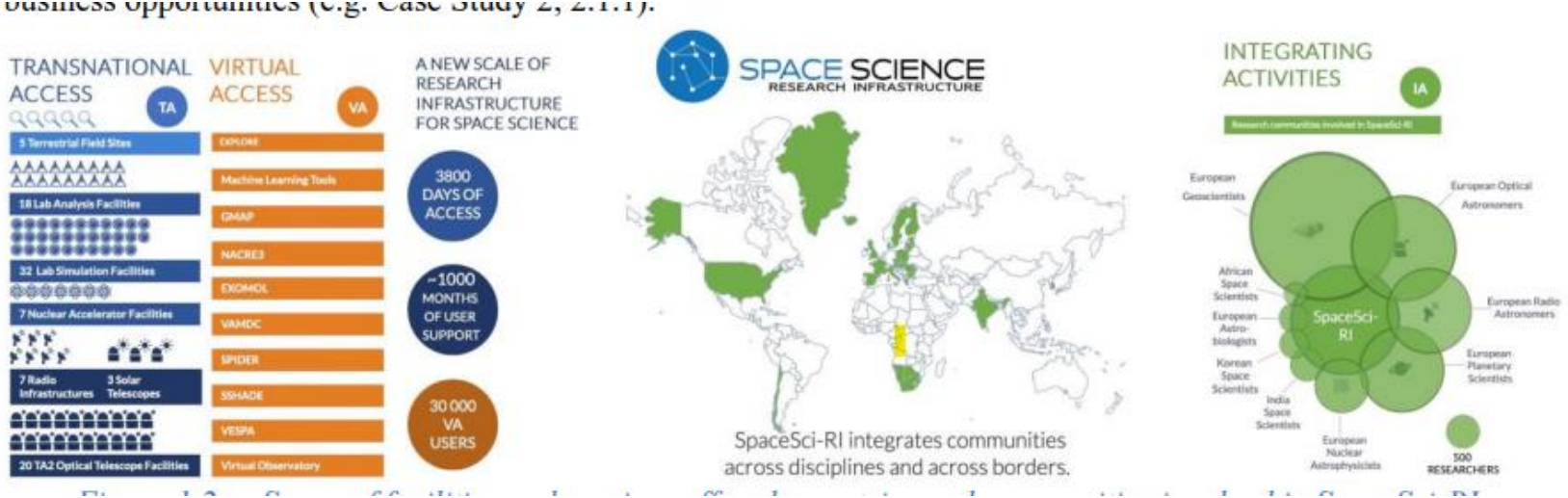
7 networks/RIs under one umbrella



Now time for one for Space sector ?

ERIM meeting June 22 Bratislava to discuss

- EU Space Strategy – Space Sci Research infrastructure



- EU Space Strategy – The missions

The Physical Universe (TPU)	The Chemical Universe (TCU)	The Search for Life (SFL)
Origin & evolution of the Universe – Early universe and cosmological parameters – Dark Ages, Cosmic Dawn & Epoch of Reionisation – The formation of large-scale structure **Formation & Evolution of Galaxies** – Physical properties of early galaxies – Properties of the first stars – Formation & Evolution of Stars – Accretion processes and upper mass limits of stars – Properties of nascent planetary systems and their early evolution – Chemical pathways for the production of complex organics **Formation & Evolution of Planets** – Formation of planets and planetary systems – Composition of planets – Evolution & ultimate fate of planetary systems – Diversity of planets & planetary system architectures – The Solar System – Heliospheric plasmas, solar physics & space weather – The early history of our Solar System – Properties of small bodies – Exploration of the planets	**Creation of the Elements** – Astrophysical sources of chemical elements – Properties of isotopes effect on nucleosynthesis **Molecular Synthesis** – Role of gas phase & surface chemistry in synthesis of ISM molecules – Relative importance of formation routes of molecules – Limits on molecular complexity in ISM/circumstellar shells. **Planetary atmosphere chemistry** – Formation & evolution of planetary atmospheres – Causes of contrasting development of Earth/Venus & impacts on habitability – Exoplanetary climates & chemistry **Terrestrial Origins of Life & Prebiotic Chemistry** – Rarity vs ubiquity of chemical processes that lead to life – Delivery & evolution of chemical building blocks on Earth – Potential lunar chemical record of molecular seeds of life on Earth – Systems chemistry & interdisciplinary approaches for determining origins of life.	**The Origins & Evolution of Life** – Timescale of first emergence of on Earth – Influence of the geological evolution of the Earth-Moon system on the occurrence & evolutionary direction of life – Possible scenarios for evolution of life, and (microbial) metabolisms for the earliest form of life **Boundaries & Habitability** – Physiological/metabolic adaptation of life to extreme physicochemical conditions & variations in energy sources – Physical and chemical limits to sustain life & impact on the definition of habitability beyond the Earth – Ability of life to survive & proliferate in putatively habitable extraterrestrial environments **The search for life on exoplanets** – Chemical, morphologic, or metabolic signatures prevalent on Earth that could be used as evidence of life – Potential for life in different celestial environments (from micron to macron scale) – Evolution and preservation of biosignatures over time within different physicochemical environments (e.g. Mars subsurface, icy moons or atmosphere of exoplanets)

SpaceSci RI

- **TA access to;**
- **Radio and optical telescopes**
- **Laboratory facilities – Nuclear astrophysics; Astrobioilogy, Astrochemistry, Planetary Science**
- **Planetary Field Analogues**

- **VA access to databases and tools – VAMDC, VESPA, ESCAPE, EXPLORE --- VO and EOSC**

Collaboration

- The next Horizon Europe Calls are focussed on clusters
- *Too Big, insufficient funds, no research*
- **YES But** …. Need to play game whilst seeking to change rules.

Infrastructures Calls 2023 -24

HORIZON-INFRA-2023-DEV-01-03: Consolidation of the RI landscape – Individual support for evolution and long-term sustainability of pan-European research infrastructures 3.00 and 4.00 million must include at least one of the ESFRI Landmarks or European Research Infrastructures Consortia (ERICs) 12 Mar 2024

Expected Outcome: Project results are expected to contribute to several of the following expected outcomes:

- **better structured and strengthened European research infrastructure landscape;**
- **new services available to a wider user community, including participants in other parts of Horizon Europe, allowing to better tackle scientific and societal challenges;**
- **increased capacity to address EU policy priorities and/or support EU industry;**
- **reinforced global competitiveness of the European Research Area;**
- **reduction of environmental (including climate-related) impacts as well as optimisation of resource and energy consumption integrated through the full life cycle of research infrastructures;**
- **increased long-term sustainability of European research infrastructures;**

- **Follow up to SpaceSci for Space Sector ?**

Infrastructures Calls 2023 -24

HORIZON-INFRA-2024-DEV-01-02: Strengthen the bilateral cooperation on research infrastructures with Africa 1.50 million 12 Mar 2024

Expected Outcome: Project results are expected to contribute to all the following expected outcomes:

- **contribution to the new Commission strategy with Africa, notably to the following**
- **specific objectives: rapidly enhance learning, knowledge and skills, research and**
- **innovation capacities (with attention to female and young researchers);**
- **enhanced research capacities in Africa;**
- **enhanced Euro-African cooperation in R&I.**

Scope: This topic aims at fostering EU-Africa cooperation in Research Infrastructures, sharing of good practices and experiences to facilitate the development of a strategic approach for structuring RI capacities at pan-African level in fields other than those addressed by topic HORIZON-INFRA-2021-DEV-01-02.

Expected space bid – looking out and remote sensing

Infrastructures Calls 2023 -24

HORIZON-INFRA-2024-DEV-01-01: Research infrastructure concept development

1.00 and 3.00 million 12 Mar 2024

This topic aims at supporting the development of new concepts for the next generation of research infrastructures of European interest, single/multi sited, distributed or virtual, that none or few countries might individually be able to implement. All fields of research can be considered.

Major upgrades of existing infrastructures may also be considered if the end result is significantly transformative and equivalent to a new infrastructure concept

Review ESA strategic aims etc – European lunar institute ? Space medicine?

Space industry?

Infrastructures Calls 2023 -24

HORIZON-INFRA-2024-TECH-01-01: R&D for the next generation of scientific

instrumentation, tools, methods, solutions for RI upgrade

5.00 and 10.00 million 12 Mar 2024

Consortia must include at least 3 different research infrastructures, each of them being an ESFRI infrastructure, and/or a European Research Infrastructures Consortium (ERIC) or another research infrastructure that is an intergovernmental organisation of European interest.

Expected Outcome: Project results are expected to contribute to several of the following expected outcomes:

- **enhanced scientific competitiveness of European research infrastructures;**
- **enhanced RI capacities to address research challenges and EU policy priorities;**
- **foundations for the development of innovative companies;**
- **increased collaboration of research infrastructures with universities, research organisations and industry;**
- **increase of the technological level of industries through the co-development of advanced**
- **technologies for research infrastructures and creation of potential new markets;**
- **integration of research infrastructures into local, regional and global innovation systems and promotion of entrepreneurial culture.**

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Thank you!

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http://europlanet-2024-ri.eu