http://europlanet-ri.eu

Planetary Field Analogues (TNA1)

Coordinator: Felipe Gómez Gómez CAB-INTA

Felipe Gómez Gómez

29 October – CAREX Projects Forum (Prague, Czech Republic)

EC grant agreement no 228319

Objectives

The ensemble of TransNational Access (TNA)

Central task of the EuroPlaNet project: overcoming the current fragmentation of the EU planetary science community.
Europlanet RI will accomplish it in two ways:

• it will **consolidate the integration of the planetary science community** which started with Europlanet's FP6 Coordination Action

• it will **integrate a major distributed European infrastructure** to be shared, fed and expanded by all planetary scientists by providing integrated access to the full set of RIs needed for planetary research.

Facilities are now open to European external users in 2009 through threeTNA activities (Call is open: http://www.europlanet-ri.eu/)

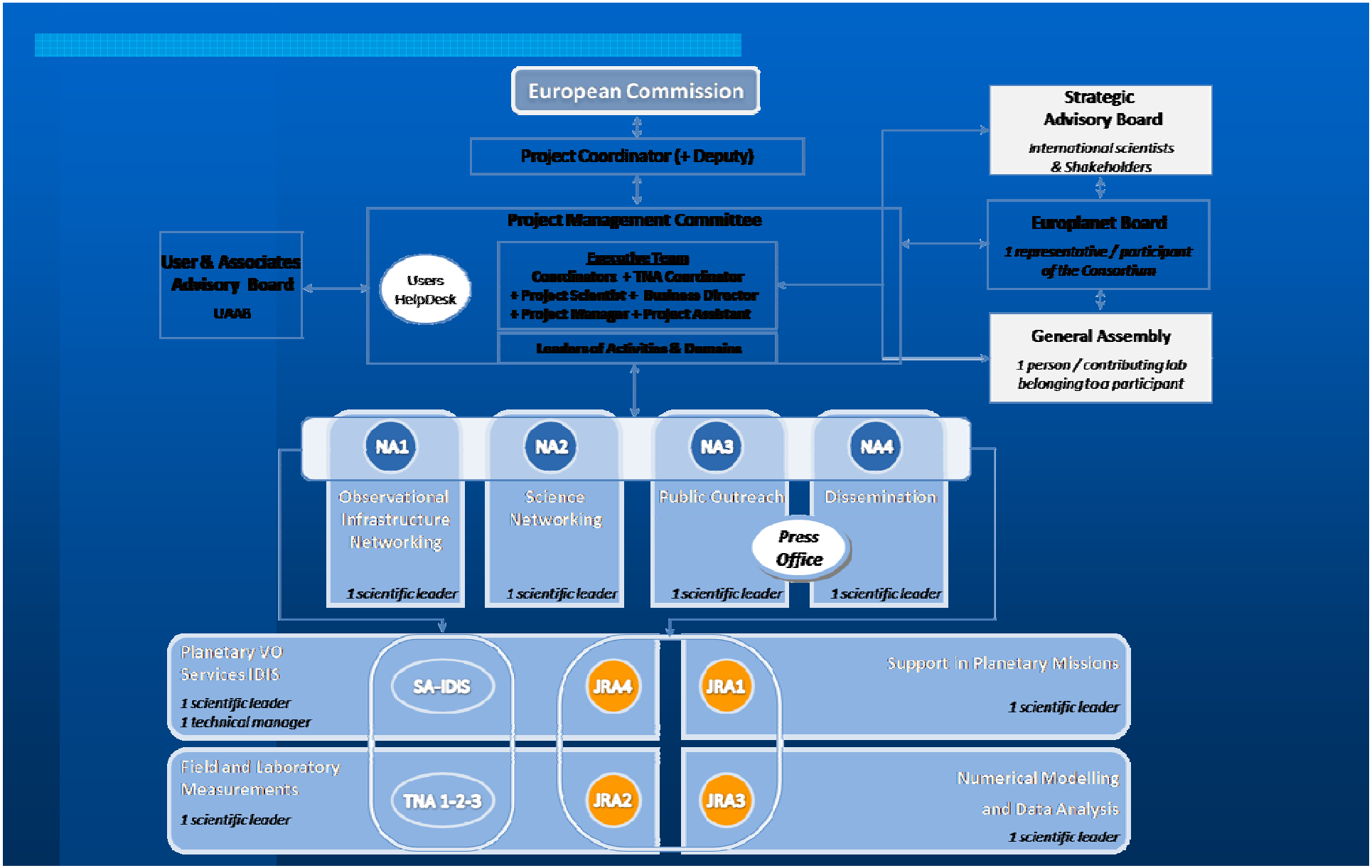
within EUROPLANET (2009-2012)

European Planetology Network

(Research Infrastructure)

Coordinator: Michel Blanc, CNRS, France

Structure


European Commission
Project Coordinator (+ Deputy)
Project Management Committee
Executive Team
Coordinators + TNA Coordinator
+ Project Scientist + Business Director
+ Project Manager + Project Assistant
Leaders of Activities & Domains
Users HelpDesk
User & Associates Advisory Board
UAAB
Strategic Advisory Board
International scientists & Shakeholders
Europlanet Board
1 representative / participant of the Consortium
General Assembly
1 person / contributing lab belonging to a participant
NA1
Observational Infrastructure Networking
1 scientific leader
NA2
Science Networking
1 scientific leader
NA3
Public Outreach
Press Office
1 scientific leader
NA4
Dissemination
1 scientific leader
Planetary VO Services IDIS
1 scientific leader
1 technical manager
SA-IDIS
JRA4
JRA1
Support in Planetary Missions
1 scientific leader
Field and Laboratory Measurements
1 scientific leader
TNA 1-2-3
JRA2
JRA3
Numerical Modelling and Data Analysis
1 scientific leader

TNAs

Access is provided by a TransNational Access (TNA) programme which supports travel and local costs of researchers at the facility for an approved period of time to conduct their own research programme. Applications are made to annual calls and are subject to peer review. It should be noted that applicants must apply to use facilities outside the country in which they are based (i.e. it is a transnational access).

TNAs

TNA1 Planetary Field Analogues: This will offer access to well-characterized terrestrial field sites that have been selected so as to provide the most realistic analogues of surfaces of Mars, Europa and Titan, to which planetary missions have either recently been directed or are planned. They include desert, permafrost, acidic environment and hydrothermal sources.

TNA2 Planetary Simulation Facilities: This will optimize the access to a set of laboratory facilities that are able to recreate and simulate the conditions found in the atmospheres and on the surfaces of planetary systems with special attention on Martian, Titan and Europa analogues. Selected facilities include atmospheric and surface simulation chambers operating under different pressure and temperature conditions; dust simulation chambers and dusty wind tunnels capable of exploring different planetary meteorological conditions.

TNA3 Planetary Sample Analysis: This will combine the resources of three of the world's leading analytical laboratories to analyze meteoritic and sample returns (e.g. Stardust) with un-paralleled precision, offering very specific isotopic analysis. An important part of this TNA will be to provide access to facilities to EU research teams developing the protocols for planning surface exploration and possibly sample return missions to the moon and later Mars and Europa.

SA Integrated and Distributed Information Service (IDIS)

JRA 2

JRA2 Planetary Facilities and Field Analogues: While current missions have largely concentrated upon Mars and Titan (and hence TNA facilities have been largely Martian or Titan analogues) future missions are aimed at the ice covered bodies where conditions for life might be present (e.g the Jovian moon Europa). Hence access to new field analogues and laboratory facilities more typical of these conditions is required.

The aim of this JRA is to provide, within the period of the RI, transnational access to two new field sites and a new state-of-the-art planetary analogue chamber suitable for testing analytical instrumentation for such proposed and planned planetary missions. The two field sites are (i) the Tunisian Chott El Jerid desert, a suitable analogue for Martian, Venusian and Mercurian surfaces and (ii) the permafrost of Siberia most especially in the area of the Popigai crater a suitable analogue for planetary ices. JRA2 will characterise these field sites from both a geological, physical and chemical point of view. The propensity of these sites for sustaining life will also be explored.

The work programme of JRA2 is aimed at completion within the first 24 months of the RI so that these facilities will be open for access via TNA1 and 2 in the second 24 months of the project.

TNA 1

coordinator: Felipe Gómez (gomezgf@inta.es)

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Rio Tinto: a 100 km long acidic aqueous river environment located in the Huelva province in South West Spain. Rio Tinto is a unique site in Europe in which a rock-water-biology interaction produces river water with a pH that averages 2.

Tunisian Chott: located in South West Tunisia is a seasonal lake that is completely dry most of the year. The surface of the lake is covered with a hard NaCl crust covering underground water. This field analogue will be fully characterised using field, geophysical and microbiological methodology in 2009-2010 so will only be open to access from 2011.

Ny-Ålesund, Svalbard archipelago: Ny-Ålesund is the world's northernmost permanent settlement situated on the island of Spitsbergen in the Svalbard archipelago, only 1,200 km from the North Pole. It includes areas in front of two glaciers that are very well suited for testing instruments for ground ice and permafrost mapping.

Ibn Battuta Centre: near Marrakech in Morocco is a desert field facility. This extreme environment is used to test rover, landing systems, instruments dedicated to the Mars exploration and to perform scientific analysis of Mars analogues.

The Kamchatka Peninsula: in Siberia Russia is one of four regions in the world with extensive geyser activity allowing a study of the complex inter-relationship between volcanism and landform development, highly relevant to some planetary bodies, whilst the hot springs are also the habitat of diverse microbiology.

TNA 1

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Six well characterized terrestrial natural field sites

Analogues of surfaces of Mars, Europa, Titan, ...

Desert, permafrost, acidic environment, hydrothermal sources

Morocco, Tunisia, Svalbard, Spain

Kamchatka, Popigai Crater in Siberia

Rio Tinto, Spain

Ny Alesund
Spitzberg

Kamchatka, Russia

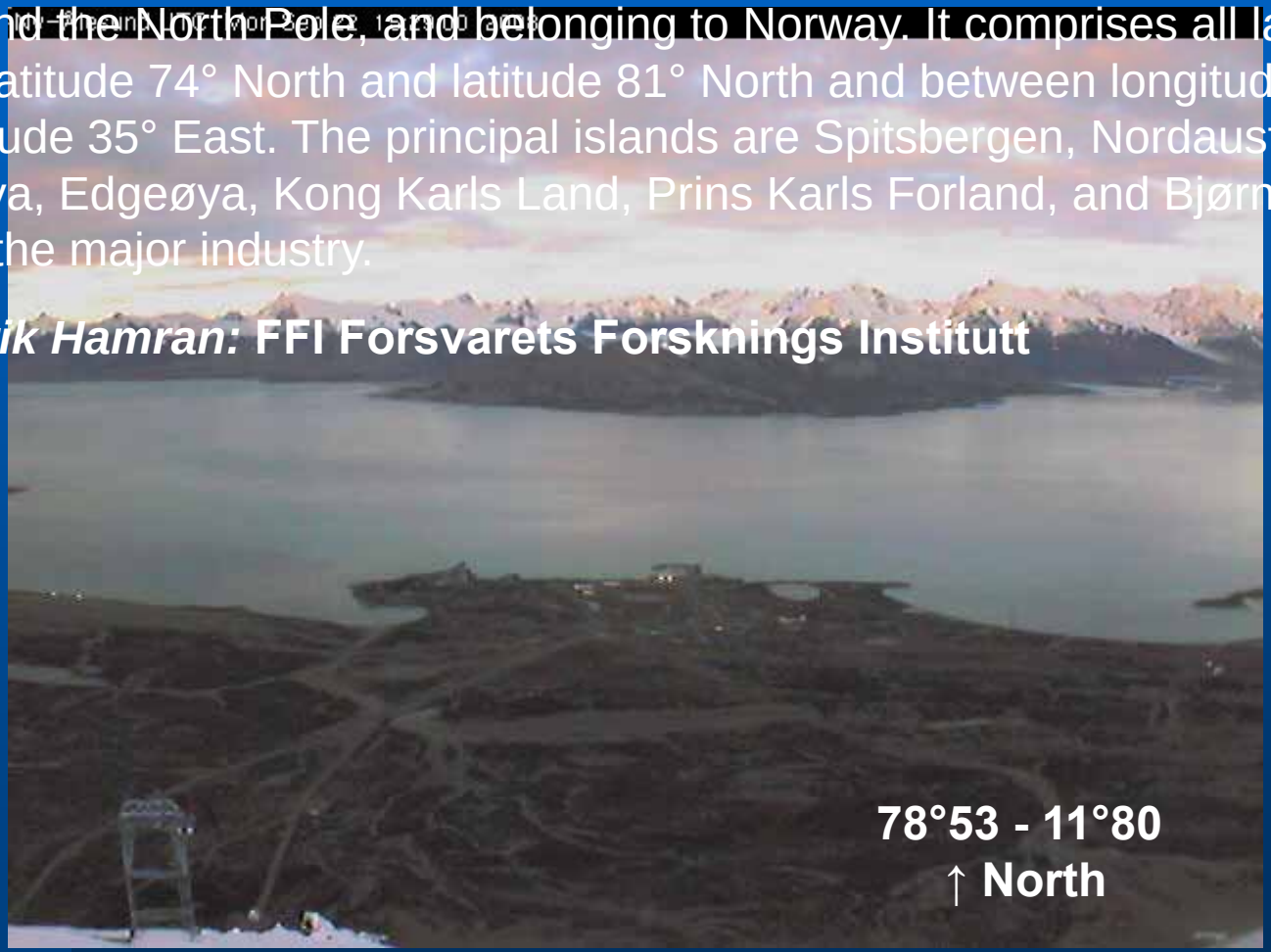
Ibn Battuta Centre
Morocco

TNA 1

Svalbard

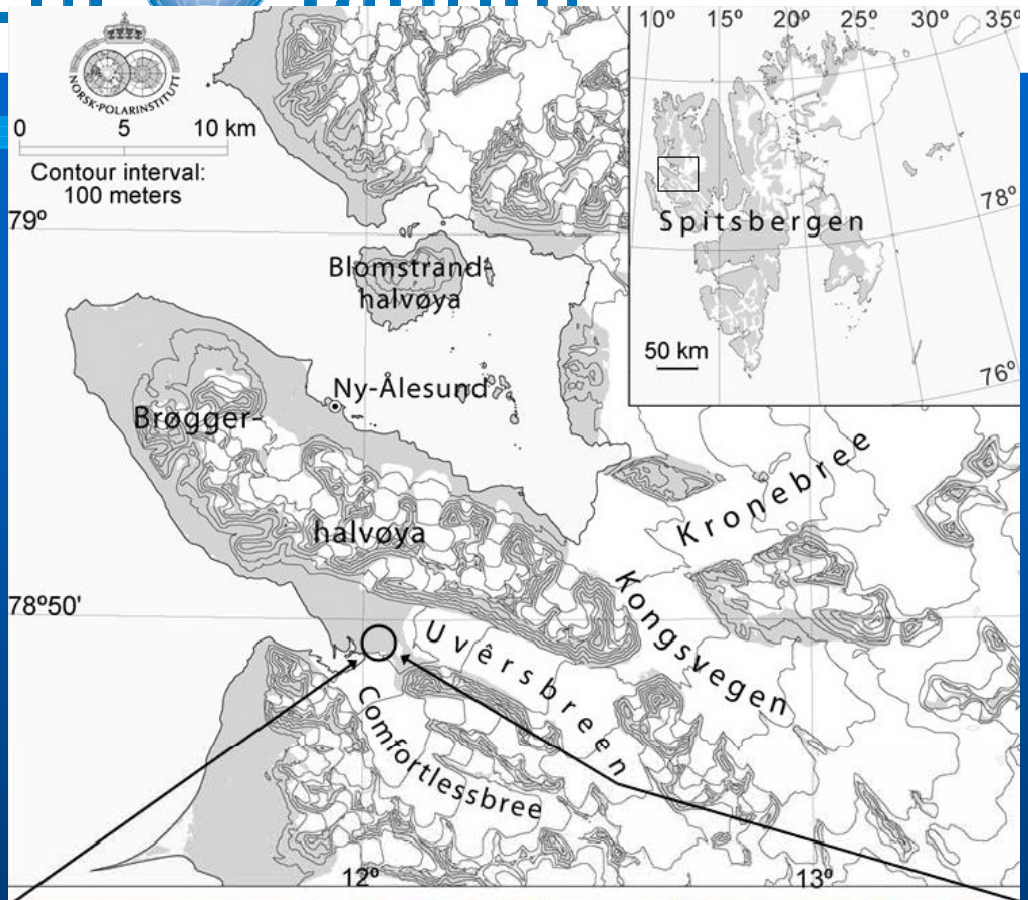
formerly Spitsbergen, archipelago in the Arctic Ocean, about midway between Norway and the North Pole, and belonging to Norway. It comprises all lands between latitude 74° North and latitude 81° North and between longitude 10° East and longitude 35° East. The principal islands are Spitsbergen, Nordaustlandet, Barentsøya, Edgeøya, Kong Karls Land, Prins Karls Forland, and Bjørnøya. Coal mining is the major industry.

Svein-Erik Hamran: **FFI Forsvarets Forsknings Institutt**



http://www.svalbard-images.com/photos/webcam-svalbard-003-2-e.php

TNA 1



- Mean annual air temperature in NÅ is - 6.3±C.
- Permafrost depth is ~100 m in costal areas and >500 m in mountainous areas.
- Active layer depth at the field site is believed to be ~2 m.
- This layer experiences thawing in the summer/autumn.

Possible fields of interest:

Geology

Physiology

Microbiology

Biotechnology

Missions Instrumental Testing

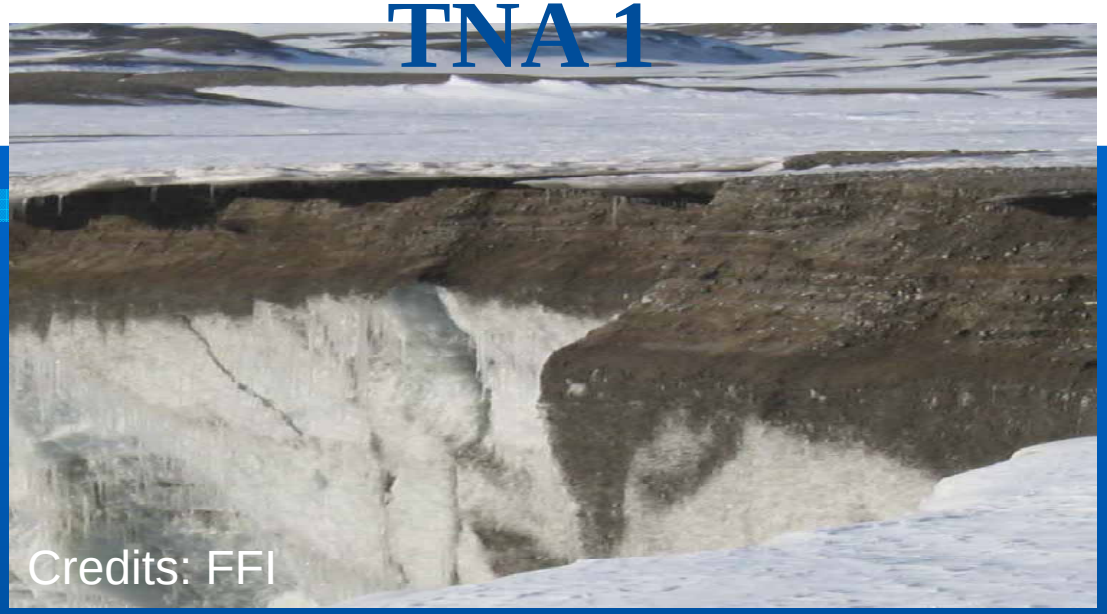
Examples:

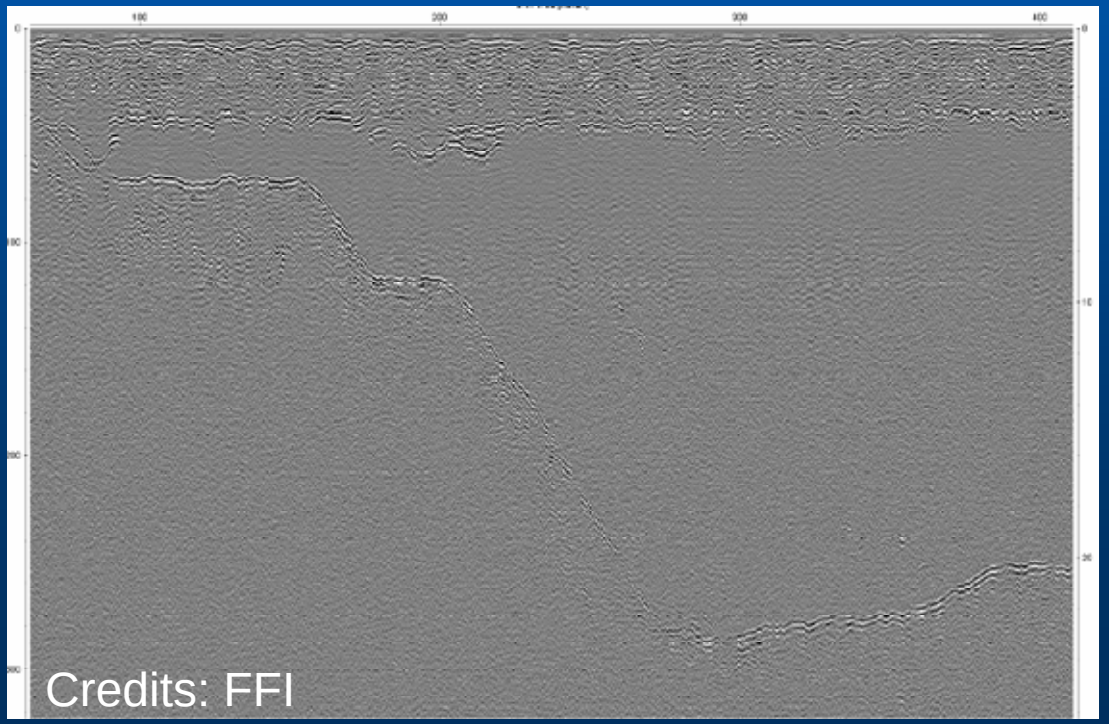
The WISDOM GPR on the ExoMars mission

Svein-Erik Hamran, FFI
Valerie Ciarletti, CETP
Charlotte Corbel, CETP
Dirk Plettemeier, TUD
Tor Berger, FFI
Leif Hanssen, FFI
Mats Jørgen Øyan, FFI

RAMAN-LIBS on the ExoMars mission

Fernando Rull, Valladolid University and CAB





TNA 1

Ibn Battuta Centre: located at the Universitè Cadi Ayyad at Marrakech

IRSPS : International Research School of Planetary Science

Gian Gabriele Ori

Possible fields of interest:

Geology

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Missions Instrumental Testing

Credits: Photogallery from Ibn Battuta Centre webpage

http://www.ibnbattutacentre.org

Activities (between others):

Testing martian rada SHARAD on Earth: SORA experimet

TNA 1

Kamchatka peninsula

IKI-RAS : Space Research Institute of Russian Academy of Sciences

O. Korablev

Yu. Ozorovich

more than 160 volcanoes on the peninsula (29 of them are active), due to the fact that it lies on the Great Pacific “ring of fire”. Volcanoes and volcanic peaks, cyclones and underground heat created here a mixture of twenty climate zones and a great variety of flora and fauna. But the main scientific attractions of Kamchatka are volcanic calderas and lakes in craters, geysers and mineral springs.

TNA 1

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JRA 2

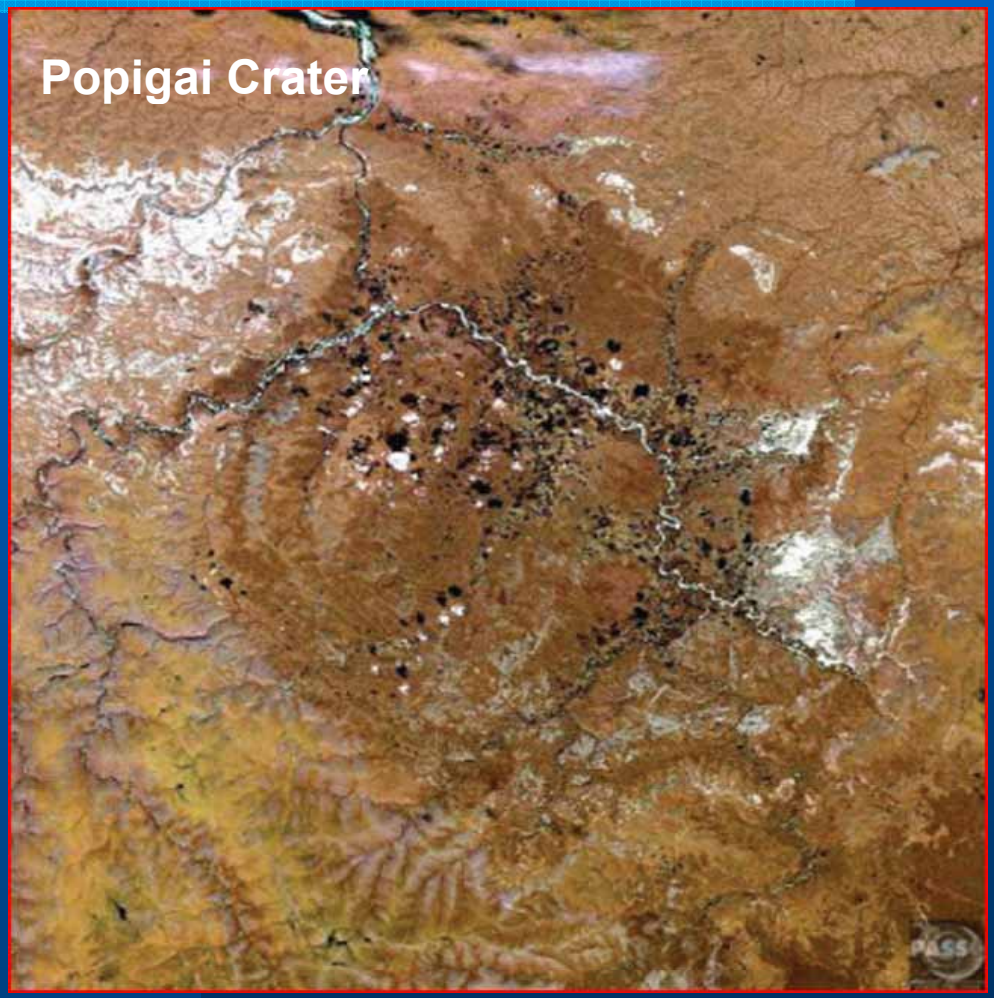
coordinator: Felipe Gómez (gomezgf@inta.es)

Popigai crater

Located in Siberia, Russia is tied with Manicouagan Reservoir as the 4th largest impact crater on Earth. A large bolide impact created the 100-kilometer diameter crater 35.7 ± 0.2 million years ago during the late Eocene (Priabonian stage). The crater is just north of the Siberian city Norilsk, or 1 1/2 hours (by helicopter) from the outpost of Khatanga. It is designated by UNESCO as a Geopark a site of special geological heritage.

The impactor in this event has been identified as either an **eight-kilometer** diameter chondrite asteroid, or a **five-kilometer diameter** stony asteroid.
The shock pressures from the impact instantaneously transformed graphite in the ground into diamonds within a 13.6 kilometer radius of the impact point. Diamonds are usually 0.5 to 2 millimeters in diameter; a few exceptional specimens are 10 millimeters in size. The diamonds not only inherit the tabular shape of the original graphite grains but they additionally preserve the original crystal's delicate striations.
Popigai is the best example yet of the formation of a crater of this type. **Three other craters** are larger, but they are either buried (Chicxulub), strongly deformed (Sudbury), or deformed and severely eroded (Vredefort).
There is a small possibility that Popigai impact crater formed simultaneous with the *c.* 35 million year old Chesapeake Bay and Toms Canyon impact craters.

JRA 2



Credit: Ronald W. Hayes Landsat/PASSC

IKI-RAS : Space Research Institute of Russian Academy of Sciences

O. Korablev

Yu. Ozorovich

Possible fields of interest:

Geology

Microbiology

Missions Instrumental Testing

JRA 2

Chott El Jerid

Possible fields of interest:

Geology

Physiology

Microbiology

Biotechnology

Missions Instrumental Testing

Testing space missions tools

An example: MARTE project

Objectives:

1) **To search for and characterize subsurface life at Rio Tinto along with the physical and chemical properties and sustaining energy sources of its environment.**

2) **2) To perform a high fidelity simulation of a robotic Mars drilling mission to search for life.**

3) **3) To demonstrate the drilling, sample handling, and instrument technologies relevant to searching for life on Mars. The simulation of the robotic drilling mission is guided by the results of the aseptic drilling campaign to search for** life at Rio Tinto.

CENTRO DE ASTROBIOLOGÍA

Implementation FP7 procedure

Call is open

http://www.europlanet-ri.eu/

Common committee for evaluation: peer review for selection

Orientation of projects

Synergies between facilities

Exchange of know-how between facilities

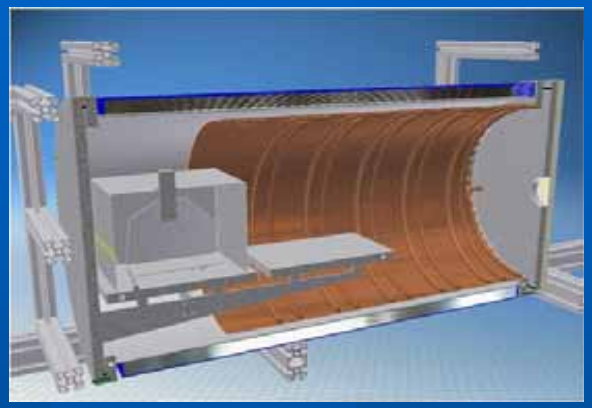
http://europlanet-ri.eu

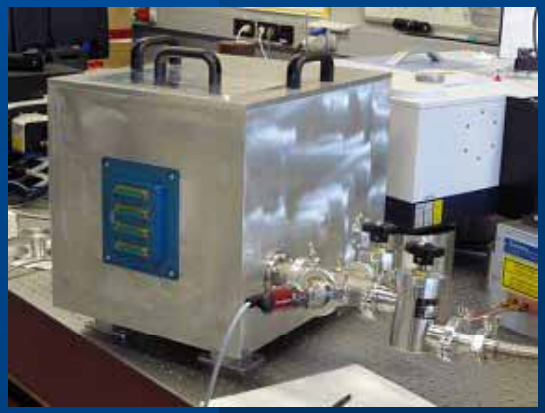
- NA2: Planetary Simulation Facilities
- coordinator: Gareth Davies (Gareth.Davies@falw.vu.nl)

- TNA2 Planetary Simulation Facilities provides access to a set of laboratory facilities that are able to recreate and simulate the conditions found in the atmospheres and on the surfaces of planetary systems with special attention to Martian, Titan and Europa analogues. Facilities include:

- Mars simulation facilities at the Vrije Universiteit, Amsterdam and the Open University, UK that can simulate Martian atmospheric conditions enabling researchers to assess to both probe the chemical and physical properties of the Martian atmosphere and surface and to test instrumentation designed to probe Martian conditions prior to its deployment in planetary space missions. The Mars surface analogue at University of Wales, Aberystwyth composed of Mars Soil simulant that provides a facility for testing robotic instrumentation for future space missions to Mars to analyse and collect geological samples. Current testing includes specific instrumentation under evaluation for the Pasteur science payload for ExoMars.
- Titan atmosphere and surface simulation chamber at the Open University capable of both reproducing the Titan atmosphere and providing an analogue for the physical and chemical conditions found on its surface. It has been used to explore the results of the recent ESA Huygens probe and to prepare instrumentation for the next generation of missions.
- A suite of Planetary Simulation chambers at the Centre for Astrobiology Research, Madrid, the Deutsches Zentrum für Luft-und Raumfahrt (DLR), Germany and the Instituto Nazonale di Astrofisica - Osservatorio Astronomico di Capodimonte, Italy, designed to study planetary surfaces, atmospheres and space environments that may be used for testing instrumentation for potential future space missions (e.g. ExoMars, Laplace, Tandem) whilst also providing researchers with access to facilities that can provide fundamental physical and chemical data for models and/or interpretation of observational data.
- Dust impact facility at the Max-Planck-Institut für Kernphysik, Heidelberg, Germany that allows the investigation of hypervelocity dust impacts onto various materials to explore dust impact onto planetary minerals caused by the interplanetary dust background. This is complemented by the dusty wind tunnel University of Aarhus, Denmark which simulates wind driven dust exposure on Mars and may be used to quantify dust deposition (i.e. on optical [illegible]ctrical or mechanical components) and examine the operation of instrumentation in dusty/windy [illegible] under Martian conditions.

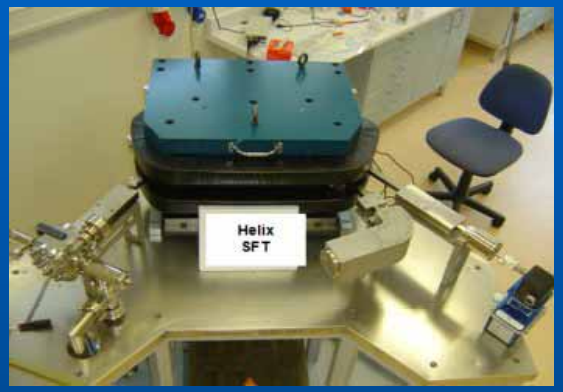
Facilities





- TNA3: Planetary Sample Analysis
- coordinator: B Marty (bmarty@crpg.cnrs-nancy.fr) , C Cloquet (cloquet@crpg.cnrs-nancy.fr)
- TNA3 Planetary Sample Analysis combines the resources of three of the world's leading analytical laboratories (within the Centre de Recherches Pétrographiques et Géochimiques (CNRS/CRPG) Nancy France; The Open University, UK and the Vrije Universiteit, Amsterdam) to analyze meteoritic and sample returns with un-paralleled precision, offering very specific isotopic analysis. State of the art equipment including ion probe facilities incorporating latest NANOSIMS instrument capable of resolving chemical structures at 50nm scale for a range of elements including C, N, O, S, Si, Mg; a range of isotope facilities for non metallic (H, He, C, O, S) and metallic Sr-Nd-Pb- Fe elements used routinely in meteorite, lunar and terrestrial rock studies with a number of state of the art GC-Mass Spectrometers capable of routinely detecting concentrations of the order ppb. All three partners can provide sample preparation facilities and are routinely used to analyse extraterrestrial material.
- Centre de Recherches Pétrographiques et Géochimiques (CNRS/CRPG) Nancy France (Ion Probe Camera 1270; Noble Gases Facility; Non traditional stable and radiogenic; isotope Facility; Stable isotopes in organic matter Facility.
- The Open University, UK: NanoSIMS 50L; Mass Spectrometry for Cosmic Samples
- Vrije Universiteit, Amsterdam: VUA Isotope Geochemistry Facility

Europlanet
Research Infrastructure



Europlanet webpage

http://www.europlanet-ri.eu/

EC contract no 228319

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