EPN2020-RI

EUROPLANET2020 Research Infrastructure

H2020-INFRAIA-2017

Grant agreement no: 654208

Deliverable D3.10
4th call for the TA2 Facilities

Due date of deliverable: 28/02/ 2018
Actual submission date: 05/02/2018

Start date of project: 01 September 2015 Duration: 48 months

Responsible WP/deliverable Leader: OU/ European Science Foundation, Nicolas Walter

Project funded by the European Union's Horizon 2020 research and innovation programme		
Dissemination level		
PU	Public	**X**
PP	Restricted to other programme participants (including the Commission Service)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (excluding the Commission Services)	

Project Number	654208
Project Title	EPN2020 - RI
Project Duration	48 months: 01 September 2015 – 31 August 2019

Deliverable Number	D3.10
Contractual Delivery date	28/02/2018
Actual delivery date	05/02/2018
Title of Deliverable	4th call for the TA2 Facilities
Contributing Work package (s)	WP3
Dissemination level	Public
Author (s)	Europlanet Coordination Team

Abstract:

This deliverable provides the additional details on Transnational Access to Planetary Simulation Facilities provided by EPN2020-RI through the TA2 call.

It complements D1.8 that provides detailed call information.

TA2: The Distributed Planetary Simulation Facility (DPSF)

Distributed Planetary Simulation Facility (DPSF) 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. TA2 also includes the possibility to characterise the texture and mineral composition of samples in unprecedented detail as well as the ability to detect and characterise life, including Next Generation Sequencing. The seven DPSF are:

Planetary Emissivity Laboratory (DLR, Berlin) is the only spectroscopic infrastructure worldwide that offers the opportunity to measure emissivity of fine-grained powder materials, bulk materials and coatings at temperatures up to 1000°C across the whole infrared wavelength range. PEL is currently supporting a wide range of planetary missions including ESA MarsExpress, VenusExpress and Rosetta, NASA MESSENGER, JAXA Hayabusa II. PEL also is highly utilised by industrial customers working for example on rapid prototyping or spacecraft isolation materials. PEL also can provide transmittance and reflectance measurements for the visible to the far-infrared spectral range. Contact person: Jorn Helbert

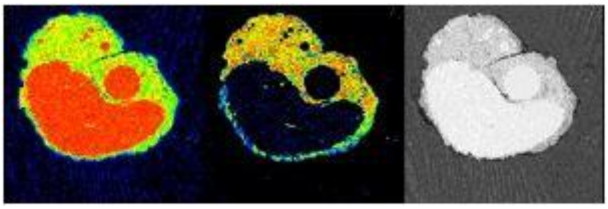
Planetary Environment Facilities at Aarhus University operates a unique experimental facility capable of re-creating the conditions found on other planets or extreme terrestrial environments. This facility is used for collaborative research by both the scientific and industrial communities, including space agencies (ESA, NASA). Specifically the facility is capable of recreating the key physical parameters such as temperature, pressure (composition), wind flow and importantly the suspension/transport of dust or sand particulates. It supports a broad range of research topics including Planetology, Volcanology, Meteorology and the study of Aerosols. Laser based optoelectronic instrumentation is used to quantify and monitor flow and particle suspension. For more information regarding access contact: Jon Merrison

Green laser being used to monitor particle flow inside the chamber, b with Jon Merrison for scale

Open University Mars Chamber is capable of recreating the Martian surface environment (-70°C to +20°C, 6 mbar CO_2/N_2 atmosphere over a regolith) with illumination. The key characteristic of this chamber is its large size (0.9 m diameter and 1.8 m in length) allowing use for large scale simulation of the Martian surface (aeolian transport etc) or testing large instruments/structures (e.g. rover mechanisms, traction etc). The chamber provides full control of temperature (to -70°C) with associated thermal data logging, as well as control and logging of pressure and high definition video recording. There is an array of data/power feedthroughs, as well as horizontal and vertical mechanical feedthroughs permitting linear manipulation of samples inside the chamber whilst under Martian conditions. Contact person: Manish Patel

High-pressure laboratory at VUA
The high-pressure, high-temperature laboratory at VU University Amsterdam is dedicated to studies of the chemical and physical properties of the minerals, magma, and fluids that rocky planets and moons are made of. The laboratory holds two piston cylinder presses, capable of generating pressures between 0.4 and 3.5 gigapascals and temperatures up to 1873 K, one multi-anvil press, capable of generating pressures between 3 and 20 gigapascals and temperatures exceeding 2000 K, and a 1 atmosphere gas mixing furnace to prepare starting materials at either highly reducing or oxidising conditions as encountered in the interiors of the Earth, Moon, Mercury and Mars. Experiments take between a couple of minutes and one week depending on the specific research topic. The laboratory also has a full set of in-house starting material and run product preparation facilities.
For more information of the facility see http://www.falw.vu/~wvwest/lab.html, or contact Wim van Westrenen with specific questions about experimental techniques and access.

Piston cylinder press



Element distribution maps within an experimental charge

Cold Surfaces spectroscopy, Institut de Planétologie et Astrophysique de Grenoble (IPAG) Grenoble, France:
The facility houses a unique home-made Spectro-Gonio Radiometer (This link will take you to an external web site. We are not responsible for their content.) that allows measurement of the bidirectional reflectance spectra and photometric distribution functions of various types of planetary materials (granular to compact) over almost the whole solar spectrum, from the visible to the near-IR (from 0.4 to 4.8 µm), with a high degree of radiometric accuracy (better than +/-0.5%) under most viewing geometries (illumination and observation up to almost 80°, all azimuths, phase angle > 4-10°). The instrument is fully described in Brissaud et al. 2004, Appl. Optics, 43, 1926-1937. The instrument is located in a dark cold room that can be cooled down to -20°C. It is fully automatized and the data calibration and reduction are made with homemade software.
Different types of measurements can be programmed with different environmental cryogenic cells:

-simple reflectance spectra at one geometry (possibly varying with time, temperature, or physical/chemical process),

-full BRDF,

-limited angle BRDF spectra (SERAC and CarboN-IR cells),

-or all these but only at selected wavelengths.

Serac cell and its thermodynamic system

A new spectro-gonio radiometer is under development to include Near-IR channel + calibration and optimized for the measurement, at low temperature, of bidirectional reflectance spectra, over the visible and near-IR (~ 0.3 to 5 µm), of very small dark and/or very fine grained samples (organics, meteorites, minerals) down to about 1 mm3 in volume.
For further information contact: Bernard Schmitt

Spectro-Gonio Radiometer with its stabilized monochromatic source, the goniometer with illumination mirror, an open sample holder with sulfur powder and the detectors and the goniometer and detection electronics.

CarboN-IR environmental cell inside the goniometer

Center for microbial life detection at Medical University Graz, Austria

ZMF - Center for Medical Research

The “center for life detection” will provide expertise in detection of microbial signatures, analysis thereof and microbial cultivation. The involved members have large experience with microbial detection and quantification in samples from extreme environments and the growth of microbial specialists in (pure) cultures (e.g. anaerobes).

Specifically we offer:

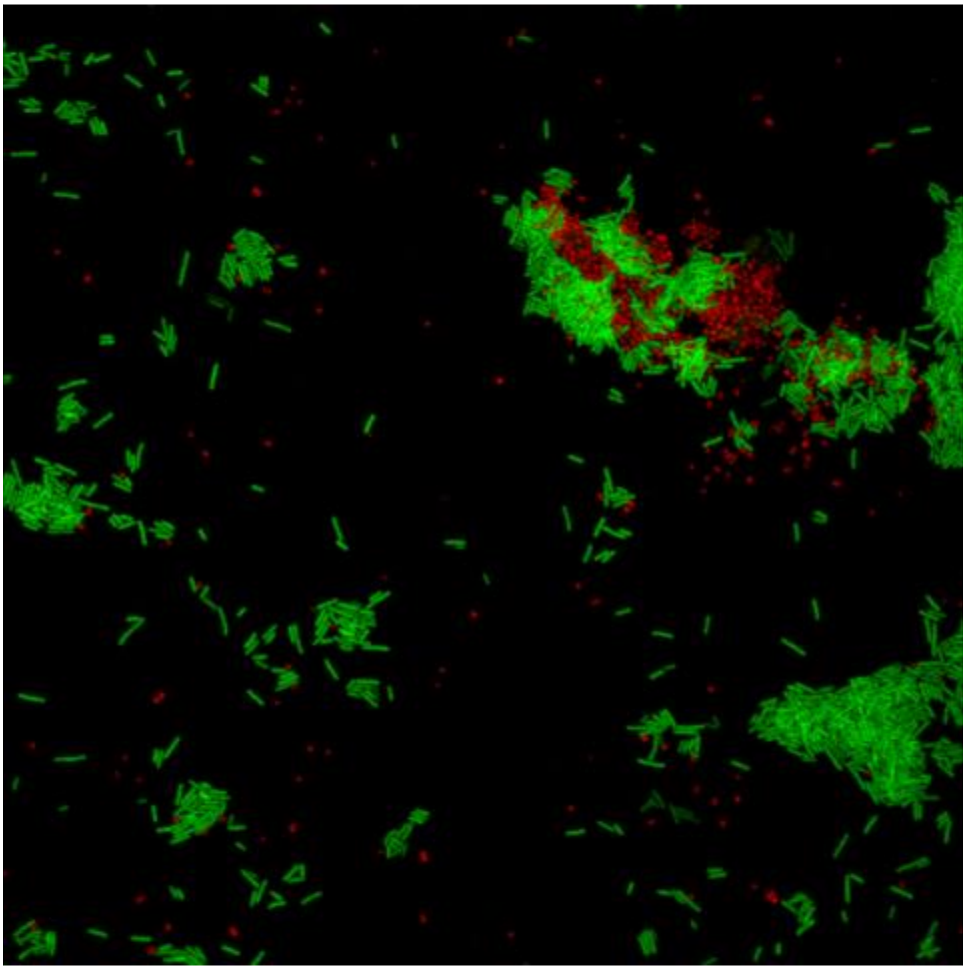
• Life detection in environmental and appropriate clinical samples (support in DNA extraction, selection of appropriate primers for bacteria, archaea and fungi, polymerase chain reaction (PCR), if desired in combination with propidium monoazide staining (detection of intact cells only), amplicon-sequencing and diversity data analysis, quantification of bacteria, archaea and fungi. If needed, -OMICS technologies can be applied.

• For the life detection workflow e.g. Next Generation Sequencing (Illumina MiSeq) for nucleic acid characterization, Gas Chromatography - Mass Spectrometry (GC-MS) for short fatty acids determination or scanning electron microscope SEM ZEISS DSM 950 for ultrastructure analysis.

• Detection of microbial cells: Domain to genus-specific fluorescence in situ hybridization, probe design and selection, visualization using confocal laser scanning microscopy (CLSM).

• Cultivation of specific microbial specialists, such as anaerobes or oligotrophs for use in laboratory experiments at the host’s institution.

• Support in data analysis includes graphical display of e.g. microbial diversity and interpretation of results with respect to the metabolic capabilities of the microbiome and the possible impact on the habitat.



Visualization of microorganisms

All services will be offered to international users and all ZMF Core Facilities are open to all researchers without restrictions. The ZMF and IMRG staff will support users with protocol development, hand-on training and analyses.

Moissl-Eichinger team members

For further information contact: Prof. Christine Moissl-Eichinger, Department of Internal Medicine

Petrology-Mineralogy Characterisation Facility (PMCF), Mineral and Planetary Sciences Division, Natural History Museum, London, UK.
Imaging and Analysis Centre
The MPSD will provide access to their world leading sample characterization instrumentation and methodologies. The facility focuses on micro-computed tomography (µ-CT) and X-ray diffractometry (XRD). Micro-CT capabilities produce 3D reproductions of geological materials with a size of between 3–250 mm with a resolution of 3–5 µm (on the smallest samples) and can use X-rays to visualise the internal structure of specimens in the XUM in 2D and 3D (Fig 1). MPSD are specialists in XRD analysis of extraterrestrial samples and have developed a micro-XRD to enable spatially resolved analysis of fine-grained materials. 4 powder diffraction instruments are available: XRD with very large 120º position-sensitive detector, XRD with GeniX high flux X-ray source (µXRD), high-resolution PANalytical X'Pert Pro α1 XRD and Rigaku D/MAX-RAPID II XRD.
The CT and XRD facility is supported by unrivalled imaging capabilities that include Field Emission SEM (two systems available) (Fig 2); Zeiss Ultra+ scanning electron microscope for high resolution secondary and backscatter electron imaging (1nm resolution at 3-5kV in-lens SE); FEI Quanta 650 ESEM FEG high resolution variable pressure SEM equipped with state of the art Bruker flat Quad EDX detector capable of high speed data acquisition including unique ability to analyse highly topographic samples in an uncoated state and at low kV (<10kV). Cameca SX100 Electron Microprobe and Zeiss EVO SEM set up specifically for quantitative electron beam microanalysis with EDX, WDX and CL capabilities in VP and high vacuum.
The NHM also provides state of the art Laser Ablation-ICP-MS, as well as solutions ICP-MS, ICP-AES and Ion Chromatography. These equipment are housed in purpose-built laboratories, with a staff complement of 12 full-time scientists. For further information contact Prof. Sara Russell and her team