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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)	

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Abstract: Under Horizon 2020, the Europlanet 2020 Research Infrastructure (EPN2020-RI) "The Distributed Planetary Simulation Facility (DPSF)" (TA2) provides European users access to seven internationally renowned research centres that enable the simulation or characterisation of planetary conditions and materials. There is urgent need for access to these facilities because Europe is operating, preparing and planning a fleet of spacecraft to investigate the surface and atmospheric environments and compositions of Mercury, Venus, comets, Mars, Jupiter, Titan and Europa. These disparate bodies are made up of remarkably diverse environments, many totally incomparable to terrestrial conditions. The expanding planetary exploration programme is generating an increasing demand for simulation facilities from European scientific and industrial communities to aid with key mission goals; instrument design; validation of instrument performance; to obtain a better understanding of the physical-geological processes that formed specific planetary environments and the biogeochemical processes that control the likelihood that life could evolve or survive. To address this demand DPSF has retained the three laboratories most in demanded in Europlanet-RI, all of which have introduced new infrastructure and expanded their methodologies since 2008. Four new laboratories have been added extending the capabilities to include spectroscopy in low temperature environments, life detection techniques, high temperature and pressure petrology and petrology-geochemical characterisation techniques. The three laboratories that were part of the previous Europlanet-RI allow visitors to measure samples under analogue conditions of Mercury, Venus, Mars, the Moon and near-Earth asteroids. The new low temperature spectroscopy laboratory extends capabilities to comets and the icy moons of the outer planets. The added life detection techniques supports the study of terrestrial extremophiles educating us about the range of potential habitable environments in the Solar System. The new high temperature and pressure petrology laboratory extends our studies from the planetary surface to the workings of planetary interiors and ultimately to the evolution of planets. Finally the computer tomography facility provides high quality geochemical imaging data of samples returned from space and allow detailed comparisons with analogue studies. DPSF will provide major synergies between the laboratories, allow the use of multi-disciplinary approaches and give the European scientific community access to a wide range of world leading technologies and in many cases unique methodologies.

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Interactive Microbiome Research Group (IMRG) Medical University Graz (MUG), Centre for Medical Research (ZMF), Graz, Austria. 6

http://www.medunigraz.at/zmf/ 6

Planetary Environment Facilities (PEF). University of Arhuus, Aarhus C, Denmark, http://phys.au.dk/en/research/facilities/planetary-environment-facilities/ 6

Ice spectroscopy, Institut de Planétologie et Astrophysique de Grenoble (IPAG) Grenoble, France; http://ghosst.osug.fr/wiki/index.php/Spectro-Gonio_Radiometer 7

High-Pressure, High-Temperature Laboratory (HPHTL), Geology and Geochemistry, VU University Amsterdam, Amsterdam, The Netherlands, www.falw.vu/~wvwest/lab.html 7

Large Mars Chamber Facility (LMCF), Open University, Milton Keynes, United Kingdom**,** http://www.open.ac.uk/science/physical-science/planetary-space-sciences/facilities/technicalsimulation 7

Petrology-Mineralogy Characterisation Facility (PMCF), Mineral and Planetary Sciences Division, Natural History Museum, London, UK, www.nhm.ac.uk 8

1. Publicity and selection process

For information regarding the publicity and selection procedure please refer to D4.3- First Annual report of TA3 access.

2. Explanation of the work carried out by the beneficiaries and Overview of the progress for TA2

Planetary Emissivity Laboratory, DLR, Institute for Planetary Research, Berlin, http://www.dlr.de/pf/en/desktopdefault.aspx/tabid-178/327_read-37513/

PEL had one TA2 visit in the reporting period

10571 Thermal Alteration Of Ci And Cm Chondrites: Links To Primitive C-Type Asteroid Surfaces

Ashley King

Department of Earth Sciences,

United Kingdom

In this TA2 visit we collected visible, near- and mid-infrared (IR) reflectance spectra from 16 CI and CM chondrites that experienced both aqueous alteration and thermal metamorphism. These unusual meteorites are likely good analogues for the types of material found on the surfaces of primitive C-type asteroids.

We find that the 0.7 µm band - attributed to phyllosilicates - is only present in the meteorites that experienced the lowest peak metamorphic temperatures (<300°C). The 0.7 µm band is often not detected in spectra of C-type asteroids suggesting that many may have dehydrated surfaces. Thermal metamorphism causes dehydration of phyllosilicates and, as expected, we observe a general decrease in the 3 µm band depth with increasing peak metamorphic temperature experienced by a meteorite.

In the mid-IR there are strong absorption bands from phyllosilicates and silicates, and we are working to correlate these to the known properties of the meteorites. This will enable us to remotely infer the nature and degree of aqueous and thermal alteration on the surfaces of C-type asteroids, and to provide context for spectra collected by the Dawn, Hayabusa-2 and OSIRIS-REx missions.

The visit took place between June the 6th and June the 10th 2016. We are currently processing the data and anticipate presenting the first results at “Hayabusa 2016: 4th Symposium of solar system materials” in November 2016. We also plan to submit at least one abstract to the “48th Lunar & Planetary Science Conference” (March 2017). We expect that the results of this study will result in at least two publications, likely in Icarus, the first of which we are aiming to submit in April/May 2017

Interactive Microbiome Research Group (IMRG) Medical University Graz (MUG), Centre for Medical Research (ZMF), Graz, Austria.

http://www.medunigraz.at/zmf/

The IMRG had 4 visits in the reporting period, one of this is still ongoing.

The visitors are:

10607 – Michamolecular – Bacterial And Archaeal Inventory In A Confined Spacecraft Mock-Up During The Mars 500 Project

Petra Schwendner

10573 - The Microbial Diversity Of The Astrobiological Significant Santa Cesarea Caves In Apulia, Italy

Stefan Leuko

10354 - Studying The Effect Of Abraded Silicates On The Survival Of Clean Room Isolates

Kai Finster sent two Master students: Michael Goul Larsen, Martin Rasmussen

10420 - Microbial Diversity Under Extreme Conditions: A Case Study In The Salt And Sulphur Springs Of The Dallol, Danakil Depression, Ethiopia

Karen Olssen-Francis, Barbara Cavalazzi

Data analysis from these visits is still ongoing.

Planetary Environment Facilities (PEF). University of Arhuus, Aarhus C, Denmark,

http://phys.au.dk/en/research/facilities/planetary-environment-facilities/

The PEF have had 3 (successful) test campaigns in the reporting period having already generated more than 1TByte of data and are already being presented this year in two international conferences. The facilities has 5 more weeks of TA access this year.

10568 CO2 Ice Mars

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Abstract submitted to; The Sixth International Conference on Mars Polar Science and Exploration (6th MPSE) will be held September 5–9, 2016

10341 Volcanic plumes

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Abstract submitted to; VOLCANO: CoV9. Conference in November 2016, abstracts - Session S2.2 Re-suspended Volcanic Ash: Forecasting, Modelling, Observations and Hazards.

10557 DREXS (DREAMS team)

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This was the most extensive test with 7 members of the DREAMS ExoMars 2016 team (5 were self-funded), this data will be used in calibration and interpretation of the 2016 Mars lander due to arrive at Mars in October 2016.

Ice spectroscopy, Institut de Planétologie et Astrophysique de Grenoble (IPAG) Grenoble, France; http://ghosst.osug.fr/wiki/index.php/Spectro-Gonio_Radiometer

IPAG had no TA visitors in this reporting period, however two visits are already planned for October and November 2016.

High-Pressure, High-Temperature Laboratory (HPHTL), Geology and Geochemistry, VU University Amsterdam, Amsterdam, The Netherlands, www.falw.vu/~wvwest/lab.html

HPHTL had no visitors in this reporting period.

Large Mars Chamber Facility (LMCF), Open University, Milton Keynes, United Kingdom, http://www.open.ac.uk/science/physical-science/planetary-space-sciences/facilities/technicalsimulation

LMCF had one visitor in this reporting period.

10541 - Laboratory Investigation Of Downslope Sediment Transport On Mars And The Influence Of Boiling

Clemence Herny

LPG-Nantes

France

Our set-up and procedure was similar to Conway et al. (2012), hence minimising additional equipment and set-up time. The Mars Chamber is a 2 m long, 1 m diameter cylindrical low pressure chamber. We used a 1 m long, 0.1 m deep, and 0.50 m wide rectangular metal tray as the test bed. A ~5 cm deep layer of dry unconsolidated fine sand was placed in this tray before the experiments. The whole test bed was set at angle of 25°. To introduce the water onto the substrate surface we used a peristaltic pump to control the flow rate and we selected one flow rates around 10 ml/s. This

flow rate suitable for Martian condition has been calibrated systematically under terrestrial pressure at least 2 times before each Martian condition experiments. The pressure in the chamber was actively controlled using a vacuum pump at ~ 7 mbar for the Mars simulation experiments. The temperatures of the sediment and water reservoir were monitored via thermocouples. We recorded the progression of the experiment using internal webcams and an external digital camera.

Before and after the experiment we created a digital elevation model using unstructured photogrammetry, or "structure from motion" by taking ~50 photographs of the test bed. Black and white markers, with known-relative-positions, were placed inside the test bed at varying elevations in order to appropriately scale the resulting elevation models.

Two parameters were adjusted during the experiments under low pressure and ambient temperature: (1) temperature of the water in order to simulate different boiling intensities and

(2) temperature of the sediments to evaluate the influence of the bed temperature on the water flow physics. We performed experiments for 3 different temperatures (23°C, 15°C and

5°C) for both, water and sand temperature and using δT of 0°C, 8°C and 18°C (so 9 kinds of different experiments parameters). Each experimental run have been repeated three times.

So at the end of our stay we performed a total of 27 experimental runs with the Large Mars

Chamber.

After the experiments we will manually measure various attributes of the flow, including length, width, maximum depth of erosion and maximum height of deposition in order to complement and cross-check the elevation model.

Petrology-Mineralogy Characterisation Facility (PMCF), Mineral and Planetary Sciences Division, Natural History Museum, London, UK, www.nhm.ac.uk

PMCF had one visitor in this reporting period in the field of meteoritics.

10602 - Solar System Forensics: Possible Supernovae Fingerprints In The Earliest Solids

The visit period was 22/8/16- 26/8/16. This is the grant to Greg Brennecka at the University of Muenster and he has sent two PhD students to do the work. We are mapping thin sections and also loose meteorite chips to look for calcium-aluminium-rich inclusions. These inclusions are then being characterised for their mineralogy and petrology.