Europlanet TA Report

Please see Annex 1 below

Infrastructure short name	Installation ID	Installation short name
DPSF	TA2-1	CSS

PROJECT LEADER – APPLICANT 1

Project number: 18-EPN5-049		
Name: Katrin Stephan		
Home Institution full address: **German Aerospace Center** **Institute for Planetary Research** **Rutherfordstraße 2** **12489 Berlin**		
Country: Germany		
Legal Status* RES		
*__UNI__ (University and other higher education organisations) **RES** (Public research organisation (including international research organisation as well as private research organisation controlled by a public authority) **SME** , **PRV** (Other Industrial and/or profit Private organisation) or **OTH**		
Tel: +493067055 422	**Fax:**	**E-mail: katrin.stephan@dlr.de**
Gender: F	**Year of birth: 1967**	**Group Leader: Y**
New user: Y	**Number of visits: 1**	**Nationality: German**
Affiliation: **DLR Berlin**	**Researcher Status:** UND / PGR / PDOC / **EXP** / TEC	**Activity Domain*** (see below) : Geoscience

CO - APPLICANT – if applicable

Name: Mauro Ciarniello		
Home Institution: **National Institute of Astrophysics (INAF)** **Institute for Space Astrophysics and Planetology (IAPS)** **Via Fosso del Cavaliere 100** **00133 Roma**		
Tel:	**Fax:**	**E-mail:** **mauro.ciarniello@iaps.inaf.it**
Gender: M	**Year of birth: 1983**	**Group Leader: N**
New user: N	**Number of visits: 2**	**Nationality: Italian**
Affiliation: **INAF/IAPS**	**Researcher Status:** UND / PGR / PDOC / **EXP** / TEC	**Scientific background*** (see below) : Physics

**Please select the most appropriate description from the list below:*

Physics	Chemistry	Life Sciences & Biotech	Earth Sciences & Environment
Mathematics	Energy	Material Sciences	Engineering & Technology
Social Sciences	Humanities	Information & Communication Technology	

How did you hear about us?

Website	Advertising email	**Colleague**	
Other:-			

HOST (TA Facility) **–** Please be accurate. This information is required for reporting.

Name:	**Host laboratory:**
Cold Surfaces Spectroscopy (CSS)	Institut de Planétologie et d'Astrophysique de Grenoble (IPAG) Bât. OSUG A 414, Rue de la Piscine - Domaine Universitaire 38400 St. Martin d'Hères France
Start Date of visit	18 March 2019
Finish Date of visit:	28 March 2019
No. of days: Please do not include travel days, this is lab/field access only	9 days
Applicant/Co-applicant reimbursed? Please indicate Yes or No	Yes

VISITORS TO LAB (If different from above applicant and co-applicant) **–**

Name:	**Affiliation:**	**Date**
David Haack	DLR Berlin	18.03.2019-22.03.2019
Andrea Raponi	INAF/IAPS	25.03.2019-28.03.2019

Project Title –

Spectral Analysis of H2O ice samples depending on particle size and temperature for icy satellites' physical surface properties

Scientific Report Summary.

We measured at the IPAG's CSS facility the spectra (0.4 -4 µm) of different ice particle sizes and particle size mixtures in the range of ~70 µm to ~1600 µm at a set of different temperatures (70 K - 150 K). Our aim was to see how the spectra change with particle size, temperature, and mixtures of different particle sizes to explain observed spectral variations of icy satellites surfaces in the Jovian and Saturnian system and will be used to constrain the investigation of variations in the ice particle sizes on the bodies.

Full Scientific Report on the outcome of your TNA visit

Our visit at IPAG's CSS facility took place during two weeks (18 – 28 March 2019), as requested in the proposal submitted to the Europlanet 2020 RI TA, Fifth Call. Upon arrival, the visitors for the first week (Katrin Stephan and David Haack) met Pierre Beck (a staff research scientist and the co-manager of the CSS facility) and Olivier Poch (a postdoc researcher). They introduced us to the laboratory and showed us the facilities during our stay: the SHINE spectrogoniometer located in the cold room to perform measurements at cryogenic temperature, a chemistry laboratory for powder preparation (with available sieves, grinding tools) and a room equipped with a fridge and the SPIPA-B setup for the preparation of water ice powders of controlled grain size. Olivier Poch extensively assisted the visitors for the major duration of the visit, thoroughly aiding in the ice sample preparation and spectra acquisition. Along with him, the visitors also greatly benefited from the help of Pierre Beck, Oliver Brissaud and Istiqomah Istiqomah (PhD student).

We measured samples of five different particle sizes and three particle size mixtures:

Day 1 and 2: 18. + 19.03.2019
After calibration of the set up, we first prepared ice particles with a size of 70 +/-30µm with the SPIPA-B setup by spraying H_2O ice droplets into liquid N_2. During the night, the samples were automatically measured at 6 different temperatures (150, 140, 130, 120, 110, and 100 K) and, in order to test the capability of the setup at colder temperatures, on the following morning also measurements at 85 K and 70 K were performed, manually. During the day 2 we repeated the procedure for particles with a size of 300 +/-100µm.

Day 3 to 6: 20. – 22.03.2019
During day 3 to 4, and 6 we prepared ice particles with sizes of 1) 680 ± 120 µm, 2) 1060 ± 60µm and 3) 1360 ± 240µm by grinding and sieving in a cold chamber and putting the ice powder in liquid N_2 to prevent sintering. On day 5, we repeated the procedure with ice particles of 300 +/-100µm (like sample 2) in order to investigate spectral changes between

spherical and irregular particles. During the night, the samples were automatically measured at least at 6 different decreasing temperatures (150 - 70 K, with 10 K steps) and over the weekend sample 5 were measured in addition at increasing temperatures (70 K – 220 K) in order to check for additional spectral differences during cooling and heating.

Day 7 to 9: 26. – 28.03.2019
We prepared SPIPA-B (sample 1) and 1000-1120µm irregular grains by grinding and sieving (sample 4) and made 1) a ~50%-50%, 2) ~75%-25%, and 3) 25%-75% mixture. The samples were put in 2 different aluminium bottles (kept in N_2) and weighed separately before mixing the two powders.

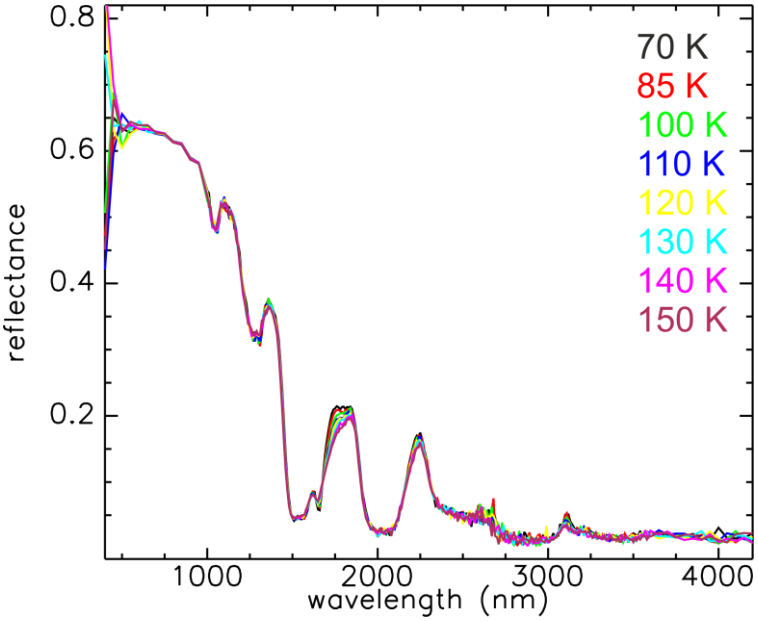

Fig. 1: Reflectance spectra of mixture 3 (25% sample 1 and 75% sample 4).

Please include:

- Publications arising/planned (include conference abstracts etc)

- **We plan to publish at least 1 paper in Icarus or a similar journal and 1 conference abstract (EPSC 2019).**

- Host approval The host is required to approve the report agreeing it is an accurate account of the research performed.

The two managers of the facility, Bernard Schmitt (CNRS/IPAG, Grenoble), and Pierre Beck (UJF/IPAG, Grenoble), approve the report and agree that it is an accurate account of the research performed during the visit of the Cold Surface Spectroscopy facility (DPSF/CSS/TA2-4).

Annex 1

Access provider short name	*Short name of infrastructure*	*Installation*		*Installation Country code*
		ID	*Short name*	
INTA	PFA	TA1-1	Rio Tinto	ES
IRSPS	PFA	TA1-2	Ibn Battuta	IT
Matis	PFA	TA1-3	Iceland	IS
INTA	PFA	TA1-4	Tirez Lake	ES
IRSPS	PFA	TA1-5	Danakil	IT
DLR	DPSF	TA2-1	PEL	DE
MUG	DPSF	TA2-2	IMRF	AT
AU	DPSF	TA2-3	PEF	DK
CNRS	DPSF	TA2-4	CSS	FR
UJF	DPSF	TA2-4(8)	CSS – 3rd party	FR
VUA	DPSF	TA2-5	HPHT	NL
OU	DPSF	TA2-6	LMC	GB
NHM	DPSF	TA2-7	PMCF	GB
VUA	DAFS	TA3-1	GGIF	NL
CNRS	DAFS	TA3-2	HNIF	FR
CNRS	DAFS	TA3-3	SRIF	FR
OU	DAFS	TA3-4	HS50L	GB
OU	DAFS	TA3-5	LFS	GB
OU	DAFS	TA3-6	CSSIA	GB
WWM	DAFS	TA3-7	RNTSI	DE
CNRS	DAFS	TA3-8	IPF	FR