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-EPN4-056		
Name: Alessandro Maturilli		
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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:	**Fax:**	**E-mail: alessandro.maturilli@dlr.de**
Gender: M	**Year of birth: 1971**	**Group Leader: N**
New user: Y	**Number of visits: 1**	**Nationality: Italian**
Affiliation: **DLR Berlin**	**Researcher Status:** UND / PGR / PDOC / **EXP** / TEC	**Activity Domain*** (see below) : Mathematics

CO - APPLICANT – if applicable

Name: Tanja Michalik		
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New user: Y	**Number of visits: -**	**Nationality: German**
Affiliation: **DLR Berlin**	**Researcher Status:** UND / **PGR** / PDOC / EXP / TEC	**Scientific background*** (see below) : Geoscience

**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)
Start Date of visit	21 January 2019
Finish Date of visit:	25 January 2019
No. of days: Please do not include travel days, this is lab/field access only	5 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**
Katharina Otto	DLR Berlin	20.01.2019-25.01.2019

Project Title –

The Dependence of Spectral Features on Ice Content and Temperature for Vesta and Ryugu

Scientific Report Summary.
We measured the spectra (0.4 -4 µm) of different mixtures of ice (grain size 67 µm) and hypersthene (grain size 63-125 µm) as analogue for Vesta at different temperatures (100 K – 270 K). Our aim was to see how the spectra change with temperature, abundance and degree of sublimation of the ice to explain observed colour anomalies of ice related morphologic features on asteroid Vesta. Additionally we repeated some of the measurements with MMX Phobos analogue material instead of hypersthene. Our results show, that the temperature has an effect on the appearance of the spectra as well as the degree of sublimation.

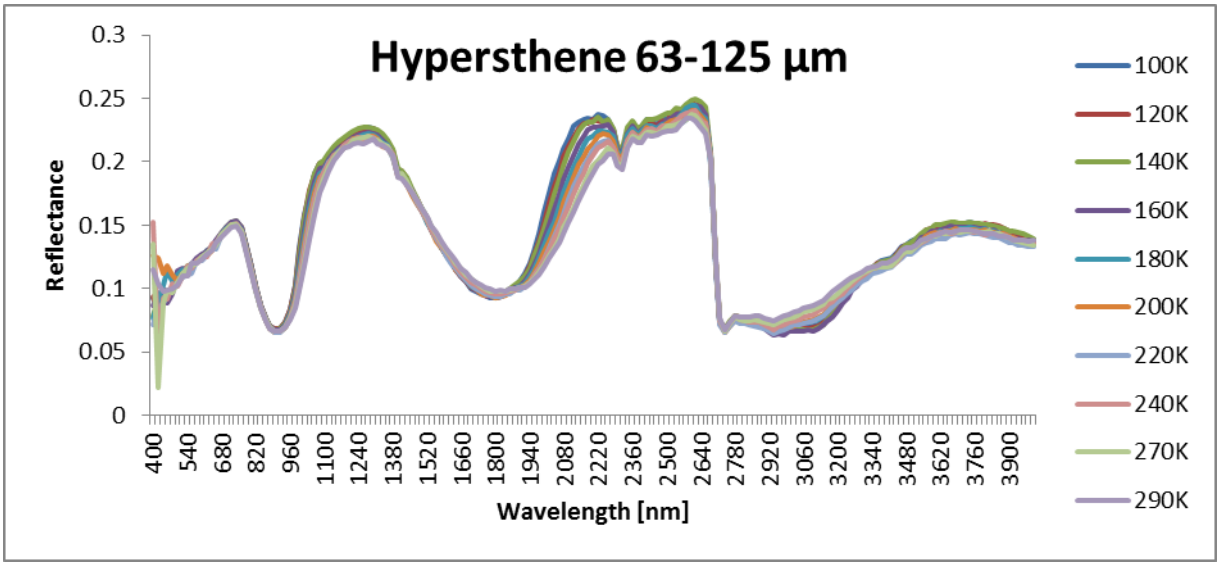
Full Scientific Report on the outcome of your TNA visit

Day 1: 21.01.2019:

On our first day we measured dry samples. First we had to calibrate our set up by measuring a 63 -125 µm grain size hypersthene sample from 0.4 µm to 4 µm without the windows and with windows.

Measurement 1: dry hypersthene 63-125 µm, ambient pressure and temperature (293K), without windows
Measurement 2: dry hypersthene 63-125 µm, ambient pressure and temperature (293K), with both windows
Measurement 3: dry hypersthene 63-125 µm, 100K, obviously pressurized and with windows
Measurement 4: dry hypersthene 63-125 µm, 200K
Measurement 5: dry hypersthene 63-125 µm, 270K
Additionally we measured the dry hypersthene sample at 120K, 140K, 160K, 180K, 220K, 240K and 290K overnight. These additional measurements were only taken during night as time permitted it.

Results:

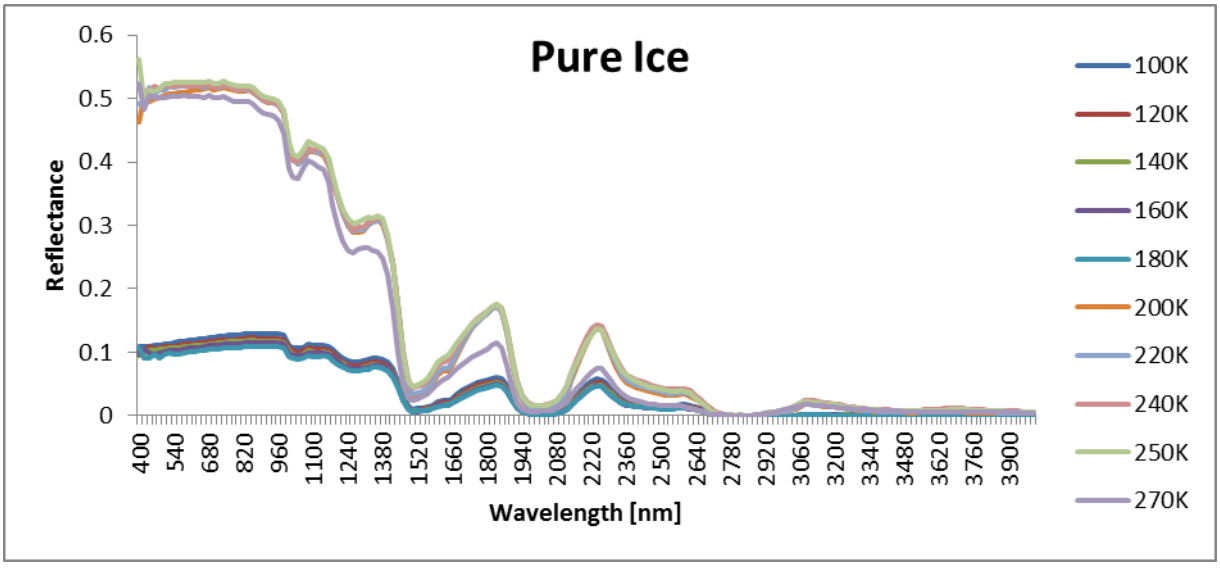


Day 2: 22.01.2019:

At a cell temperature of 240K, we placed our sample in the cell and conducted several measurements during night.

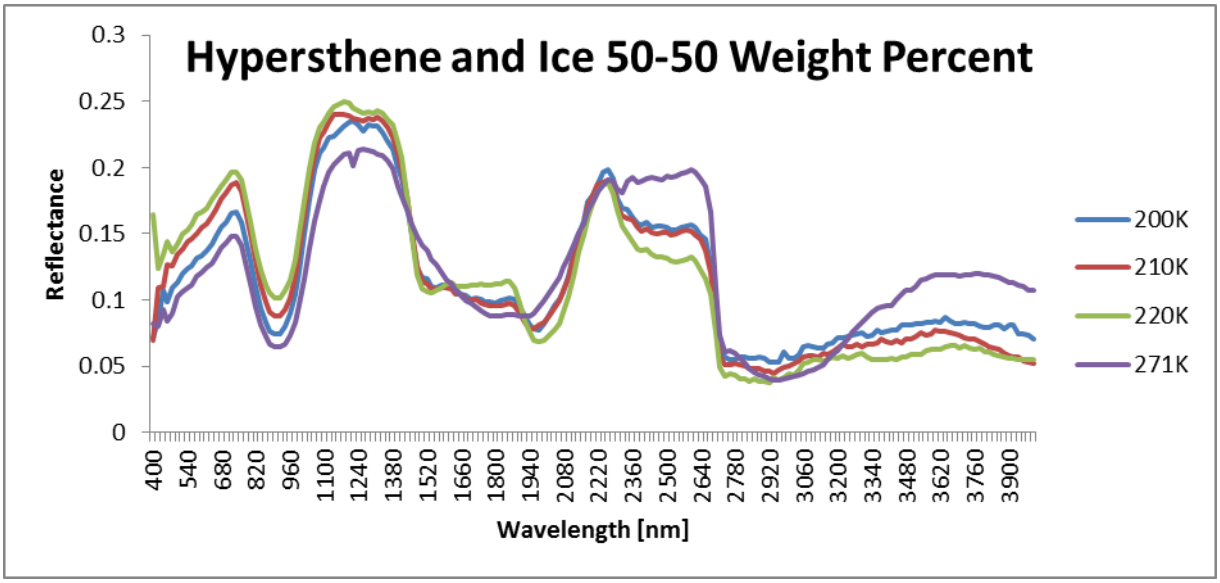
Measurement 6: dry Phobos analogue 63-125 µm, 100K
Measurement 7: dry Phobos analogue 63-125 µm, 200K
We abandoned more Phobos measurements for time reasons.
Measurement 8-17: pure ice particles at 100K, 120K, 140K, 160K, 180K, 200K, 220K, 240K, 250K, 270K

Results:



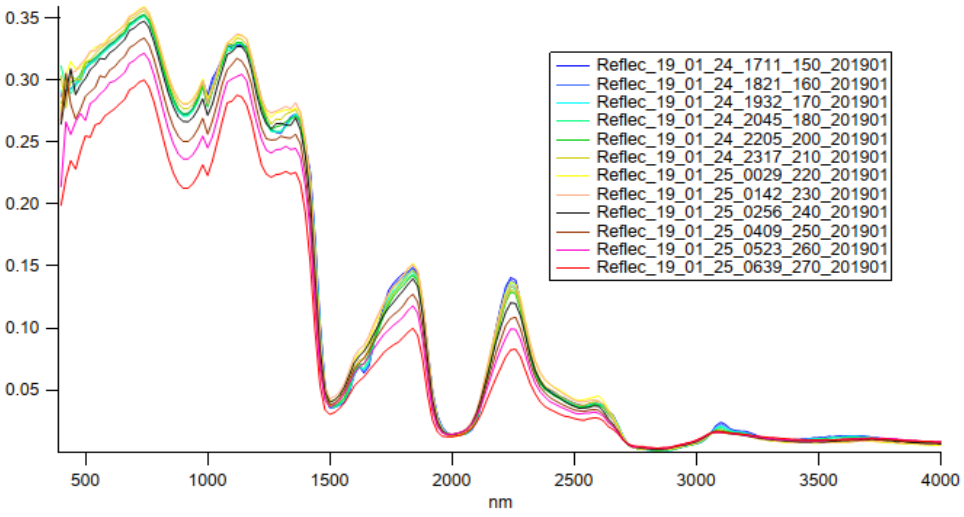
Day 3: 23.01.2019:
We produced a 50-50 weight percent hypersthene (63-125 µm) ice sample, placed it into the cell and cooled it down. We used 1.5 g of each material. We conducted several measurements during night. We achieved the following measurements:
Measurement 18-20: dust ice mixture of 1:1 weight percent at 200K, 210K, 220K and 271K

Results:



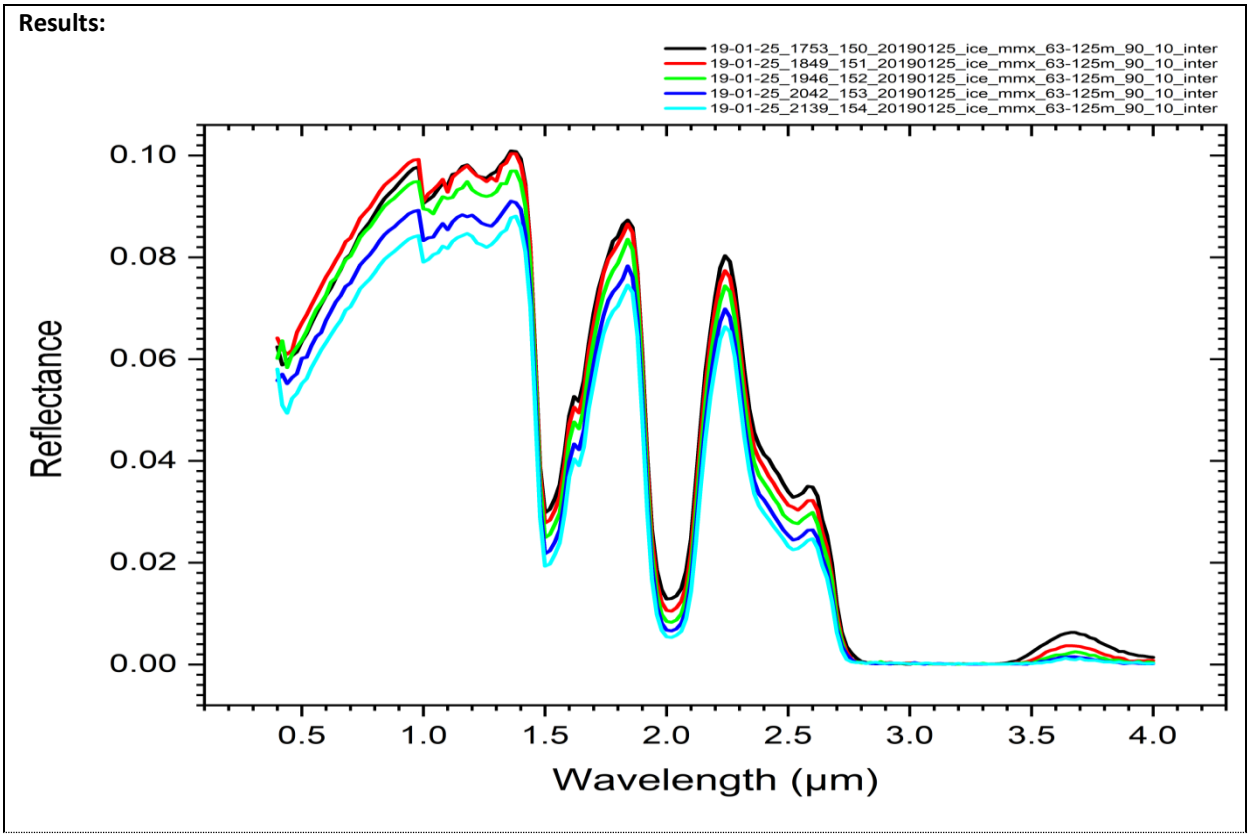
Day 4: 24.01.2019:
We produced a 90% ice and 10% hypersthene (63-125 µm) in mass sample. We used 2.2 g of ice and 0.2 g of hypersthene. The sample looked grey but much lighter than the 50-50 mixture. At temperature 220K we placed the sample into the chamber and started cooling down to 200K.
We measured spectra from 150K to 270K in the following order: 200K, 180K, 150K, 160K, 170K, 180K, 200K, 210K, 220K, 230K, 240K, 250K, 260K, and 270K. Spectra at 200K and 180K were measured twice.

Results:



Day 5: 25.01.2019:
On this day we measured the Ryugu (MMX) 63-125 µm particle size sample mixed with ice in a ratio 10 to 90 (dust to ice). We were able to take multiple measurements over the weekend and recorded 5 spectra:
We measured the following temperatures in the given order: 150K, 151K, 152K, 153K and 154K.
Because of a leak, the sample surface was exposed to high vacuum, so some of its water ice sublimated, explaining the decrease of the reflectance seen on the 5 spectra (see Results).

Results:



Please include:

- Publications arising/planned (include conference abstracts etc)

- **Submission of an Abstract (poster) to LPSC 2019.**

Please add the Europlanet official Acknowledgement to each publication and dissemination activity

"Europlanet 2020 RI has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 654208"

- 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 CSS facility, Bernard Schmitt (CNRS/IPAG, Grenoble), and Pierre Beck (UGA/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