EPN2020-RI

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4th NA1 Annual Report

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Responsible WP Leader: Finnish Meteorological Institute, Ari-Matti Harri

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Dissemination level		
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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: During the fourth year the WP12 (networking activity NA1: Innovation through Science Networking), has finalized its activity. We have arranged meetings, as well as topical workshops and expert exchange visits, which facilitate short-term visits and exchange of personnel (including industrial partners) to share best practice and expertise and to expand the horizons of the ERA community. Through these activities, NA1 has enhanced the ability of European planetary scientists to participate on the global scene with their own agenda. We have worked on the scientific topics that are currently most relevant to bring together the various sections of the European planetary science communities, under-represented states, early career researchers, amateur associations, commercial and industrial organizations.

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1.1. Objectives

1.1.1. WP 12.1 (Coordination) objectives of the fourth year

The WP Coordination Team is led by FMI, supported by the deputy coordinator from Wigner-RCP, who are members of the Impact and Innovation Sub-Board. They are advised by a broader Core Team, made up of the leaders of NA1 tasks 2-5. The WP 12.1 Lead will be in charge of the overall NA activities, coordinating the task Leaders, be responsible for dissemination, and manage the WP webpage.

Objectives for the fourth year were:

- Operating the NA1 webpage and internal portal for tasks
- Integrating and linking NA1 activities to the overall EPN2020 activities efficiently
- Supporting the Expert Program with Calls
- Overall coordinating and supporting the work done within the NA1 tasks
- Supporting the workshop activities within the NA1 tasks
- Arranging the NA1 meetings
    - Final Progress Meeting in Tallinn, Estonia
- Preparing the documentation/deliverables
    - Preparing the Annual Report and Final Report of NA1 activities in the project

1.1.2. WP 12.2 (Scientific Working Groups) objectives of the fourth year

Lead by: MPS, CNRS, UCL

This task brings together the different science teams, especially new teams working on similar science topics and missions, to strengthen links between them and counter the fragmentation that still exists in the European planetary science community. It was linked to other RI and H2020 activities. Meetings were made widely accessible by Webex tools. Meeting presentations were made available on the NA1 project's web page; summary reports were prepared for the broad community. Special efforts were made to involve scientists from under-represented countries. Topical science workshops have been organized, and the subject for many of these were motivated by the currently active and future missions by ESA or other space agencies. Such workshops offered the chance to planetary scientists with no direct involvement or access to space mission projects to have a hands-on experience with mission data and relevant models. The themes of the meetings for each year have been suggested by the Task Team for approval by the WPB.

The main objective of the fourth period (Sep 2018-Aug 2019) of NA1-Task 2 was the organisation and support of eleven scientific workshops with a wide variety of planetary science topics, some of them in support of ongoing or future planetary missions from Mercury to the Outer planets and beyond to Exoplanets:

- Uniting Planetary Models and Data Analysis Tools and Services
- Outer planet moon-magnetosphere interactions
- BepiColombo Young Scientists Meeting
- Meteorite impacts and their role in the evolution of life
- Vulcano Workshop and Summer School: A natural laboratory for marine, terrestrial and planetary science and technology
- Integrations of satellite and ground-based observations and multidisciplinarity in research and prediction of different types of hazards in Solar system
- Astrophysical Origins: Pathways from Star Formation to Habitable Planets
- Planetary Environment models

- Planetary Mapping and Virtual Observatory (2nd edition)
- Uniting Planetary Models and Data Analysis Tools and Services 2
- Exoclimes 5: Observation and modeling of exoplanet atmospheres

2.3.1 WP 12.3 (Knowledge Consolidation and Strategic Planning) objectives of the fourth year

Lead by: ISSI, Wigner RCP

While Task 2 brings together scientists to enhance their current work, periodic efforts are required to consolidate knowledge into a state of play. Therefore, planetary science workshops will be organised at the International Space Science Institute three times during the project on a scientific theme proposed by the WP teams and accepted by ISSI, such that they produce a synergy with Tasks 2, 4 and 5. Each workshop will produce a peer-reviewed scientific book on the selected scientific topic. These activities will be open to scientists from all nationalities. Biennial meetings/brainstorming sessions on strategic planning issues will also be organised at ISSI based on existing best practice. During Europlanet RI FP7 three such workshops at the International Space Science Institute (ISSI) were organised, resulting in three multi-authored books.

For the fourth year, WP 12.3 objective was:

- Organise two ISSI Europlanet workshops and one forum
- Increase the number of participants from under-represented states

1.1.3. WP 12.4 (Innovation and Foresight Working Groups) objectives of the fourth year

Lead by: ABER, FMI

Task 4 will bring together the EPN2020-RI Industry Officer along with science and industrial teams to promote the innovation that is inherent in space activities because of the challenging environments they work in. The very existence of a structured community of European planetary scientists is of considerable added value for the European industry, not only for the large companies of the space sector but even more importantly for SMEs and non-space industry, which must identify relevant interlocutors. Identifying a market is vital in order to invest in technology. For an SME or for a larger non-space company, assessing opportunities for planetary science applications remains a challenge. The technical foresight will help to identify specific topics relevant to SMEs.

Task 4 will deliver two thematic workshops per year with participants from industry and academia. Outcomes from WSs will be rapidly disseminated to build industry involvement in later years.

The overarching objectives of the WP12.4 for the fourth year were:

- To organize and/or support at least 3 meetings
- To increase the number of industry participants

1.1.4. WP 12.5 (Coordination of Ground Based Observations) objectives of the fourth year

Lead by: OEAW, VU

The main objective of the fourth year of NA1-Task 5 was the organisation of 3 topical workshops for the ground-based support of space missions and/or summer schools and amateur training workshops. Other

objectives of project year 4 were the support of the Alpbach Summer School in July 2019, putting online the new version of the ground-based observatories database (the so-called NA1-Matrix), the organization and support of dedicated amateur sessions at EPSC 2018 (Berlin, Germany). Finally NA1-Task 5 organized and supported 5 dedicated workshops and 4 Summer Schools that took place in project year 4, as well as one session during EPSC 2018. In addition, NA1-Task 5 gave support to pro-am exoplanet workshop that was organized by NA1-Task 1

Further continuous objectives of project year 4 were dissemination and the regular communication within NA1-Task 5.

1.1.5. WP 12.6 (Exchange Program) objectives of the fourth year

Lead by: FMI

The objective of Expert exchange program (Task 6) is to support the activities of Europlanet RI with experts and scientific exchange whenever it is needed. One of the objectives is to support exchange and foster cooperation between academia and industry (SMEs), and to provide benefits beyond the individual participants to the broader European community.

During the reporting period the Open Expert exchange call received 17 applications and 15 of them were approved. The open Call was closed 8.3.2019. All visits had to be done by the end of June 2019 and reimbursement claims by the end of July 2019. The approved visits were to University of Bologna, IRAP, IRF, Royal Belgian Institute for Space Aeronomy, LabEx ESEP, Paris Observatory and Wigner-RCP.

1.2. Explanation of the work carried for NA1

1.2.1. WP 12.1

During the fourth year the management structure of the NA1 activity worked as it was established during the previous years.

- In the core of the NA1 activity is the WP Coordination Team led by the NA1 Lead Prof. Ari-Matti Harri from FMI, together with the deputy Lead Dr Karoly Szego from Wigner-RCP. Maria Genzer has taken a more active role during the fourth year as deputy of Ari-Matti Harri, organizing the monthly NA1 telecons and compiling monthly reports. The Coordination team was in charge of the overall NA activities, coordinating the task Leaders, responsible for dissemination, and manage the WP webpage.

- The NA1 Executive team made up of the leaders of NA1 tasks 1-6 supported the Coordination team. Individual Task Leaders defined the annual activities of their Tasks. The **NA1 Exec Team** consists of:

    - Prof. Ari-Matti Harri (FMI), Chair
    - Prof. Karoly Szego (Wigner-RCP)
    - Dr. Norbert Krupp (MPG)
    - Dr. Rachel Cross, U. Aberystwyth
    - Dr. Gunter Kargl, OEAW
    - Ms. Maria Genzer, FMI

- The NA1 Advisory Board provided the reviewing functions for the NA1 activity. The proposals for the Expert Exchange Visits and the annual plans of the Tasks were sent for the advisory Board for review to be approved. The members of the **Advisory Board** are:

    - Dr. Maria Teresa Capria (INAF), Chair
    - Dr. Philippe Louarn (CNRS), Deputy Chair
    - Prof. Karoly Szego (Wigner-RCP)
    - Prof. Ari-Matti Harri (FMI), secretary (no voting power)

The webpage serving as the principal information channel for the NA1 was maintained as the main information channel of the NA1 activity including:

- Overall presentation and information regarding the NA1 activities, objectives and results
- Expert Program electronic application and reporting section
- Intranet webpage for NA1 task leaders (password protected)
- All workshop information (upcoming and past)
- "Propose a workshop" webpage where anyone can propose a new workshop for NA1

1.2.2. WP 12.2

The WP 12.2 has worked on scientific topics presently most relevant to bring together the various sections of the European planetary science communities, amateur associations, commercial and industrial organizations. The following workshops have been organized:

2018	**12.9.**	**14.9.**	**NA1.T2.014 ****	**Uniting Planetary Models and Data Analysis Tools and Services**	**Kalamata**	**Greece**
2019	11.2	15.2.	NA1.T2.015 **	Outer planet moon-magnetosphere interactions	Selfoss	Iceland
2019	**26.3.**	**28.3.**	**NA1.T2.016 *,****	**BepiColombo Young Scientists Meeting**	**Coimbra**	**Portugal**
2019	**10.5.**	**13.5.**	**NA1.T2.017 ***	**Integrations of satellite and ground-based observations and multidisciplinarity in research and prediction of different types of hazards in Solar system**	**Valjevo**	**Serbia**
2019	20.5.	22.5.	NA1.T2.018 ***,****	Planetary Environment models	Toulouse	France
2019	10.6.	13.6.	NA1.T2.019	Meteorite impacts and their role in the evolution of life	Tällberg	Sweden
2019	11.6.	21.6.	NA1.T2.020 **	Vulcano Workshop and Summer School: A natural laboratory for marine,	Vulcano	Italy

				terrestrial and planetary science and technology		
2019	17.6.	2.8.	NA1.T2.021	Astrophysical Origins: Pathways from Star Formation to Habitable Planets	Vienna	Austria
2019	1.7.	3.7.	NA1.T2.022 ****	Planetary Mapping and Virtual Observatory (2nd edition)	Saint-Rémy-lès-Chevreuse	France
2019	**22.7.**	**25.7.**	**NA1.T2.023 ** **	**Uniting Planetary Models and Data Analysis Tools and Services 2**	**Kalamata**	**Greece**
2019	12.8.	15.8.	NA1.T2.024	Exoclimes V, Observation and modeling of exoplanet atmospheres	Oxford	UK

*supported by OEAW
**supported by UCL
***supported by FMI
****supported by IRAP

Four of them were held in under-represented countries marked in **bold**. The statistics including the total number of participants are listed below:

Number	Total number of participants	Number of participants of Inclusiveness states	Number of female participants	Number of male participants	Number of early career scientists	Participants from Industry	Amateur Participants	Participants from outside Europe
NA1.T2.014	14	1	4	10	5	0	0	2
NA1.T2.015	40	0	11	29	8	0	0	16
NA1.T2.016	37	11	11	26	25	1	0	4
NA1.T2.017	33	28	8	25	11	2	1	0
NA1.T2.018	14	0	2	12	0	1	0	1
NA1.T2.019	48	2	12	36	12	0	0	10

NA1.T2.020	44	2	11	33	17	1	0	10
NA1.T2.021	64	2	26	38	24	0	2	11
NA1.T2.022	39	5	11	28	11	3	0	0
NA1.T2.023	13	8	4	9	6	0	0	0
NA1.T2.024	139	0	54	85	93	2	0	78
Total	485	59	154	331	212	10	3	132

Funding overview of NA1.T2 scientific workshops in the fourth period:

Number	Budget from T1 (FMI)	Budget from T2 (MPS)	Budget from T5 (OEAW)	Budget from UCL	**Total**	remark
NA1.T2.014				10000	**10000**	
NA1.T2.015		21963,7		9027	**30990,7**	
NA1.T2.016	5000	9472	859.75		**14472**	
NA1.T2.017		5000	5000		**10000**	
NA1.T2.018	5000				**5000**	
NA1.T2.019		11520			**11520**	
NA1.T2.020				10000	**10000**	
NA1.T2.021		6258,54			**6258,54**	
NA1.T2.022				15000	**15000**	
NA1.T2.023				12100	**12100**	no final invoice yet
NA1.T2.024		9879,47			**9879,47**	
Total	**10000**	**64093,71**	**5000**	**56127**	**135220,71**	

Europlanet workshop NA1.T2.014: Uniting Planetary Models and Data Analysis Tools and Service
Date and location: 12-14 Sep, 2018, Kalamata, Greece
webpage: https://www.ucl.ac.uk/~ucapnac/Europlanet/
SOC: N. Achilleos, N. Sergis
Workshop report: NA1 Website at FMI

Short summary: This workshop brought together some expertise in numerical modelling and data analysis related to planetary science. Details of the models / tools discussed can be found in the presentations above. Below is a list of some of the pertinent points which were discussed during the final workshop session.

- Further training workshops of this nature for the community would be advantageous in fostering further collaborations between observers and modellers.
- The caveats under which model outputs are made available by various means (see below) should be made clear (e.g. citation / authorship arrangements). In practice, this may involve some kind of 'registration / agreement' on the part of the user.
- These 'various means' emerged during the workshop discussions. Essentially, there are different styles of access to modelling / analysis tools. One way to describe these is according to target groups. For example, tools / repositories may be (initially) restricted to small research groups / instrument teams at one end of the 'spectrum'; all the way through to public access repositories, such as those established via the Europlanet research infrastructure project.
- In addition, many journals currently impose requirements on 'data availability'. For modellers, it is often the case that they have to clarify with the journal the conditions of access to model outputs, and / or modelling code. Journals impose such requirements partly to ensure that published results are 'repeatable' by other parties. In terms of a numerical model, is it sufficient to have an initial publication/s which thoroughly describes the equations / algorithms used to develop the model? In principle, such a publication, with adequate detail, could be designed to be 'reproducible' by others?
- It is a good idea for modelling software developers to familiarize themselves with the intellectual property policy of their host institution, as regards the IP status of software developed by members of staff.
- Naturally emerging scientific collaborations lend themselves well to the distribution of model outputs / data analysis tools and results. Public databases may be useful for a 'first look', but a 'human point of contact' always encourages potential users who will likely have many questions about e.g. the limitations of models / algorithms. Common access protocols and frameworks help to make online data / tools more appealing and 'user friendly'.
- There were also discussions about licencing code developed under the auspices of research infrastructure projects such as Europlanet.

Europlanet workshop NA1.T2.015: Outer planet moon-magnetosphere interactions
Date and location: Selfoss, Iceland
webpage: https://www.mps.mpg.de/Iceland2019
SOC: N. Krupp, E. Roussos, M. Holmström
Workshop report: NA1 Website at FMI

Short summary: The main purpose of the workshop was to build up and expand the community of moon magnetosphere interactions science on a long-term basis and to transfer the knowledge to the next generation of plasma scientists. The idea was to use the knowledge and the findings from previous spacecraft near the outer planet moons to update our knowledge about the interaction processes between the plasma environment and the moon's surfaces, exospheres, magnetospheres. In particular, the analysis of data sets from JUNO, CASSINI, GALILEO, VOYAGER and other spacecraft and recent simulation results should be combined to describe the environments of the moons. In a further step the discussion and preparation of science and science planning for future missions (i.e. JUICE and EUROPA CLIPPER and other outer planets missions) should be started.

Europlanet workshop NA1.T2.016: BepiColombo Young Scientists Meeting
Date and location: 26-28 Mar 2019, Coimbra, Portugal

webpage: https://sites.google.com/view/bepi-ys-wg-workshop/home
SOC: D. Heyner
Workshop report: NA1 Website at FMI

Short summary: After the NASA-MESSENGER mission has improved our understanding of planet Mercury, there are still open important questions about the innermost planet of the solar system. Why does it possess such a large iron core? What is the nature of the dynamo operating in the interior? How do the Hollows at the surface form? What is the low-reflectance material spread around the planet? What drives the exosphere? These are some of the major scientific questions that need to be explored by the BepiColombo mission. Important discussions will allow to predict which dedicated BepiColombo instrument observations should be planned – with some of these especially requiring simultaneous measurements on both BepiColombo spacecrafts. Dedicated time for scientific discussions is very little during the existing science working team meetings of BepiColombo. Therefore, there is a true need of having separated scientific meetings.

Achievements:

1) All topics were addressed during the workshop: surface, surface, exosphere and dust environment, internal magnetic field, magnetosphere modelling, magnetosphere observations, Venus flyby science.
2) Creation of other subgroups related to surface and dust similar to the existing SHOTS subgroup that has the aim to compare and benchmark numerical magnetospheric simulations performed with different numerical codes. This group has defined two common scenarios which the individual modelers now compare. It has been found, that depending on the numerical scheme and boundary conditions, the global structure of the simulated magnetosphere can vary drastically.
3) The planned observations at the BepiColombo Venus flybys with simultaneous ground observations from Earth have been discussed.

Europlanet workshop NA1.T2.017: Integrations of satellite and ground-based observations and multidisciplinarity in research and prediction of different types of hazards in Solar system
Date and location: 10-13 May 2019, Valjevo, Serbia
webpage:http://www.gi.sanu.ac.rs/site/index.php/en/activities/conferences-organisation/998-hazards-sos
SOC: A. Nina
Workshop report: NA1 Website at FMI

Short summary: This meeting was related to: Hazards on the Earth (atmospheric disturbances, earthquakes, landslides, telecommunication, damage satellites…), and Hazards on planets caused by different types of radiation, small bodies etc. The scientific programme consisted of oral presentations, poster section and two discussions. It was 18 talks (12 Invited talks and 6 Progress reports) and 8 posters. Discussions related to integration of observation methods and models in research of earthquakes and volcanoes (the first discussion) and of hurricanes, meteors and climatic change (the second discussion). Also, in order to better connect the people we have organized a Networking event on the last evening.

Europlanet workshop NA1.T2.018: Planetary Environment models
Date and location: 20-22 May 2019, Toulouse, France
webpage:
SOC: N. Andre
Workshop report: NA1 Website at FMI

Short summary: Under Horizon 2020, the Europlanet 2020 Research Infrastructure includes an entirely new Virtual Access Service, “Planetary Space Weather Services” (PSWS) that will extend the concepts of space weather and space situational awareness to other planets in our Solar System and in particular to spacecraft that voyage through it. PSWS will provide at the end of 2017 12 services distributed over 4 different service domains – 1) Prediction, 2) Detection, 3) Modelling, 4) Alerts. Several tools and services are in particular developed for planetary observations and image

analysis by amateurs. These include software to model planetary environments and the heliosphere. The proposed workshop focused on the modelling of the magnetospheres of Mercury, Jupiter, Saturn, Ganymede and ice giants as well as the Moon-magnetosphere interactions at Jupiter's and Saturn's moons (Callisto, Europa, Enceladus, …). It gave the opportunity to present the latest results based on simulations and compare them to observations as well as to discuss how to use them for future mission planning (BepiColombo, JUICE, Clipper, Ice Giant missions). A large part of the workshop was devoted to the comparison between the various models and the publication of simulation runs/output in the Virtual Observatory.

Europlanet workshop NA1.T2.019: Meteorite impacts and their role in the evolution of life
Date and location: 10-13 June 2019, Tällberg, Sweden
webpage: http://www.nordicastrobiology.net/Impacts2019/
SOC: Natalia Artemieva, Alexis BrandekerCharles Cockell, Jamie Elsila, Wolf Geppert, Lydia Kalle Kirsimäe, Christian Koeberl, Paula Lindgren, Anna Losiak, Ingrid Mann, Simone Marchi, Karen Meech, Alessandro Morbidelli, Gisela Pösges, Geopark Ries, Wolf Uwe Reimold, Vivi Vajda, Kai Wünnemann
Workshop report: NA1 Website at FMI

Short summary: The following sessions were organised in various sessions. For every session we had invited and at least one keynote speaker:

- Impacts, the Early History of the Solar System and the Formation of the Moon
- Late Accretion and Delivery of Volatiles to the (early) Earth
- Physical and Chemical Characterisations of Impactors (meteorites, comets etc.)
- Identification and Exploration of Impact Features
- Ecological and Climatic Consequences of Impacts
- Impact Craters and Impact Hydrothermal Systems as Habitats for Life
- Geoconservation of Impact Areas
- Impacts as Subjects for Science Education and Outreach

Europlanet workshop NA1.T2.020: Vulcano Workshop and Summer School: A natural laboratory for marine, terrestrial and planetary science and technology
Date and location: 11 - 21 June, 2019 / Vulcano, Italy
webpage: http://robexsummerschool.de/
SOC: Laurenz Thomsen, Vikram Unnithan, Frank Sohl
Workshop report: NA1 Website at FMI

Short summary: The Vulcano Summer School focused on Planetary and Terrestrial Analogues with an emphasis on magmatic and hydrothermal systems. This year a variety of spectral instruments ranging from visible and near-infrared (VNIR) reflectance and Raman spectroscopy to Laser-Induced Breakdown Spectroscopy (LIBS) were deployed at various sites for mineralogical, biological, and elemental analysis. The in-situ survey, and its comparison with laboratory standards and instruments, will provide an assessment of the usability these techniques to characterise extraterrestrial environments and guide our search for life in the Solar System (e.g. via assessing the detectability of biosignatures).

Europlanet workshop NA1.T2.021: Astrophysical Origins: Pathways from Star Formation to Habitable Planets
Date and location: 17 June - 2 August, 2019 / Erwin Schroedinger International Institute for Mathematical Physics, University of Vienna, Vienna, Austria
webpage:https://www.esi.ac.at/activities/events/2019/astrophysical-origins-pathways-from-star-formation-to-habitable-planets
SOC: Manuel Güdel, Ramon Brasser , Theresa Lüftinger , Stephen Mojzsis
Workshop report: NA1 Website at FMI

Short summary: The program summarized here on the topic of Astrophysical Origins: Pathways from Star Formation to Habitable Planets was organized at the Erwin Schrödinger International Institute for Mathematics and Physics (ESI),

a program-oriented research institute of the University of Vienna. ESI organizes various types of collaborative and discussion-led meetings; these range from lectures and seminars to workshops and to the largest category of "thematic programs". In 2017 we applied for a thematic program at ESI with the above title: "Astrophysical Origins: Pathways from Star Formation to Habitable Planets." The ESI "thematic programmes" are meant to bring together a large number of researchers to exchange views, participate in brainstorming sessions, initiate collaborations and/or work on publications or proposals during an extended period of time (usually several weeks). The structure of such a thematic program is left to the organizers and is maximally free, typically involving some presentation sessions and workshops, but primarily driven towards free discussions, exchange of ideas, and networking. Our program was designed as an interdisciplinary meeting bringing together astrophysicists, geologists, atmospheric scientists, (astro-)chemists and biologists to discuss the potential places of origin of life in the universe, the emergence of habitability on planets, and the conditions that lead to such environments. Given the breadth of this topic we aimed to make the program, and the resulting list of attendees, as inclusive as possible. This scientific topic is one of the most attractive in the area of astrophysics and planetary sciences, fostered enormously by the detection of thousands of exoplanets, but also by rapid progress in the research of solar-system planets, their geology and their atmospheric evolution. The search for life, and the community's attempts to gain a better understanding of how life originated on Earth inspired us to cast a wide net when it came to the disciplines of the invited researchers. Only by successfully combining astrophysics, planetary science, (pre-biotic) chemistry and biology do we stand a chance to make progress solving this difficult problem.

Europlanet workshop NA1.T2.022: Planetary Mapping and Virtual Observatory (2nd edition)
Date and location: 1-3 July, 2019 / Saint-Rémy-lès-Chevreuse, France
webpage: https://epn-vespa.github.io/mapping2019/
SOC: Angelo Pio Rossi, Matteo Massironi, Chiara Marmo, Stephane Erard
Workshop report: NA1 Website at FMI

Short summary: The workshop aimed at bringing together the geologic, geospatial and VO communities at a European scale for bringing forward knowledge, tools and standards for mapping the Solar System. The programme included keynotes, lightning presentations (5 minutes) and associated posters, tutorials, hands-on sessions and hackathons, as well as discussions. For the first time, multiple projects contributed to such a workshop (Europlanet/NA1 and VESPA, PlanMap, OpenPlanetary). This includes the non-profit association OpenPlanetary (https://www.openplanetary.org/) via its newly released forum (https://forum.openplanetary.org/). Additional funding was provided by CNRS / Programme National de Planétologie (Call 2019 TelluS Colloques).

Europlanet workshop NA1.T2.023: Uniting Planetary Models and Data Analysis Tools and Service 2
Date and location: 22-25 July, 2019 / Kalamata, Greece
webpage:https://www.ucl.ac.uk/planetary-sciences/news-events/europlanet-na1-workshop-uniting-planetary-modelling-and-data-analysis-part-2
SOC: Nick Achilleos, Nick Sergis
Workshop report: NA1 Website at FMI

Short summary: Knowledge Exchange: The presentations given by the participants covered modelling and data analysis related to the space environments of the planets Saturn, Jupiter and the Earth. The laboratory and 'walkthrough' sessions provided preliminary training and descriptions of: applying model outputs to magnetic field and particle dynamics investigations; analysis of X-ray observations of planetary auroral emissions; preparation and processing of data for archiving purposes. In a wider context, the participants also exchanged knowledge regarding the analysis and interpretation of X-ray, ultraviolet and infrared observations of planetary auroral emissions; the best algorithms and methods for characterising variability and typical conditions associated with auroral emissions, planetary ring currents and magnetospheric magnetic fields; the use of wavelet transforms and machine learning techniques for space weather studies and investigations of related variability of physical conditions in the Earth's ionosphere; modelling algorithms and equation sets associated with magnetosphere-ionosphere coupling, morphology of magnetospheric boundaries, polar ionospheric outflows. The discussions also frequently made use of,

or referred to, datasets associated with space missions such as Cassini and Juno, and observational platforms such as the Hubble Space Telescope, the Chandra and XMM X-ray satellites. The final discussion session of the meeting also presented participants with an introduction to Europlanet services such as the Virtual European Solar Planetary Access (VESPA) databases, and the PSWS (Planetary Space Weather Services); as well as the auroral database APIS (Auroral Planetary Imaging and Spectroscopy).

Future Scientific Collaborations and Initiatives: Breakout sessions during the workshop allowed participants to continue with the laboratory training, and continue scientific discussions and interactions. An important breakout session identified a real need to answer the scientific question of the physical origin of the main auroral emission attacks Saturn. It was suggested that this could potentially form the basis of a future scientific meeting related to this subject, possibly to be organized, for example, as an event of the ISSI (International Space Science Institute). Careers: As well as providing the keynote address for the meeting, Dr. Krimigis took part in our 'question and answer' session, which was a valuable opportunity for researchers of different backgrounds to ask about the successes and challenges faced during his own career, and future prospects for young scientists seeking careers in space physics.

Educational Initiatives: Some of the material presented by Prof. Achilleos was discussed as the possible basis for developing further pedagogical and educational material related to magnetospheric physics and particle dynamics. We will continue to develop this initiative further for all relevant material presented at the meeting, by seeking support for appropriate visiting lectureships. These will further foster scientific knowledge exchange through a platform involving education.

Europlanet workshop NA1.T2.024: Exoclimes V, Observation and modeling of exoplanet atmospheres
Date and location: 12-15 August, 2019 / University of Oxford, UK
Webpage: http://exoclimes2019.org
SOC: Nick Cowan, Ray Pierrehumbert, David Sing, Joe Harrington, Suzanne Aigrain, Yohai Kaspi, Jayne Birkby, Heather Knutson, Ruth Murray-Clay, Emily Rauscher, Jeremy LeConte, Robin Wordsworth, Nathan Mayne, Dorian Abbot, Beth Biller
Workshop report: NA1 Website at FMI

Short Summary: The meeting ExoClimes V took place at the University of Oxford from 12-15 August, 2019. ExoClimes is the world's premiere meeting focused on the climates of Solar System planets and Exoplanets, and brings together observers, instrument designers, theorists and modelers in a small-group setting that fosters networking and building collaborations. To make ExoClimes available to a wider community, the entire meeting was webcast, and a recording of the webcast will be made available through the NASA YouTube channel shortly. Details of the programme can be found at exoclimes2019.org. Exoclimes was attended by 139 participants. A full list of participants is attached. 54 participants were female and 85 were male. Of these, 93 were early-career researchers (53 graduate students and 40 postdoctoral research associates). 61 participants were from Europe and 78 were from outside Europe. Two attendees were from industry. There were no amateur participants. Unfortunately, despite extensive advertising to under-represented EU countries, including mailing of posters to physics and astrophysics departments we could identify at major universities and advertising through EUROPLANET, we were unable to attract any applicants from under-represented countries. The subject of exoplanetary science is not currently well developed in these countries, and while there are undoubtedly physics and engineering students who would be interested in the subject, future efforts of this sort will need a better way to reach the relevant audience. However, since the full conference has been recorded and will be made available to the public, there is still an opportunity to reach an audience in under-represented countries. Despite our disappointing results with attracting under-represented participants, we were pleased with the geographical diversity of our participants, which included researchers from the UK, France, Spain, Germany, Ireland, Italy, Switzerland, China, Japan, Australia, United States, and Canada. We are especially pleased with our success

at achieving an excellent level of gender diversity amongst the speakers and participants. In fact, 7 of the 10 invited keynote speakers are women. EUROPLANET funds were used to provide full or partial participant cost waivers to the early career researchers among the 61 European participants, plus selected keynote speakers. The participant cost waivers covered the participants' share of conference facilities fees, accomodation and meals. Travel grants were not given from EUROPLANET funds. Of the total fee waivers granted, approximately 19% went to conference facility costs, 45% to accomodation and 36% to meals and refreshments. The total amount is stated in the accompanying invoice.

1.2.3. WP 12.3

Europlanet 2020 NA1-Task 3 has organised or co-organised workshops as follows:

2018	**22.10**	**26.10**	**NA1.T3.003**	**ISSI workshop 2: Reading terrestrial planet evolution in isotopes and element measurements**	**Bern**	**Switzerland**
2018	**12.11.**	**16.11.**	**NA1.T3.004**	**ISSI workshop 3: Comparative study of the atmospheres of planets and exoplanets**	**Bern**	**Switzerland**
2019	**19.2.**	**20.2.**	**NA1.T3.005**	**ISSI forum: Solar System | Exoplanet Science Synergies**	**Bern**	**Switzerland**

Number	Total number of participants	Number of participants of Inclusiveness states	Number of female participants	Number of male participants	Number of early career scientists	Participants from Industry	Amateur Participants	Participants from outside Europe
NA1.T3.003	47	0	11	36	0	0	0	22
NA1.T3.004	37	1 guest	8	29	0	0	0	12
NA1.T3.005	27	2	8	19	0	0	0	6

WS #2 on "Reading Terrestrial Planet Evolution in Isotopes and Element Measurements"
Date and location: 22-26 October, 2018, Bern, Switzerland
webpage: http://www.issibern.ch/workshops/evoinisotopes/
SOC: H.Lammer. M.Blanc

2 papers are already submitted for review, 3 will follow in August, and 5 are expected until the end of September.

Short report: The dominant paradigm on terrestrial planet formation has been that such planets are assembled from material with "chondritic" compositions. This view is embodied in the aphorism that "The chondrites are the building blocks of the planets". Chondrites are geologically undifferentiated meteorites, whose compositional diversity reflects the complexities of processes in the solar nebula. The new and more recent paradigm looks at processes that produce chemical compositional changes AFTER the solar nebula/chondrite stage. Two main processes stand out:

1. collisional erosion, but also
2. post-nebula volatilization, including possible escape and fractionation of elements and isotopes.

The latter affects noble gases (isotopes), atmospheric gases and "moderately volatile elements", including the radiogenic heat-producing element potassium. Collisional erosion is also critical to the eventual budget of the three heat-producing elements (Th, U and K) in terrestrial planets. In turn, the heat-producing elements determine the planet's subsequent evolution.

The formation scenarios of the young protoplanets, their impact history, the Moon forming impact in the case of Earth as well as possible nebular-based protoatmospheres in relation to the activity history (X-ray, EUV, wind) of the young Sun will be discussed in the workshop. Isotopes can also be used for constraining the time-scale of accretion, the volatile delivery and the origin of the Moon. Further planetary evolution in relation to the formation of plate tectonics (on Earth) and the origin of early Earth's secondary nitrogen atmosphere will also be discussed. The origin of early Earth's nitrogen atmosphere will also be discussed within the framework of comparative planetology between Venus, Mars and Saturn's large moon Titan. Consequences for the evolution of Earth-like habitats on other stars will be addressed. Finally, the workshop will conclude with future space missions that are important for enhancing our understanding in terrestrial planet evolution related to the science cases discussed in this workshop

WS #3 on "Understanding the Diversity of Planetary Atmospheres"
Date and location: 12-16 November, 2018, Bern, Switzerland
website: http://www.issibern.ch/workshops/studyplanetsexoplanets/
SOC: F.Forget, O.Korablev, J.Venturini

Short report: Objectives and Contents of the Workshop
Progress in understanding of atmospheric evolution on terrestrial planets and explosive development of exoplanetary science, suggest to reassess and generalise our knowledge from the Solar system to multiple worlds beyond. Analysing the atmosphere of an exoplanet is the only possible means to assess its habitability, because so far we have no other access to biosignatures, for instance at the surface. The goal of the present Workshop is to bring together planetologists, experts on aeronomy and escape, climatologists, and astronomers to look for commonalities among atmospheres of the Solar system, the only example we know reasonably well, and the atmospheres of planets around distant stars, which can be assessed only indirectly.

The WS summarised our knowledge of the atmospheres and their evolution, based on ground/space observations and modelling, and focused on future space missions to characterize exoplanets' atmospheres and possibly find signatures of life there. Several space missions have recently brought new insights about the atmospheres of the Solar system planets, such as Venus Express and Akatsuki on Venus, dedicated escape and atmosphere missions on Mars, MAVEN and ExoMars TGO, New Horizons and JUNO on outer planets. The exoplanet missions, flying and planned (Kepler, TESS), explore the transit method with advanced spectroscopic capabilities for atmospheres. This means that for a long time the focus will remain on atmospheres characterisation.

2nd FORUM: Solar System/Exoplanet Science Synergies
Date and location: 19-20 February, 2019, Bern, Switzerland
website: http://www.issibern.ch/forum/issieuroplanetsosyexo/
Main Editors: M. Blanc, J. Venturini, K. Heng

Short report: The solar system as well as exoplanetary systems provide a wealth of data which help us to better understand how Earth developed and whether life may have also emerged elsewhere. The aim of the Forum was to discuss how synergetic research between the Solar System and Exoplanet communities and their space projects could address and try to solve the key questions related to extrasolar planetary systems in the coming decades. The key points to address include the origins of planetary systems, the causes of the diversity of their architectures, the causes

of the diversity of the objects composing them, atmospheric evolution and magnetic interactions and the conditions for the emergence of habitable worlds. The Forum brought together scientists and discussed the possibilities of synergistic research between the different communities.

Missions to solar system bodies gain complexity, including landers, rovers, drills, drones, balloons, in situ analysis labs and sample return mechanisms. For exoplanet characterization, current techniques rely on transiting planets, but direct imaging methods (cornography and interferometry) will be the driver for future missions with large-scale telescopes.

The themes for future ISSI workshops and Forums were discussed, focusing on possibly new concepts of observation programs (space-based or ground-based) that could derive from these synergies and would be instrumental in helping to successfully address the six key questions.

1.2.4. WP 12.4

NA1-Task 4 Workshop organisation

Europlanet 2020 NA1-Task 4 has organised or co-organised workshops as follows:

2019	4.7	4.7	NA1.T4.010	Exoplanetary Magnetism	Lancaster	UK
2019	12.5.	17.5.	NA1.T4.011	IVOA Interop May 2019	Paris	France
2019	6.7.	12.7.	NA1.T4.013	International Planetary Probe Workshop	Oxford	UK
2019	28.5	29.5		iCubeSat	Milan	Italy
2019	18.3	25.3	NA1.T1.010	Europlanet Mars workshop	Saariselkä	Finland
2019	26.8	30.8		Introductory Solar System Plasma Summer Workshop	Aberystwyth	UK

Number	Total number of participants	Number of participants of Inclusiveness states	Number of female participants	Number of male participants	Number of early career scientists	Participants from Industry	Amateur Participants	Participants from outside Europe
NA1.T4.010	22	0	4	16	13	3	3	0
NA1.T4.011	132	-	-	-	-	-	-	35
NA1.T4.013	240	3	60	180	70	28	0	156
cubesat	138	3	-	-	74	36	2	51
NA1.T1.010	32	6	7	25	14	1	0	1

ISSP	28	0	6	22	25	1	2	1
Total	**428**	**6**	**70**	**218**	**182**	**68**	**7**	**208**

Funding overview of NA1.T4 workshops in the fourth period:

Number	Budget from T4 (ABER)	Budget from T4 (FMI)	**Total**
NA1.T4.010	1,382.10		
NA1.T4.011		10000	
NA1.T4.013	5000	5000	
cubesat	3000		
NA1.T1.010	9865.50		
ISSP	6000		
Total	**25,247.60**	**15000**	**40, 247.60**

Europlanet workshop NA1.T4.010: Exoplanetary magnetism workshop, held as part of National Astronomical Meeting (NAM) 2019,
Date and location: 4 July 2019, Lancaster University
Webpage: https://nam2019.org/nam2019/grants https://nam2019.org/nam2019/key-dates-outline-schedule

Short report: The aim of this panel and networking session was to bring together expertise in solar magnetospheres and the exoplanet community to explore potential future collaborations. With the advent of new instrumentation (both space based and ground based) the routine detection of exoplanets using radio waves emitted when a stellar wind interacts with an intrinsic planetary magnetic field is becoming an increasing possibility.

Europlanet workshop NA1.T4.XXX: 8th Interplanetary CubeSat Workshop, iCubeSat
Date and location: 28 -29 May 2019**, Milan, Italy**
Webpage: https://icubesat.org

Short report: Organised with Europlanet Industry Officer, iCubeSat 2019 aims to address the technical challenges, opportunities, and practicalities of interplanetary space exploration with CubeSats. The workshop provides a unique environment for open wide ranging practical collaboration between academic researchers, industry professionals, policy makers and students developing this new and rapidly growing field.

Europlanet workshop NA1.T4.013 International Planetary Probe Workshop
Date and location: 6-12 July 2019, Oxford, UK
Webpage: www.ippw2019.uk

Short report: The International Planetary Probe Workshop is an annual meeting which alternates between the USA and Europe (the first IPPW, in 2003, was hosted in Portugal). It was set up initially by ESA Huygens scientist Jean-Pierre Lebreton to exchange information between European and American counterparts, with a focus on bringing together scientists and engineers associated with planetary entry probe missions. Many of the sessions are quite technical, focussing on engineering aspects of the Entry, Descent and Landing (EDL) systems, but there is a deliberate aim to present also the scientific rationale both for measurements during EDL and the scientific rationale for the missions themselves.

The 5-day Workshop itself (8-12 July) was preceded by a Short Course (6-7 July) entitled "Ice Giants: Exciting Targets for Solar System Entry Probes Exploration". This course, aimed at early career scientists and engineers, gave an overview of the science and engineering of Uranus & Neptune entry probe missions.

Europlanet workshop NA1.T4.XXX: Introductory Solar System Plasma
Date and location: 26-30 August 2019, Aberystwyth University, UK
Webpage: https://www.aber.ac.uk/en/phys/issp19-summer-school/

Short report: The objective of the workshop is to provide a broad introduction of the latest scientific issues in Solar System Plasma Research, including the current challenges that drives UK research in this field. As well as the core subjects expected in this school (as guided by UK Solar Physics and MIST). Knowledge is provided through specialist sessions on new missions, new ground-based telescopes, and high-performance computing. These are of huge importance to the new generation of researchers, particularly given the revolutionary new observations promised by the DKIST telescope, and the crucial need for supercomputers to model solar system plasmas. There are networking events and a workshop on communications to outside academia.

We will carry out as funding permits. Meetings will be co-sponsored where possible in order to maximise impact and cost effectiveness. Workshops will also be co-located with EPSC. The list of all past and future Workshops can be seen on the NA1 web site.

1.2.5. WP 12.5

Extensions of the ground-based observatories database and list of observatories

The extension of the so-called NA1-Matrix (see http://iwf.oeaw.ac.at/matrix/) went online in project year 4 providing the possibility for amateur observers to upload their observational images. Through an EPN-TAP service for the NA1-Matrix at OEAW observational data can then be directly linked to VESPA. The database can therefore be used in future observation campaigns of amateurs or small telescope facilities in case that they have no other possibility to make their data publicly available or to link it to VESPA.

Dissemination

A presentation of Europlanet 2020 with a focus on NA1-Task 5 was held at the Summer School Graz in Space 2018 on September 07, 2018, in Graz, Austria with the title "Europlanet 2020 – Planetary and Space Sciences in Europe" (see also http://grazinspace.oeaw.ac.at). On December 18, 2018 a talk on the amateur involvement in Europlanet 2020 was held at the Annual Meeting of the Austrian Commission for Astronomy in Vienna, Austria. In addition, the presentation "Interactive Data Analysis Tools in Planetary and Space Science" with a focus on Europlanet 2020 was given at the University of Graz on April 10, 2019. Europlanet

was also briefly presented at all NA1-Task 5 related workshops and summer schools in project year 4. On the pro-am exoplanet workshop in Helsinki, Finland, April 25-28, 2019 the talk “Europlanet 2020: Fostering the collaboration between professional scientists and amateur astronomers” was held.

A public talk was given at the NA1-Task 5 Workshop “PLATO Citizen-Planetcheck”, October 15-22, 2018 in Kea, Greece. A report of this workshop was also presented at a seminar at the space Research Institute of the Austrian Academy of Sciences on December 13, 2018 in Graz, Austria, and a photo-blog can be found at

http://www.astrode.de/reisen/reisen18c/planet18.htm. The lecture notes of the 3rd Advanced School on Exoplanetary Science will be published by Springer in its Astrophysics and Space Science Library Series. In addition, the Europlanet Workshop "Integrations of satellite and ground-based observations and multi-disciplinarity in research and prediction of different types of hazards in Solar system" will publish proceedings in the *Journal of the Geographical Institute "Jovan Cvijic" SASA*. All lectures of the Astrobiology Introductory Course 2019 were filmed and are available online for the public at http://astrobiovideo.com/en.

NA1-Task 5 Workshops organization

During the fourth project year of Europlanet 2020 NA1-Task 5 organised and supported 8 workshops and summer schools plus a session at EPSC 2018. In addition 2 workshops of Task2 were co-funded by Task 5.. The 8 workshops and summer schools plus EPSC session are listed below:

2018	**5.9.**	**7.9.**	**NA1.T5.016**	**Physics of comets after the Rosetta mission**	**Stara Lesna**	**Slovakia**
2018	18.9.	18.9.	NA1.T5.017	Professional-Amateur collaborations in small bodies, terrestrial, giant, exoplanets studies and Juno Ground-Based Support	Berlin	Germany
2018	**15.10.**	**22.10.**	**NA1.T5.018**	**PLATO 2.0 Citizen Planetentest**	**Astras, Kea**	**Greece**
2019	**5.3**	**9.3.**	**NA1.T5.019**	**RED'19: Astrobiology Introductory Course**	**Bordeaux**	**France**
2019	25.4.	28.4.	NA1.T5.020*	Pro-Am exoplanet observations workshop	Helsinki	Finland
2019	13.5	17.5.	NA1.T5.021	Exocomets: Understanding the Composition of Planetary Building Blocks	Leiden	Netherlands
2019	27.5.	31.5.	NA1.T5.022	3rd Advanced School on Exoplanetary Science: The Demographics of Exoplanetary Systems	Vietri sul Mare	Italy

2019	**11.6.**	**21.6.**	**NA1.T5.023**	**Europlanet Summer School 2019**	**Moletai**	**Lithuania**
2019	16.7.	25.7.	NA1.T5.024**	Alpbach Summer School	Alpbach	Austria

*Workshop was supported by NA1-Task 1.
**Summer school was co-funded by NA1-Task 2.

Those listed in bold (4 workshops) were held in under-represented countries. The statistics of the workshops are listed below (for the workshops co-funded with Task 2 see Task 2 description):

Number	**Total number of participants**	**Number of participants of Inclusiveness states**	**Number of female participants**	**Number of male participants**	**Number of early career scientists**	**Participants from Industry**	**Amateur Participants**	**Participants from outside Europe**
NA1.T5.016	32	8	10	22	3	0	0	11
NA1.T5.017	19	5	2	17	2	0	17	0
NA1.T5.018	14	7	4	10	3	2	7	0
NA1.T5.019	38	5	19	19	38	0	0	3
NA1.T5.020	22	8	2	20	3	0	20	0
NA1.T5.021	56	3	27	29	17	0	0	19
NA1.T5.022	85	2	34	51	85	0	0	11
NA1.T5.023	33	21	18	15	5	1	6	3
NA1.T5.024	58	10	20	38	58	0	0	2
Total	**357**	**69**	**136**	**221**	**214**	**3**	**50**	**49**

Funding overview of NA1.T2 scientific workshops in the fourth period:

Number	Budget from	Budget from	Budget from	**Total**

	T1	T2 (MPS)	T5 (ÖAW)	
NA1.T5.016			4 454.63	4 454.63
NA1.T5.017			8 567.06	8 567.06
NA1.T5.018			8 307.32	8 307.32
NA1.T5.019			5 040.00	5 040.00
NA1.T5.020	12000		0.00	12000.00
NA1.T5.021			3 000.00	3 000.00
NA1.T5.022			5 237.21	5 237.21
NA1.T5.023			9 975.00	9 975.00
NA1.T5.024		4000	6 000.00	10 000.00
Total		**66955,7**	**50581.22**	**66581.22**

NA1-Task 5 Workshops organization

During the third project year of Europlanet 2020 NA1-Task 5 organised and supported 9 workshops and summer schools. In addition, NA1-Task 5 also co-supported 2 workshops of NA1 Task 5 (see Task 2). Four of the workshops/summer schools were held in so-called under-represented countries.

Europlanet NA1 Workshop Physics of Comets after the Rosetta Mission: Unresolved Problems
Location: Stara Lesna, Slovakia **(under-represented country)**
Date: September 05-07, 2018
Website: https://www.astro.sk/AFTERROSETTA/
SOC: Oleksandra Ivanova (chair), Colin Snodgrass, Jürgen Blum, Carsten Guettler, Yuri Skorov, Kargl Günter, Michael S. P. Kelley, Dominique Bockelee-Morvan, Evgenij Zubko, Jan Svoreň, Matt Taylor, Vera Rosenbush, Luboš Neslušan
LOC: Zuzana Kaňuchová, Marek Husárik, Marián Jakubík, Dušan Tomko, Anna Bobulová, Martin Roth
Workshop report: https://tinyurl.com/after-rosetta-report

Short summary: The workshop gathered researchers studying different aspects of the physics of comets and discuss about the heritage of the Rosetta mission with special emphasis on the remaining issues, unresolved problems, and unexpected findings. Special attention was paid to the interrelation of the Rosetta findings at Comet 67P/Churyumov–Gerasimenko with results obtained in other comets in situ as well as in ground-based and space-born astronomical

observations. Another important aspect of the workshop was to examine disagreements between Rosetta findings and predictions of existing theoretical models, numerical simulations, and/or laboratory experiments.

Europlanet NA1 Workshop PLATO Citizen-Planetcheck – Time Critical Photometry of Exoplanet Transit Candidates
Location: Ioulida, Kea, Greece **(under-represented country)**
Date: October 15.22, 2018
Website: http://info.plato-planets.at
SOC: Manuel Guedel, Günther, Werner Zeilinger, Anasia Kokori, Angelos Tsiaras
LOC: Georgios Paissidis, Günther Wuchterl

Short summary: The EUROPLANET workshop "PLATO Citizen-Planetcheck, Time critical photometry of exoplanet transit candidates" was held at the local English language school, from Mon, 15h – Mon, 22nd October 2018, in Ioulis (Ioulida) and environs, Kea, Hellas. ESA's PLATO project scientist introduced the mission, PLATO and ECHO consortium members (3) explained the follow-up procedures to the amateur astronomers (7), educators (1), young scientists, (3) and teacher (1) attendees (total participants 14, 11 m, 4 f, 27% f). Amateurs showed their transit observation procedures and detected 5 exoplanet transits during nightly observations at the workshop as demonstrator and guidance for the specification of a citizen science campaign based on selected TESS-transits, for a start in March 2019 in preparation for the respective PLATO-programme. Specifications were negotiated in a round table and led to a test campaign that is distributed via the Extrasolar Transit Database (ETD) of the Czech Astronomical Society and http://info.plato-planets.at, http://info.plato-planeten.at of the http://Kuffner-Sternwarte.at. A public observing event was held by the Hellenic participants in local language and had the complete village as participants, in particularly all the children in town. The public announcement was made during the PLATO week in Graz in March 2019, in an outreach talk of the PLATO mission PI Heike Rauer and also presented at the Amateur-Pro collaboration EUROPLANT-workshop in Helsinki. An outreach campaign with DLR and ESA is foreseen for the time after the CHEOPS launch.

Red'19 Astrobiology Introductory Course 2019 supported by Europlanet
Location: Ornithological Park, Le Teich, France
Date: March 03-09, 2018
Website: http://www.exobiologie.fr/red/index.php/en/red16-astrobiology-course
SOC: Muriel Gargaud, Hervé Cottin
Workshop report: https://tinyurl.com/red19-report

Short summary: The aim of this Training School is to offer an interdisciplinary training in astrobiology to students with a master's degree in astronomy, geology, chemistry or biology and preparing a thesis in one of these fields in an astrobiological context. The school was created to allow PhD students working in the field of astrobiology to acquire bases in disciplines that are sometimes very far from their expertise (for example geology for astronomers, and vice versa) but for which it is necessary to have some basic notions (at least as far as vocabulary is concerned) in order to grasp the big questions related to the origins of life on Earth, its evolution and its distribution in the Universe. In addition to lectures, a large part of the training school was devoted to informal discussion, especially during the geological workshop and the preparation of short projects where students experienced the difficulty of the interdisciplinarity when an astronomer, a geologist, a chemist and a biologist have to deal with a common question.

One of the great wealth produced by these schools is that, since 2010, all courses are filmed and available for free on the Astrobiovideo platform . This platform allows students from all over the world to get a background in astrobiology, and to benefit from lectures of the very best lecturers of the discipline. All RED'19 lectures were registered and can be found here: http://astrobiovideo.com/en/.

Europlanet Pro-am Exoplanet Observations Workshop 2019
Location: Observatory of Helsinki, Helsinki, Finland
Date: April 25-28, 2019
Website: **http://fmispace.fmi.fi/index.php?id=exo2018finland**

SOC: Harri Haukka and Veikko Mäkelä
LOC: Harri Haukka and Veikko Mäkelä
Workshop Report: Presentations of the workshop available in workshop page

Short Summary: Workshop was held in Observatory of Helsinki in the vicinity of the city centre and main organizers were Finnish Meteorological Institute and Amateur Astronomical Association Ursa. This workshop was to connect amateur astronomers all over Europe to plan and discuss on how european amateur astronomers can contribute efficiently to scientific community, especially in the field of exoplanet observations and research. During the four day meeting participants from Finland, Germany, Spain, Austria, Czech Republic and Greece had overall 17 oral presentations. Main themes were observation technologies, data processing methods and scientific reporting of results e.g. to the ETD (Exoplanet Transit Database) maintained by the Variable Stars and Exoplanet Section of Czech Astronomical Society.

Exocomets: Understanding the Composition of Planetary Building Blocks
Location: The Lorentz Center, Leiden University, Leiden, The Netherlands
Date: May 13-17, 2019
Website: https://www.exocomets.org
SOC: Paul A. Wilson, Quentin Kral, Sarah Rugheimer, Colin Snodgrass, Melissa McClure
Workshop Report: https://tinyurl.com/exocomets-report

Short summary: The workshop was the very first exocomet workshop to be held. It brought together experts from lots of different communities together in the same room to share ideas and exchange knowledge which undoubtedly fostered new insights and developed fresh approaches to a very timely topic.
The aims of the workshop were to:

- Bring together the exocomet, Solar System, exoplanet, disk and astrobiology communities
- Establish collaborations, foster new insights and develop fresh approaches.
- Determine the most expedient approaches for detecting exocomet compositions.
- Establish what future work would most benefit our understanding of how exocomets affect exoplanet atmospheres and the emergence of life throughout the Universe.

Beyond the insights gained and the new collaborations which were established, there were also tangible outcomes with more expected in the future. The first was a telescope proposal which was written by one of the working groups of the workshop. After two days of intense work it was submitted on time. We are still waiting to hear about the outcome of this. The second is a paper which is currently being written and which is in a draft stage. It is titled: “Exocomets from a Solar System Perspective” and is planned to be published in the Publications of the Astronomical Society of the Pacific. During the writing of the paper we have brought together the Exocomet and Solar System communities and realised that we have a lot in common. The last tangible outcome so far is the website https://www.exocomets.org/ which acts as resource to the community by providing the talks and posters from the workshop.

3rd Advanced School on Exoplanetary Science: Demographics of Exoplanetary Systems
Location: Vietri Sul Mare, Italy
Date: May 27-31, 2019
Website: http://www.mpia.de/ases3
SOC: k. Biazzo, V. Bozza, L. Mancini, A. Sozzetti
Workshop Report: https://tinyurl.com/ases3-report

Short summary: The 3rd Advanced School on Exoplanetary Science (ASES) took place in Vietri sul Mare (Salerno), Italy from 27 to 31 May, 2019. The ASES School is organized every two years and is aimed to provide a comprehensive, state-of-the-art picture of a variety of relevant aspects of the fast-developing, highly interdisciplinary field of Exoplanet research. The School is addressed to graduate students and young post-doctoral researchers, and offers the

fascinating possibility to interact with world-class experts engaged in different areas of the astrophysics of planetary systems. The Lecture topics of the 3rd edition of the School were focused on the exoplanet demographics and unveiling planet formation and evolution. The Lectures were delivered by five senior researchers to an audience of graduate students, Ph.D. students and young post-docs. As for the first two editions, the Lecture Notes of the 3rd Advanced School on Exoplanetary Science will be published by Springer in its Astrophysics and Space Science Library series.

Europlanet Summer School 2019 on Space missions: Ground-based Observations and Science Communication
Location: Moletai Astronomical Observatory, Moletai, Lithuania (under-represented country)
Date: June 11-21, 2019
Website: https://tinyurl.com/moletai2019
SOC: Grazina Tautvaišienė, Anita Heward, Šarunas Mikolaitis, Erika Pakštienė, Manuel Scherf
LOC: Renata Minkevičiūtė, Arnas Drazdauskas, Rimvydas Janulis, Algirdas Kazlauskas, Sigitas Leišis, Šarūnas Mikolaitis, Rima Mikutavičienė, Edita Stonkutė, Gražina Tautvaišienė,
Workshop Report: https://tinyurl.com/epn2019-school-report

Short summary: This summer school was organized as part of the Europlanet 2020 RI NA1 (Innovation through Science Networking) Task 5 (Coordination of ground-based observations) and Europlanet 2020 RI NA2 (Impact through outreach and engagement). Due to a large success and interest to the previous courses on the ground-based observations and science communication for space missions, the aim of the course was to give participants a thorough, multidisciplinary introduction into space missions and the ground-based observations required by space missions before and after launch, as well as an introduction to science communication. More general subjects about specific space missions (TESS, JWST, PLATO etc.), planetary systems, habitability of planets, photometric and spectroscopic techniques were presented. Participants were given some hands-on experience with analysis of stellar chemical composition, detection of stellar variability and/or exoplanets using the Molėtai Astronomical Observatory telescopes (CCD photometry and high-resolution spectroscopy). In addition, the course gave participants the opportunity to develop comprehensive theoretical and practical skills in science communication to the public, media, policy makers, schools and educators. The course was open to PhD and master students, early career scientists, and amateur astronomers. Activities of professional astronomers and amateur astronomers were merged in order to achieve more understanding between groups. The level of the school was orientated to PhD students and early career scientists, however amateur astronomers were provided with the additional scientific support during lectures and observations.

Alpbach Summer School 2017 - 2019

Since 2017 NA1-Task 5 in cooperation with NA1-Task 2 is supporting 8 students of the under-represented countries to participate at the famous and well-known ESA Summer School in Alpbach, Tyrol, Austria. Those students would otherwise not have had the possibility to participate.

In 2016 – one year prior to the start of the Europlanet funding – 7 (out of 60) students from under-represented countries participated on their own costs at the Alpbach Summer School (all others were funded by their respective national funding agencies). In 2017, 12 students from these states applied for the newly available Europlanet funding and 8 were finally chosen to participate. In 2018 Europlanet NA1 already received a total of 39 applications from students of the under-represented countries, of which – due to limited budget – 8 were again finally chosen. For additionally 4 of those students external budget could be made available nationally to increase the number of participants from these states to a total of 12 (out of 64). In 2019 again 29 applications were made and a total of 10 students were selected for support. A verbal quote from one of the students of 2019: "*Thanks to the Europlanet support, I am the first student from my country to participate in the Summer School, but without further support in the next years I will also be the last one*". Since the topic of 2019 was a more technical oriented one, the majority of the students were from the field of aerospace engineering. All reports reports and presentations from the last years can be found at www.summerschoolalpbach.at

The high number of applications from under-represented countries over the last years illustrates not only the high need of funding for the students of such countries, but also that the high potential for planetary sciences in under-represented countries. . The track record of students of this and other summer schools, and the achieved impact on knowledge transfer back into the under-represented countries demonstrates that the support of established and successful summer schools is a viable tool to integrate scientists and engineers into the European community in addition to organise workshops and schools directly via Europlanet. However, it has to be pointed out that students from these underrepresented countries will depend on continued support from the European community for the near future.

Further information on the Alpbach Summer School 2019:

Alpbach Summer School 2019: Geophysics from Space using Micro- or Nano-Satellite Constellations
Location: School house of Alpbach, Alpbach, Austria
Date: July 16-25, 2018
Website: www.summerschoolalpbach.at
Workshop report: Reports and presentations can be found at
https://www.summerschoolalpbach.at/index.php?file=students.htm

Amateur Sessions at EPSC

As in 2017 at EPSC Riga, Europlanet NA1-Task 5 also supported the amateur session at EPSC 2018 in Berlin. There was one joint amateur session (oral & poster), i.e.:

- Professional-Amateur collaborations in small bodies, terrestrial, giant, exo-planets studies and Juno Ground-Based Support (9 talks, 9 posters).

With a total of 18 presentations EPSC 2018 was the European Planetary Science Congress with the biggest attendance of amateurs in the history of EPSC (see Figure below).

Regular communication within NA1-Task 5

During the fourth project year regular communications between the beneficiaries of NA1-Task 5 took place. This includes regular and frequent telecons between Vilnius University and OEAW to coordinate the work within NA1-Task 5. In addition, continuous communication with some of the leading amateur astronomers in Europe proceeded also during project year 4 of Europlanet 2020. During the course of this project year these communications led to a network of amateur and small telescope facilities all over Europe and beyond which is planned to be expanded within the upcoming years.

1.2.6. WP 12.6

During reporting period of 01.09.2018 - 31.08.2019 the Exchange program had one continuously open call, with application submission deadline of 28.2.2019 and travel deadline of 30.6.2019.

Accepted Applications and Details:

September 2018

1. ***Exner Willi:*** "Second workshop of the SHOTS group" 4 days, September 2018

November 2018

2. ***Osama Sarah:*** "Attending the short course GEOMICROBIOLOGY OF EXTREME ACIDIC ENVIRONMENTS: FUNDAMENTALS AND APPLICATIONS IN ASTROBIOLOGY", 3 days, 26-29 November 2018

December 2018

3. ***Hickman-Lewis Keyron:*** "Early Earth surface environments" 5 days, December 2018

January 2019

4. ***Ghica Daniela:*** "Electron Paramagnetic Resonance study of the biotic vs abiotic nature of primitive carbonaceous material", 4 days, 28.-31. January 2019
5. ***Stefan Mariana:*** "Electron Paramagnetic Resonance study of the biotic vs abiotic nature of primitive carbonaceous material", 4 days, 28.-31. January 2019

February 2019

6. ***Antoine Caminiti:*** "Geological and geochemical observations of thermal spring associated to the Afar Depression – a case study from Republic of Djibouti", 7 days, 2.-10. February 2019

March 2019

7. ***Mario Bandic:*** "Reconstruction of the magnetopause positions" 6 days, March 2019
8. ***Giuli Verbanac:*** "Plasmapause Characteristics" 6 days, March 2019

April 2019

9. ***Iaroslav Iakubivskyi:*** "Team up for an ARIEL preparatory survey", 5 days, April 2019
10. ***Andris Slavinskis:*** "Team up for an ARIEL preparatory survey", 5 days, April 2019
11. ***Janis Dalbins:*** "Team up for an ARIEL preparatory survey", 5 days, April 2019
12. ***Anna Aret:*** "Team up for an ARIEL preparatory survey", 5 days, April 2019
13. ***Mark Hofstadter:*** "Part 1: Studying neutral/ion interactions near the magnetopause of a comet. Part 2: Collaborations on potential future missions to Uranus and Neptune.", 7 days, April 2019

June 2019

14. ***Pierre le Sidaner:*** "Registry extension for voevent server", 3 days, June 2019

Statistics:
16 submitted applications, 14 approved: 11 male / 3 female, 9 from under-represented countries.

1.3. Impact

In Year 4, NA1 networking activity has organized 38 topical workshops and meetings, bringing together 1375 scientists, engineers, amateurs and industrial representatives from different countries both inside and outside EU. Especially the number of participants from under-represented countries has risen to 13,75%.**)* Many participants would not be able to participate in these activities without support from Europlanet.

**) Greece has been added to the list of under-represented countries for Year 4.*

NA1 Workshops and summer schools covered and combined all different methods through which planetary science is facilitated: Earth-based observations, including amateur astronomy (8 dedicated workshops), space-based observations, simulations/modeling and laboratory work/instrumentation (3 dedicated workshops).

The support by NA1 has helped the planetary community to optimize the format of several workshops to a level that they have now been established as essential for the field. The community is now motivated to maintain these workshops for the future, beyond Europlanet. For instance, the Outer planet moon-magnetosphere interactions in Iceland will be targeted to be organized as a bi-annual conference. Several

well-attended workshops from years 1-3 were repeated in year 4 (e.g. “Uniting Planetary Models and Data Analysis Tools and Services”, “Planetary Mapping and Virtual Observatory”) reaching to a bigger audience, while evolving the results of the earlier workshop versions.

The full statistical data for NA1 impact is presented in Table 1.

A specific effort has been made to activate the under-represented countries. The special report on inclusiveness activities has been added as an Annex to this report.

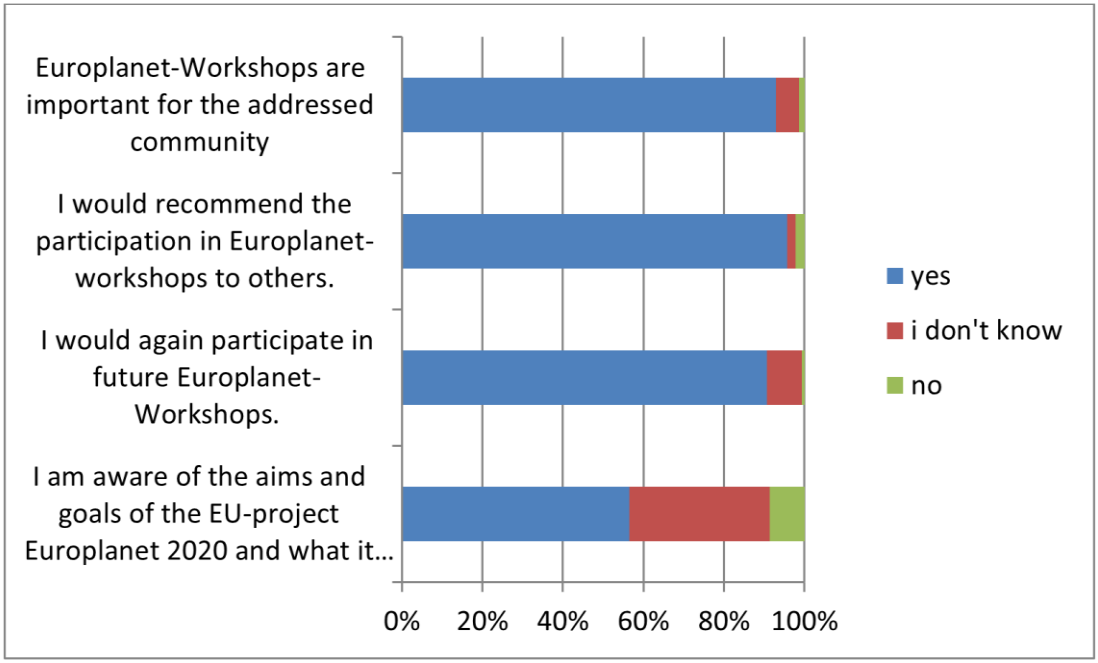
As an example of impact, we quote a participant from Alpbach Summer School 2019, organized by Task 5:

“*Thanks to the Europlanet support, I am the first student from my country to participate in the Summer School, but without further support in the next years I will also be the last one*”.

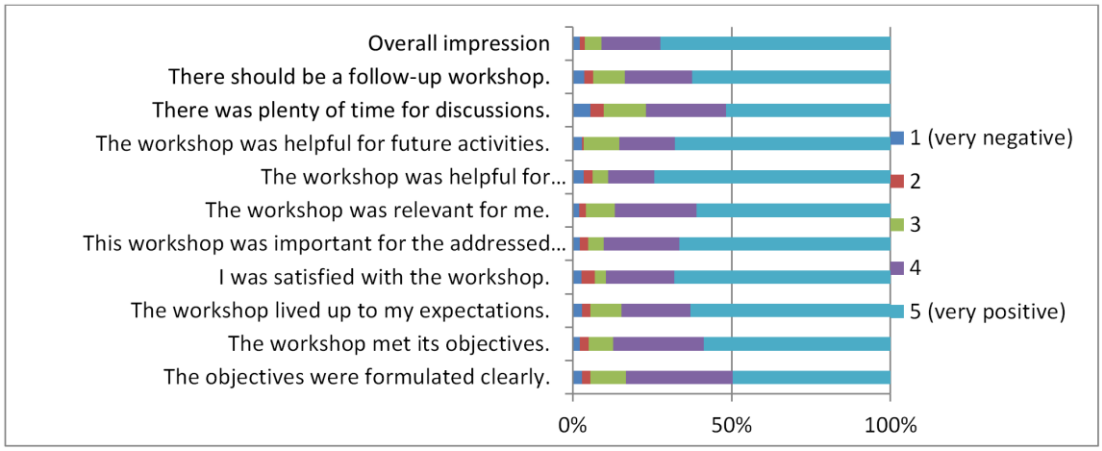
At the Europlanet Impact and Innovation Board the NA1 activity are represented by the NA1 Coordination team or individual Task leaders or their deputies.

Workshop feedback

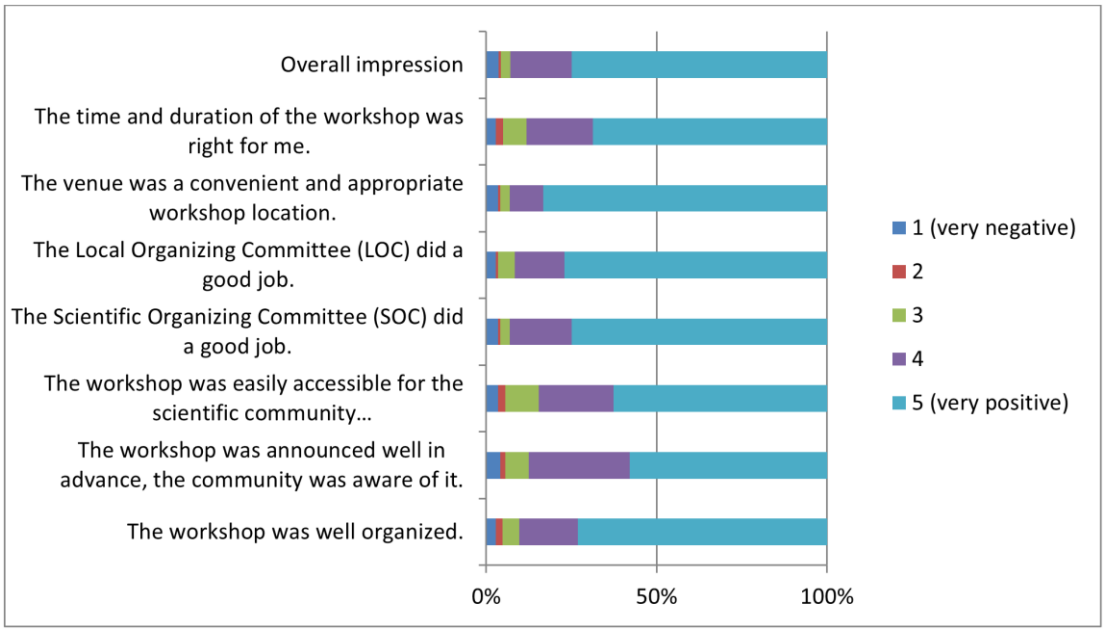
Feedback on the Europlanet workshops were gathered over the whole project via a specific questionnaire developed at the beginning of Europlanet 2020. Some of the statistics can be found graphically visualized below:



Workshop Feedback 1: General questions on Europlanet and its workshops (data from 2015-2019).



Workshop Feedback 2: Workshop content (2015-2019).



Workshop Feedback 3: General workshop feedback (2015-2019).

Statistical data on the NA1 impact.

Year	from	to	EPN year	NA1 Task	Workshop Title	Venue	City	Country	held in inclusiveness target country	Total number of participants	Number of participants of Inclusiveness states	Number of female participants	Number of male participants	Number of early career scientists	Participants from Industry	Amateur Participants	Participants from outside Europe
2015	24.11.	25.11.	1	1	NA1 Kickoff	Freizeit In Hotel	Göttingen	Germany	no	15	2	4	11	0	0	0	0
2016	21.4.		1	1	NA1 progress meeting 1	EGU	Vienna	Austria	no	7	1	1	6	0	0	0	0
2016	31.8.	1.9.	1	1	NA1 progress meeting 2 / 1st annual meeting	FMI	Helsinki	Finland	no	11	0	1	10	1	0	0	0
2017	24.4.		2	1	NA1 progress meeting 3	EGU	Vienna	Austria	no	8	1	1	7	0	0	0	0
2017	2.5.		2	1	NA1 progress meeting 4	Hotel	Windsor	United Kingdom	no	6	0	1	5	0	0	0	0
2017	**28.8.**	**31.8.**	**2**	**1**	**NA1 progress meeting 5 / 2nd annual meeting**	**Hotel**	**Budapest**	**Hungary**	**yes**	**14**	**7**	**5**	**9**	**1**	**0**	**0**	**0**
2018	11.4.		3	1	NA1 progress meeting 6	EGU	Vienna	Austria	no	8	1	2	6	0	0	0	0
2018	**11.9.**	**12.9.**	**3**	**1**	**NA1 progress meeting 7 / 3rd annual meeting**	**Gellert Hotel**	**Budapest**	**Hungary**	**yes**	**26**	**19**	**12**	**14**	**6**	**0**	**0**	**1**
2019	18.2.	22.2.	4	1	Planetary laboratory experiments	University of Stirling	Stirling	UK	no	32	1	12	20			0	0
2019	18.3.	22.3.	4	4	Planetary instrumentation	Hotel Riekonlinna	Saariselkä	Finland	no	32	6	7	25	14	1	0	1
2019	25.3	29.3	4	1	Rosetta workshop	Hotel President	Helsinki	Finland	no	29	0	7	22	6	0	0	2
2019	21.5.	23.5.	4	4	7th European Lunar Symposium	Manchester museum of science and industry	Manchester	UK	no								

2019	22.5.	23.5.	4	1	Mars Atmospheric Science and Recent Mars Missions Workshop	Hotel Los Lanceros	El Escorial	Spain	no	30	0	7	23	12	1	0	1
2019	**4.6.**	**5.6.**	**4**	**1**	**Europlanet Hub Meeting**	**Gellert Hotel**	**Budapest**	**Hungary**	**yes**	**24**	**17**	**13**	**11**	**8**	**1**	**0**	**0**
2019	**10.6.**	**14.6.**	**4**	**1**	**S-SAIL: Solar system atmosphere s' investigatio n and exoplamnet s**	**Lisbon University**	**Lisbon**	**Portugal**	**yes**	**40**	**17**	**12**	**28**	**23**	**0**	**0**	**0**
2019	**21.7.**	**3.8.**	**4**	**1**	**Design of small satellite missions for planetary studies**	**Tartu University**	**Tartu**	**Estonia**	**yes**	**20**	**7**	**4**	**16**				**3**
2019	7.8.	8.8.	4	1	NA1 final meeting	FMI	Tallinn	Estonia	yes	6	1	2	4	2	0	0	0
2016	7.6.	9.6.	1	2	Mars 3D	MSSL/UC L	Dorking	United Kingdom	no	23	5	11	12	23	1	0	4
2016	1.12.	3.12.	2	2	Ethiopia (Danakil Depression in Planetary Science)	University of Bologna	Bologna	Italy	no	20	0	7	13	2	2	2	2
2017	20.3.	24.3.	2	2	Dynamics of planetary systems (Alexander von Humboldt Symposium)		Bad Gastein Salzburg	Austria	no	50	12	9	41	10	2	3	6
2017	26.3.	30.3.	2	2	Exomars Atmospheric Science and Missions Workshop	Hotel Riekonlinn a	Saariselk ä	Finland	no	22	1	6	16	3	0	0	2
2017	19.4.	21.4.	2	2	Planetary Mapping through Virtual Observatory	UPMC CNRS ROSCOFF MARINE STATION	Roscoff	France	no	30	0	10	20	9	2	0	2
2017	**19.6.**	**23.6.**	**2**	**2**	**Comets Formation**	**Hotel**	**Sofia**	**Bulgaria**	**yes**	**53**	**6**	**20**	**33**	**5**	**0**	**0**	**4**

2017	24.7.	26.7.	2	2	5th CHEOPS science workshop	Schloss Seggau	Seggau	Austria	no	89	10	23	66	17	1	0	8
2017	**8.8.**	**10.8.**	**2**	**2**	**Early history of planetary systems and habitable planets**		**Tartu**	**Estonia**	**yes**	**54**	**26**	**17**	**37**	**37**	**2**	**12**	**20**
2017	**25.9.**	**30.9.**	**3**	**2**	**Geosciences for understanding habitability in the solar system**		**Azores**	**Portugal**	**yes**	**68**	**25**	**23**	**45**	**18**	**0**	**0**	**3**
2017	9.10.	11.10.	3	2	Sun's influence on planets	IRAP	Toulouse	France	no	24	3	8	16	3	0	0	4
2017	27.11.	29.11.	3	2	Vespa simulations		Brussels	Belgium	no	25	0	7	18	0	0	0	0
2018	**26.3.**	**30.3.**	**3**	**2**	**Kuiper belt objects**		**Coimbra**	**Portugal**	**yes**	**109**	**8**	**27**	**82**	**50**	**0**	**0**	**59**
2018	**11.6.**	**15.6.**	**3**	**2**	**Planetary atmospheric erosion**	**Puflene Resort**	**Murighiol**	**Romania**	**yes**	**35**	**8**	**7**	**28**	**5**	**2**	**0**	**10**
2018	**12.9.**	**14.9.**	**4**	**2**	**Uniting Planetary Models and Data Analysis Tools and Services**	**Elite Hotel**	**Kalamata**	**Greece**	**yes**	**14**	**3**	**4**	**10**	**5**	**0**	**0**	**2**
2019	11.2	15.2.	4	2	Outer planet moon-magnetosphere interactions	Hotel Selfoss	Selfoss	Iceland	no	40	0	11	29	8	0	0	16
2019	**26.3.**	**28.3.**	**4**	**2**	**BepiColombo Young Scientists Meeting**		**Coimbra**	**Portugal**	**yes**	**37**	**11**	**11**	**26**	**25**	**1**	**0**	**4**
2019	**10.5.**	**13.5.**	**4**	**2**	**Integrations of satellite and ground-based observations and multi-disciplinarity in research and**	**Petnica Science Centre**	**Valjevo**	**Serbia**	**yes**	**33**	**31**	**8**	**25**	**11**	**2**	**1**	**0**

					prediction of different types of hazards in Solar system												
2019	20.5.	22.5.	4	2	Planetary Environment models	IRAP	Toulouse	France	no	14	0	2	12	0	1	0	1
2019	10.6.	13.6.	4	2	Meteorite impacts and their role in the evolution of life	Hotel Dalecarlia	Tällberg	Sweden	no	48	2	12	36	12	0	0	10
2019	11.6.	21.6.	4	2	Vulcano Workshop and Summer School: A natural laboratory for marine, terrestrial and planetary science and technology		Vulcano	Italy	no	44	2	11	33	17	1	0	10
2019	17.6.	2.8.	4	2	Astrophysical Origins: Pathways from Star Formation to Habitable Planets	Erwin Schroedinger International Institute for Mathematical Physics, University of Vienna	Vienna	Austria	no	64	2	26	38	24	0	2	11
2019	1.7.	3.7.	4	2	Planetary Mapping and Virtual Observatory (2nd edition)		Saint-Rémy-lès-Chevreuse	France	no	39	5	11	28	11	3	0	0
2019	**22.7.**	**25.7.**	**4**	**2**	**Uniting Planetary Models and Data Analysis Tools and Services 2**	**Elite Hotel**	**Kalamata**	**Greece**	**yes**	**13**	**8**	**4**	**9**	**6**	**0**	**0**	**0**
2019	12.8.	15.8.	4	2	Exoclimes V, Observation and modeling	University of Oxford	Oxford	UK	no	139	0	54	85	93	2	0	78

					of exoplanet atmospheres												
2016	12.9.	13.9.	2	3	ISSI forum 1: Solar system exploration	ISSI	Bern	Switzerland	no	45	1	11	34	4	5	0	11
2018	5.2.	9.2.	3	3	ISSI workshop 1: Role of Sample Return Missions in the Exploration of the Inner Solar System	ISSI	Bern	Switzerland	no	47	3	18	29	0	0	0	17
2018	22.10.	26.10.	4	3	ISSI workshop 2: Reading terrestrial planet evolution in isotopes and element measurements	ISSI	Bern	Switzerland	no	47	0	11	36	0	0	0	22
2018	12.11.	16.11.	4	3	ISSI workshop 3: Comparative study of the atmospheres of planets and exoplanets	ISSI	Bern	Switzerland	no	37	1	8	29	0	0	0	12
2019	19.2.	20.2.	4	3	ISSI forum: Solar System | Exoplanet Science Synergies	ISSI	Bern	Switzerland	no	27	2	8	19	0	0	0	6
2016	21.1.		1	4	Eurospace meeting		Paris	France	no	12	0	3	9	0	0	0	0
2016	26.4.	28.4.	1	4	Eurospace meeting	Rolex Learning Center	Lausanne	Switzerland	no	85	0	10	75	0	80	0	0
2016	**21.9.**	**22.9.**	**2**	**4**	**Asteroid mining**		**Luxembourg**	**Luxembourg**	**yes**	**79**	**13**	**11**	**68**	**19**	**21**	**1**	**16**
2016	24.10.	27.10.	2	4	IWIPM-3		Pasadena	USA	no	250							
2016	14.11.	18.11.	2	4	Space weather and radiation design (in	ESWW	Oostende	Belgium	no	20	12	0	0	3	3	0	1

					conjunction with PSWS).												
2017	**17.9.**	**22.9.**	**3**	**4**	**Towards a lunar village**	**Hotel**	**Riga**	**Latvia**	**yes**	**60**	**20**			**20**	**5**	**0**	**5**
2017	28.11.	1.12.	3	4	Space weather and radiation design	ESWW	Oostende	Belgium	no	25	5			5	5	0	2
2018	**16.4.**	**17.4.**	**3**	**4**	**Asteroid mining 2**	**Univ. of Luxembourg**	**Luxembourg**	**Luxembourg**	**yes**	**90**	**25**			**10**		**0**	**5**
2018	**13.8.**	**18.8.**	**3**	**4**	**Microsatellites in planetary and atmospheric research**		**Tartu**	**Estonia**	**yes**	**50**	**18**			**35**	**0**	**0**	**2**
2019	18.4.		4	4	Exoplanetary Magnetism	Imperial College	London	UK	no	22	0	4	16	13	3	3	
2019	12.5.	17.5.	4	4	IVOA Interop May 2019	Observatoire de Paris	Paris	France	no	132							35
2019	6.7.	12.7.	4	4	IPPW: Planetary Entry Probes - Science & Technology	Oxford University	Oxford	UK	no	240	3	55	185	40	29		145
2016	11.5.	13.5.	1	5	Ground-based observations in support of the JUNO mission to Jupiter	Obs Midi Pyrenees	Nice	France	no	33	4	1	32	0	0	22	5
2016	20.6.	22.6.	1	5	Rosetta ground-based observations	Schloss Seggau	Seggau	Austria	no	40	0	11	29	8	0	2	14
2016	**2.8.**	**12.8.**	**1**	**5**	**Exoplanets**	**Moletai Observatory**	**Moletai**	**Lithuania**	**yes**	**45**	**31**	**13**	**32**	**17**	**0**	**13**	**0**
2016	25.10.	27.10.	2	5	Planetary Radio Emissions VIII	Schloss Seggau	Seggau	Austria	no	50	5	10	40	13	0	0	18
2017	9.6.	12.6.	2	5	Pic du Midi T1M Planets Observation Campaigns Workshop	Pic du Midi	Toulouse	France	no	7	1	0	7	0	0	5	0
2017	18.7.	27.7.	2	5	Alpbach Summer	School House of	Alpbach	Austria	no	60	8	22	38	60	0	0	0

					School: Dust in the Solar system	Alpbach										
2017	**18.7.**	**28.7.**	**2**	**5**	**Europlanet Summer School 2017 "Space Missions: Ground-based Observations and Science Communication"**	**Moletai Observatory**	**Moletai**	**Lithuania**	**yes**	**32**	**15**	**17**	**15**	**10**	**0**	**8**	**2**
2017	**17.9.**	**22.9.**	**3**	**5**	**2 Amateur Sessions at EPSC 2017: - AM1 Amateur collaborations in small bodies, terrestrial, giant and exoplanetary research - AM2 Juno ground-based support from amateurs**	**EPSC 2017**	**Riga**	**Latvia**	**yes**	**15**	**1**	**1**	**14**	**1**	**0**	**11**	**2**
2018	10.5.	11.5.	3	5	New Views of Jupiter: Pro-Am Collaborations during and beyond the NASA Juno Mission	Royal Astronomical Society	London	United Kingdom	no	50	5	4	46	4	2	33	8
2018	**19.6.**	**21.6.**	**3**	**5**	**Didymos Observer Workshop**	**Astronomical Institute of the Charles University in Prague**	**Prague**	**Czech Republic**	**yes**	**29**	**6**	**4**	**25**	**6**	**0**	**1**	**9**
2018	**24.6.**	**1.7.**	**3**	**5**	**Geology and geophysics of the solar system**	**Petnica Science Centre**	**Valjevo**	**Serbia**	**yes**	**43**	**17**	**28**	**15**	**43**	**0**	**0**	**20**

					bodies											
2018	17.7.	19.7.	3	5	Tools and Services for Planetary Observations and Image Analysis by Amateurs	Pic du Midi	Toulouse	France	no	16	1	4	12	1	0	12	0
2018	19.7.	26.7.	3	5	Alpbach Summer School: Sample return from small solar system bodies	School House Alpbach	Alpbach	Austria	no	62	12	21	41	62	0	0	0
2018	**31.7**	**10.8.**	**3**	**5**	**Europlanet Summer School 2018 "Space Missions: Ground-based Observations and Science Communication"**	**Moletai Observatory**	**Moletai**	**Lithuania**	**yes**	**33**	**15**	**18**	**15**	**4**	**0**	**13**	**1**
2018	17.8.	18.8.	3	5	Basics of Astrobiology Summer school	University of Vienna	Vienna	Austria	no	66	14	27	39	53	0	0	15
2018	**5.9.**	**7.9.**	**4**	**5**	**Physics of comets after the Rosetta mission**	**Stara Lesna**	**Stara Lesna**	**Slovakia**	**yes**	**32**	**8**	**10**	**22**	**3**	**0**	**0**	**11**
2018	18.9.	18.9.	4	5	Professional-Amateur collaborations in small bodies, terrestrial, giant, exo planets studies and Juno Ground-Based Support	EPSC 2018	Berlin	Germany	no	19	5	2	17	2	0	17	0
2018	**15.10**	**22.10**	**4**	**5**	**PLATO 2.0**	**Ioulida**	**Kea**	**Greece**	**yes**	**14**	**7**	**4**	**10**	**3**	**2**	**7**	**0**

	.	**.**			**Citizen Planetentest**												
2019	5.3	9.3.	4	5	RED'19: Astrobiology Introductory Course	Parc Ornithologique du Teich	Bordeaux	France	no	38	5	19	19	38	0	0	3
2019	25.4.	28.4.	4	5	Pro-Am exoplanet observations workshop	Observatory of Helsinki	Helsinki	Finland	no	22	8	2	20	3	0	20	0
2019	13.5	17.5	4	5	Exocomets: Understanding the Composition of Planetary Building Blocks	Lorentz Center, Leiden University	Leiden	The Netherlands	no	56	3	27	29	17	0	0	19
2019	27.5.	31.5.	4	5	3rd Advanced School on Exoplanetary Science: The Demographics of Exoplanetary Systems		Vietri sul Mare	Italy	no	85	2	34	51	85	0	0	11
2019	**11.6.**	**21.6.**	**4**	**5**	**Europlanet Summer School 2019**		**Moletai**	**Lithuania**	**yes**	**33**	**21**	**18**	**15**	**5**	**1**	**6**	**3**
2019	11.6	21.6.	4	5	Alpbach Summer School		Alpbach	Austria	no	58	10	20	38	58	0	0	2

Overall statistics

Total number of participants		Number of participants of Inclusiveness states	Number of female participants	Number of male participants	Number of early career scientists	Participants from Industry	Amateur Participants	Participants from outside Europe
SUM	**3462**	**561**	**822**	**2011**	**1019**	**179**	**194**	**608**
% of total		**16.2**	**23,7**	**58**	**29,4**	**5,28**	**5,72**	**17,94**

Annex 1- Report on INCLUSIVENESS ACTIVITIES
01/09/2018 – 31/08/2019

1. Objectives

Our objective is to integrate more and more scientists and industrial representatives from under represented countries into the European space research community. Having a wider, less homogeneous scientific community will boost competition and scientific results. Expanding the European concept to the Eastern parts can also increase cost effectiveness.
During this period more effort was put into strengthening personal contacts and building a network of scientists and engineers. There has been also a shift in our understanding of "network" from being a rather passive set of emails to a network of people who actively want to take part not only in European space research but also in the quest to battle its fragmentation.

2. Explanation of the work carried out

During this period a more active approach was chosen because the previous working method of contacting people via email did not prove to be successful. Two 1.5 day - meetings were organised in Budapest to discuss exclusively the inclusiveness program with the participation of ~15 scientists from Eastern Europe (reports below). Both proved to be very successful and inspirational both for NA1 in shaping our way in the direction of the future hub structure, and both for Eastern European scientists in seeking actively cooperation possibilities. Besides dedicated workshops, our dissemination activities were also carried out more intensively.
Both Inclusiveness Meetings and all our dissemination activities bring in a bunch of further ideas. Some will be presented here as success stories and they might be added into the core of our activities in the future.

Dissemination activities

During the last year we have spent more effort on advertising Europlanet's inclusiveness activities and raising awareness of the geographical imbalance existing in Europe. A short introductory talk was held at the beginning of several Europlanet funded workshop (listed in Dissemination part of the Periodic report).

People usually followed the talks with great interest and shared their astonishment about the low participation rate of Eastern European scientists on European conferences. As a result, the conveners of the last Europlanet-ISSI Forum could be persuaded to invite at least 5 Eastern European scientists, but finally 2 people could participate. This is already a good first step, if we consider that the two ISSI workshops held during this period did not have any Eastern European participants invited to scientific discussion, but 1 was representing Europlanet.
This task is meant to be continued in the next bid by the Widening Officer, that does not need to be one and the same person, but could be a chain of people representing Europlanet at different conferences all around Europe.

Through our dissemination activities a strong cooperation started with EPEC Diversity working group.

Inclusiveness discussion meetings organized:

WS #1 Inclusiveness Forum

Date and location: Budapest, 11-12 September, 2018.
LOC: Andrea Opitz, Melinda Dósa, Klaudia Szabó (Wigner RCP)
Total number of participants: 26
Participants from under-represented countries: 19 (73%)
Female participants: 12 (46%)

The forum was the continuation of a debate started at the EPSC in Riga, where it became clear that there is a strong interest for such activities all around Europe.
Participants representing Europlanet were: Louise Thomas (Open University), Ari-Matti Harri, Maria Genzer and Harri Haukka from FMI, Norbert Krupp and Elias Roussos from MPI, Manuel Scherf (ÖAW-SRI) and the LOC from Wigner RCP including Karoly Szegő, Anikó Timár, Zoltán Németh.
Participants from underrepresented states were: Veneta Guineva (BAS, Space Research and Technology Institute, Bulgaria), Giuli Verbanac (University of Zagreb, Croatia), Jan Soucek and Jan Lukacevic (CAS, Institute of Atmospheric Physics, Czech Republic), Iaroslav Iakubivsky (Tartu Observatory, Estonia), Konstantina Moutsouroufi (University of Athens, Greece), Ákos Kereszturi (Konkoly Observatory, Hungary), Ewa Szuszkiewicz (University of Szczecin, Poland), Ruben Goncalves (Institute of Astrophysics and Space Sciences, Lisbon, Portugal), Magda Stavinschi (Astronomical Institute of RAS, Romania), Octav Marghitu (Institute for Space Sciences, Romania), Milan Radovanovic (Geographical Institute Jovan Cvijic, Serbia), Zuzana Kanuchova (Astronomical Institute of SAS, Slovakia)

First, participants from each country presented their country's space research activities according to the previously distributed template focusing on strength and weaknesses. Based on the presentations we could identify the main general problems of these countries and some specific ones. The main problems that these countries share are the followings:

- Insufficient funding, leading to lack of predictability and sustainability of the institutions.
- Science career is not attractive enough to young researchers because of the low salaries. It was emphasised that not the general low level of salaries is meant, but the discrepancy between the public and private salaries that makes the field not competitive and discourages young people to choose a scientific career.
- Information gap due to the lack of travel opportunities and inadequate supply of relevant literature (many do not have access to the important journals and use illegal websites to obtain scientific papers).
- Low level of information about grant opportunities, forming project proposals. Lack of direct connection to international projects and low involvement in H2020 and other projects. Lack of international collaborations.
- Lack of specific knowledge on methodology.
- Low visibility at conferences, no invited speakers, but also low participation rate at organisations and societies.
- Senior scientists and postdocs go abroad. It is very typical that you have young students and professor emeritus staff within the space department, but no middle-aged leaders, teachers, supervisors, managers.
- Administrative burdens, too much paperwork. Often also problems to meet budgetary and administrative requirements.

Some countries had specific problems, e.g. Serbia is not even an EU member, Slovakia not an ESA member, thus there is no industry involvement in space science questions.

Suggested solutions included (and were ranked according to importance):
1. Improve networking and international collaboration
2. Bring external funding to these countries
3. Popularise science among the public, in elementary and secondary schools
4. Manage administrative load

Possible measures of success were also identified:

- an increase in the number of joint publications
- an increase in the number of participants and talks from inclusiveness countries at EPSC
- increase submitted TA proposals from inclusiveness countries

Prompt impact: Immediately after the Inclusiveness meeting there was one proposal on NA1 website to organise a workshop in Petnica Science Center, Valjevo, Serbia, which was finally held in May, 2019. Since then, the organiser (Wigner RCP) has more lively and reliable contacts with Slovakia, Czech Republic and Serbia. A closer collaboration manifested also in the common organisation of the afore mentioned Valjevo workshop.

WS #2 EUROPLANET Meeting with a focus on Widening activities and Industry
Date and location: Budapest, 4-5 June, 2019.
LOC: Melinda Dósa, Lilla Kalocsai, Anikó Timár (Wigner RCP)
Total number of participants: 24
Participants from under-represented countries: 16 (66%)
Female participants: 15 (63%)

Hub leaders and country representatives were invited from all over Europe in order to discuss issues concerning inclusivity and the involvement of industry.
Anita Heward (Europlanet 2020 RI Communication Officer), Marcell Tessényi (Europlanet 2020 RI Industry Officer) and Jonas L'Haridon (European Science Foundation / Europlanet Society Executive Office) were representing Europlanet 2020 RI. All the Hub-leaders or their substitutes were invited and with the exception of the German, Swiss and UK-Ireland hub, all of them were represented. From hubs involving at least 3 countries, country representatives were invited as well. For the industry section we also invited the industry officer of Poland, being the biggest country in the Central Europan hub, hosting the event.
During the first section each hub presented its members and reported on its status and recent activities. Some recent problems were also mentioned. Concerning our networking activity the following ideas were raised and will be put into practice:

- ESF will help the Hub chairs to reach out to past EPSC participants. The website and email aliases of each hub will also help building the network and keeping contact.
- Members are encouraged to advertise Europlanet's and the hub activities at local events, e.g. the Spain-Portugal hub was officially presented in the Spanish National Meeting of Planetary Science and Exploration of Solar System at INTA, in Madrid, Spain. The Italian Hub also had a successful presence at the Italian national congress of planetary sciences, including outreach programmes in which high school students and journalists participated.
- An online survey is being planned in each country to collect all those people who are in any way related to planetary sciences (scientists, amateurs, companies, educational institutions, etc.)

Several questions were discussed concerning the hub structure and how the hubs should and could help Europlanet's aims. They are also relevant from the inclusiveness point of view, as the Eastern hubs have the same possibilities and responsibilities.

The second section of the workshop was about the problem of Eastern Europe being under-represented in all European conferences. There was discussion regarding how to interpret the low attendance from those countries: is it due to lack of funds to attend the conference, does it reflect the relatively low number of planetary scientists in these countries, and what active steps could be taken to build up participation? We were discussing measures Europlanet RI could undertake when organizing EPSC.

Although there are guidelines on diversity and inclusion for EPSC conveners and the SOC, which highlight the need to ensure that speakers represent the whole community, more could be done, and best practice learned from other meetings. To reinforce the message, EPSC could hold a telecon to go over the guidelines and raise awareness of unconscious bias and the need to provide a representative programme.
There were suggestions to organize webinars to support under-represented countries applications for European Commission funding, and provide access to successful (and even unsuccessful) proposals to help people understand the process and raise the quality of proposals
Europlanet could collate statistics for policy makers regarding the benefits of investment in planetary science (e.g. number of publications compared to amount spent on missions / research)

To discuss Europlanet's links with the industry, Marcell Tessényi (Industry Officer) was invited, and also industry representatives from Hungary and Poland. A. Szkulmowska is an entrepreneur with links to optics industry in Poland and beyond. M. Tessényi presented the Europlanet Industry Working Group and its recent activities. An industry database has been compiled from publicly available information, but it will need support from the hubs to validate the information and to keep it up to date. All focus to date has been on space technology, but there may be other related industries (e.g. optics).
All participants agreed to work on a white paper on relationships with industries. The aim would be to compile a strategic document on industry relationship with the scientific community. The hubs should consider realistic actions to improve the training of young scientists with respect to industry career paths and other topics relating to research / industry bridges.
Several members expressed interest to have access to case studies on collaborations between research and industry. Two examples were mentioned: Cassini RPWS (Radio and Plasma Wave Science) and ExoMars collaboration between industry and the Czech Academy of Sciences, and A. Szkulmowska's photonics instrumentation.

***Prompt impact*:** After the suggestion of the Italian representative, a common proposal to ESOF (Euroscience Open Forum) in Trieste 2020 was put together by Anita Heward with the active participation of many members. An interactive round table discussion is proposed including 2 (out of 5) panellists from under-represented states (Poland and Portugal).

3. Impact and Success stories

All success stories can be related to one of the tasks in NA1. We can use statistics as a good measure of effectiveness:

- 15 out of 29 workshops were held in inclusiveness states during the reported period (34%)
- 16% of all Europlanet 2020-RI workshop participants were from URS during the given period (the same figure was about 10% in 2015-16)
- 53% of all applicants for Europlanet 2020-RI expert exchange were from URS during the last call
- 46 URS applicants to the Alpbach Summer School in 2018 and 29 applications in 2019 (compared to ~12 in 2017)
- Participation rate at the EPSC 2018 in Berlin fell back to 7.6% after the previous year's high (18.3%), when EPSC was held in an under-represented state (Latvia)

Success story Nr 1: A "wish list" handed in for NASA

Dr. Hofstadter, from NASA's Jet Propulsion Laboratory, visited the Wigner Research Center for Physics for one week in 2019. It was a productive visit during which valuable information was exchanged, setting up future work. The two institutes had not have a close working relationship before, if it were not for the expert exchange program, the visit would never have happened. But

thanks to Europlanet, after a thorough and detailed introduction of all scientific activities on both sides, actions were identified for continued and expanded collaborations between the Wigner RCP in Hungary and scientists/engineers in the U.S. U.S. scientists studying outer planet magnetospheres have been contacted about undertaking further exchanges with scientists at Wigner, including the possibility of U.S. researchers co-Advising Hungarian graduate students. These discussions are on-going. Furthermore, the specifications of the Wigner RCP designed FluxSet magnetometer are being made available to scientists at various U.S. institutions, in the hopes of triggering interest within the U.S. of flight-qualifying these new sensors.
In summary, this EUROPLANET grant resulted in a valuable exchange that has the potential of leading to continuing collaborations which are beneficial to personnel in both Hungary and the United States. All of us involved would like to thank EUROPLANET for enabling this effort and managing the Exchange program.

Success story Nr 2: A local project raised to European level
During the second meeting Romania was represented by Iharka Szücs-Csillik, an astronomer from the Romanian Academy of Sciences. She has co-authored a book on teaching astronomy for small children and kindly offered the book to be available to EPSC participants in 2019 in Genf. She has organised a splinter meeting in EPSC where she will distribute a copy of the book in 3 languages for all those interested. The printing costs were funded by Europlanet 2020 RI.

Success story Nr 3: Message spreading
After our increased dissemination activities it was good to see that many have understood and taken seriously our message of urging steps against geographical imbalances.

- Right after one of the talks, I came across a note on Twitter about how serious the situation is with reference to the given talk.
- The conveners of the second Europlanet-ISSI forum gave all their efforts to invite at least 5 scientists from Eastern Europe. Finally, 2 people participated, but compared to the previous zero-participation rate, it is already a very good start. It was also useful to see how the conveners think, what their concerns are about inviting less-known people and prepare scientists in under-represented states to increase their visibility, and try to “sell themselves” better.
- The 2nd EPEC annual week in Lisbon was organised by Ruben Goncalves. He paid special attention that more early carrier scientists apply from under-represented states (and get partial funding) and also offered a 30 min slot to talk about inclusivity. About 1/3 of participants came from Eastern Europe and Portugal.

Success story Nr 4: The network is alive
We have built a network of inclusiveness scientists and engineers working in inclusiveness countries. It was rather a passive, one-way communication channel for a long time, but after the first (and especially after the second) Europlanet meeting focusing on inclusiveness issues, the network was successful in:

- suggesting scientists to be invited to the 2nd ISSI-Europlanet forum
- contributing to the Europlanet proposal to ESOF 2020 put together by Anita Heward (see before)
- suggesting an Eastern European candidate to be Executive Board Member of the Europlanet Society