



# eur PLANET 2024

Research Infrastructure

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## Deliverable D12.4

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1. **Nature:** R = Report, P = Prototype, D = Demonstrator, O = Other

2. **Dissemination level:**

PU	PP	RE	CO
Public	Restricted to other programme participants (including the Commission Service)	Restricted to a group specified by the consortium (including the Commission Services)	Confidential, only for members of the consortium (excluding the Commission Services)

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**Executive Summary / Abstract:**

This annual report provides a comprehensive overview of the activities performed within WP12 NA2 Coordination of Ground-based Observations over the third project year of Europlanet 2024 RI. These include, among others, the coordination of the Europlanet Telescope Network, collaboration with amateur astronomers, the organization of virtual events, and management and dissemination activities. It also gives an overview on the objectives and impact of NA2, as well as deviations from the original work plan due to the COVID-19 pandemic.

**Deliverable**

**1 Explanation of work & Overview of progress**

**1.1 Deliverables**

Deliverable number	Deliverable name	Lead participant	Dissemination level	Delivery date (month)	Status

D12.1	Observation Campaign Website and Observational Alert System	AMU	PU	12	Delivered on time
D12.2	NA2 Annual Report	IWF-OEAW	PU	24	Delivered on time
D12.3	NA2 Annual Report	IWF-OEAW	PU	36	Delivered on time

## 1.2 Milestones

Milestone number	Milestone name	Due date (month)	Means of verification	Status
MS9	Kick-Off Meeting of NA2	3	meeting organized and held	held as virtual meeting on March 30, 2020
MS10	Establishment of the Scientific Working Group	3	Scientific Working group Established	established during kick-off meeting on March 30, 2020
MS13	NA2 Website and Observational Support Application Form	4	NA2 website and application form for the observational support online.	published online on June 01, 2020
MS14	Memorandum of Understanding	5	Set up to be signed by Europlanet 2024 and collaborating telescope facilities.	finalized and sent to facilities in June 2020
MS20	Amateur Workshop Guidelines	8	Workshop Guidelines for the regional amateur trainings established	finalized in September 2020
MS32	Year 1 Scientific Working Group (SWG) Telecons	12	4 SWG telecons held to decide on observational support applications.	Meeting to discuss review process on March 31, 2020; first review on November 27, 2020
MS33	Year 1 Amateur Training Workshops	12	At least one big amateur workshop at Pic du Midi held	held as 3 virtual workshops at EPSC 2020 due to COVID-19
MS34	Year 1 Observational Workshops	12	have been organized and held	shifted to PM19 due to COVID-19
MS35	Year 1 Observational Support	12	Up to 50 observation nights agreed to be funded by the project	first observation nights taking place in January 2021

MS58	Year 2 Scientific Working Group (SWG) Telecons	24	SWG telecons held on average every two months depending on incoming proposals	Telecon on 30. Nov. 2021 on implementation of "fast-tracking" follow up observations.
MS59	Maintenance/further updates of the Observational Alert System, 1st iteration	24	Work in progress as scheduled	<a href="http://www.astro.amu.edu.pl/parsec">www.astro.amu.edu.pl/parsec</a>
MS60	Year 2 Amateur Training Workshops	24	under progress – but only virtual (already held one virtual training workshop + 3 EPSCsplinter sessions)	<a href="http://mao.tfai.vu.it/europlanet2022/">http://mao.tfai.vu.it/europlanet2022/</a> Online Workshop, Postponed to 9. – 11. 2. 2022
MS61	Year 2 Observational Workshops	24	Hybrid Workshop 16.- 27. 6. 2021	Europlanet Virtual Summer School on "Asteroid Photometry" at Moletai Observatory, Lithuania
MS62	Year 2 Observational Support	24	Under progress, Rolling call open	
MS91	Year 3 Scientific Working Group (SWG) Telecons	36	SWG telecons held depending on incoming proposals	Telecons: 23/03/2022 25/07/2022 11/11/2022
M92	Maintenance/further updates of the Observational Alert System, 2nd iteration	36	Work in progress as scheduled & 3 alerts issued via PVOL	<p>link to service: <a href="http://www.astro.amu.edu.pl/parsec">www.astro.amu.edu.pl/parsec</a></p> <p>Moreover, we have developed the database for collecting observations from the Europlanet Telescope Network. The database is connected to VESPA, where the data becomes available after one year of embargo. Such solution is more convenient for users who don't have to learn how to transfer data to VESPA, they simply upload the data to our database.</p> <p>Alerts regarding planetary observations issued via the PVOL system: <a href="https://pvol2.ehu.eus/">https://pvol2.ehu.eus/</a>          Specific alerts in 2022:          2022-03-27- Pluto occultation observable from the South East Pacific on June 1, 2022          2022-05-28 - Return of the Venus</p>

				Cloud Discontinuity 2022-09-20 - Jupiter opposition and Juno's Europa flyby on 26 Sep. 2022.
MS93	Year 3 Amateur Training Workshops	36	2 training workshops held as scheduled	- Europlanet Telescope Network Science Workshop, Feb 9-11, 2022 (online) - Europlanet Pro-Am Comet Community (Hybrid) Workshop, June 10-12, 2022 (hybrid - Prague & online) -> also hybrid between training workshop and science workshop
MS94	Year 3 Observational Workshops	36	3 science workshops held & 2 pro-am science workshops at EPSC 2022	Workshops held: - 2 fireball workshops (Feb 4-5, 2022 & Aug 14-15, 2022) - Europlanet Pro-Am Comet Community (Hybrid) Workshop, June 10-12, 2022 (hybrid - Prague & online) -> also hybrid between training workshop and science workshop  Pro-am science workshops at EPSC 2023: - Exoclock and Amateur Astronomy contribution Exoplanet Science; - Amateur Observations of Outer planets: Juno and James Webb support
MS95	Year 3 Observational Support	36	Support of observational proposal at Europlanet Telescope Network	Out of 14 observation requests 10 were granted in the reporting period, i.e., 124 nights were requested and 66 were granted. An additional 7 nights were granted for free at Moletai observatory

### 1.3 Objectives

#### 1.3.1 Task 12.1: Management of the Work Package

Task 12.1, managed by a core team led by IWF-OEAW, supported by the deputy UoE and advised by the task leaders and its deputies, coordinates and manages NA2. The core team aims to also work closely with NA1 and to exploit the Europlanet Society's Regional Hubs to distribute information on observational campaigns and training events to the wider planetary science community and to bring in new participants.

In this project year, the overall objectives of this task are

- Overall coordination of the WP and support of all NA2 tasks
- Distributing and disseminating the campaigns, events, and results of NA2

- Maintaining or update as required the NA2 website as part of the general Europlanet website together with Tasks 12.2 and 12.4
- Preparing the NA2 Annual Report (D12.3).

### 1.3.2 *Task 12.2: Coordination of Observations*

This task, led by UoE and supported by AMU, IWF-OEAW, UPV/EHU, VU and OBSPARIS, is organising the cooperation of a network of small telescopes (i.e. the so-called Europlanet Telescope Network) to facilitate and coordinate observation campaigns related to different planetary science topics. It has established a Scientific Working Group (SWG), thereafter called 'Science Advisory Panel' (SAP), including science experts of different research topics. The SAP plays a key role in developing the network of telescope facilities and in supporting and coordinating planetary observation campaigns. The SAP is also reviewing applications for observational support. In addition, Task 12.1 will, led by AMU, develop a generalized alert system for observations, which will notify and allow participating observatories to select appropriate targets across the diverse range of planetary science topics listed above. A dedicated website has been created, gathering easy-to-find information about the observation campaigns and links to the tools for observation planning (first prototype online as of project month 12).

In the third project year, the overall objectives of this task are:

- SAP reviewing incoming application forms for the telescope network (MS91)
- Updating and maintaining the observational alert system (M92)
- Development of a database for collecting observational data of the telescope network and linking it with VESPA.

### 1.3.3 *Task 12.3: Amateur Education & Training*

This task, led by IWF-OEAW and supported by UPV/EHU and OBSPARIS, exploits the amateur community's potential to support planetary science i) by streamlining workflows and cooperation with professional scientists, and ii) by reaching out to the diverse regional communities within Europe and beyond. The main objective of this task is the organisation of dedicated training and education workshops for amateurs. This will include workshops that will be held in the different Europlanet Regional Hubs to engage the different local communities. To assure quality, standardised workshop guidelines and tutorials will be developed in the project.

In this project year, the overall objectives of this task are:

- Organisation of two amateur training workshops (MS93)
- Supporting amateur observations in planetary sciences.

### 1.3.4 *Task 12.4: Ground-based Observations Support*

This task, led by VU and supported by IWF-OEAW, UPV/EHU, UoE and OBSPARIS, supports coordinated planetary observation campaigns by (i) supporting scientists and trained amateurs to observe using the telescope network set up in Task 12.2, (ii) the support of professional telescope facilities to observe in dedicated observation campaigns and (iii) the support of workshops for the organisation of coordinated observation campaigns. Task 12.4 (together with Task 12.2) has set up a simple application form to the telescope network and the SAP will recommend which applications will be funded. Observational data that will be produced during supported campaigns will be made publicly available, ideally through the

Virtual Observatory of VESPA. A Memorandum of Understanding (MoU) was set up to facilitate the collaboration between Europlanet 2024 RI and the telescope facilities.

In this project year, the overall objectives of this task are:

- Supporting researchers and amateurs to observe at the telescope network (MS95)
- Organisation of an Observational Workshop (MS94).

Due to the Russian invasion of Ukraine we have lost contact with the Ukrainian telescope sites.

## 1.4 Explanation of the work carried out per WP

### 1.4.1 Task 12.1: Management of the Work Package

The management structure of NA2 was established at the beginning of the project with IWF-OEAW (Günter Kargl and Manuel Scherf [until 30. 9. 2021]) leading the project and UoE (Colin Snodgrass) as deputy. The core team of NA2 is further supported by all other beneficiaries within NA2, i.e., UPV/EHU (Ricardo Hueso and Itziar Garate-Lopez), AMU (Edyta Podlowska-Gaca and Grzegorz Dudzinski), VU (Grazina Tautvaisiene and Sarunas Mikolaitis), and OBSPARIS (Francois Colas).

#### NA2 website (part of MS13)

The website of NA2 (<https://www.europlanet-society.org/europlanet-2024-ri/telescope-network/>), as part of the main Europlanet website, was prepared and put online on June 1, 2020, together with the NA2 Call for Observations (MS4, <https://bit.ly/EPNObservationCall>). The website is continuously updated to disseminate the information provided by NA2. It lists all workshops organised by NA2 and all proposals that were granted to observe at the Europlanet Telescope Network

#### Support and communication within NA2

Task 12.1 further coordinated the communication and collaboration between the different tasks of NA2 and with Europlanet 2024 RI. NA2 telecons combining all tasks and beneficiaries took place on a bi-monthly basis. In addition, further online meetings were regularly organized to discuss amateur workshops and proposals to the NA2 Call for observations and other NA2 related issues.

For dissemination activities see Section 2.

### 1.4.2 Task 12.2: Coordination of Observations

The main objective of this task was the establishment of a network of telescopes providing their facilities for observations to the planetary science community. This network, named Europlanet Telescope Network, was established over the first months of the project and officially kicked-off with the start of the so-called NA2 Call for Observations on June 1, 2020 at <https://bit.ly/EPNObservationCall>. Through this open call, observers – professionals and amateurs – can apply to observe at the facilities in the network (see Task 12.4 for a full description of the application form and procedure). The Europlanet Telescope Network initially contained 15 different facilities from Europe and beyond and was by now extended to 17 observatories by the end of 2022. The network seeks to draw in further facilities and had already received interest from additional observatories such as the Stefanik Observatory in the Czech Republic.

The Ussuriysk telescope in Russia was permanently suspended due to imposed EU sanctions and the contact to the three Ukrainian telescopes was lost due to the war.

The current facilities in the network are:

- **Pic du Midi Observatory**, France, 1.06 m
- **Moletai Astronomical Observatory**, Lithuania, 1.65 m and 35/51 cm
- **Kryoneri Observatory**, Greece, 1.2 m
- **Skalnate Pleso Observatory**, Slovakia, 1.3 m and 61 cm
- **Faulkes Telescope Project**, worldwide, two 2 m, nine 1 m, and ten 40 cm robotic
- **Tartu Observatory**, Estonia, 1.5 m and 60 cm, and 30 cm robotic
- **Danish Telescope at La Silla Observatory**, Chile, 1.54 m
- **Beacon Observatory**, UK, 42 cm
- **Observatorio del Teide**, Spain, 82 cm and 45 cm
- **Calar Alto Observatory**, Spain, 1.23 m
- **Konkoly Observatory**, Hungary, 1 m and 80 cm
- **Rozhen Observatory**, Bulgaria, 2 m, 60 cm and 50/70 cm
- **Observatorio Astrofísico de Javalambre**, Spain, 80 cm

**Facilities that are affected by the Russian-Ukrainian war:**

- **Lisnyky Observation Station**, Ukraine, 70 cm **Currently not available**
- **Chuguev Observatory**, Ukraine, 70 cm **Currently not available**
- **Terskol Peak Observatory**, Ukraine, 2 m and 60 cm **Currently not available**
- **Ussuriysk Astrophysical Observatory**, Russia, 25 cm and 50 cm **Observatory removed from Europlanet because of EU sanctions imposed on Russia.**

Out of the remaining 13 facilities, 6 are in under-represented countries. Further details on the different observatories, including their equipment, costs, and nights/hours provided to Europlanet 2024 RI can be found on the NA2 Call for Observations website (<https://bit.ly/EPNObservationCall>) and, particularly, in a comprehensive telescope summary table ([https://bit.ly/EPN\\_2024RI\\_Telescope\\_Network\\_list](https://bit.ly/EPN_2024RI_Telescope_Network_list)) that was worked out by Task 12.4 in collaboration with the different facilities. A graphical visualisation on the location can be found at [https://bit.ly/EPN-2024RI\\_Telescopes](https://bit.ly/EPN-2024RI_Telescopes).

To counteract travel restrictions in view of COVID-19, most of the observatories can provide remote observations, i.e., the observer does not necessarily have to physically go to these facilities. As it turns out even after the lifting of the travel restrictions we still receive proposals where remote observations were requested instead of physical travel.





Figure 1. Location of the different facilities within the Europlanet Telescope Network.

#### Science Advisory Panel:

- **Head:** Colin Snodgrass, UoE, UK (Co-PI of Comet Interceptor)
- **Deputy:** Alessandra Miglorini, INAF, Italy (Deputy)
- **Fireballs** (including Lunar Impact Flashes and Jovian fireballs): Detlef Koschny, ESA, The Netherlands
- **Stellar Occultation:** Josselin Desmars, OBSPARIS, France
- **Planetary Observations** (in support of upcoming missions such as Juno, BepiColombo, JUICE): Ricardo Hueso, UPV/EHU, Spain
- **Asteroid Light Curves** (including NEOS): Anna Marciniak, AMU, Poland
- **Comets** (upcoming mission Comet Interceptor): Oleksandra Ivanova, Astronomical Institute SAS, Slovakia
- **Exoplanets** (CHEOPS and upcoming missions such as PLATO, Ariel): Monika Lendl, Univ. Geneva, Switzerland

The SAP meets on a roughly bi-monthly basis depending on the incoming observation proposals to discuss, review and rate incoming applications.

#### Maintenance and update of the observational campaign website and observational alert system (M92)

The aim of this subtask, led by AMU, is to develop a generalized alert system for observations, which will notify and allow participating observatories to select appropriate targets across a diverse range of planetary science topics. This will provide both regular monitoring of targets and alerts for events requiring time-critical and/or spatially distributed observations (e.g., stellar occultation by asteroids). The service is based on the existing alert system software created to coordinate amateur observations of asteroids in support of the ESA Gaia mission (Gaia-GOSA, [www.gaiagosa.eu](http://www.gaiagosa.eu)) which currently provides targets for asteroid light curve observations based on the observer's location and the available targets at the time. Targets of interest of the new service will involve atmospheres of the giant planets (like convective storms or planetary disturbances), Mars and Venus observations, and ephemeris for their

observation, asteroids, comets, exoplanets and other targets for which observations are needed.

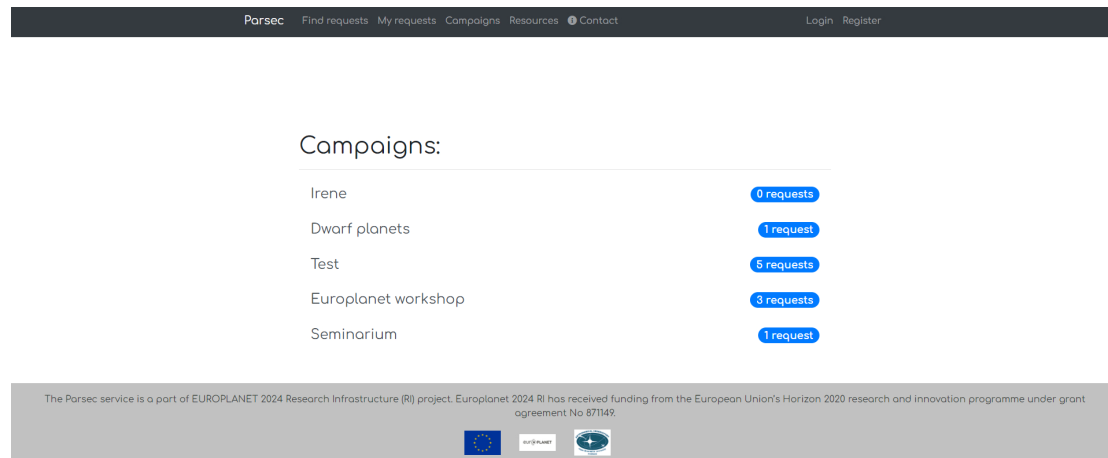


Figure 2. Campaign page of the current prototype of the observational alert website (Jan 2023).

The first early prototype version was finished by the end of 2020, and can be found online at [www.astro.amu.edu.pl/parsec](http://www.astro.amu.edu.pl/parsec); internal tests of the service have started. For further information on the service, check the presentation at <https://bit.ly/3luMU5N> and the report on D12.1.

On Gaia GOSA we have 177 registered users, and we have received around 50 nights of observations last year. In total we have more than 1000 nights of observations.

Moreover, we have developed a database for collecting observations from the Europlanet Telescope Network. The database is connected to VESPA, where the data becomes available after one year of embargo. Such a solution is more convenient for users who don't have to learn how to transfer data to VESPA; they simply upload the data to our database.

Alerts issued via the PVOL system:

Three alerts were issued in year 3, i.e.,

- 2022-03-27- Pluto occultation observable from the South East Pacific on June 1, 2022
- 2022-05-28 - Return of the Venus Cloud Discontinuity
- 2022-09-20 - Jupiter opposition and Juno's Europa flyby on 26 Sep. 2022.

#### 1.4.3 Task 12.3: Amateur Education & Training

##### EPSC 2022 bursaries

The 2022 EPSC in Granada was held as an in-person conference. From NA2, 55 bursaries were issued to enable amateurs to participate at the EPSC conference. From these 55 bursaries two persons did not participate in the conference, 1 person declined travel support and 5 persons did not provide required information and could therefore not be processed.

##### Pro-am science workshops at EPSC 2022

Two pro-am science workshops were organized by NA2 and held at EPSC 2022:

- Exoclock and Amateur Astronomy contribution Exoplanet Science

- Amateur Observations of Outer planets: Juno and James Webb support

The statistics from the meeting:

Meeting Title: SMW5: Amateur Observations of Outer planets: Juno and James Webb support

Meeting Date: 21 Sept.

Meeting Location: In presence & Online

Type of Event: Splinter Workshop during EPSC

Audience(s): Scientists, Amateur astronomers and citizen scientists

Total Number of Attendees: 25 on site, plus 6-8 online

Number of Female Attendees: About 7

Speakers: 4 (1 Female, 1 amateur)

Splinter recorded and available on: <https://www.youtube.com/watch?v=O-iPi1nHYKo>

Meeting Title: SMW4: Exoclock and Amateur Astronomy contribution Exoplanet Science

Meeting Date: 21 Sept.

Meeting Location: In presence & Online

Type of Event: Splinter Workshop during EPSC

Audience(s): Scientists, Amateur astronomers and citizen scientists

Total Number of Attendees: 10 on site plus 5 online

Number of Female Attendees: 5

Speakers: 2 (1 female, 2 early career scientists)

Splinter recorded and available on: <https://www.youtube.com/watch?v=IDqEX8T15Jc>

### Amateur training workshops

Two training were held in year 3, both were in collaboration with Task 12.4, i.e., hybrid science and training workshop, i.e.,

- Europlanet Telescope Network Science Workshop, Feb 9-11, 2022 (online – 210 participants)
- Europlanet Pro-Am Comet Community (Hybrid) Workshop, June 10-12, 2022 (hybrid - Prague & online - ca. 35 on site, 45 online) - hybrid between training workshop and science workshop

Both workshops are described in more detail in Section 1.4.4. A list of workshops can be found in Annex 1.

### Amateur observational alerts and campaigns

NA2 additionally issued three observational alerts to the amateur community and supported different amateur observation campaigns during the first project year. These are described below:

- 2022-03-27- Pluto occultation observable from the South East Pacific on June 1, 2022
- 2022-05-28 - Return of the Venus Cloud Discontinuity
- 2022-09-20 - Jupiter opposition and Juno's Europa flyby on 26 Sep. 2022.

The alert system was also used in fall 2022 to help organize an observation campaign for the Mars-Lunar eclipse.

#### 1.4.4 Task 12.4: Ground-based Observations Support

##### **Europlanet Telescope Network Science Workshop**



Figure 3. A map of the global participants location for the Europlanet Telescope Network Science Workshop. Image credits: Gražina Tautvaišienė/Univ. Vilnius.

In collaboration with Task 12.3 (Amateur Education and Training, Task 4 (Support of Ground-based Observations)) has organised the Europlanet Telescope Network Science Workshop. The meeting was held virtually on the 6-11 February, 2022. The goal of this workshop was to encourage community-led proposals and to highlight scientific results achieved with EPN-TN and other medium size and small telescopes. We invited interested astronomers and amateurs to participate, to learn more about the instruments offered, their capabilities and scientific potential. Sessions were distributed over three half-days and were dedicated accordingly: Day 1 - Solar System planets, Day 2 - Exoplanets, Day 3 - Minor Solar System Bodies. The meeting attracted participants from 43 countries (11 of them EU URS and 23 Non-EU). Among 210 participants, there were 63 early career researchers, 80 amateurs, 22 educators, and 43 senior researchers. 30% of participants were females. All the presentations have been recorded and are accessible via the Workshop Web page, i.e., <http://mao.tfai.vu.lt/europlanet2022>, and on the YouTube channel of the Moletai Astronomical Observatory:

[https://www.youtube.com/channel/UC5\\_rYbaQ-L2MnFb31pwYbdQ](https://www.youtube.com/channel/UC5_rYbaQ-L2MnFb31pwYbdQ).

##### **Europlanet Workshops on Fireball observations**

In 2022 two more workshops on fireball observations were held in online and hybrid form.

The second workshop in the series was held on 4.- 5. February 2022 as an online workshop titled: *Virtual Fireballs Workshop #2 on Fireball Databases, Lunar Impact Flashes and Machine Learning*. As in the first workshop further progress was made to a joint data format which could speed up the exchange of fireball sightings between different meteor networks. In the session about machine learning we had presentations on how to use artificial intelligence and machine learning routines for automated fireball detections. As a new topic lunar impact flashes were introduced and best strategies on how to observe them were discussed.

The workshop had 45 participants online from all over the world with contributions from Australia, New Zealand Brazil, Morocco, USA, India and China.



*Figure 4. Seamus Anderson from Curtin University, Australia reported on the use of machine learning to find meteors with a remote-controlled drone. Image credits: Anderson/Curtin University.*

The third workshop was from 14. – 15. August 2022 in hybrid form at the University of Glasgow in conjunction with the annual meeting of the British Meteoritic Society. This workshop concentrated to a large part on lunar impact flashes. Amongst the contributions were ESA representatives who reported on agency activities in this area (NEMO program). Participants discussed how to coordinate impact flash observations across networks. A larger part of the workshop was dedicated to hands-on training with a flash detection software from the Greek NELIOTA project.

The workshop had about 15 persons on site in Glasgow and about 45 persons online with variations depending on the global time-zone of the participants.

From 10. – 12. June 2022 a hybrid Pro-Am workshop was held in Prague at the Stefanik Observatory. This workshop was in cooperation with the British Astronomical Association, Planetum Prague and the Czech cometary community SMPH. The topics were covering:

- Cometary Science Overview
- Pro-Am campaigns
- Imaging equipment, techniques and standards
- Processing methodologies
- Standardisation of methodologies and parameters
- Archiving of data and simplifying access to datasets
- Broadening participation/outreach/education

During the workshop on average 35 persons were on site and on average 45 persons were following the livestream and participated in the presentations and discussions. Participants from as far as the US, South America and India were online.

## 1.5 Impact

The Europlanet Telescope Network, which was established during the first project year, is the first network of its kind worldwide that combines a diverse set of small-scale observational facilities in Europe and beyond. Besides space missions, and the well-known big ground-based observatories, relatively small telescopes cover a niche that is, more than ever, particularly important for planetary sciences and for the characterization of exoplanets. Studying planets, asteroids or comets can require either long-term monitoring or precise timing and collaboration between facilities on different locations around the Earth. A network of small telescope facilities, but also the amateur community, achieve these requirements but can also react relatively fast. All these characteristics provide a unique opportunity that can be covered by the Europlanet Telescope Network.

The two splinter meetings related to NA2 at EPSC 2022 additionally attracted about 46 participants.

NA2 was also able to attract the amateur community towards the Europlanet Telescope Network which will lead to a better integration of amateur astronomers into planetary sciences in Europe which will enhance the scientific output within the field, e.g., by increased amateur contributions to specific projects such as the Ariel mission's ExoClock. From the 27 proposals submitted to the telescope network so far, 8 were led by amateur astronomers, out of which 7 were finally granted by the SAP (including proposals for the observation of exoplanet transits that feed into ExoClock).

Besides amateur astronomers, NA2 also tried to draw in early career scientists, females and researchers from under-represented states in collaboration with NA1 and the Europlanet Regional Hubs, particularly with the Central European Hub. This effort resulted in 13 out of 27 proposals, as of December 2022, submitted to the NA2 Call for Observations being led by women.

With the workshops held in 2022 we reached a global audience of more than 400 participants. Contributions and presentations were delivered from as far as Australia, New Zealand and the USA.

A major outcome was the initialisation of a common data format which most European meteor networks agreed to implement as part of their observation results. Thus, the exchange of observation data is much easier and thus the finding of freshly fallen meteors facilitated.

Similarly, a database for hosting all of the observational data gathered through the Europlanet Telescope Network was developed and connected with VESPA. This will strongly facilitate data distribution, data visibility and data availability. It can also serve as a gateway for hosting further observational data from small telescope facilities in the future that do not have the capacities to share their data online via VESPA or through other means.

Due to the lower cost of virtual workshops in total a larger number of workshops was possible.

## 1.6 Access provisions to Research Infrastructures (if applicable)

Access provision to the Research Infrastructure within NA2 will be provided through the telescope facilities in the Europlanet Telescope Network, for which the service costs for observations of successful applicants will be reimbursed. An overview on granted observations at these facilities and their costs is summarized in the table in Annex I.

## 2 Update of exploitation & dissemination plan

Three virtual sessions related to NA2 were held at EPSC 2022 (see Task 12.3) with a total participation of over 46 participants.

### Update of data management plan

NA2 contributed to the general Data Management Plan (DMP) of Europlanet 2024-RI (D1.3); at the current stage of the project no update to the DMP is needed from the side of NA2.

## 3 Deviations from Annex 1 (DoA)

Explain the **reasons for any deviations, the consequences & proposed corrective actions.**

### 3.1 Tasks

Because of the war in Ukraine, four telescopes of the network (3 Ukraine, 1 Russian) are not available for the moment and it is unlikely that they will become available again during the remainder of the project.

Because of COVID-19, activities related to the Europlanet Telescope Network have been delayed due to difficulties accessing the sites. However, by now most observatories can provide remote or service observations. As it turned out even, after the lifting of travel restrictions we still received a significant number of proposals requesting remote observations. It is likely that this trend will continue and has to be seen positive in light of a still existing COVID risk and vastly increased transport costs and the environmental impact. So far, we had a request for 204 observation nights, out of which 126 have been granted so far.

### 3.2 Use of Resources

As mentioned in the previous section, costs of face-to-face workshops could not be used in project years 1 and 2. All these workshops are intended to be held later in the project or will be replaced with more online workshops which are less costly. During the end of the third year more requests and proposals for workshops have been received. Thus, we expect that the budget reserved for workshops will be used up until the end of the project. It should be noted that, due to the organising of virtual workshops, the actual number of held workshops was larger than would have otherwise been possible with face-to-face workshops only.

## 4 Annex 1 – Proposals submitted to the NA2 Call for Observations

### Observation proposals

Nr.	Title	Category	Country	Gender	Career status	Facility	nights/ hours	Funded
#01	Reducing the selection effects in asteroid spins, shapes, and thermal parameters	asteroids	Poland	female	senior researcher	Moletai Astronomical Observatory	7 nights	yes
#02	Characterization of V-type asteroids outside the dynamical Vesta family	asteroids	Poland	female	senior researcher	Chuguev Observatory	8 nights	yes
#03	Precise asteroid volumes from Gaia and ground-based observations I	asteroids	Poland	female	post-doc	Tartu Observatory	6 nights	yes
#04	Precise asteroid volumes from Gaia and ground-based observations II	asteroids	Poland	female	post-doc	Observatorio del Teide	5 nights	yes
#05	High-precision photometry of known exoplanets and planetary candidates	exoplanets	Russia	male	senior researcher	Moletai Astronomical Observatory	14 nights	no
#06	Variable Nebulae: Understanding the protostar environment	other/astronomy	UK	male	amateur	Beacon Observatory	39 hours	yes
#07	Project Near Super Earth	exoplanets	Spain	male	senior researcher	LCO	39 hours	no
#08	Photometric follow-up observations of transiting extrasolar planets and related science	exoplanets	Poland	male	senior researcher	1.5m Danish Telescope	14 nights	yes
#09	High-resolution spectroscopic follow-up of known exoplanet-hosts and candidates	exoplanets	Poland	female	Senior researcher	Moletai Astronomical Observatory	7 nights	yes
#10	Observation of Corot-10b and WASP-156b exoplanet transits to help preparing Ariel mission	exoplanets	Spain	female	amateur	Observatorio del Teide	1 night	yes
#12	Photometric follow-up observations of transiting extrasolar planets and related science.	exoplanets	poland	male	Senior researcher	La Silla, Chile	14	yes
#13	High-resolution spectroscopic follow-up of known exoplanet-hosts and candidates: star-planet connection	exoplanets	Lithuania	male	Post-doc	Moletai Astronomical Observatory	10	yes



#14	Revisiting past binary and planetary microlensing events to resolve microlensing degeneracy	exoplanets	Iran	female	Senior researcher	La Silla, Chile	14	Yes, without travel cost
#15	ROBOTIC RECONAISSANCE OF DIPPING DOUBLES (R2-D2)	exoplanets	UK	female	Senior researcher	La Silla, Chile	14	No
#16	Rotational lightcurves, absolute magnitudes, and accurate astrometry of selected occultation-relevant trans-Neptunian objects.	Trans Neptunian objects	Spain	male	Student	La Silla, Chile	8	yes
#17	A New Look at the Sodium Nebula Surrounding the Jupiter System	Jupiter	Zyprus	male	amateur	Pic Du Midi		Proposal withdrawn after request for revision
#18	OBSERVATION OF WASP-186b EXOPLANET TRANSITS TO HELP PREPARING ARIEL MISSION	exoplanets	Spain	female	amateur	Teide Observatory	2	yes
#19	OBSERVATION OF WASP-148b EXOPLANET TRANSITS TO HELP PREPARING ARIEL MISSION	exoplanets	Spain	Male	amateur	Teide Observatory	1	yes
#20	Eclipsing binary stars as an extra tool in asteroseismology	exoplanets	Lithuania	Female	Senior researcher	Moletai Astronomical Observatory	8	yes
#21	Polish-Lithuanian Black Hole hunt	Black holes	Lithuania	male	Senior researcher	Moletai Astronomical Observatory	12	yes
#22	OBSERVATION OF MASCARA-1b EXOPLANET TRANSITS TO HELP PREPARING ARIEL MISSION	exoplanets	Spain	male	amateur	Teide Observatory	2	yes
#23	OBSERVATION OF WASP-59b EXOPLANET TRANSIT TO HELP PREPARING ARIEL MISSION	Exoplanets	Spain	Female	Amateur	Teide Observatory	1	yes
#24	Asteroseismology of variable white dwarf star PG2303+243	White dwarf stars	Lithuania	Female	Student	Moletai Astronomical Observatory	7	yes
#25	ExoClock photometric follow-up of confirmed transiting exoplanets	exoplanets	Brazil	Male	Amateur	Moletai Astronomical Observatory	10	yes
#26	Photometric follow-up observations of transiting extrasolar planets and related science using DFOSC and TCI instruments	exoplanets	Poland	Male	Senior researcher	La Silla, Chile	14	no
#27	OBSERVATION OF HAT-P-64B & HATS-18B EXOPLANET TRANSITS IN PREPARATION OF THE ARIEL MISSION	exoplanets	UK	Male	student	Teide Observatory	1	no

## 5 Annex 2 – Workshops organised by NA2

Workshops organised within NA2

Name	Organizer	Date	Participants	Comments
NA2 Kick-Off Meeting	M. Scherf	March 30, 2020	37	WP kick-of meeting
The Europlanet TelescopeNetwork	M. Scherf	September 30, 2020	ca.30	Splinter EPSC 2020 /Amateur training WS
Juno Ground-Based Support from Amateur Astronomers	R. Hueso	September 21, 2020	ca.50	Splinter EPSC 2020 /Amateur trainingWS
The Ariel mission for exoplanets and support from amateurs	A. Kokori	September 28, 2020	ca. 50	Splinter EPSC 2020 /Amateur training WS
Virtual Fireballs Workshop #1 on Fireball Databases and Machine Learning	M. Scherf, U. Amerstorfer, G. Kargl, D. Koschny	June 11-12, 2021	100	Pro-Am Workshop
Virtual Workshop on the use of the Europlanet Telescope Network for amateur astronomers	R. Hueso, I. Garate-Lopez	May 15-16, 2021	ca. 70	Amateur training workshop + remote observations at Calar Alto Obs.
Pro-Am collaborations (I): Juno's Extended Mission at Jupiter	R. Hueso	September 17, 2021	ca. 45	Splinter EPSC 2021 / Amateur Training WS
Pro-Am collaborations (II): JWST and the exploration of Giant Planets	L. Fletcher	September 24, 2021	ca. 50	Splinter EPSC 2021 / Amateur Training WS
Pro-Am collaborations (III): the EuropanetTelescope Network and ExoClockproject	M. Scherf	September 22, 2021	ca. 30	Splinter EPSC 2021 / Amateur Training WS
Europlanet Telescope Network Science Workshop	G. Tautvasiene, R. Hueso, G. Kargl, S. Mikolaitis, E. Podlewska-Gaca, C. Snodgrass	February 9. – 11. 2022	210	Amateur Training WS
Virtual Fireballs Workshop #2 on Fireball Databases and Machine Learning	G. Kargl, U. Amerstorfer, D. Koschny	February 4. – 5. 2022	ca. 45 online	Pro-Am Workshop
Pro-Am Comet Workshop	H. Usher	June 10. – 12. 2022	ca. 35 on site, 45 online	Pro-Am Workshop
Virtual Fireballs Workshop #3 on Fireball Databases and Lunar impacts	G. Kargl, D. Koschny, M. Scherf	August, 13. – 14., 2022	ca. 15 on site, 45 online	Pro-Am Workshop
Exoclock and Amateur Astronomy contribution Exoplanet Science	A. Kokori, R. Hueso	Sept. 21, 2022	10 on site, 5 online	Pro-Am Workshop
Amateur Observations of Outer plants	R. Hueso	Sept. 21, 2022	25 on site, 7 online	Pro-Am Workshop