



EPN2020-RI

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Deliverable 5.9 PSWS Validation Report

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Responsible WP Leader: CNRS, Nicolas André

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

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Abstract: Under Horizon 2020, the Europlanet 2020 Research Infrastructure (EPN2020-RI) includes an entirely new Virtual Access Service, “Planetary Space Weather Services” (PSWS) that extends 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 provide twelve new services to the research community, space agencies, and industrial partners planning space missions. These services are in particular dedicated to the following key planetary environments: Mars (in support of the NASA MAVEN and European Space Agency (ESA) Mars Express and ExoMars missions), comets (building on the outstanding success of the ESA Rosetta mission), and outer planets (in preparation for the ESA JUpter ICy moon Explorer mission), and one of these services aims at predicting and detecting planetary events like meteor showers and impacts in the Solar System. This gives the European planetary science community access to new methods, interfaces, functionalities and/or plugins dedicated to planetary space weather as well as to space situational awareness in the tools and models available within the partner institutes. The Planetary Space Weather Services provide 12 services distributed over 4 different service domains – A. Prediction, B. Detection, C. Modelling, D. Alerts - having each its specific groups of end users.

The present report deals with the validation of the services dedicated to Prediction.

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Two of these services (A1 and A2) are dedicated to the prediction of the properties of the solar wind and the arrival time of solar perturbations to planets, comets, and probes. One of these services (A3) is dedicated to the prediction of meteor showers at planets, whereas the last one (A4) is dedicated to the prediction of cometary tail crossing by spacecraft in the interplanetary medium.

The status of these 4 services is summarized below:

A1. 1D MHD Solar Wind Prediction Tool - Heliopropa (CNRS)

Status: fully operational (<http://heliopropa.irap.omp.eu/>)

Ingested in the ESA Space Situation Awareness – space Weather, <http://swe.ssa.esa.int/>

Documentation available at <http://swe.ssa.esa.int/>

A2. Propagation Tool (GFI Informatique)

Status: fully operational (<http://propagationtool.cdpp.eu/>)

Reference paper published in Planetary and Space Sciences, Rouillard et al., A propagation tool to connect remote-sensing observations with in-situ measurements of heliospheric structures, Planetary and Space Science, Volume 147, p. 61-77, doi : 10.1016/j.pss.2017.07.00, 2017

Ingested in the ESA Space Situation Awareness – space Weather, <http://swe.ssa.esa.int/>

A3. Meteor showers (OBSPARIS)

Status: operational through VESPA as an EPN-TAP service (<http://vespa.obspm.fr/planetary/data/epn/query/all/>)

Documentation available as a poster on *Meteor showers predictions available as VO-tool* by Vaubaillon et al. presented at the Meteoroids 2019 conference, June 2019

A4. Cometary tail crossings - Tailcatcher (UCL)

Status: Operational

http://www.mssl.ucl.ac.uk/comet_tail/

Documentation available at http://www.mssl.ucl.ac.uk/comet_tail/

The status of the validation of these services and their prediction is summarized below:

The services A1 and A2 and the accuracy of their prediction have been validated against spacecraft observations in the interplanetary medium by Grison et al., Shock deceleration in interplanetary coronal mass ejections (ICMEs) beyond Mercury's orbit until one AU, Journal of Space Weather and Space Climate, Volume 8, id.A54, 10 pp., doi: 10.1051/swsc/2018043, 2018 and by Grison et al., Testing space weather connections in the solar system, European Planetary Science Congress 2017, held 17-22 September, 2017 in Riga Latvia, id. EPSC2017-178.

The service A3 has been validated by Vaubaillon et al., *Meteor showers predictions available as VO-tool*, Meteoroids 2019 conference, June 2019.

The service A4 has been validated against Ulysses observations in the interplanetary medium by Jones, G., Tailcatcher: A software tool for the finding of potential cometary tail crossings, European Planetary Science Congress 2018, held 16-21 September 2018 at TU Berlin, Berlin, Germany, id.EPSC2018-1035.