



EUROPLANET 2024 Research Infrastructure

**JRA4 ML - Machine Learning Solutions for Data Analysis
and Exploitation in Planetary Science**

Task 10.1 – *Management and Coordination of the JRA*

(M1 – M36, IWF-OEAW, KNOW)

Task 10.2 – *Requirements for Machine Learning, Tool Validation and Communication*

(M1 – M36, IWF-OEAW, KNOW, All)

Task 10.3 – *Data Pre-Processing, ETL and Feature Engineering*

(M3 – M36, UNI PASSAU, KNOW, All)

Task 10.4 – *Time-based Signal Analysis and Automatic Classification*

(M3 – M36, KNOW, IWF-OEAW, IAP-CAS)

Task 10.5 – *General Classification Tools*

(M3 – M36, KNOW, UNI PASSAU)

Task 10.6 – *Virtual Access and Interfaces*

(M12 – M36, IWF-OEAW, ACRI-ST, KNOW)

IAP CAS

- Detection of plasma boundary crossings at planetary magnetospheres and solar wind (*magnetospheres, plasma environments and space weather*)
- Search of specific plasma and radio wave emissions and classification according to their spectral, polarization and propagation properties (*planetary and solar radio emissions*)

IAPS-INAF

- Mineral identification via reflectance spectra (*planetary surfaces/compositions/interiors*)
[possible applications foreseen in GMAP]

DLR

- Classification of surface composition on the surface of Mercury (*planetary surfaces/compositions/interiors*)
[resulting data products can be used for geological mapping of Mercury (GMAP)]

AOP

- Meteor and Asteroid Astronomy, automatic detection and classification of meteor signal (*small bodies, asteroids & comets*)

GMAP

- Automatic recognition and analysis of planetary surface features (*planetary surfaces / compositions / interiors*)

[Collaboration in context of this science case, use of resulting ML tools to produce high-level data products]

IWF-OEAW

- Stellar light-curve analysis for the search and classification of exoplanets (*Exoplanets*)
- Detection and classification of CMEs and CIRs in in-situ solar wind data (*magnetospheres, plasma environments and space weather*)

LMSU

- Analysis and forecasting of space weather events and solar wind conditions (*magnetospheres, plasma environments and space weather*)

D10.1, D10.2, D10.7 — *Annual Reports 1, 2 and 3 (M12, M24, M36)*

Agendas and feedback from workshops etc., description of requirements, high-level data products, ...

D10.3 — *Tutorial on Machine Learning and Basic How To's (initial release) (M25)*

Theoretical background, (user-) interfaces and potential applications, practical examples and best practices

D10.4 — *Demonstrator and Documentation of Data-Processing techniques (M36)*

D10.5 — *Demonstrator and Documentation of Time-based Signal Analysis and Automatic Classification Tool (M36)*

D10.6 — *Demonstrator and Documentation of General Classification Toolset (M36)*

All demonstrators also include UIs as applicable.

D10.8 — *Tutorial on Machine Learning and Basic How To's (final release) (M36)*

MS11 — *Requirements for ML tools documented (M4)*

Science cases analysed, all relevant requirements extracted & documented






MS51 — *ML Demonstrators implemented and tested (M24)*

Initial versions of tools for data preparation & ML analysis for every science case

MS86 — *ML Demonstrators fully validated and integrated (M36)*

Final versions of tools for data preparation & ML analysis for every science case

Overview (Tasks, Deliverables, Milestones)

Task	M1 – M12	M13 – M24	M25 – M36
10.1 - Management and Coordination of the JRA	 D1 D2 D7		
10.2 - Requirements for Machine Learning, Tool Validation ...	 MS11 D3 D8		
10.3 - Data Pre-Processing, ETL and Feature Engineering	 MS51 MS86 D4		
10.4 - Time-based Signal Analysis and Automatic Classification	 MS51 MS86 D5		
10.5 - General Classification Tools	 MS51 MS86 D6		
10.6 - Virtual Access and Interfaces	