

Use of Open Source Software in the ESA Planetary Science Archive

F. Raga², R. Docasal³, J. Osinde², H. Perez², J.S. Oliveira⁴, T. Cornet¹, B. Merin¹, M.S. Bentley¹, D. Coia⁴, E. Grotheer⁵, D. Heather¹ and T. Lim⁴

¹ESA/ESAC (Camino Bajo del Castillo s/n, 28692 Villanueva de la Cañada, Madrid, Spain), ²RHEA for ESA, ³Aurora Technology BV for ESA, ⁴Telespazio UK Ltd for ESA, ⁵Serco for ESA



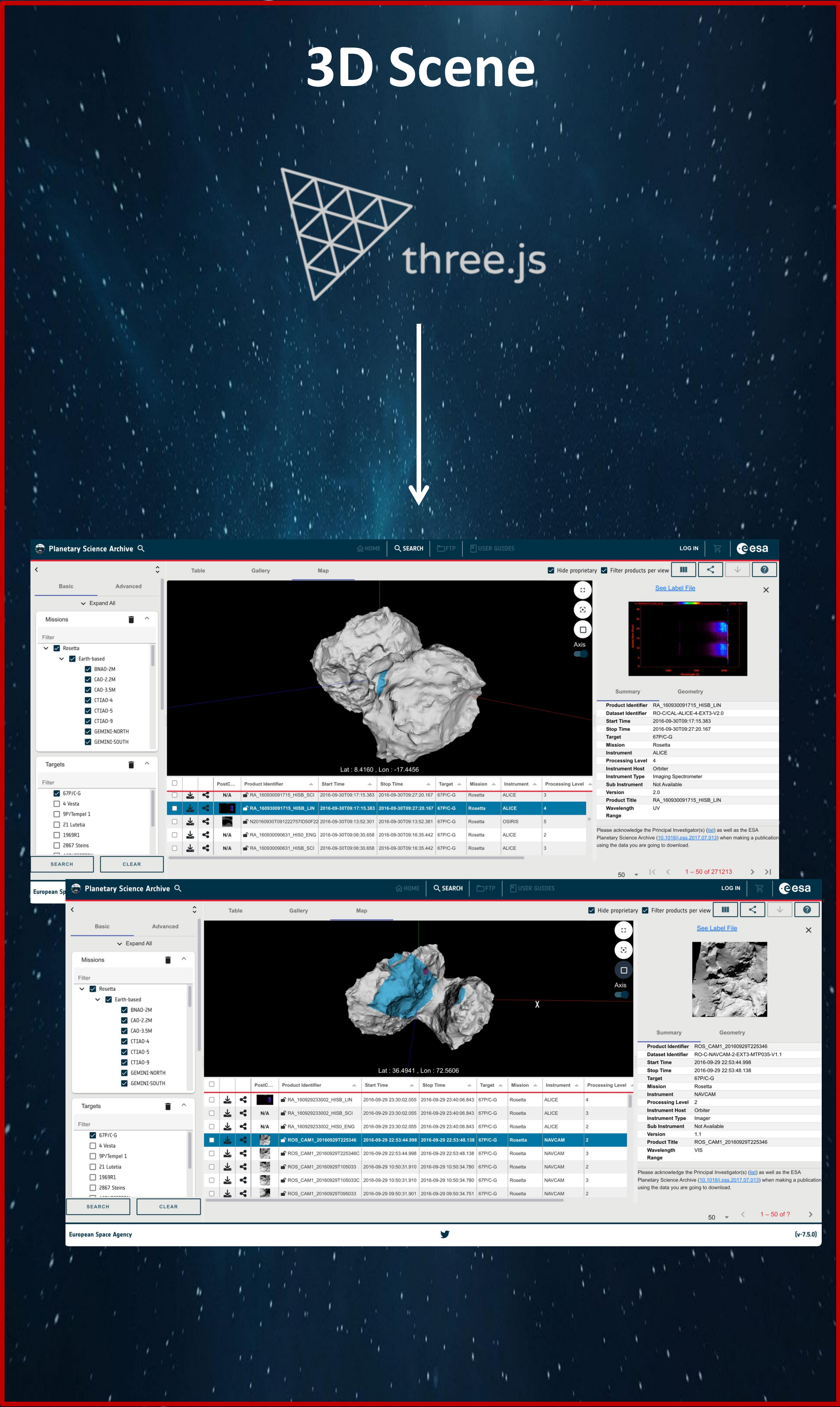
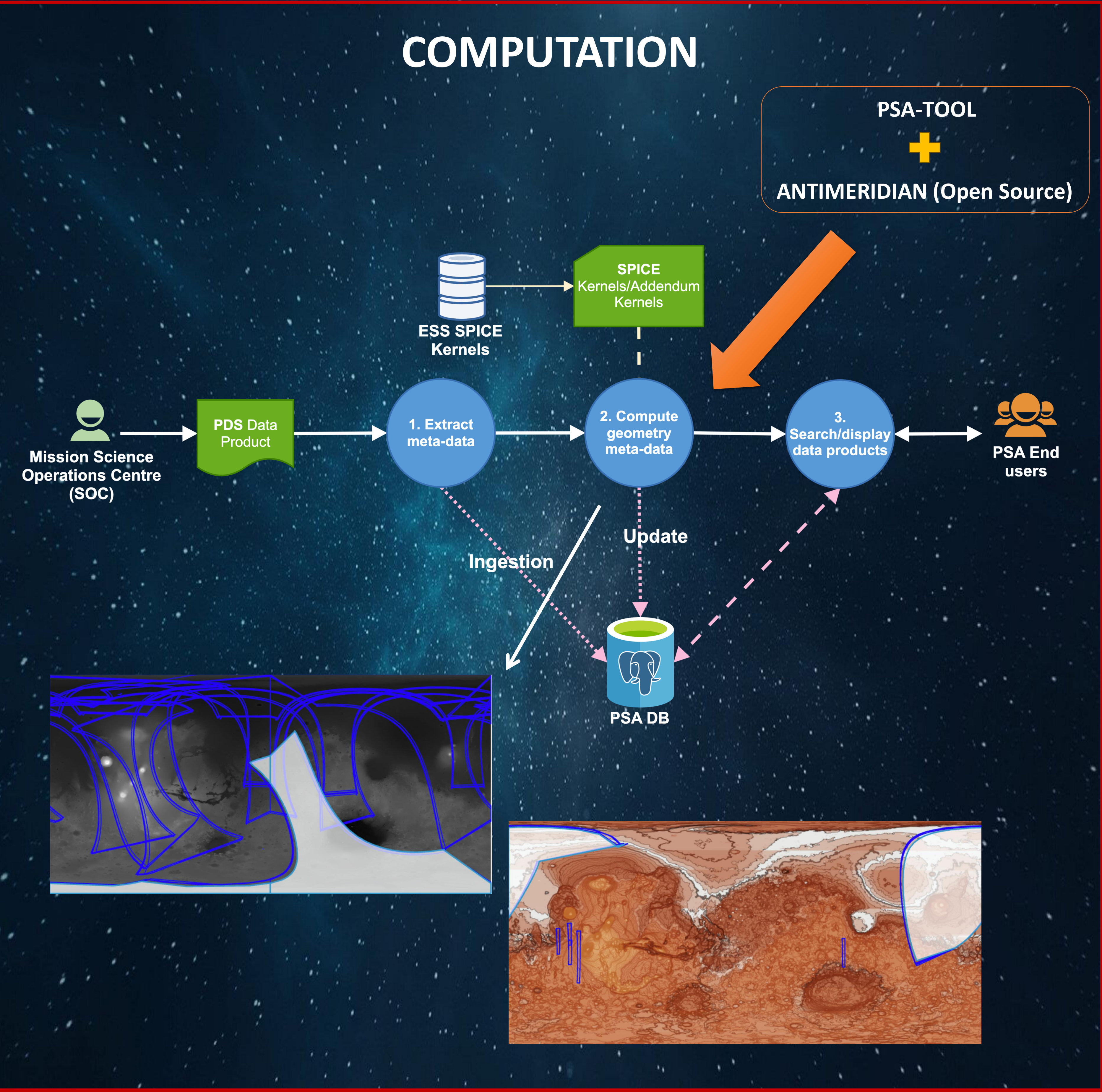
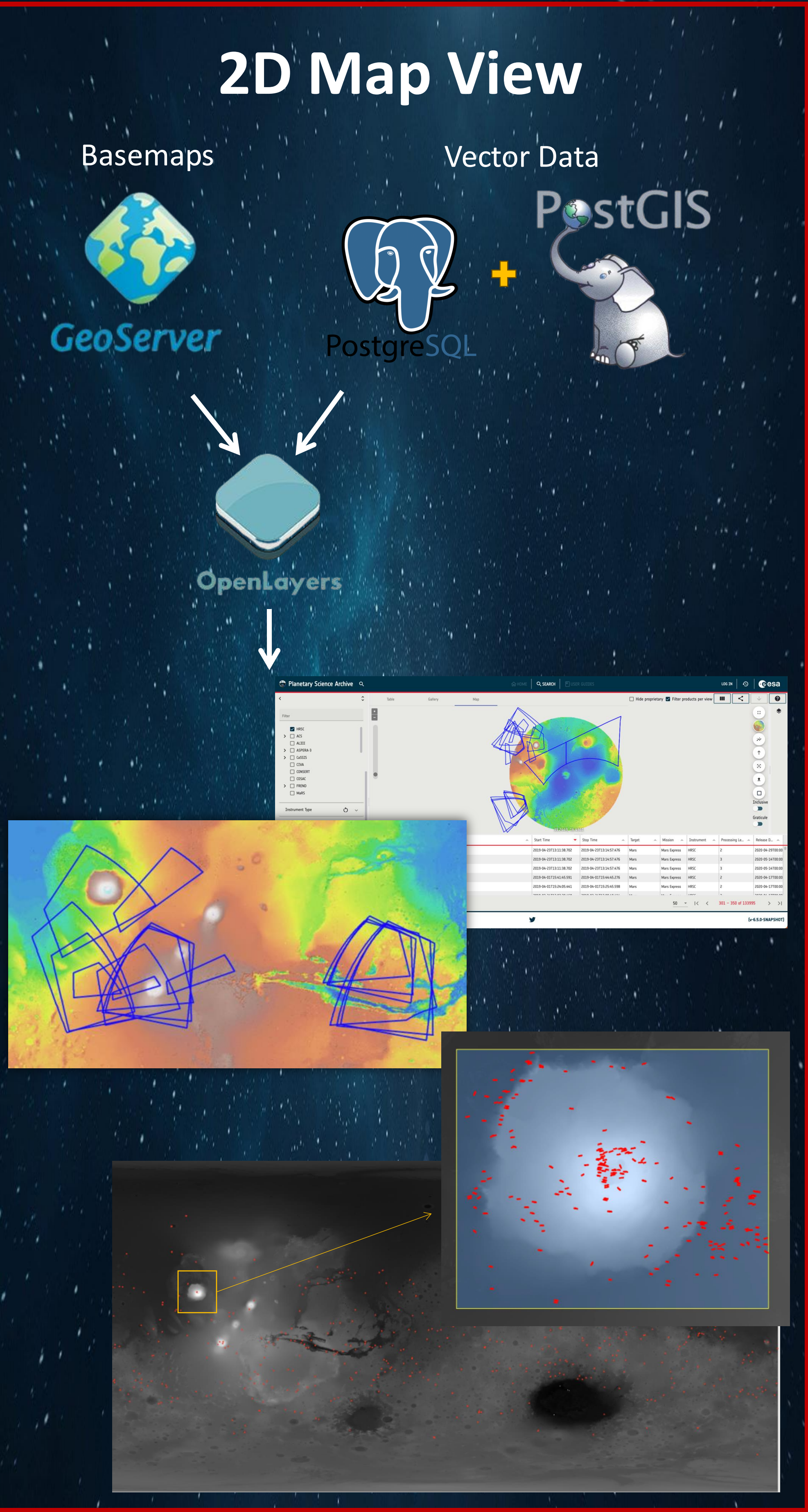
INTRODUCTION

The European Space Agency (ESA) has adopted a variety of open-source software tools to manage, visualize, and distribute planetary data, currently focussed on Mars and Phobos (Mercury will come soon this year). These tools are essential for both internal operations and for providing crucial data access to the global scientific community. Below, we detail the use of these technologies, collaboration on open-source projects, and the underlying GIS architecture developed by the Planetary Science Archive (PSA).

What is the PSA?

The European Space Agency's Planetary Science Archive (PSA) is the central repository for all scientific and engineering data returned by ESA's planetary missions: currently ExoMars 2016, Giotto, Huygens, Mars Express, Rosetta, SMART-1, Venus Express, Juice, BepiColombo etc..., as well as several ground-based cometary observations.

PSA UI OPEN SOURCE LIBRARIES



Public API Sample

[https://psa.esa.int/psa-tap/tap/sync?LANG=ADQL&REQUEST=doQuery&FORMAT=json&QUERY=SELECT logical_ididentifier, ST_AsGeoJSON\(footprint_geometry\) AS footprint_geometry FROM psa.product_ui WHERE footprint_geometry IS NOT NULL AND ST_Contains\(ST_GeomFromText\('POLYGON\(\(-138.93 22.46,-138.93 13.98,-128.75 13.98,-128.75 22.46,-138.93 22.46\)\)',49900\),ST_SetSRID\(footprint_geometry,49900\)\)='true' AND footprint_srid=49900 AND \(footprint_geometry IS NOT NULL\)&page=1&page_size=50](https://psa.esa.int/psa-tap/tap/sync?LANG=ADQL&REQUEST=doQuery&FORMAT=json&QUERY=SELECT logical_ididentifier, ST_AsGeoJSON(footprint_geometry) AS footprint_geometry FROM psa.product_ui WHERE footprint_geometry IS NOT NULL AND ST_Contains(ST_GeomFromText('POLYGON((-138.93 22.46,-138.93 13.98,-128.75 13.98,-128.75 22.46,-138.93 22.46))',49900),ST_SetSRID(footprint_geometry,49900))='true' AND footprint_srid=49900 AND (footprint_geometry IS NOT NULL)&page=1&page_size=50)



<https://psa.esa.int>

Conclusion

Open-source software enable ESA to offer a powerful and accessible platform for planetary research. This benefits not only its own scientists but also the global scientific community, promoting knowledge sharing. Tools such as OpenLayers, GeoServer, Three.js, PostgreSQL, and PostGIS, Astroquery and Antimeridian, are fundamental for the efficient management and precise visualization of planetary data.

REFERENCES

[1] S. Besse et al. (2018), ESA's Planetary Science Archive: Preserve and present reliable scientific data sets, Planetary and Space Science, Volume 150, p. 131-140,

ACKNOWLEDGMENTS

We are grateful to the PSA development team for their invaluable assistance in creating and refining the PSA software. We also thank our advisors and supporters for their guidance and encouragement throughout the process.



CONTACT INFO

Fran Raga
Francisco.Raga.Lopez@ext.esa.int

ESAC Science Data Centre
<https://www.cosmos.esa.int/web/esdc>

European Space Astronomy Centre (ESAC)
Camino Bajo del Castillo s/n
28692 Villanueva de la Cañada, Madrid, Spain

