Science Planning opportunities and coverage analysis for the JUICE mission on ESA DataLabs

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To plan a planetary spacecraft observation it is crucial to visualize the surface coverage of its different instruments at different scales (global, regional and local). All the planetary missions, past, current and future use JPL/NAIF SPICE kernels to describe spacecraft position and instrument orientation in space [1]. These files are usually produced by space agencies and require complex setup and advance users to know when and how a given surface feature on a target body is visible by an instrument.

To quickly identify of these opportunities, we developed a Python package (`moon-coverage`), built on top of `spiceypy` [2] that provides an object-oriented approach to perform spacecraft trajectory computations, instrument field of view projections and region of interest intersections. Primary developed for the ESA JUICE mission, this library is compatible with any SPICE-based space mission (BepiColombo, EnVision, Juno, Europa-Clipper…).

The `moon-coverage` is publicly available on the JUICE Gitlab and on PyPI. Many examples are available online and can be reproduced in Jupyter environments and on ESA DataLabs.

In this presentation, we will illustrate how we deployed the `moon-coverage` on ESA DataLabs to bring new tools to the JUICE users; how we ensure that they have access to all the kernels produced by the ESA SPICE service, so they can stay up-to-date with the latest trajectories without needing to download any large dataset and how they can work collaboratively. Finally, we will provide a feedback on our early access to SciApps that open new perspectives for the future.

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References: [1] Acton (1996) PSS, [2] Annex et al. (2020) JOSS