

BepiColombo Quick-Look Analysis interface status

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Abstract

The ESA/JAXA BepiColombo mission to Mercury [1] was launched on the October 20th, 2018. During its seven years Cruise phase, BepiColombo will perform several flybys of the Earth, Venus and Mercury before its insertion into orbit and start of science phase at the beginning of 2026. In the harsh hermean environment, the mission various instruments will allow studying Mercury as a whole system where the interior, surface and space weather science will be inter-connected. In this context, the ESA Science Ground Segment (SGS) aims at providing a support tool for data visualisation and analysis, suited to the specific needs of each instrument team, and facilitating scientific collaboration. This paper summarises the status of the development of the Quick-Look Analysis (QLA) web interface for BepiColombo.

1. Context

The BepiColombo mission is composed of three spacecraft, the ESA Mercury Planetary Orbiter (MPO), the JAXA Mercury Magnetospheric Orbiter (MMO or Mio) and the Mercury Transfer Module (MTM), stacked together during the seven years cruise phase. MPO is the host of eleven instruments dedicated to a wide range of measurements, from characterising the deep interior of the planet to its geology and composition, and its close space environment. MMO is equipped with five main instruments composed of numerous subsystems, mostly dedicated to study the interaction between the magnetosphere of the planet and the solar wind.

In collaboration with the instrument teams, the SGS is developing a Quick-Look Analysis web interface able to explore interactively and in near real time instrument science and housekeeping data. This interface aims at supporting in the observations quick assessment, (re)defining observation priorities based on the data analysis, track the mission progress, and facilitate the scientific collaboration between teams

by allowing them to share information in a centralised place.

2. Development and status

The QLA is the end part of the BepiColombo Science Operation Control System (BSCS) [2] architecture. The BSCS includes several subsystems retrieving and processing the spacecraft and instruments telemetry. Science data are stored according to PDS4 standards in the Planetary Science Archive (PSA) [3]. The SGS is responsible of the first step of data conversion from telemetry to raw data. The subsequent data levels (partially processed, calibrated) are in vast majority produced by the ITs and then delivered to the SGS. These data are used in order to test and define the different views in the QLA interface, which in turns also allows an early testing/review of the data formats by the data analysis scientists.

Once operational, the QLA accesses and displays the data contained in the PDS4 files as “widgets” on “dashboards” (Figure 1), with currently time-based queries. Dashboards are customisable, and are set to various levels of restrictions by the user. The pre-defined dashboards are not customisable but are defined based on inputs provided by the ITs. Widgets are fully interactive plots that can be maximised, zoomed in/out, panned, and exported in various formats (jpeg, png, pdf, csv, ...). User credentials protect the access to the various dashboards and menus in the interface in a way that only shared information is accessible to anyone in the project. Currently, the QLA interface is being developed for six of the MPO instruments (BERM, ISA, MPO-MAG, MERTIS, MIXS and SIXS), and being populated with data acquired since launch.

Finally, The QLA is also able to access data that are not contained in the archived instrument data, such as power profiles, packet stores data volumes, downlinked data volumes, telemetry events, etc. for an operational purpose.

References

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[2] Pérez-López, F. et al. (2016) 14th International Conference on Space Operations. DOI: 10.2514/6.2016-2314.

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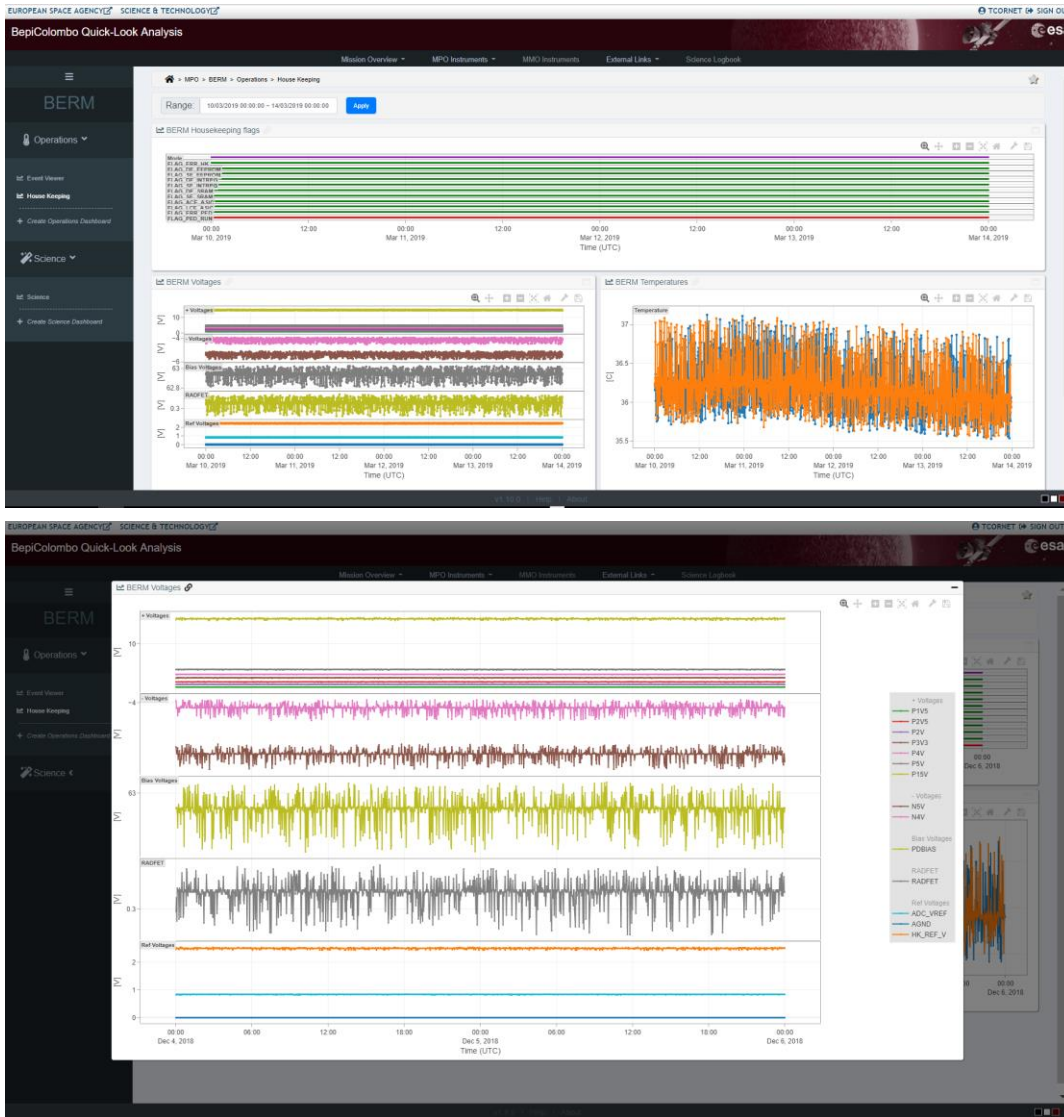


Figure 1: Screenshot of the QLA for the radiation monitor (BERM) data in the housekeeping dashboard. Individual widgets can be maximised and manipulated up to data export in several formats.