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The visible and infrared hyperspectral imager (VIHI) of the BepiColombo MPO mission: development status and observation strategy

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SIMBIO-SYS (Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem) is a multi-channel instrument integrating a STereoscopic imaging Channel (STC), a High spatial Resolution Imaging Channel (HRIC) and a Visual and Infrared Hyper-spectral Imager channel (VIHI).
VIHI will provide valuable information to help constrain the Mercury formation models, through the identification of the major silicates compounds and the mapping of their spatial distribution over the entire surface with a spatial resolution better than 500m. The selected spectral range 400 - 2000 nm, encompassing all the major diagnostic bands of the expected minerals, coupled with a spectral sampling of 6.25 nm is suitable to perform the required mineralogical study of the Mercury surface.
VIHI will be capable of studying the properties of the regolith, its formation and evolution processes as well as its role in the interpretation of albedo features. As demonstrated by the lunar samples, the analysis of soil maturity is crucial to constrain mineralogical composition from the spectral reflectance characteristics.
A high spatial sampling capability (100m at Periherm) will allow to investigate in detail the boundary zones between different geologic regions as well as local surface features (craters, scarps, lava flows, ejecta), thus relating the observed morphology to the spectrum. Such analysis will give information on the processes that have been dominant in planet history: tectonics, volcanism and cratering.
The Mercury surface will be globally mapped during the first 6 months of the nominal mission, while during the second half of the mission specific targets will be observed with the best spatial resolution available.
VIHI optical set-up is based on a modified Schmidt telescope coupled to a grating spectrometer in Littrow configuration. Two dioptric doublets are used to correct aberrations both in the telescope and spectrograph optical paths. An optimisation of the thermal-mechanical design is presently being carried out to minimise vibration levels at the focal plane A single infrared HgCdTe array detector is used which adopt a technology to extend its sensitivity to the visible domain. The read-out circuit of the detector is currently being tested at the Observatoire de Meudon. A proximity electronic made of rad-hardened components (radiation resistant to 70 krad) will drive all the peripherals and will includ pre-processing functions such as dark subtraction and averaging. An internal calibration unit will be used to periodically verify the spectral and radiometric calibration. This calibration is essential to provide a correct interpretation of the observed spectra, a breadboard of the unit has been built and tested.
The presentation shall provide a brief development status of the instrument and a thorough discussion of the optimised VIHI's observation strategy also in the light of the latest Messenger observations of the spectral properties of the Mercury surface.

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