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A Penetrator deployed Biogeochemistry package for the Europan surface.

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Abstract

The use of high-speed penetrator deployment technologies may offer the first opportunity to perform in-situ surface and subsurface analysis of Europan material. In order that such a unique opportunity returns the maximum scientific return, careful consideration to the instrument payload will be required.

Gas chromatography-mass spectrometry (GC-MS) is the gold standard in the analytical technique for the determination of the molecular and elemental composition. The current state of the art in light element and organic molecule detection is the 500 gram GC-MS Ptolemy instrument onboard the ROSETTA lander Philae. We believe that Ptolemy style science capabilities are imperative for any penetrator mission to Europa (or Ganymede) as these would allow for the full characterisation of the organic inventory and the detection of any compounds of biological significance at the penetrator impact sites. In addition, through isotopic composition analysis it may be possible to further constrain the origin of any detected compounds, enable the detection of biogenic signatures (i.e. through measurement of delta ^{34}S) and allow the distinction between meteoric origin and local production of organic material.

We will present the status of rugged instrumentation currently under development that will allow these scientific objectives to be met and thus enable Ptolemy style science to be conducted from a penetrator deployed scientific platform.