

# **Investigation of the Feasibility of In Situ Radiometric Dating on Mars using the Beagle 2 Gas Analysis Package and X-ray Spectrometer**

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There are significant scientific returns to establishing an in situ age for Martian geological materials, perhaps most notably to perform a calibration of the Martian cratering rate. Beagle 2 was to have attempted a radiometric dating of rocks accessible by the lander. We have investigated the feasibility of  $^{40}\text{K}$ - $^{40}\text{Ar}$  radiometric dating of basalt rocks utilising versions of the Beagle 2 Gas Analysis Package (GAP), a miniature mass spectrometer, and the X-ray Spectrometer (XRS). Several basalts were used in the study of  $^{39}\text{Ar}$ - $^{40}\text{Ar}$  radiometric ages in the range 171 - 1141 Ma. The K content of each basalt was measured by the flight spare XRS and the  $^{40}\text{Ar}$  content using a next-generation model of the GAP. We report on the results from these analyses. Having investigated the technique using flight-like instrumentation, we discuss operational aspects of conducting in-situ radiometric dating on Mars using robotic spacecraft with particular emphasis on Mars landers.