Potential for non-destructive astrochemistry using the ExoMars PanCam

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We investigate the utility of adding a 365 nm ultraviolet (UV) light source to the ExoMars panoramic camera (PanCam) scheduled for launch in 2013. The modification makes it feasible to monitor rover drill cuttings for aromatic organic molecules and provide constraints on polycyclic aromatic hydrocarbons (PAH) as a function of depth to the 2-meter limit of the ExoMars drill. This non-destructive triage allows prioritized deployment of organic detection experiments requiring sample destruction and/or expenditure of non-replaceable resources. Utilizing the Beagle 2 PanCam backup filter wheel fitted with original blue (440 nm), green (530 nm), and red (670 nm) filters we captured fluorescent images following 365 nm excitation of 3-, 4- and 5-ring PAH species doped on Mars analog peridotite grains. We demonstrate a detection limit for pyrene of 1.5 mg in granular peridotite doped at pyrene levels of 50 ± 5 ppm for camera-to-target distance of 1 meter.

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