SEARCHING FOR METEORITRS ON MARS WITH THE ROSALIND FRANKLIN ROVER.

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Introduction: Meteorites on the surfaces of other planets has become an increasingly important topic in meteoritics. Meteorites on the surface of other planets, coined *Exogenic meteorites*, can provide important contextual information relevant to the search for life [1]. So far over 50 meteorites have been found on the surface of Mars, including 15 officially noted by the Meteoritical Society [1,2]. Meteorites on Mars can act as a witness plate throughout geological time and provide valuable insight into the history of the site: Chemical and Physical weathering can provide information on climate weathering rates and water-rock interactions [2,3,4]; meteorite size and distribution can help infer information about the density of the atmosphere [5,6,7]; Chondritic materials could be a potential delivery mechanism for organic materials to Mars and provide microhabitats for developing life [8]. Martian Rovers have had much success in identifying these meteorites as secondary studies along the Rover's intened traverse, the addition of Meteorites into the intended search catalogue would increase find rates as well as allow the opportunity for potential sampling or return [1].

Exomars Rosalind Franklin Rover:
The ExoMars mission focuses on the pursuit of evidence of past or present life on Mars, as such the multispectral instrumentation has been designed to provide the best coverage of minerals indicative of the presence of water, materials with biosignature preservative qualities and indications of past habitability [9]. The Panoramic Camera for ExoMars (PanCam), with both the high-resolution camera (HRC) and Multispectral wide-angle cameras (WACs), will be the primary instrument for identifying meteorites on the surface of Mars [10]. Serving as the main scientific imaging instrument PanCam will provide RGB and spectral data of the rover surroundings, allowing further targeting with HRC and other spectral instruments. As such, preparations to maximise scientific return and expedite interpretation and analysis of potential meteorite samples is important for this instrument. Utilising the method outline by cousins et al. 2012 [11], a comparison of the central multispectral filter central wavelengths (CWL) and bandwidth between Rosalind Franklin's PanCam, Curiosity's MastCam and Perseverence's MastCam Z indicate PanCam's spectral suites could be best suited to continue to search for Chondritic material on the surface of Mars and maintain the find record for Iron and Stony-Iron Meteorites.

Mission preparations: Here we report on our work to prepare the ExoMars PanCam instrument to search for meteorites of the surface of Mars using spectral interpretation tools and spectral parameter mapping, utilising the Natural History Museum London's meteorite collections. Iron, Stony and Stony Iron meteorites show distinct variation across the VNIR spectral range of PanCam captured by the 12-position multispectral instrument. Categorisation of meteorite spectral response yields distinct profiles for stony, stony-iron and iron meteorite but can also distinguish degrees of weathering in iron meteorites, chondrules at near mission minimum configuration and alteration across the surface of samples. Spectral parameter mapping and feature identification tools have been developed in ExoSpec, an ENVI plug in developed by the PanCam Team [12], to highlight spectral signatures of the various meteorite types on Mars within the mission tactical timelines. This expedited identification of meteorites would allow for the option to further investigate these samples before moving on and potentially sample a meteorite on Mars.

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