Evaluating perspectives from the past missions to shape future investigations using the Mars 2020 Planetary Instrument for X-ray Lithochemistry

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Over the past five decades, planetary scientists have relied upon X-ray fluorescence (XRF) instrumentation to derive compositional data from the rock and soil of planetary bodies. Knowledge of whole rock elemental chemistry provides information about planetary origins, regions of potential habitability and information on the geological evolution of the planet. As demands upon mission science returns increase so also does the demand upon X-ray instrument capabilities. The Planetary Instrument for X-ray Lithochemistry (PIXL), selected for Mars 2020 is the most capable instrument of this type to date.

PIXL is an XRF spectrometer designed to deliver a sub-millimeter focused X-ray beam. It is capable of raster- scanning to produce two-dimensional maps of quantifiable elemental abundances. With this unique mapping capability, scientists will be able to probe deeper into Mars' early history to answer questions pertaining to habitable regions that may contain biosignatures.

Data returned from prior missions such as the Mars Exploration Rover (2003) and the Mars Science Laboratory (2012) help to inform investigative directions on sites to visit, science questions to ask and new ways to look at features of interest. This talk will present a brief review of earlier mission XRF data with emphasis drawn to how PIXL might assist in furthering the investigation of Mars' geological (and potential biological) history. The talk will then draw attention to some of the recent calibration efforts made to develop PIXL's ability to quantify elemental abundances and characterize accuracy levels.