

The potential for luminescence dating of Martian sediments - preliminary results from terrestrial basaltic samples

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Recent results from high resolution remote sensing and from landers, has revealed that the Martian surface is covered by a variety of sediments including those of aeolian, fluvial and glacial origin, similar to on Earth. These sediments are expected to have formed in response to large scale climatic changes influenced by cyclical changes in the orbit of Mars. However, there has been no absolute chronology for these sediments to test this assertion. Luminescence dating is a potential method that could be applied to Mars, but it faces a number of challenges. On Earth the mineral most commonly analysed in luminescence dating is quartz, but this is absent on the surface of Mars. Thus the luminescence behaviour of other minerals needs to be assessed.

This paper investigates the potential for applying luminescence dating to Martian sediments, by analysing two basaltic analogue samples on Earth with known ages; 1) a basaltic lava from Cima volcanic field, California (c.a. 12 ka), and 2) a scoria from A. D. 472 Pollena eruption from Somma Vesuvios, Italy.

Luminescence properties of these samples, such as their characteristic emission wavelength at various measurement temperatures, dose response to high doses, stability of signals, and preliminary dating results will be presented.