Geosci. Instrum. Method. Data Syst. Discuss., 2, C323–C324, 2012
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Geoscientific Instrumentation Methods and Data Systems Discussions

Interactive comment on "Muon radiography for exploration of Mars geology" *by* S. Kedar et al.

Anonymous Referee #1

Received and published: 11 December 2012

This paper is very interesting and I quite liked it. The technique has been used on earth successfully for many years and has produced many beautiful results. This is obtained by comparing the muon flux behind a geological structure with the unobscured muon rate. The application of this technique on Mars for me has to face a major problem, which the authors have already tried to answer but needs perhaps more clarifications: the different, and much smaller, thickness of the Mars atmosphere with respect to the earth. On earth the atmosphere acts as a natural filter of cosmic rays reaching the surface of the planet to produce an almost pure muon flux with negligible background. On Mars on the other hand there will be roughly 200 times more p's compared to muons for vertical cosmic rays, so a factor of at least 10^4 suppression of p's has to be provided at the detector level. It is true that for inclined muons the p/muon ratio may decrease to about a factor of ten, still a substantial background reduction is needed if one wants to be sensitive to percent variations in detected muon flux. Is this feasible? and, is it

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feasible with a negligible increase in detector mass? Also it would in general be nice to have more details of the possible detector the authors have in mind (e.g. surface, granularity, redundancy), even if the detection techniques may evolve somewhat by the time of the mission.

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., 2, 829, 2012.