M2 Project

Title: Experimental study of sediment transport by brines on Mars

Supervisors: Susan Conway, Jan Raack and Manish Patel

Technical support: Marion Massé

Resume: There is strong debate about the role that liquid water has to play in active and recent surface processes on Mars (e.g., Conway and Balme, 2016; Dundas et al., 2017b, 2017a; McEwen et al., 2011). Striking morphological similarity with features created by flowing water on the Earth (e.g., Levy et al., 2011; Malin and Edgett, 2000) caused researchers to suggest the action of liquid water on the martian surface. However, recent laboratory work has suggested that liquid water at the martian surface may transport sediment via a range of boiling-induced processes not known on Earth (Herny et al., 2018; Massé et al., 2016; Raack et al., 2017). Salts are now known to be abundant at the martian surface, yet their potential influence on the sediment transport by flowing water has only been explored by a single reported experimental series (Massé et al., 2016). For this project the student will conduct one month of laboratory simulations at the Open University's Mars chamber in Milton Keynes, UK under the supervision of Susan Conway and Jan Raack (University of Munster). These experiments will follow the same procedure as outlined in Raack et al. (2017) and Herny et al. (2018) but will use brines instead of liquid water. If time permits experiments with pure water over salty substrate and other material types may be performed. As a complement to this laboratory work the student will have the opportunity to perform calculations with data output by a Mars Global Climate Model to explore when and where conditions conducive to flowing liquid water and brines could occur on Mars today and in the recent past. The student should be familiar with modern surface processes on Mars, have some background in GIS or programming and be comfortable with learning new computer-based techniques. The student will acquire skills in performing and setting up experiments, manipulating and analysing experimental and numerical data, including making elevation models using close-range multi-view photogrammetry (or structure from motion), basic scripting skills and ArcGIS analysis routines. This project is partly financed by Europlanets and partly by GeoPlaNet.

Biblio:

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