Gullies on Mars and observations of seasonal ices in CaSSIS and HiRISE data

Kelly Pasquon [1], Susan J. Conway [*1], Antoine Pommerol [2], Jan Raack [3], Meven Philippe [1], Axel Noblet [1], Ginny Gulick [4], Livio L. Tornabene [5], Nick Thomas [2], Gabriele Cremenose [6], the CaSSIS and HiRISE teams.

[1] Laboratoire de Planétologie et Géodynamique (LPG), CNRS : UMR6112, Université de Nantes - France
[2] Physikalisches Institut, University of Bern - Switzerland
[3] Institut für Planetologie, Westfälische Wilhelms-Universität - Germany
[4] SETI Institute & NASA Ames Research Center, Moffett Field, California - USA
[5] Institute for Earth and Space Exploration and the Department of Earth Sciences, University of Western Ontario - Canada
[6] Osservatorio Astronomico di Padova, INAF, Padova - Italy

Gullies on Mars are kilometre-scale downslope mass wasting systems that resemble water-worn gullies on Earth. Recent observations have revealed that they are active today and tend to be active when the seasonal frosts are sublimating in spring. Mars' axial tilt is similar to the Earth's, hence it experiences similar seasons. Instead of water ice snow extending towards the mid-latitudes in winter, it is mainly CO_2 ice that condenses onto the surface. In this study we use images from the Colour and Stereo Surface Imaging System (CaSSIS) aboard ESA's Trace Gas Orbiter (TGO) and the High Resolution Science Imaging Experiment aboard NASA's Mars Reconnaissance Orbiter to study the relationship between surface frosts and gullies. The colour images from both instruments are useful for the identification of surface frosts, particularly when their distrubution is local and patchy. Our initial study focusses on gullies found in the south polar region of Mars, because MRO and TGO are polar orbiters which allows higher frequency of temporal monitoring. Our results reveal that gully-alcoves defrost before the fans and gullies in general defrost later than surrounding terrain. This suggests activity is driven by the availability of "hot" sediment in the alcoves triggering sublimation of CO_2 ice as material falls down the gully.

Acknowledgments: KP, SJC, MP and AN are grateful for the financial support of CNES for their CaSSIS work. The authors thank the spacecraft and instrument engineering teams for the successful completion and operation of CaSSIS. CaSSIS is a project of the University of Bern funded through the Swiss Space Office via ESA's PRODEX programme. The instrument hardware development was also supported by the Italian Space Agency (ASI) (ASI-INAF agreement no. I/018/12/0), INAF/ Astronomical Observatory of Padova, and the Space Research Center (CBK) in Warsaw. Support from SGF (Budapest), the University of Arizona (LPL) and NASA are also gratefully acknowledged.

Mots-Clés : Martian gullies, seasonal frosts, remote sensing

*Intervenant

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.