Geophysical Research Abstracts
Vol. 12, EGU2010-13725-1, 2010
EGU General Assembly 2010

Possible seasonal activity of gullies on an sand dune (Russell crater, Mars)

Gwénaël Jouannic, Julien Gargani, and François Costard
IDES, UMR 8148, Université Paris Sud 11, Orsay, France (gwenael.jouannic@u-psud.fr)

Recent work has shown that gullies are among the most youthful features on Mars (Malin and Edgett, 2000; Costard et al., 2002; Reiss and Jaumann, 2003, Malin et al., 2006). Here we show that the gullies located on the Russell Crater dune are not only extremely youthful but also seem to be still actives. Various geomorphological features consistent with a seasonal activity suggest reactivated flows over the last three terrestrial years.
Moreover, using an assemblage of 26 HiRISE images over a 31 month period (November 2006-May 2009) and superposed with MOLA tracks, we performed a quantitative analysis of the sinuosity and branching of the gullies on the shallow slope of the Russell crater. These geomorphologicals features suggest that debris flow have been formed by a fluid flow. As pure water generally is not thought to be stable on the surface of Mars under current conditions, these gullies could be indicative of a highly localized zone of meta-stability heretofore unidentified in the literature or by a highly mineralized water. Equally, the occurrence of the gullies on a dune may point to a near-surface source, i.e. near surface permafrost (Vedie et al. 2008), that could have been emplaced under conditions associated with late Amazonian obliquity excursions (Costard et al., 2002). Nevertheless, the precise composition of the fluid (CO2, mineralized water,. . .) is still unknown.

Costard, F., Forget, F., Mangold, N., Peulvast, J.P., 2002. Formation of recent martian debris flow by melting of near-surface ground ice at high obliquity. Science, 295, 110-113.
Malin, M.C., Edgett, K.E., 2000. Evidence for recent groundwater seepage and surface runoff on Mars. Science, 288, 2330-2335.
Malin, M.C., Edgett, K.E., Posiolova, L.V., McColley, S.M., Dobrea, E.Z., 2006. Present day impact crater rate and contemporary gully activity on Mars. Science, 314, 1573-1577.
Reiss, D., Jaumann, R., 2003. Recent debris flows on Mars : Seasonal observations of the Russell Crater dune field. Geophysical Research Letters, 30, doi:10.1029/2002GL016704.
Vedie, E., Costard, F., Font, M. and Lagarde, J.L., 2008. Laboratory simulations of Martian gullies on sand dunes. Geophysical Research Letters, 35, doi:10.1029/2008GL035638.