

## Flow rates of ice-rich deposits in middle latitudes on Mars

# Tetsuyuki Ishii[1]; Eiichi Tajika[1]; Nobuhiko Azuma[2]; Yasuharu Ohba[2]; Tomohito Maeda[2]

[1] Dept. Earth Planet. Sci., Univ. of Tokyo; [2] Mech. Engin., Nagaoka Univ. Tech.

Viscous flow features associated with near-surface water ice are observed in middle latitudes on Mars in images taken by the Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) and the Mars Odyssey Thermal Emission Imaging System (THEMIS). Although a few studies have estimated the flow rate of these features using the flow law of pure ice [1, 2], these features are considered to be composed of water ice and a high-proportion of solid materials. In this study, we estimate the flow rate using the results of laboratory deformation experiments of ice samples that contain silica particles as solid impurities. We classify these flow features into two types: One is small features, which are formed on relatively high-gradient slopes (larger than 10 degrees), with several tens of meters in thickness, including ice-rich mantling deposits and glacier-like flows. The other is large features with more than several hundreds of meters in thickness, including lobate debris aprons, concentric crater fill, lineated valley fill, and terrain softening. It is assumed that ice-rich deposits have a constant temperature for the small scale features. The temperature of the large scale features is assumed to increase with depth along the geothermal gradient.

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