Geophysical Research Abstracts
Vol. 17, EGU2015-4249-1, 2015
EGU General Assembly 2015

Estimates of Denudation Rates and Implications for Climate Control, Phlegra Montes (Mars)

Stephan van Gasselt (1), Angelo-Pio Rossi (2), Csilla Orgel (1,3), and Julia Schulz (1)

(1) Freie Universität Berlin, Department of Earth Sciences, D-12249 Berlin, Germany (stephan.vangasselt@fu-berlin.de), (2) Jacobs University Bremen, Earth and Space Sciences, D-28759 Bremen, Germany, (3) Eötvös Loránd University, Department of Geology, Budapest, 1053 Hungary

The Phlegra Montes, Mars, are located north–east of the Elysium volcanic rise and form a 1,250 km long arcuate topographic ridge composed of Hesperian to Noachian–aged remnant massifs with associated debris aprons and lineated valley fill features.

The region covers more than twenty degrees in latitude (165°E, 29.5–51.0°N) and is formed by a complex system of isolated hills, ridges and small basins that provide insight into large climate–controlled geomorphologic settings and processes on Mars.

We here report on a systematic survey that has been carried out to derive denudation–rate estimates for mass–wasting units under the assumption of hyper–arid climate conditions which favour specific denudation phenomena such as gelifluction. This survey complements earlier work focused on the latitudinal dependence of surface ages. In order to estimate denudation rates, ages based on impact-crater size-frequency measurements have to be extracted for characteristic areas first.

High denudation rates of over 10–20 B (corresponding to 10–20 mm/10^3 a) across the overall study area might be partially related to the high local relief but are more probably suggestive of a complex landscape development characterised by an interplay between atmospheric ice—deposition (potentially caused by periodic changes in spin–axis obliquities) and in-situ fragmentation, such as congelifraction and gravitational mobilisation, e.g. creep, of ice and rock. Our estimates provide further quantitative constraints on the history of remnant degradation at and near the dichotomy boundary and pose new challenges to unwind and separate different climatic processes.