Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

PPS03-P13 Room:Convention Hall Time:May 24 17:15-18:30

Slope analyses of massive landslides on Valles Marineris, Mars

Ryosuke Kurahashi[1], DEMURA, Hirohide[2*], OGAWA, Yoshiko[2], ASADA, Noriaki[1]

[1]Dept. Computer Science & Engineering, The University of Aizu, [2]CAIST/ARC-Space, Univ. of Aizu

Valles Marineris (VM) is a system of large troughs in the equatorial region of Mars. VM extends over 4,000 km from west to east, with individual troughs up to 11 km in depths, 250 km in widths, and over 1,000 km lengths. Many processes have been hypothesized to explain the geometry and formation of the troughs, including tectonic, collapse, and erosional mechanisms [e.g., Sharp, 1973; Tanaka and Golombek, 1988; Schultz, 1991].

VM consists of a number of large-scaled troughs suggesting massive landslides. We foucused on such features and conducted an analytical survey based on the altimetry data from Mars Orbiter Laser Altimeter (MOLA) onboard Mars Global Surveyor. We used the gridded data of MOLA with spacial resolution of 1/128 degree/pix and a software called GRIDVIEW developed by Roark et al. [2004].

We examined the slopes of individual troughs on the north wall and south wall of VM, respectively. The trough areas consist of multiple planes. We picked up the planes of $>$ 5km in representative scale considering the resolution of MOLA gridded data. We divided each landslide-like area into 3 sections; alcove (collapse or fall), channel (erosion) and talus (deposition), referring to the image map of Mars and also partly checking the image data from HiRISE. Then we measured each slope of the sections.

We observed the slopes of the alcoves are almost same between both walls, which suggests no difference of material strength and fall mechanism between the north and south walls. We also found the upper limit of the slope of the talus and the lower limit of that of the alcove are both 20-25 degrees. This fact suggests that the angle of repose on Mars are likely more than 10 degrees lower than 34 degree indicated by Chojnacki et al. [2010], which could be explained by considering the involution of the ancient air at VM on Mars.

Keywords: Mars, Valles Marineris, Landslide, Angle of repose, Morphology, Data analysis