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# Stratigraphic correlation between the clays of the Mawrth Vallis region as detected by OMEGA, and HRSC color imagery and DTM

D. Loizeau (1), N. Mangold (1), F. Poulet (2), E. Hauber (3), J.-P. Bibring (2), V. Ansan (1), Y. Langevin (2), B. Gondet (2), P. Masson (1), G. Neukum (4), and the OMEGA and HRSC teams

(1) IDES-CNRS, Bât. 509, Université Paris-Sud, 91405 Orsay, France, (2) IAS, Université Paris-Sud, Orsay, France, (3) DLR Berlin, Germany, (4) Institut für Geologische Wissenschaften, Freie Universität Berlin, Germany (damien.loizeau@u-psud.fr)

OMEGA/Mars Express (Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité) has discovered large outcrops rich in phyllosilicates in the region of the outflow channel Mawrth Vallis, Mars (around 20°W, 25°N) [1, 2, 3]. The region is located in highly cratered Noachian terrains [4].

Comparison with laboratory spectra reveals similarities with Mg- or Fe-smectites (such as nontronite) and Al-rich smectites (such as montmorillonites). Those hydrous minerals are located exclusively on bright outcrops present on the Noachian highlands, locally cut by the outflow channel. On HRSC/MEx (High Resolution Stereo Camera) and MOC/MGS (Mars Orbiter Camera) narrow angle images, the phyllosilicate-rich outcrops reveal strong erosion features such as numerous residual buttes showing a meter-scale layering. The phyllosilicate-rich outcrops are the most exhumed part of a thick and large unit covering the whole region of Mawrth Vallis ($\sim$300x400 km$^2$), over several hundreds of meters in thickness in some parts [3].

We have correlated the clay-rich outcrops with HRSC color imagery (false colors as result of contrast enhancement); we show that the Fe-smectites are predominantly located on "reddish" and "pink/yellowish" outcrops whereas the Al-rich clays are located on "bluish/white" outcrops. Those outcrops of different colors seem to be arranged in different superimposed layers. This correlation suggests not only that the

different clays occur on distinct parts of the bedrock, but also that this difference of composition could correspond to a chemical layering of the crust, either created during the sedimentation processes or during *in situ* alteration through different chemical pathways.

A careful mapping of the different outcrops of the clay unit, with the help of the HRSC DTM (derived from stereoscopic images), may show the geometry of the clay unit detected by OMEGA and help to understand its formation.

Future lander missions would be essential to discriminate these possibilities and more completely understand the past environment of this region.

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