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# New high resolution morphologic map of SW Elysium Planitia

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We are re-examining a particularly interesting region of Elysium Planitia between the plateaus of Zephyria and Aeolis Planum. This region is characterized by widespread layered deposits and exhumed channel fills that show both fluvial and glacial morphologies.

Elysium Planitia has been repeatedly proposed to be the site of a former ice sheet or frozen lake [e.g. 1, 2, 3] and is often cited as an example for possible volcano - (ground-)ice interaction on Mars [e.g. 4].

Based on MGS, Mars Odyssey and Mars Express data we are generating a detailed morphological map of the region in high resolution to quantify and qualify the glacial and/or fluvial inventory and to identify correlations of specific features to develop a detailed geologic history of the region. The chronology of events both glacial and fluvial in the region – and on Mars in general - is of particular interest regarding the climate history of the planet.

First results show that material was deposited from several different directions. A prominent radial pattern of numerous inverted channels indicates deposition from the centre of the region towards its margins. In contrast to this pattern we observe additional deposition towards the centre coming from north-western and southern areas, though the radial pattern is clearly dominant. Interestingly, superposition of material from different direction was not observed.

The morphology of the region is very complex. Though the inventory of glacial or fluvial features is limited, mainly to esker-like ridges and inverted channels, these features are morphologically very diverse in shape and dimension indicating different

formation processes of morphologically similar features.

So far our data suggest that the observed surface features are consistent with generation by a stagnant and slowly sublimating ice-shield or possibly several smaller ice-bodies. Several dentritic networks of inverted channels resemble deltaic or fan structures. Their position and correlation with the proposed glacial features suggests either subaerial fan deposition along the margins of a retreating ice-body or possibly deltaic deposition of material in a subglacial lake. Along the north-eastern margins of the region several fan-shaped features suggest an additional input of groundwater or permafrost possibly mobilized by magmatic activity.

References: [1] Nussbaumer, J. (2006), *Fourth Mars Polar Science Conference*, #8023; [2] Nussbaumer, J. (2005), *Lunar and Planetary Science XXXVI*, #1949; [3] Scott, D. H. & Chapman, M. G., *US Geol. Surv. Geol. Ser. MAP I-2397*; [4] Mouginis-Mark, P.J. et al. (1984), *Earth, Moon and Planets*, pp. 149-173;