STRUCTURAL RELATIONS OF A SULFATE-BEARING UNIT NEAR CETI MENSA, CANDOR CHASMA, MARS. F. Fueten[1] R. Stesky[2], P. MacKinnon[1], E. Hauber[3], K. Gwinner[3], F. Scholten[3] and T. Zegers[4], [1]Department of Earth Sciences, Brock University, St. Catharines, Ontario, Canada L2S 3A1, FFueten@Brocku.ca; [2]Pangaea Scientific, Brockville, Ontario, Canada; [3]Institute of Planetary Research, German Aerospace Center (DLR), Berlin, Germany; [4]Faculty of Geosciences, Utrecht University The Netherlands.

Introduction: Sulfates have been detected in a number of locations on Mars, particularly within Valles Marineris (VM), but their stratigraphic and structural settings are little documented. Initial studies [1] suggest that they occur in a variety of settings and are most likely present within the rock, rather than as a surface coating.

A new model for the development of interior layer deposits (ILD) in VM [2] (Fig. 1) suggests that the ILD deposits formed mainly during the initial subsidence of ancestral basins. Later opening of the VM by rift faulting [3] proceeded with little deposition of new material, leaving the earlier filled basins as hills and mesas. Sulfate-bearing sediments deposited only during the later stages of rifting. These latter units are unconformable and show a drape morphology.

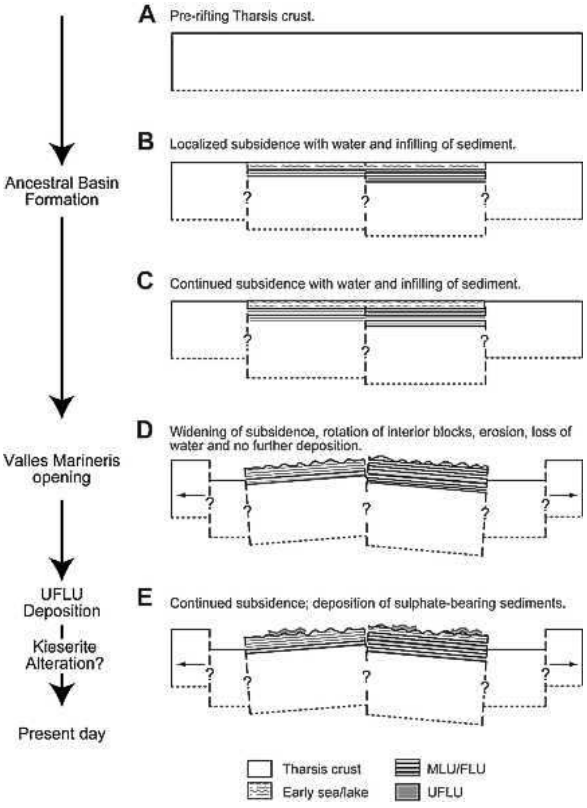

Fig. 1. A schematic model of the development of the ILDs in south-western Candor Chasma. The sulfate appears only an upper, unconformable unit. [1]

The model was developed from a detailed structural and stratigraphic analysis of an ILD in south-western Candor Chasma (74.8°W-75.9°W, 5.7°S-7.0°S). Similar sulfate-bearing sediments [1] lie just to the north of Ceti Mensa, an ILD located about 100 km further to the north-west. Here, we show that these sediments have a similar structural relationship with the rest of the ILD.

Data Sources: Our observations are based upon the HRSC panchromatic orthoimage obtained during orbit 2138 (12.5 m/pixel) and the computed elevation model (13 m/pixel). Pangaea Scientific's software ORION provided the structural measurements and three-dimensional views.

Observations: Ceti Mensa consists of a 2 km. (minimum) thick sequence of massively to thinly bedded sediments, here dipping to the south [4,5,6]. Its northern edge forms a steep scarp that has been interpreted as a normal fault [6]. In form and structure, Ceti Mensa resembles the ILD deposits further south.

To the north, a kieserite unit lies in a broad basin. It is light toned and shows distinct light and dark layering, dipping to the north. Where the OMEGA instrument detected higher concentrations of kieserite (Fig. 2B,C) [1], the sediments form a mound and are slightly darker and unlayered. The polyhydrated sulfate unit is medium toned and smooth, with no layering evident.

The kieserite unit is unconformable to the scarp units. In places, it is at higher altitudes than the nearby scarp units and truncates their layering (Fig. 2B,D), suggesting it is younger than and onlaps the scarp deposits. Also, faults cutting the Ceti Mensa units do not cross the kieserite unit (Fig. 2B), again suggesting post-faulting deposition.

Conclusions: As in the area further south in Candor Chasma, Ceti Mensa forms a fault-bound block of tilted sediments that we interpret to have been emplaced during ancestral basin formation. The sulfate-bearing sediments are late in the development of the Valles Marineris deposits and were emplaced unconformably near the end of the rift-stage tectonics.

References: [1] Mangold N. et al. (2007) *Icarus* (in press). [2] Fueten F. et al. (2008) *JGR* (in review). [3] Schultz R.A. (1998) *Plan. Space Sci., 43*, 1561-1566. [4] Gaddis L.R. et al. (2005) *LPS XXXVII* Abstract #2076. [5] Lucchitta B.K. (2007) *LPS XXXVIII* Abstract #2093 [6] Fueten et al. (2007) *LPS XXXVIII* Abstract #1388.

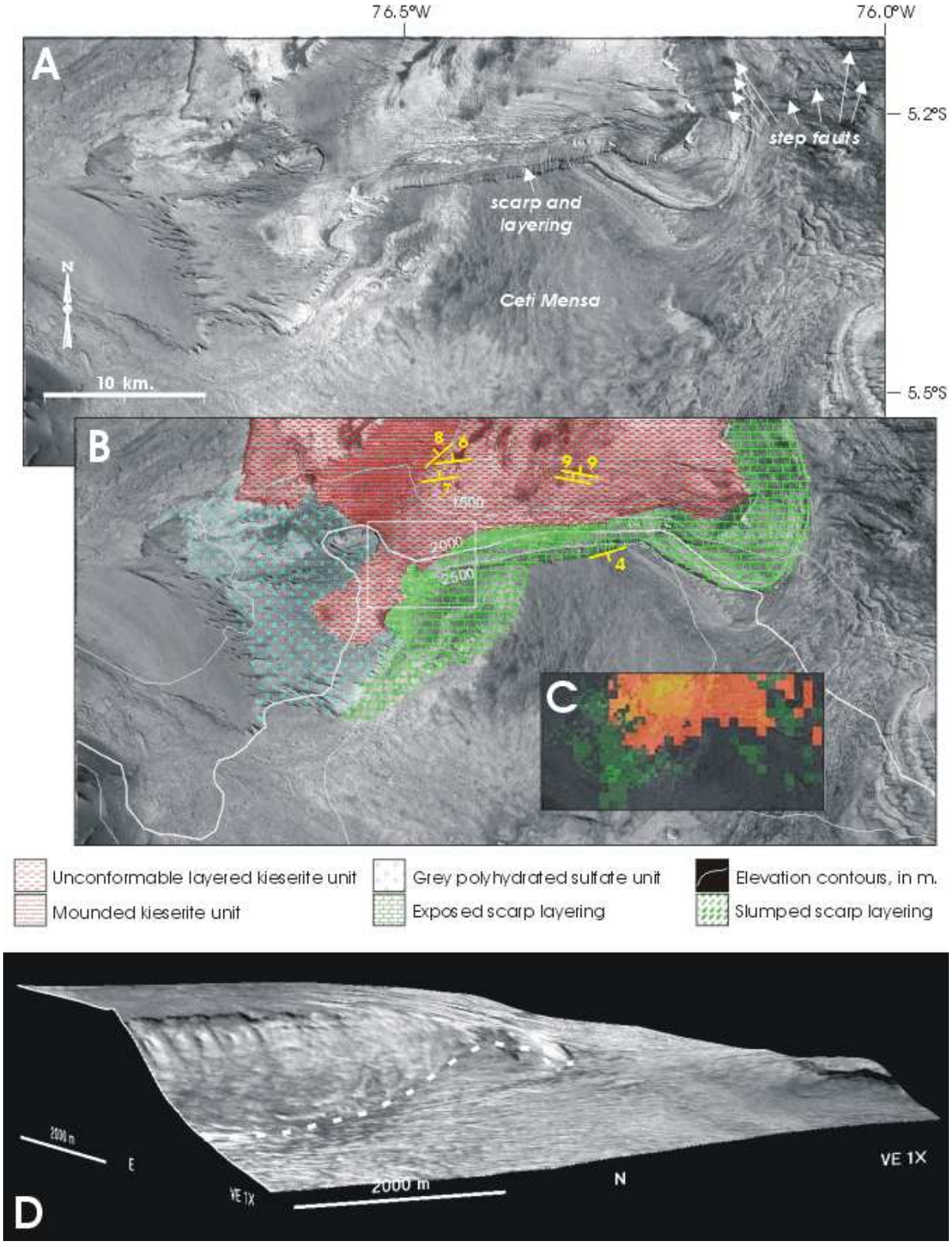

Figure 2. A) Enhanced portion of HRSC 2116, showing the northern half of Ceti Mensa and the sulfate-bearing basin. B) Structure and lithology map, with selected elevation contours. The white rectangle shows the area depicted in D. C) Distribution of monohydrated (yellow & orange) and polyhydrated (green) sulfates (from [1]). D) 3D projection of unconformable sulfate-bearing layer overlying the scarp layering (the dashed line is the contact).