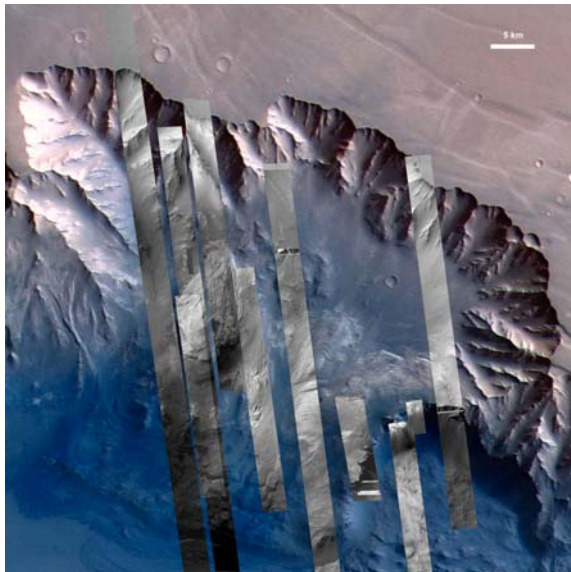


**COPRATES CHASMA NORTH WALL INTERIOR LAYERED DEPOSIT: LAYER MEASUREMENTS AND COMPARISON WITH JUVENTAE CHASMA ILDS USING MARS EXPRESS HIGH RESOLUTION STEREO CAMERA (HRSC) DERIVED TOPOGRAPHY** Michael, G.<sup>1</sup>, E. Hauber<sup>1</sup>, K. Gwinner<sup>1</sup>, R. Stesky<sup>2</sup>, F. Fueten<sup>3</sup>, D. Reiss<sup>1</sup>, H. Hoffmann<sup>1</sup>, R. Jaumann<sup>1</sup>, G. Neukum<sup>4</sup>, T. Zegers<sup>5</sup>, and the HRSC Co-Investigator Team <sup>1</sup>Institute of Planetary Research, German Aerospace Center (DLR), Berlin, Germany <sup>2</sup>Pangaea Scientific, Brockville, Ontario, Canada <sup>3</sup>Department of Earth Sciences, Brock University, St. Catharines, Ontario, Canada <sup>4</sup>Remote Sensing of the Earth and Planets, Freie Universitaet, Berlin, Germany <sup>5</sup>ESTEC, ESA, Noordwijk, The Netherlands

**Introduction:** The interior layered deposit (ILD) in the north wall of Coprates Chasma differs from those we have examined in Hebes, Ophir, Candor, Melas, and Juventae Chasmata [1] in that its base apparently occurs some 2700 m above the main chasma floor. Situated in a re-entrant of the chasma wall, it has two main sections, the maximum lateral extent of the larger deposit being about 15 km. Nevertheless, it displays several small-scale features in common with an apparently exhumed ILD in Juventae Chasma (HRSC orbit 1070) of much greater extent (50-150 km, also in two sections): bright material; regular layering with 3-6 m layer thickness; steeper slopes with chutes headed by scalloped alcoves, and ending with dark talus fans; morphologically similar yardangs. Using a digital terrain model derived from HRSC stereo together with projected nadir and colour channels and manually coregistered MOC images, we investigate the structure of the layering, and the present erosional features. As elsewhere, we are interested to make measurements of the strike and dip of the layering, since this information could potentially discriminate between theories of the origin of the layers: whether water emplaced sediments, volcanic ash deposits, or some other airfall deposit.



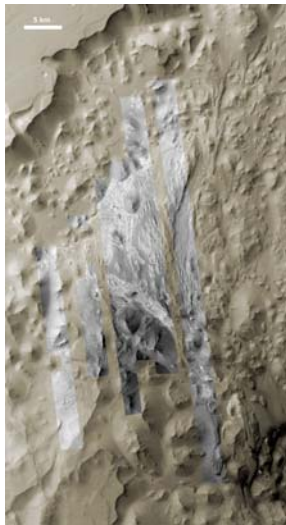
**Coprates Chasma north wall ILD (orbit 515):** Small compared to the other ILDs, about 15 km across, the deposit base is around 2700m above the

Coprates floor, and has a height of ~3000m. It shows two apparent scales of layering: one producing a step-like relief, the other much finer. Measurements of the fine layers give mean thickness values of 3.2 m (Profile 1: 30 layers in 205m over 1.5km baseline, registered MOC, only dark to light transitions counted) and 5.7 m (Profile 2: 45 layers in 255m over 1.6km baseline). The coarser layers are measured to have a mean thickness of 85m (Profile 3: 14 layers in 1200m over 3 km baseline). Seen in perspective view with MOC overlays, it would appear that the coarse layering is not horizontal, but dips outward from the centre of the ILD. Wind eroded yardangs are seen between two main sections in apparently similar material. Talus deposits originate particularly from one height level in the main section. Some appear dark and fresh; lighter ones more eroded. Their formation leaves distinctive alcoves at the head of a chute. At the south-west of the ILD there is a scarp of 60° inclination with many such chutes, and morphologically similar to that seen in the Juventae North ILD. The lesser section of the ILD is confined by a ridge of the chasma wall.



**Juventae ILD N1 (orbit 1070/1) :** This ILD is 70 km north-south in extent, with a wind-eroded top-surface. The yardangs show fine layering, with a typical mean thickness of 2.7m (Profile 1: 60 layers in 160m over 2 km baseline) and 6.5m (Profile 2: 35 layers in 230m over 2 km baseline). There are chutes

(horizontally, up to 1 km) to talus fans headed by distinct scalloped alcoves, originating in particular from at least two specific height levels. There is a strongly degraded concavity on the west side, where significantly more talus is seen, and the chutes are deeper. The dune material to this side of the ILD is particularly abundant. Traceable layers can be observed somewhat outside bright mound of the ILD to the west, over 8 km distance. These are interrupted by a 500m crater. There is a layer of a different type from the fine layers to the south of the ILD, extending over more than 10 km. There is also a talus flow (1.5km) from a smooth top-surface, but with no alcoves.



**Juventae ILD N2 (orbit 1070/1 – thin deposit north of ILD N1):** Degradation scarp on SE remnant (NE facing) with dark talus fans, as for Juventae ILD N1 and Coprates Chasma north wall ILD. A additional terrain type is present – dark, smooth topped, with occasional sharp edges. Occurs in some places on top of the ILD, in others adjacent. It is cratered, with craters up to ~20m diameter (there are no craters on yardang-eroded material). In some places it shows collapse/sublimation pits. Two small mounds (500m diameter) apparently superimposed on yardangs. Possibly protruding remnant, or somehow hardened remnant

**Conclusions:** Among the ILDs we have examined [1], the Coprates north wall and Juventae north ILDs share several characteristics: fine layering, fine-grain dark talus originating at specific levels, erosion into yardangs, suggesting they are likely of similar origin.

The 2700m elevation of the base of the Coprates north wall ILD provides an interesting constraint for possible formation theories.

Dark dune material observed near the ILDs likely originates from the talus.

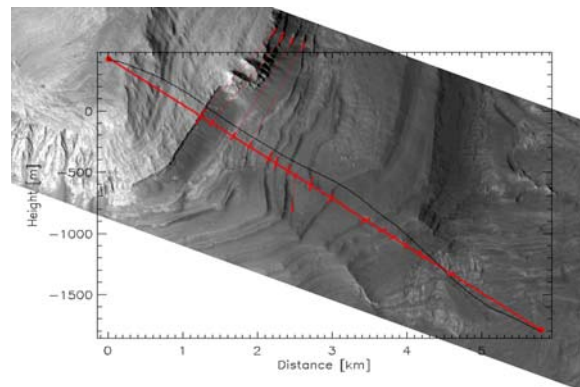
Regular fine layering suggests cyclic formation process.

We hope to get more insight into the origin of the ILDs in the future with the use of results from the OMEGA instrument [2].

#### References:

[1] E. Hauber et al. (2005) Interior layered deposits in Valles Marineris, Mars: insights from 3d-data obtained by the High Resolution Stereo Camera (HRSC). LPSC XXXVI

[2] A. Gendrin et al. (2005) Sulfates in Martian Layered Terrains: The OMEGA/Mars Express View, Science Feb 2005.



View of the coarse layering of the Coprates ILD from south-east side (MOC image with HRSC height profile)

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