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Layering attitudes in southwestern Candor chasma from HRSC image data and stereo-derived DTM

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Layered deposits occur widely within the chasmata of Valles Marineris, but their origin and mechanism of formation are uncertain. Recent geochemical data indicate the presence of sulfates in some of the deposits. Less is known about their internal geometry and structural setting, properties that may give clues to their formation process. High resolution imagery and stereo-derived digital terrain models (DTMs) from the High Resolution Stereo Camera (HRSC) experiment on the Mars Express orbiter can provide this information, by allowing the attitudes of observed layering to be calculated at various locations throughout the image. This study focused on the deposits in southwestern Candor Chasma which had already been mapped as units of Hesperian or Amazonian age.

The multispectral image (12.5 m/pixel) and DTM (50 m/pixel) were calculated from HRSC data collected during orbit 2116. Pangaea Scientific's software ORION was used to calculate the layering attitudes. Layer dips are generally low (less than 30°) and tend to be in the direction of the local topographic slope, as is also observed in other ILDs. New to this work is the measurement of fine layers in the deep part of the chasma in the northeastern part of the image area. The layers are subhorizontal, similar to the attitudes found for deep layers in nearby Ceti Mensa and in Hebes and Ophir chasmata.

As concluded earlier, the pattern of dip angles and directions is most likely the result of the strata draping over irregular basement topography. The basement likely con-

sists of fault blocks that formed during the initial opening of the chasma and then were rotated and downdropped with continued opening and collapse of the chasma. Our draping model, if correct, suggests that deposition must have occurred under low energy conditions. High energy situations such as fluvial or subglacial deposition are unlikely. Subaerial or deep water conditions are more likely, suggesting either pyroclastic ash fall or the presence of a deep ocean (in this case, at least 6 km deep). We tend to favor the former.