**DIGITAL PHOTOMOSAIC OF VIKING IMAGES 14A29-14A35: A PRELIMINARY LOOK AT GANGIS CHASMA, MARS.** David E. Melendrez (Dept. of Geological Sciences, California State Polytechnic University, Pomona, CA 91768), James R. Zimbelman (Lunar and Planetary Institute, Houston, TX 77058), Peter W. Francis (Lunar and Planetary Institute, Houston, TX 77058).

The largest canyon system on the surface of Mars, Valles Marineris, extends along the Martian equatorial zone for nearly 4000 km (1). Gangis Chasma is one of the smaller sub-canyons to the east of and roughly parallel to the main system. A number of large landslides and other smaller examples of mass wasting events are evident within this canyon. One of the best examples of a relatively recent geological process on the surface of Mars is the largest landslide within Gangis Chasma, near the junction with Capri Chasma in Viking Orbiter 1 frame 14A30. Digital image processing of frames 14A29-14A35 was used to generate a 7-frame mosaic of this area.

Histograms of each frame were generated by the computer (VAX 11/780) to determine the distribution of pixel digital number (DN) values. When a compressed distribution existed, various types of "stretches" (linear and piecewise) were used to enhance surface contrast and bring a more uniform brightness to the scene. Bad or unwanted pixels were either replaced with the average of the adjacent pixels' DN values or by simply "patching" the anomalous area with a representative one of equal size. Control points (coincident pixels from two frames that occur in the area of overlap between those frames) were selected to generate mapping coefficients that were in turn used to geometrically correct, or "warp," the images to ensure a better fit with one another. After the patching, stretching, and warping were completed, another single control point was found to join the original two frames together or to add a new frame to the growing mosaic. When the mosaic was completed, the individual frame margins were only faintly visible (Fig. 1).

These seven frames cover an area from about 42.3° W to 46.0° W and from about 5.7° S to 11.4° S (2). The oblique orientation of the features is due to the spacecraft position at the time the images were recorded. The viewing direction is almost due south (north azimuth is $\simeq 179°$ from the line of sight) with the emission angle being $\simeq 65°$ from the vertical. The average range of the spacecraft from the surface was 2338 kilometers and the average resolution of the images is 88 m.

Relative age relationships can be determined for a number of features. Several of the large impact craters have been partially eroded by later sliding events along the canyon walls implying that the craters predate the landslides. Similarly, some craters on the plains appear to have been partially filled by more recent lava flows of fairly low viscosity. The large landslide in the upper right of Figure 1 (frame 14A30) has exposed a section through an older crater on the adjacent plain, and some stratigraphy is visible in the canyon wall. This area of intense mass-wasting activity contains at least three major slides; the largest one is the most recent because it overrides

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the other two. The largest slide scarp is approximately 100 km across with the flow reaching a distance of roughly 50 km onto the canyon floor. It displays classic landslide features with huge slump blocks and a grooved debris flow apron. The grooves may represent shear surfaces between particles travelling at different velocities within the flow (3). The exposed wall extends up to 2 km above the canyon floor and shows little evidence of fluvial erosion. However, wind erosion may play a role in the formation of fresh talus slopes (3,4).

The photographic print in Figure 1 was produced on an Optronics C4300 Colorwrite at LPI on loan from the NASA/Johnson Space Center. This study was performed as part of the 1986 Summer Intern Program for Undergraduates at the Lunar and Planetary Institute, under the supervision of Dr. James R. Zimbelman and Dr. Peter W. Francis.


Figure 1.
Photomosaic of Gangis Chasma within Valles Marineris.

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