

Geological Tour of Southwestern Mexico

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Nineteen Landsat Thematic Mapper quarter scenes, coregistered at 28.5 m spatial resolution with three arc second digital topographic data, were used to create a movie, simulating a flight over the Guerrero and Mixteco terranes of southwestern Mexico. The flight path was chosen to elucidate important structural, stratigraphic, and geomorphic features.

The satellite imagery, resampled into Universal Transverse Mercator projection, was geometrically and radiometrically corrected to produce a mosaic covering two 1:250,000 topographic sheets (Ciudad Altamirano, I 14-4, and Cuernavaca, I 14-5; 18-19°N latitude 98-102°W longitude). This 422 km by 111 km area covers 46,842 km². The video, available in VHS format, was generated by computer interpolation between approximately 50 manually selected key frames to produce a 360 second animation consisting of 30 frames per second (i.e., 10,800 total frames). The simulated velocity during three 120 second flight segments of the video is approximately 37,000 km per hour, traversing approximately 1,000 km on the ground.

Each flight segment uses a different spectral band combination: (1) simulated natural color, (2) false color infrared, and (3) principal components to enhance features of interest. For each segment, the opening scene is a space view of the entire input data set. During each simulated flight segment that more or less follows Highway 51, geologic and geomorphic features are examined in the following order: the complexly folded and faulted Mesozoic strata of the San Lucas anticlinorium/Malpaso syncline, and Tertiary volcanoclastic redbeds and volcanics of the eastern Tierra Caliente region; the high angle Arcelia fault defining the western margin of the Tierra Caliente metamorphic complex (TCMC); the TCMC from Arcelia to Teloloapan; the thrust-faulted eastern margin of the TCMC and the Chilacachapa anticlinorium in the Teloloapan-Iguala-Taxco region; the Tertiary volcanoclastics and volcanics and middle Cretaceous carbonates displaying karst topography between the Huactamo and Atenango del Rio; the complexly folded and faulted Cretaceous strata of the Atenango del Rio synclinorium; and the Papalutla thrust fault that defines the northwestern margin of the Acatlan metamorphic complex.

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