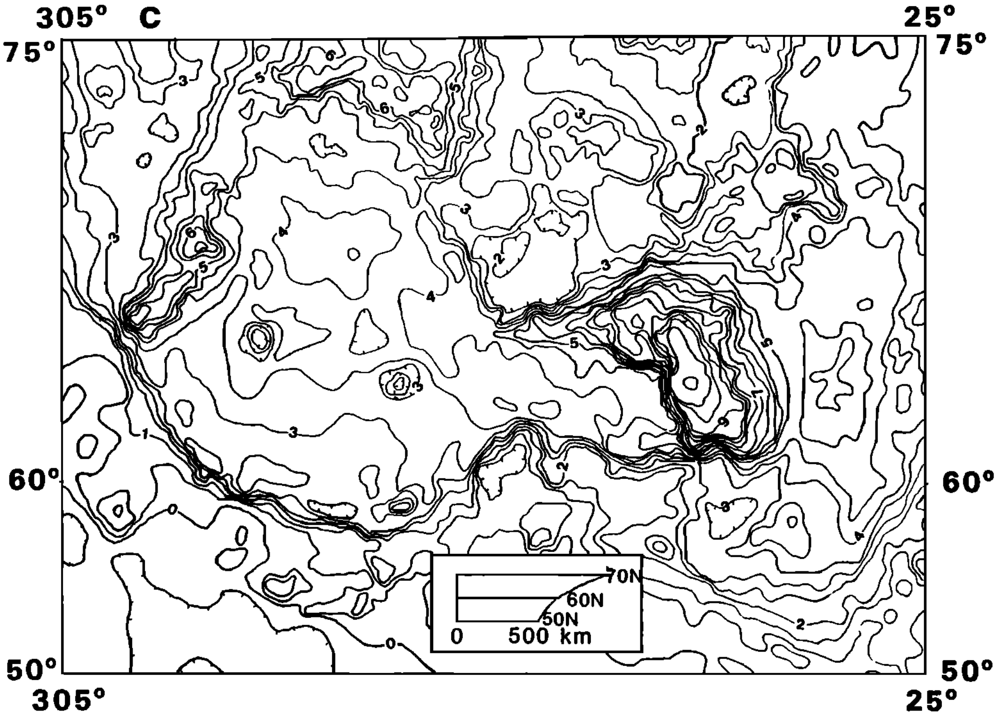

Fig. 1. (continued)

occurring there, identifying the structural elements, their tectonic origin, and their sequence. Finally, we develop a geologic and tectonic chronology and propose a model for the origin and evolution of Maxwell Montes.

REGIONAL DESCRIPTION, SURFACE MORPHOLOGY, AND GEOLOGIC MAPPING

The Ishtar Terra Highland region on Venus (Figure 1) is dominated by the plateau Lakshmi Planum, which is elevated 3-4 km above the surrounding plains and which is surrounded by linear mountain belts [*Masursky et al.*, 1980; *Campbell et al.*, 1983; *Barsukov et al.*, 1986; *Basilevsky et al.*, 1986]. These mountain belts are from 200 to 500 km wide, extend to over 1000 km in length, and possess 3-8 km of relief relative to the plateau. The belts on the western and northern flanks of Lakshmi Planum, Akna Montes and Freyja Montes (Figure 1), are morphologically similar to terrestrial orogenic belts [*Crumpler et al.*, 1986]. In contrast, Maxwell Montes is far more rectilinear in plan view and possesses twice the relief of the other mountain belts. The most distinctive characteristic of Maxwell Montes in the Arecibo image (Figure 2*a*) is its high radar backscatter cross section relative to the surrounding terrain. The boundary defining the area of high backscatter cross section closely follows the 6-km altitude contour (Figure 2*c*).

In both data sets, the most distinctive features of Maxwell Montes and the other linear mountain belts are paired, parallel bright and dark bands (Figures 1 and 2). These bands represent topographic ridges and valleys in the Venera 15/16 image and relatively rough and smooth areas in the Arecibo image. Uncertainties in the kilometer-scale topography of this region precludes a direct correlation of individual ridge/valley and rough/smooth pairs across the mountain range, but we find that there are broad areas where the ridges observed in the Venera data correspond well with the rough areas observed in the Arecibo data. Therefore we conclude that the ridge crests on Maxwell Montes are characterized by relatively rough surfaces, while the valleys are characterized by relatively smooth surfaces. If erosion rates are low on Venus, as suggested from surface lander images [*Garvin et al.*, 1984] and reflectivity data [*Pettengill et al.*, 1982], then the crests of the ridges may be rough simply due to tectonic breakup of ridge crests and concentration of rock debris not far from the crests. The troughs, however, could be smoother due to collection of soil in lows or a lack of tectonic breakup and concentration of talus on the ridge and its flanks. In addition to these rough, linear ridges and smooth valleys, there are also areas of shorter bright ridges that are parallel or intersect one another at a variety of angles. Some ridges are also observed that are more sigmoidal in shape. Finally, other features that are recognized as individual bright or dark linear segments are observed in the images. These features are interpreted to represent scarps, faults, or fractures, and their occurrence is far less frequent than that of the parallel ridges and troughs.

Continuous areas of similar structures and textures can be identified across Maxwell Montes and mapped as geomorphic and geologic units. The key factors in identifying particular units are a similarity in structures, texture, and overall backscatter cross section. Through a comparison of the Arecibo and Venera images, 10 distinctive morphologies can be recognized across Maxwell Montes, identified as units, and compiled in a geological map (Figure 2*d*). A detailed description of each of these units is provided elsewhere [*Vorder Bruegge*, 1987], but similarities in the features and textures of some units enable us to define four basic groupings of units (Figure 2*d*). We interpret the nature and origin of these units based on their structures, textures, locations, and correspondence to the detailed topography (Figure 2*c*).

The "Banded Units" are composed predominantly of long,