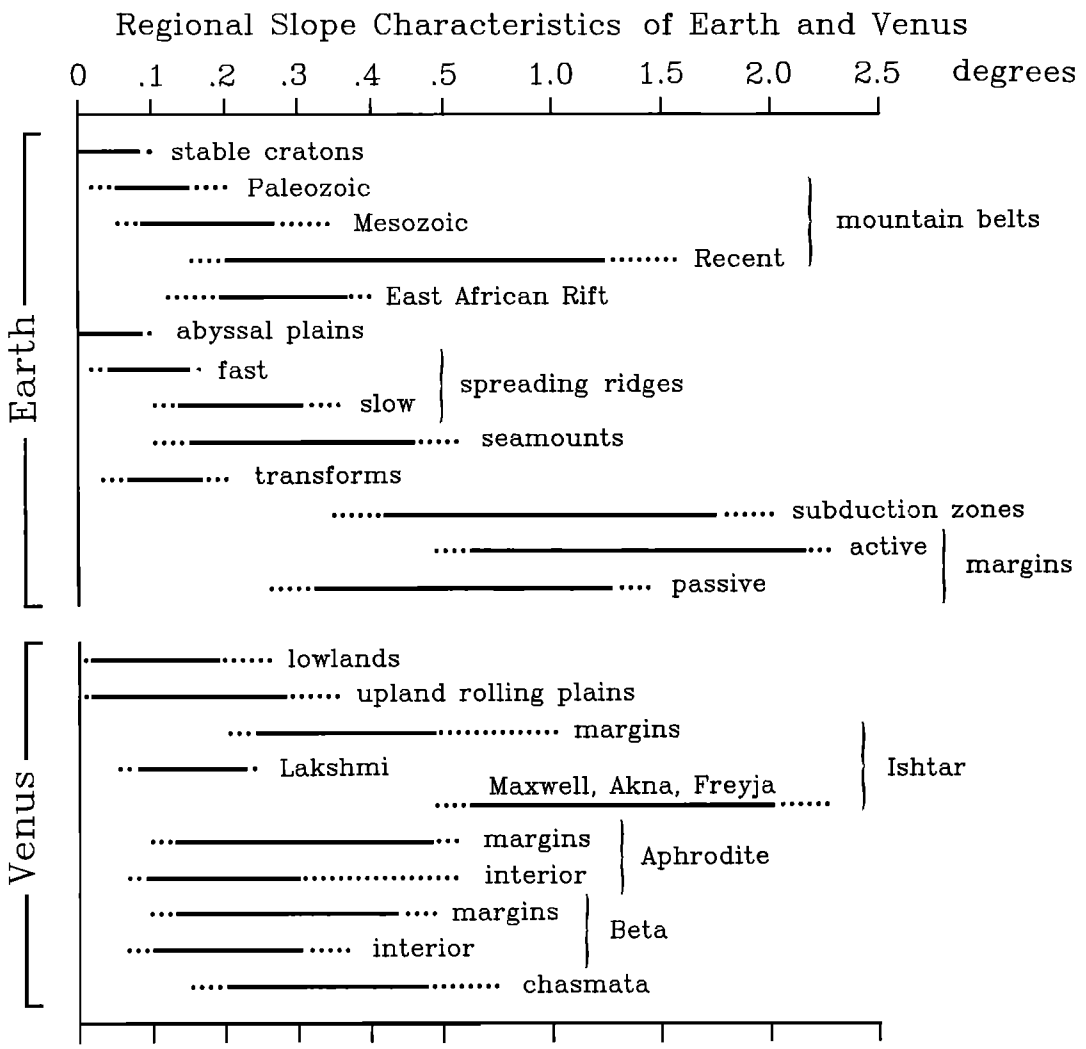

Fig. 1. Regional slope characteristics of selected terrestrial and Venusian topographic features discussed in text. Values represent the average surface tilt of 3° by 3° regions. Solid lines give typical values; dots extend across the full range of slope values associated with each feature.

(Plate 1) and the frequency of occurrence of these slope values differ significantly between earth and Venus [*Sharpton and Head*, 1985]. Figure 1 summarizes the regional slope values characteristic of major features observed on both planets.

Regional Slope Characteristics of Earth

Plains and Related Features

The stable interiors of the continents, as well as oceanic abyssal plains, appear as extensive regions of 0.0° slope in Plate 1, top. At the scale of this analysis, the continental cratons appear flatter, broader, and more continuous than the ocean basins.

The ocean basins of earth are marked by numerous linear features indicative of a wide range of processes related to seafloor spreading. The flanks of mid-ocean ridges are expressed as broad, low-sloping linear regions of marked continuity and global extent. The slope characteristics of these divergent plate boundaries are controlled by the spreading rate of the ridge: Slow spreading ridges, such as the Mid-Indian and the Mid-Atlantic (1–2.5 cm yr^{-1} and 1.25 cm yr^{-1}, respectively [*Heirtzler et al.*, 1968; *Parsons and Sclater*, 1977]), are flanked by relatively narrow, well-defined regions of 0.1°–0.4° regional slope, whereas a faster spreading ridge, the East Pacific Rise (2–6 cm yr^{-1} [*Heirtzler et al.*, 1968; *Parsons and Sclater*, 1977]), is bounded by ill-defined flanks generally inclined less than 0.2°. Major fracture zones and transform faults associated with the East Pacific Rise can be recognized as narrow linear features trending at high angles to the ridge axis. As these features exhibit slopes typically less than 0.2°, the occurrence of transforms and fracture zones associated with slower spreading ridges is difficult to determine in Plate 1, top.

Less extensive linear features of moderate slope define the locations of seamount chains such as the Hawaii-Emperor and the Tuamotu-Pitcairn Island chain, arranged in parallel systems in the central Pacific. These and other discrete linear arrangements of volcanic islands [*Minster et al.*, 1974] are produced as the lithosphere moves over relatively stationary magma source regions in the mantle [*McDougall*, 1971; *Wilson*, 1963; *Morgan*, 1973; *Burke and Wilson*, 1976]. As the volcanic topography migrates away from the hotspot, the lithosphere cools and subsides under the load, reducing local relief toward the more distal (older) portions of these chains. Thus the flanks of these hotspot traces display a systematic pattern of regional slope magnitudes ranging from less than 0.1° at the distal extents to 0.6° at the sites of the most recent volcanic activity (e.g., the eastermost islands in the above-mentioned chains).