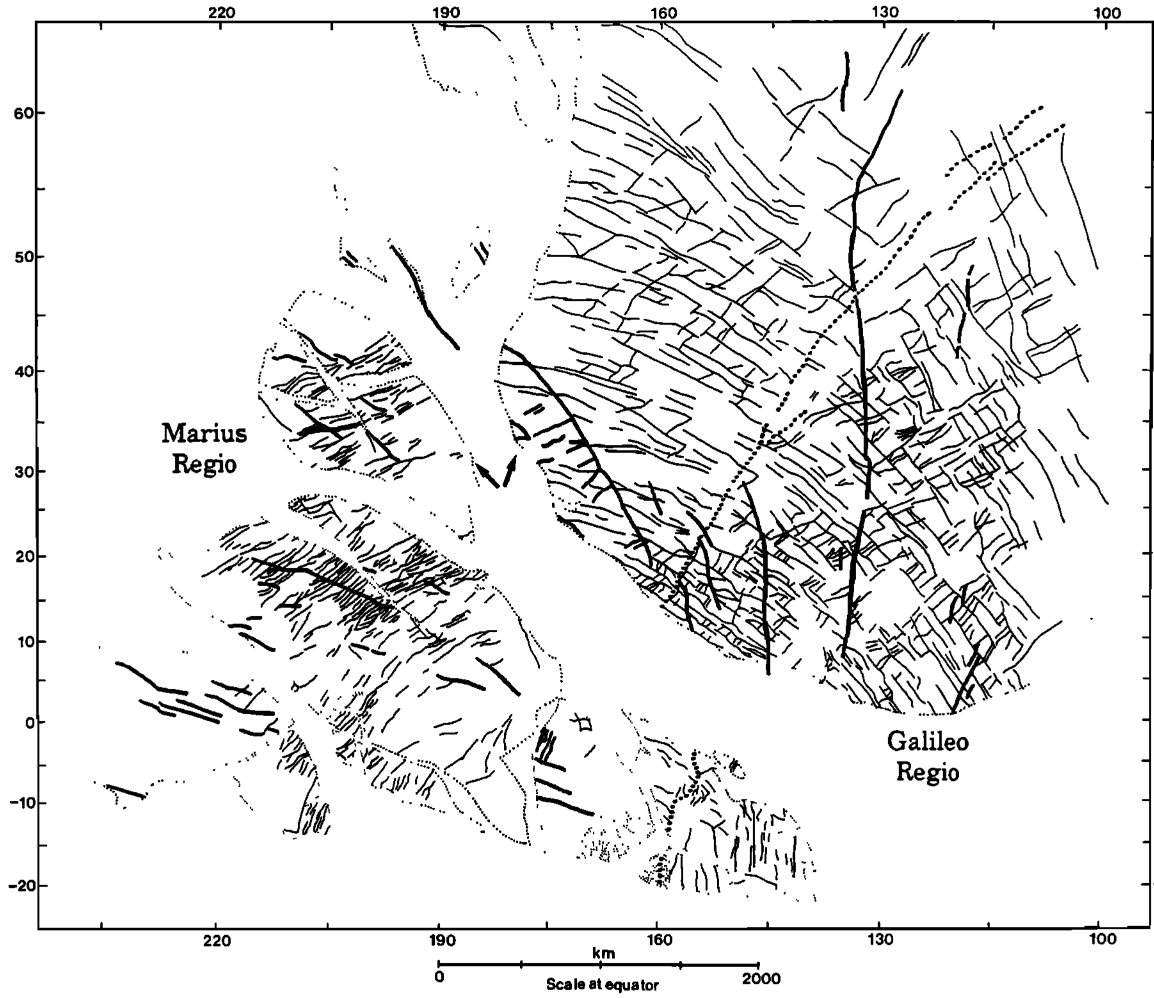

Fig. 1. Mercator map of dark terrain structures in the anti-Jovian hemisphere. Fine solid lines are system I furrows, and heavy solid lines are system II furrows. The heavy dotted lines represent a unique, postfurrow trough broken into two segments each several hundreds to thousands of kilometers in length. Arrows point to the discontinuity in the trends of arcuate furrows between Galileo Regio and Marius Regio. Fine dotted lines are light terrain-dark terrain contacts, and the circular stippled area is the giant palimpsest at the center of curvature of the system I arcuate furrows.

the sub-Jovian hemisphere and is dominated by arcuate troughs. *Schenk and McKinnon* [1987] interpreted "system III" furrows really to form two systems, one arranged concentrically to 38°N,32°W and a superposed one arranged concentrically to 56°N,46°W. *Murchie and Head* [1987, 1988] interpreted the furrows to form a single system arranged generally concentric to 60°N,50°W.

Several groups of workers have noted that the orientation of system I arcuate furrows changes abruptly between Galileo Regio and Marius Regio (Figure 1), and have suggested that left-lateral offset of the two areas has occurred since furrow formation [*Lucchitta*, 1980; *Passey and Shoemaker*, 1982; *Shoemaker et al.*, 1982]. *Zuber and Parmentier* [1984*a*] tested this hypothesis by examining furrow geometry and the circularity of light terrain craters, as tests for shear offset and shear strain. They concluded that the arcuate furrows either formed in their present configuration or were deformed before light terrain was emplaced. *Murchie and Head* [1988] found evidence for (1) a fault zone that separates the areas and follows the trace of a small circle about 45° of arc in radius, and (2) several independent structural indications of 500 km of left-lateral motion across the fault zone. Removal of this proposed shear (Figure 2) restores structural continuity to both systems I and II. Stratigraphic relations indicate that shear occurred subsequent to furrow formation and before and during the earliest stages of light terrain emplacement, in agreement with the constraints imposed on possible dark terrain disruption by *Zuber and Parmentier* [1984*a*]. *Schenk and McKinnon* [1987] made the alternative interpretation that the furrows formed in their present configuration.

Previous studies of the furrows have resulted in several models of their origin. *Smith et al.* [1979b], *McKinnon and Melosh* [1980], *Passey and Shoemaker* [1982], *Shoemaker et al.* [1982], and *Schenk and McKinnon* [1987] have suggested that arcuate furrows originated as ring graben due to collapse of a large impact cavity in a low-viscosity mantle. *Casacchia and Strom* [1984] and *Murchie and Head* [1987] suggested that some furrows originated by fracturing of a domal uplift. *Thomas et al.* [1986] suggested that furrows originated by volcanic and tectonic reactivation of relict tidal fractures. *Croft and Strom* [1985], *Croft and Goudreau* [1987], and *Croft et al.* [1990] suggested that furrow formation resulted from regional-scale tectonism. *Murchie and Head* [1987] suggested that arcuate furrows formed by extensional tectonic reactivation of impact-generated fractures.

Two very different interpretations of the origin of dark