



Fig. 16. Mercator maps of system I furrows; 500 km of left-lateral shear of area 1 relative to areas 2 and 3 have been retrodeformed. (a) Arcuate furrows. Curved lines are small circles centered on the furrow pole of area 3, 15°S, 168°W. Furrows in a small area of northwestern Marius Regio deviate systematically from concentricity. The primary area of furrow nonconcentricity is northern central Marius Regio and southeastern Galileo Regio (arrows). (b) Arcuate furrows. Curved lines are small circles centered on the center of curvature of system III arcuate furrows, approximately 60°N, 50°W. Most nonconcentric furrows (arrows) parallel these small circles, consistent with local reuse of the older system III arcuate furrows. (c) "Radial" furrows. Curved lines are small circles centered on the furrow pole of area 3, 15°S, 168°W. Note the truly radial arrangement about this pole of the furrows in Marius Regio and the consistent northeast orientation of furrows in Galileo Regio. (d) "Radial" furrows. Curved lines are small circles centered on the center of curvature of system III arcuate furrows, approximately 60°N, 50°W. Furrows in Galileo Regio are orthogonal to the small circles, consistent with reuse of older system III radial structures.

and that arcuate furrow nonconcentricity in Galileo Regio may have resulted from reuse of older system III structures.

It is observed in Figures 4 and 13 that throughout Marius Regio system I radial and arcuate furrows are consistently orthogonal. Thus, if the giant palimpsest is correctly identified as the center of the arcuate furrows, then system I radial furrows in Marius Regio (areas 2 and 3) should be arrayed radially to the palimpsest. Figure 16c is a map of the system I radial furrows in their "restored" configuration, along with small circles centered on the furrow pole of area 3 which falls within the palimpsest. The "radial" furrows in Marius Regio are arrayed truly radially both to this furrow pole and to the palimpsest. This result supports the identification of the palimpsest as the true center of system I and underlines the significance of the large westward separation from this feature of the arcuate-furrow pole for Galileo Regio.

It is also observed in Figure 16c that the system I "radial" furrows in Galileo Regio are not truly radial to the palimpsest. Rather, they have a consistent northeast orientation that differs systematically by up to 30° from truly radial. In Figure 16d, the same structures are shown, but this time along with small

circles centered on the center of curvature of the older system III furrows. The "radial" furrows in Galileo Regio are radial to that center of curvature, consistent with reuse of older system III radial structure. This observation supports the independent suggestion of reuse of older system III structure by the system I arcuate furrows in Galileo Regio.

#### *Possible Nonshear Explanations of Furrow Geometry*

The above discussion raises the issue of whether control by older system III structures might be a possible nonshear explanation for the geometry of system I furrows. Two specific questions must be asked. First, could the consistent northeast orientation of system I "radial" furrows in Galileo Regio be explained as control by older system III radial structures, if the furrows' observed configuration is analyzed – that is, if shear is assumed not to have occurred? Second, if the giant palimpsest is assumed to be the center of system I, then an area of arcuate furrow nonconcentricity covers central and western Galileo Regio and is responsible for the misalignment of the arcuate furrows in Galileo and Marius Regio. Could the observed configuration of system I arcuate furrows simply be the result of