- We have constructed from new Viking imaging data topographic maps of the two largest martian shield volcanoes - Olympus Mons and Arsia Mons. The uncertainties in their volumes and relief is much reduced, and their general morphology is much clearer. Combined with new observations of large positive free-air gravity anomalies associated with these two volcanoes, these topographic data will make possible useful studies of the internal structures of the shields, and deformations and displacements of the martian crust.

The map of Olympus Mons was compiled from a single stereo image (NASA 646A71) using a semiautomatic digital mapping system developed for the Viking Orbiter Imaging Team at the Image Processing Laboratory, JPL (Ruiz et al. 1977, JGR 82, 41,89, and Blasius 1977, B.A.A.S. 9, 538). The map of Arsia Mons was compiled from four images (571A49, 50, 574A48, 49) by measuring the feature image coordinates digitally at JPL then estimating their positions in space using a geodetic least squares estimation program developed by one of us (P.C.D.). The map datum was derived from earth-based radar data (Downs et al. 1975, Icarus 26, 273).

4.18-A Olympus Mons Aureole: Possible Evidence for the Antiquity of Olympus Mons. R.W. Wolfe, National Air and Space Museum -- Many hypotheses have been proposed for the origin of the aureole of grooved terrain encircling Olympus Mons. Most relate the aureole to Olympus Mons and should explain the asymmetric distribution of grooved terrain about the central volcanic edifice.

The aureole may be circumscribed by two circles, each about 600 km in radius: one concentric with Olympus Mons and the other eccentric to the NW with its center lying on a line through Olympus Mons and normal to the trend of the Tharsis ridge (see fig.). The aureole is discontinuous in the east and south quadrants of the concentric circle. This pattern may be simply explained by assuming the aureole was emplaced in two stages: 1. Prior to the development of the Tharsis uplift, aureole material was emplaced on a level surface and distributed evenly and continuously about the source (coincident with Olympus Mons); 2. The aureole material to the NW of Olympus Mons was emplaced subsequent to the Tharsis uplift and its distribution was controlled by the regional slope to the NW.

This model may apply regardless of which hypothesis for the origin of aureole material is chosen. Save those