CHRONOLOGY OF SYRTIS MAJOR QUADRANGLE. Adele Fuller Williams, (Dept. of Geology and Geological Engineering, University of Idaho, Moscow, ID 83844).

Introduction: A chronology of the Syrtis Major Quadrangle on Mars has been devised using geologic [1], topographic, gravimetric [2], and magnetic data [4] along with recent narrow-angle images from the Mars Orbiter Camera [4].

A study of the Syrtis Major Quadrangle has found narrow-angle images among the more than 900 available between 1999 and 2004 that demonstrate superposition along the boundaries between the major structures. Recent research of the area by Ivanov and Head (2003) [5] and Hiesinger and Head (2004) [6] has been compared to and incorporated with this study [7].

Results: : The dichotomy boundary and Arabia Terra are two of the five major structural features within the quadrangle (Fig. 1, next page). Arabia Terra appears to be the basement at least on the southern side of the dichotomy boundary. Recent reports of an andesite-like composition similar to the northern lowlands may indicate that Arabia Terra is a part of the lowlands rather than the southern highlands, but other interpretations of the data appear more likely. Arabia Terra is relatively low topographically, especially to the west of Syrtis Major Quadrangle, but it is usually shown on the southern side of the north-south dichotomy, which corresponds closely to the edge of the thinnest crust. Also, a slight increase in elevation includes Arabia Terra in the southern highlands without significantly changing the rest of the boundary.

The Arabian basement may or may not have existed as such before the dichotomy occurred to separate the northern lowlands from the southern highlands. Several very large impacts near the north pole may have occurred close together toward the end of the heavy bombardment to initiate the dichotomy. Smaller, though still relatively large, impacts such as the Isidis impact may then have deformed and changed parts of the boundary at the end of the heavy bombardment.

The Isidis Basin was formed at the end of the Noachian along with the other large impact basins of Hellas, Argyre, and Chryse. The basin is topographically degraded especially on its northern and eastern rims. However, it has a strong gravity signature, positive within the basin and negative in a wide ring surrounding it. The basin is located at a bend in the dichotomy boundary. Its strong gravity signature may be a reflection of the very thin underlying crust, which in turn may indicate that it formed after the dichotomy was in place. Isidis may have contributed material to the dichotomy boundary, but it did not force the bend to occur. It probably only masked a more gradual bend or, more probably, contributed to the final outline of the boundary.

The Nili Fossae are concentric to the Isidis Basin rim and are essentially contemporaneous with the formation of Isidis or very slightly younger if the fossae formed in reaction to the initial impact. They occur within Arabia Terra-type basement material (Fig. 2, next page).

Syrtis Major volcanics superpose the main trough of the Nili Fossae at its southern extremity. Lobes of Syrtis Major volcanics also superpose Arabia Terra to the west and Isidis to the east and probably contributed to the masking of the dichotomy boundary. The inception of Syrtis Major volcanics may have preceded or been contemporaneous with any of the other four major structural features in the quadrangle, but the most widespread lavas are the youngest of the major features.

Evidence of water, in the form of channeled scablands, mesas with moats, and craters indicative of a moist landing field, is most common in the northern and eastern areas of the quadrangle. This is expected as these areas border the drainage basins of the putative Borealis Ocean. However, pedestal and rampart craters are found even at the summit of Syrtis Major. No strong evidence of water occurs in the relatively small part of the Arabia Moisture Region in the southwestern corner of the Syrtis Major Quadrangle, but data here are sparse and this recently determined “moisture region” covers a very large area extending to the west and southwest.

Possible evidence of subsurface water ice is seen in a small crater exhibiting a smooth, dark surface within a highly fractured, light colored material at a juncture between Syrtis Major, Nili Fossae, and Isidis. In some aspects, the feature shows a resemblance to impacts in icy Ganymede and Europa. However, it appears more similar to areas within Baldet Crater located in Syrtis Major Quadrangle to the north of Syrtis Major Planum.

References: [1] Greeley and Guest, 1987, Geologic Investigation Map 1-1802-B. [2] Zuber et al., 2000, Science 287, 1788-1793. [3] Acuña et al., 1999, Science 284, 790-793 [4] Malin Space Science Services, ww.msss.com [5] Ivanov and Head, 2003, J. Geophys. Res. 108, 17pp.[6] Hiesinger and Head, 2004, J. Geophys. Res.109, 37pp. [7] Williams, A. F., 2004, Ph.D. Dissertation, University of Idaho, Moscow.

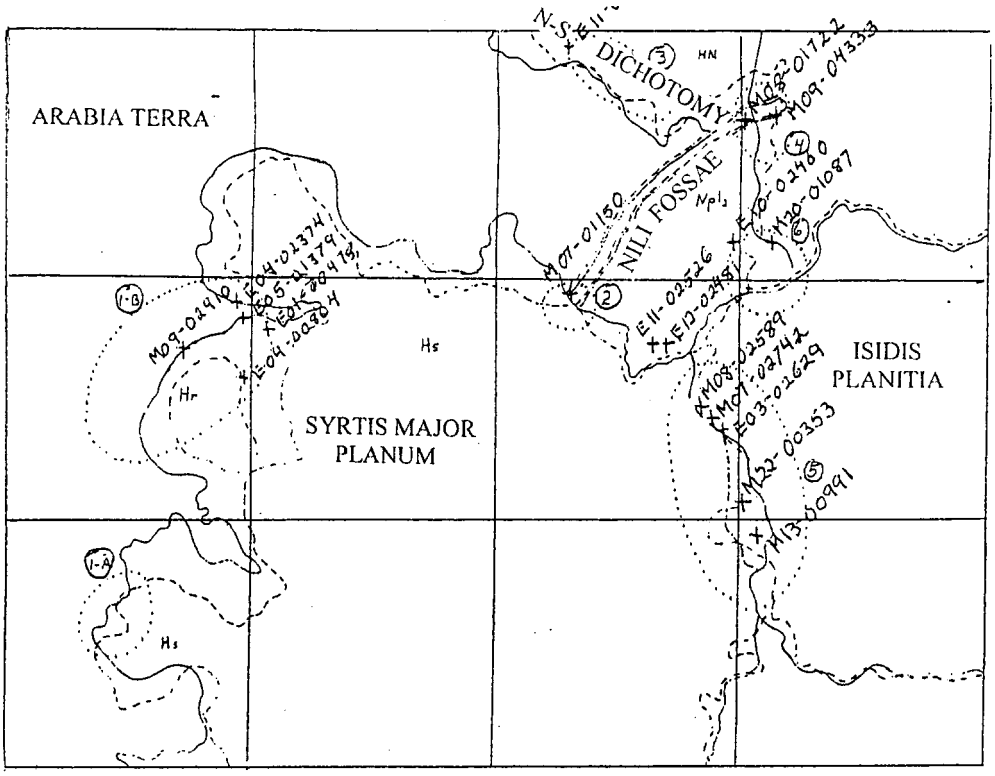

Fig. 1: Major Structural Features on Syrtis Major Quadrangle. Crosses = narrow-angle images showing possible superposition. Solid lines = boundaries as seen on the MOLA High Relief Map. Dashed lines = units given on Greeley and Guest's Geologic Map. Dotted lines = areas checked through MSSS for narrow-angle images showing boundary superposition.

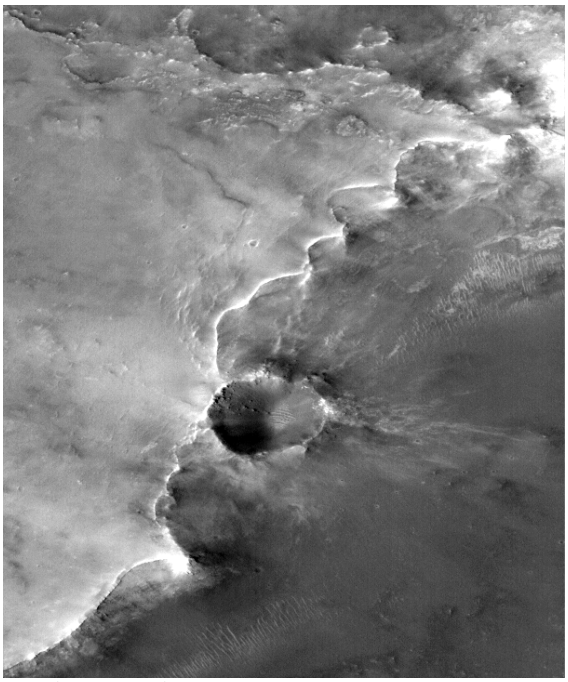

Fig. 2: Area 2, M07-01150 at 287.10°W, 19.19°N is titled "Contact between fractured uplands and lowland plains." The contact referred to in the title is located just north of the Nili Fossae. The contact edge is sharp and scalloped . The scalloped edge incates slumping.