



Elliptic craters in Thaumasia (Mars) : consequences on fault behavior

P. Allemand (1), D. Baratoux (2), M. Mondoux (1,2)

(1) Laboratoire de Sciences de la Terre UMR 5570, Université Lyon 1 & ENS-Lyon, 2 rue R. Dubois, 69622 Villeurbanne cedex, France,

(2) UMR 5562/CNRS/ Toulouse III University, Midi-Pyrenees Observatory, 14 Av. E. Belin, 31400 Toulouse, France

Baratoux@ntp.obs-mip.fr

pascal.allemand@univ-lyon1.fr

Thaumasia area is located south of the Tharsis dome. This 2000 km by 1000 km region is affected by an intense tectonics (both compressive and extensive) which has been mapped and studied these last years from old Viking data and recent MGS and Mars Express data. This region has a key position to understand both Tharsis development and individual martian faults. The faults affect numerous impact craters. The purpose of this paper is to show relationships between the deformation produced by the faults and the ellipticity of impact craters as measured on HRSC (Mars Express data). Similar works on Viking images have been done in order to discuss the possible discrepancy between extension measured by faults and extension estimated from impact craters. 120 craters have been investigated on HRSC orthorectified nadir images (486, 497, 508, 530, and 563). For each, it has been measured the position, the size and orientation of the major and minor axis of the best fitting ellipse, the number of faults and their average orientation. The ratio between the difference of minor-axis length and the major-axis length (strain value if the crater is deformed) ranges from 0.02 to 0.25. Small craters not affected by faults present the extreme values. From the 120 craters, 31 are affected by more than one fault. The major axis of the ellipse which fits the crater is perpendicular to faults. That suggests that deformation by fault is responsible for the crater ellipticity. The relationships between extension of impact crater and extension produced by single faults measured from topography is discussed.