Structures that add to our understanding of the development of Claritas Fossae, Mars. J. Raitala¹, V.-P. Kostama¹, S. Kukkonen¹, P. Esestime² and J. Kortenemi¹, ¹Astronomy, Department of Physics, PO Box 3000, FIN-90014 University of Oulu, Finland (jouko.raitala@oulu.fi), ²Dipartimento di Scienze Terra, Università “G.d’Annunzio”, Chieti, Italy (paoloesestime@yahoo.it).

Introduction: The elongated Claritas Fossae bulge spans 1500 kilometers on the SE slope of Tharsis from 110°W/15°S to 95°W/45°S. Its major tectonic structures consist of an impressive Claritas Rupes escarpment and an extensive horsetail set of graben-horst structures with a semi-parallel NNW-SSE to N-S to NNE-SSW orientation.

Previous studies explain their formation by an extensional crest strain and compression stresses around the Tharsis’ crest added by a conjugate tension and rising or intrusive mantle that produced rift-like qualities.

Figure: The Claritas Rupes scarp and the NNW-SSE to N-S to NNE-SSW set of horsetail grabens are the best-known tectonic elements. Older structures were preserved on elevated areas. The E-W grabens are independent of (and thus older than) the main faults. The E-W channels show paleoslopes and preceded the main Claritas tectonics and present topography (MEX-HRSC 530).

Claritas’ structures dated: The crater-count method shows that the 4 Ga old highland was cut by E-W grabens before the resurfacing of its graben floors about 3.6 Ga ago. This early tectonic phase had a vertical maximum stress and a N-S minimum stress component. Contemporal E-W flow channels indicate a continuous paleoslope away from the highland that is considered to have been a temporary ice accumulation and melting area.

The paleoslope was later cut by the formation of a N-S–elongated plume-related bulge, and the onset of an E-W minimum principal stress component that initiated the Claritas Rupes fault and resulted in the formation of two axial ridges and a central trough.

Extensive Tharsis’ growth increased Tharsis-radial stresses that, in the Claritas area, translated to the N-S maximum principal stress component. This compression evoked strike-slip faulting with a dextral shear, folded a diagonal set of en echelon ridges, and deformed the Claritas area by changing its topography. Less than 3 Ga old lavas were still cut by minor hangingwall faults. The most probably, Claritas Rupes was still active around 2.5 Ga ago.