



## **An extended global Inventory of Mars Surface Faults**

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For a quantitative assessment and interpretation of the tectonic history of Mars, a global mapping of tectonic structures is necessary. Based on the fault inventory used previously to model the expected spatial distribution of seismic activity on Mars [1], we have produced a new, more extensive catalog of thrust and normal faults on Mars. We have revised the fault traces contained in the catalog of [1], removing some minor inaccuracies, and added 1409 new thrust faults and 4925 normal faults, with a cumulative length of about 340000 km, which were previously not contained. The total numbers of faults are now 5146 thrust and 9689 normal faults, with a cumulative length of about 941000 km. All faults were mapped based on a global shaded relief map derived from MOLA (Mars Orbiting Laser Altimeter) topography data, with a map resolution of 1 km per pixel. The topographic map was artificially illuminated from two different directions, 90 degrees apart, to avoid any sampling bias by illumination geometry. Additionally, a global 3-D anaglyphic map (Knapmeyer et al., shown elsewhere on this conference) was used to support the identification of faults. The ESRI ArcGIS and the GRASS open-source software were used for mapping, interpolation to uniform sampling and numerical evaluations. A digitized version of the USGS geological map of Mars [2] [3] [4] was manually registered to the MOLA map and absolute surface ages were assigned based on crater statistics.

All faults were gathered into several groups and sub-groups of presumably common tectonic origin, and relative ages of these groups and sub-groups were derived from cross-cutting relations between them. These relative ages allow inferring a sequence of tectonic events or epochs independent of the crater statistical ages.

**References:** [1] Knapmeyer M. et al. JGR, 111,E11006, doi:10.1029/2006JE002708, 2006. [2] Scott & Tanaka, Map I-1802-A, USGS, 1986 [3] Greeley & Guest, Map

I-1802-B, USGS, 1987 [4] Tanaka & Scott, Map I-1802-C, USGS, 1987