

Ancient Cratered Southern Highland Province, Mars:

James Dohm^{1*}, Shigenori Maruyama¹, Hideaki Miyamoto²

¹Earth-Life Science Institute, Tokyo Institute of Technology, ²The University Museum, The University of Tokyo

The geologic provinces of Mars, as identified through a synthesis of geologic, paleohydrologic, topographic, geophysical, spectral, and elemental information [1], are windows into its evolution, with the ancient southern highland province being a key to the extremely ancient geological and possible biological pasts. The ancient cratered southern highland province includes Noachian (>3.7Ga) geologic terrains that are marked by magnetic anomalies [1]. The terrains include: (1) Noachian mountain ranges, Thaumasia highlands and Coprates rise, both of which exhibit complex structures such as thrust and normal faults and rift systems, as well as cuestas and hogbacks along their margins, (2) basin and range topography, including salt-containing, structurally-controlled basins, as exemplified at Terra Sirenum, (3) faults that are tens to thousands of kilo-meters long, and (4) degraded promontories, many of which are interpreted as silica-rich volcanoes or in some cases, impact crater massifs.

These terrains can be aptly explained through dynamic endogenic activity, including some form of primitive plate tectonism and/or mobile crust, as well as planetary shrinkage due to cooling, rather than impact events. The ancient cratered southern highland province could comprise extremely ancient (>3.9 Ga) geologic and habitable environmental information, including granite and primordial continental crustal materials. Such materials are considered to be critical to the emergence to life on Earth [2].

References

- [1] Dohm, J.M. et al., (2013?in press), Mars evolution. Nova Science Publishers, Inc.
- [2] Shigenori Maruyama, this conference.