

True Polar Wander Due to Surface Mass Loading on Mars: Implication to Evolution of the Tharsis Province

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Long-term variation of a pole location driven by evolution of a volcanic province on a terrestrial planet is investigated in order to provide implication to evolution of Tharsis on Mars. The present modeling comprehends large-scale variation. Also, an elastic lithosphere is considered here to memorize a remnant rotational bulge. For this purpose, the previous formulation for the final state of true polar wander is simply expanded into that for long-term variation. Remarkable variations are those on a true polar wander angle for the following situations. The parameter Q' (i.e. a normalized magnitude of a surface mass load) is larger than or equal to one, and also is slightly smaller than one. In addition, the initial load co-latitude is less than about ten degrees. Under the situations of such Q' and initial load co-latitude, the results are as follows. If the initial load co-latitude is close to zero, extremely large and rapid variation like as inertial interchange is possible. If not close to zero, variation is relatively large but is much more gradual. These results would give us a possibility of reconstruction of volcanic history, such as the evolution of Tharsis on Mars.