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Eruption frequency record of the Syrtis Major Volcanic Province, Mars

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Syrtis Major is one of the most prominent Hesperian-aged volcanic provinces on Mars, located near the dichotomy boundary, west of Isidis Planitia. It extends over approximately 740,000 km² and has a N-S elongated central depression containing the calderas of Meroe Patera and Nili Patera. Lava thicknesses range from approximately 0.5-1.0 km and total volume of erupted material has been estimated at about 320,000 km³.

This province is another target area of our ongoing study to quantify the global volatile release during volcanic eruptions on Mars. Estimates of eruption frequency, associated volume of erupted material, and gas release to the atmosphere are the key parameters of this research. Reconstruction of the eruption history of volcanic provinces is one of the steps to be taken in order to constrain these parameters.

In total, 58 lava flows were mapped of which 39 were suitable for age determination using crater size-frequency distributions. In addition, the caldera of Meroe Patera was also dated using crater statistics. Model ages range between 0.87 Ga and 3.63 Ga. There is no apparent time-space correlation observed. The broad spectrum of model ages, ranging from Early Hesperian to Middle Amazonian, points to long-lasting volcanic activity of the studied province. This fact together with post-emplacement deformation of lava flows indicates a much longer eruption and volcano-tectonic history of the Syrtis Major Volcanic Province than previously thought, extending it to the Middle Amazonian period