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Sequence of events for the geological history of Mars

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Over the past few years we have been able to carry out a great number of crater size-frequency measurements and gather a large data set of surface ages of prominent Martian landforms. These data were measured on HRSC as well as on Viking, THEMIS and MOC image data. Special focus was given to the geological evolutionary history of the northern lowlands, their volcanic, fluvial and possible glacial resurfacing, but also to impact basin formation as well as to the global volcanic evolutionary history. While the water-related activity in the past (before 3.5 Ga ago) was dominated by fluvial processes as some manifested in valley networks and outflow channels, glacial activity outside the polar caps (some landforms most likely still contain ice) is observed over the most recent 500 Ma. The volcanic activity observed globally was most active before about 3.5 Ga ago. Most volcanic constructs achieved their present dimensions already at that time. More recent volcanic activity dominantly is found in the large volcanic provinces Tharsis and Elysium. The most recent volcanic activity in especially the Tharsis region is correlated with surface ages found for fluvial by formed landforms in this region. The ages found in the highlands, for the large basins and the volcanic structures give a temporal constraints for the thermal evolution of Mars which is represented as surface reaction in those landforms to the interior heat sources and processes. The sequence of events of the volcanic history is also coupled to the occurrence of ages in the Martian meteorites which show a close parallelism in time. Ages found for areas showing strong or almost no remnant magnetization, highland units and large impact basins, set time marks for the cessation of the dynamo about 3.9 Ga ago. A combination of Martian meteorite crystallization ages, the spatial distribution of magnetic anomalies and related surface ages, and the distribution of volcanic activity in space and time allows for a temporal parameterization of thermal modeling results and the internal evolutionary history of Mars.