How to reconstruct the History of the Martian Climate

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As the martian relief can not be the result of the recent martian climate the question arises how and when Mars got the harsh climate of today. Due to its small surface acceleration it seems to be logic that Mars lost its atmosphere permanently into space from the very beginning. On the other hand, volcanic activities produced huge amount of gas (mantle degassing).

If we assume that in the very first beginning of the martian history rain/snow was possible on the entire planet then fluvial valleyes must have been formed together with a layer of ground water.

After loosing a large part of its atmosphere Mars ultimately ended up with a run-away cold desert which no longer allowed presipitation, but which led to the formation of a layer of ground ice/permafrost: a sub-surface glaciation which probably still exists in large areas of the southern uplands.

Such a behavior of the martian climate should be visible in the martian relief, especially in valley history. It will be of special interest to see whether the non-eolian exogenic dynamics were switched off but one time, or whether they have been reactivated some times due to the complex history of the martian volcanism.

Hence, reconstruction of the martian climate means reconstruction of its morphologic history; which in turn means reconstruction and understanding of its endogenic dynamics. It`s one complex system which can only be reconstructed and understood as a whole!