A PLAUSIBLE FORMATION MODEL FOR THE MAJA VALLES OUTFLOW CHANNEL SYSTEM.

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Introduction: Water volume calculations are performed comparing ILD-volume measurements [1] and modeling results of evaporation pocesses [2] and [3] in order to reconstruct the amount of water needed to form the mounds A, B, C and D in Juventae Chasma and to form the outflow channel system Maja Valles on Mars.

Summary and results: With a measured volume of 25.15 km^3, mound A is the smallest mound in Juventae Chasma. Mound B is 213.28 km^3 in size. Mound C is the largest mound with a size of 1028.23 km^3. Finally, mound D only reaches 104.01 km^3 in size. The net volume of the Juventae basin is up to 55,349 km^3. The results of the water quantity were calculated from the total amount of the precipitated evaporites out of one liter water, extrapolated to the volume of each mound [2], [3]. Porosities were not considered in the simple calculations because the values are most likely within the error, which is not determinable anyway. Possible erosion was also not considered.

Figure 1 shows the calculated amount of water from 100 to 200°C for the olivine-, S-komatiite**,** volcanic glass and DTS-2b samples based on modeling results and volume calculations for mound A, B, C, D in the Juventae basin.

Modeling results show that the higher the temperature the more water is needed to generate the volume of mound A-D by evaporation [1], [2].

Almost the entire sample results show that the samples that were treated with sulfuric acid at pH 1.3 generate less water after numerical evaporation than those that were treated with sulfuric acid at e.g. pH 3. Each precipitated mineral phase suggests that the incorporation of water into the crystal lattice is the key mechanism, with temperature and pH as the limiting factors [1], [2].

Under the assumption that the mounds consist of 100% evaporites, the calculated total water amount of the olivine-, S-komatiite**,** volcanic glass and DTS-2b samples at 100 to 200°C would be enough to fill the Juventae basin and subsequently form Maja Valles.

Investigations conducted by [4], [5] and [6] exhibit several episodic flood events in Juventae Chasma and Maja Valles. For this reason, a more detailed morphological investigation of mound B was carried out and was already presented [1].

Mound B's so called "stairstep"-morphology [1] shows sediment layers or strata formed by episodic evaporation processes. It is also possible that the unique morphology displays terraces formed by multiple water levels. Erosional terraces formed by subsequent water ingressions would have change the chemism of the mineral deposits and would have led to undefined lithostratigraphies. Nevertheless, for all of the processes mentioned above, episodic flooding is a premise.

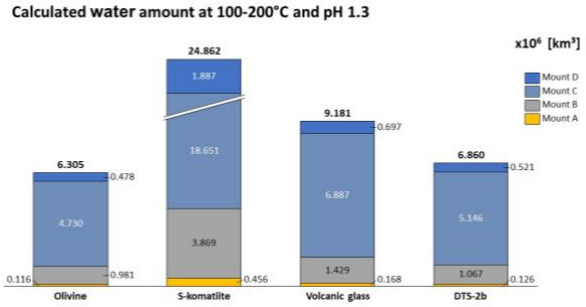

Figure 1. Calculated amount of water from 100 to 200°C for the olivine-, S-komatiite-, volcanic glass and DTS-2b samples based on modeling results and volume calculations for mound A, B, C, D in Juventae Chasma.

The results of the water amount calculations suggests that already one flooding event is sufficient to completely fill the Juventae basin as well as to provide enough water to flood the northern plateau and subsequently to form Maja Valles. Thus, a new and less complex hypothesis of decreasing surface water temperatures during evaporation as a geologic process for ILD formation in Juventae Chasma on Mars can be assumed.

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