Reconstructing paleoenvironments in Robert Sharp Crater, Mars: Evidence for a fluvio-lacustrine system

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Recent mineralogical studies suggest the presence of an iron chlorine hydroxide, namely akaganeite. This mineral is known to form under specific conditions, and it has been detected in the Robert Sharp Crater, located at Martian low-latitudes (133.59E, -4.12N) [1]. Its detection implies an acidic and oxidizing environment in this region. Indeed, akaganeite typically forms in highly saline and chlorinated aqueous environments on Earth. These akaganeite deposits might be the ultimate alteration phase of a drying lake within the Robert Sharp Crater. Hence, we carried out morphological and stratigraphical studies, as well as age determination by crater counting to constrain the geological and hydrological history of the region [2]. Finally, we found that the Robert Sharp Crater has known a varied geological history, including the formation of fretted terrains and an airfall filling during the Hesperian epoch. Furthermore, the presence of valleys and fan-shaped deposits, and the detection of various aqueous minerals, in the region suggest the possibility of a fluvio-lacustrine activity phase within the crater during the last period of the Martian chronology, also named Amazonian epoch. The presence of a putative paleolake should be short-time and estimated between 1.3 Ga and 500 Ma. Thus, by reconstructing the paleoenvironments in the Robert Sharp Crater, we demonstrate that Mars has known several episodes of aqueous activities well after the late Noachian/ early Hesperian period.

References: [1] Carter, J. et al. (2015) *Icarus*, 253. [2] Brossier, J. F. et al. (*in prep*).

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