Evidence for volcanic resurfacing in the surrounding region of Ravi Vallis, Mars

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Fluvial and volcanic activities are the key factors in shaping the history of Mars. In the equatorial region of Mars, Ravi Vallis is a ~200 km long channel system located in the east of Valles Marineris in the Xanthe Terra region [1,2]. The channel is associated with two depressions that begin at Aromatum Chaos and ends at the western margin of the Hydraotes Chaos. Earlier study suspected volcano-ice interaction in this region of Mars [2], however little is known about the time of interaction and its nature. In addition, the origin, modification and time of formation of Ravi Vallis is a quest till date which possibly comprises the evidence of fluvial and volcanic activity in the region [1,2]. Moreover, Noachian-Hesperian aged volcanism on Mars are the indicator of most extensive volcanism on Mars [3,4]. These volcanic activities are the important source to understand about the thermal evolution, formation of the pristine martian crust and its resurfacing over the time. As not much is known about the volcanic activity in the vicinity of Ravi Vallis [5] due to substantial geologic modification, degradation and resurfacing processes.

In this context, we have provide evidence for the diverse geological activities happened in the vicinity of Ravi Vallis region on Mars. We analyzed the surrounding region of Ravi Vallis including impact craters all-around. For the topographical analysis, we used MOLA and MOLA-HRSC derived products. For morphological analysis, CTX and HiRISE imagery were used. Overall, this study attempted to: 1) constrain the time of formation, modification or resurfacing associated to Ravi Vallis 2) provide substantial evidence for volcanic resurfacing in the region. Thus, this work provide substantial evidence for the possible volcanic material in the Ravi Vallis region on Mars that have implication for volcanic activity in this region of Mars and for the formation of Ravi Vallis.

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