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Evidence for Late Hesperian lacustrine activity in Shalbatana Vallis, Mars

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Martian palaeolakes of substantial dimensions have been recently studied [1,2]. They occupied closed basins and are important because they indicate past climatic conditions which created hydrological settings quite different from those of modern Mars. Using HRSC data, an intravalley paleolake (more than 400m deep) was detected along the course of Shalbatana Vallis from the evidence of shorelines and the occurrence of a few fan-delta deposits (including a Gilbert-type delta). The fronts of all the sedimentary deposits strikingly match the same topographic contours (2800-3000 m below the MOLA datum) indicating the water levels under which they formed [3]. Also the corresponding shorelines are well visible along the Shalbatana walls. The peculiar settings of the lake suggest that Shalbatana Vallis was impounded during its final hydrological activity (Late Hesperian) and that ponding of water lasted enough time to allow the formation and evolution of the lacustrine system. Water source is uncertain but we envisage a composite sapping mechanism with a dominant runoff component in order to take into account for the amount of water required to excavate, transport, and deposit the materials found in the delta. Previous works and new crater counting computations indicate that the paleolake was active during the Hesperian epoch, however, is not clear whether the hydrological activity was sustained exclusively by a favorable climatic regime and the possibility that system evolved relatively independent from climatic conditions can not uniquely discounted. Groundwater activity could have been also triggered/accelerated by local magmatic intrusion and impact craters. This fact and the regional importance of our research advised against the extrapolation of results to the overall Martian climatic-geomorphological issue.[1] Di Achille et al. (2006), *J. Geophys. Res.*, doi:10.1029/2005JE002561;[2] Irwin et al. (2005), *J. Geophys. Res.*, doi:10.1029/2005JE002460;[3] Di Achille et al. (submitted).