Serpentinization and listwanitization of ultramafic rocks in Ladon basin, Mars

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The evolution of the Ladon basin has been marked by the discharge of huge volumes of water from the Martian highlands to the lowlands in the late Noachian and Hesperian. Our study area displays younger dark lobate flows which were likely extruded from a regional fracture network. Spectral analysis suggests that these flows and the underlying terrains have an ultramafic composition. Stratigraphically below the lobate flows is a yellowish alteration level. Its spectral signature indicates serpentinization of the underlying ultramafic rocks. It includes hundreds of structurally controlled narrow ridges which are reminiscent of ridges of listwanite, a suite of silicified, fracture-controlled silica-carbonate assemblage of hydrothermal origin observed in terrestrial ophiolites. Serpentinization and listwanitization probably result from the thermal effect of the overlying ultramafic flows on an Hesperian aquifer. East Ladon may host the first listwanite ridges ever described on Mars.