STRATIGRAPHICAL AND SEDIMENTOLOGICAL EVIDENCE FOR LACUSTRINE-LIKE BASIN (SOUTHWEST PLATEAU OF JUVENTAE CHASMA). F. Salese[1], A. Murana[1], G. G. Ori[1,2], M. Pondrelli[1], [1]IRSPS (Università D'Annunzio, Viale Pindaro 42, 65127 Pescara, Italy; francesco@irsps.unich.it; murana@irsps.unich.it), [2]Ibn Battuta Centre (Université Cady Ayyad, Marrakech, Morocco).

Introduction: Extensive Light-toned layer deposits (LLD) cover the south-west plateau of Juventae Chasma (Fig. 1). The unit cover an area of ~80 km^2 and shows the same characteristics along its extension. We conduct sedimentological and stratigraphical analysis of the outcrops and their morphological patterns. In our opinion, the presence of LLD outcrops and likely fluvial landforms close to them, make the area an ideal landing site for future scientific purposes.

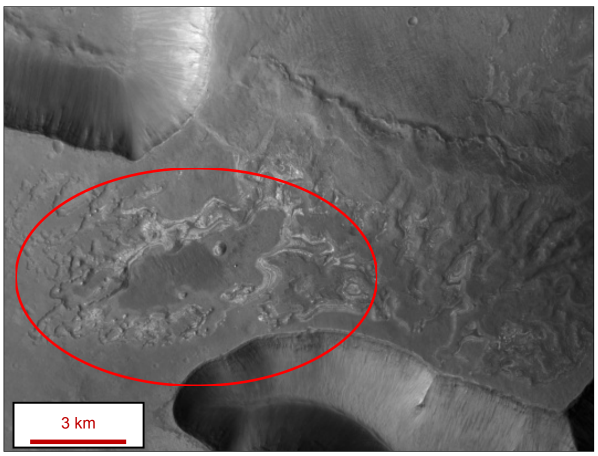

Fig. 1: CTX image of examined area (B07_012255_1753_XN_04S063W).

Data and methods: The area has a good coverage of HiRISE, CTX, MOC images and CRISM data. Many HiRISE are stereo pairs, have been used to built DTMs as well as MOC images using 2D-photoclinometry. An USGS DTM (DTEEC_003434_1755_003579_1755_U01) was used for quantitative detailed measures. Photoclinometry was used to support HiRISE observation in uncovered areas.

Characterization of LLD: Outcrops show an alternation of dark and light toned layers having ticknesses from few decimeters to some meters. The brighter layers are apparently more resistant than low albedo layers and they tend to produce isolated and solid blocks with erosion, up to metric size (Fig. 2). The brighter layers are characterized by polygonal cracking and flat surfaces (Fig. 3) and using CRISM data, previous authors [1] recognized that they are composed mainly by hydrated sulfates.

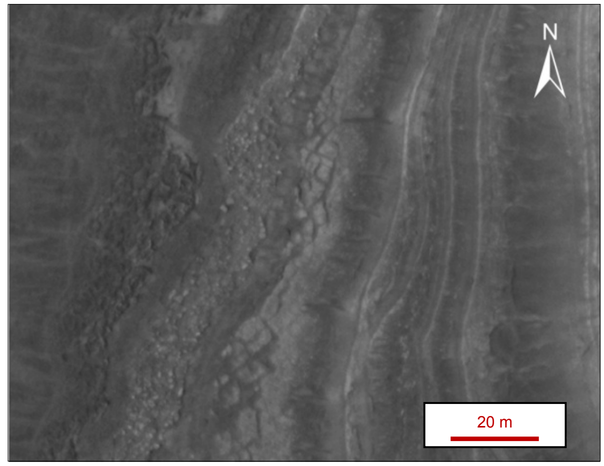

Fig. 2: Isolated and solid blocks formed by erosion in brighter layers. (PSP_003434_1755)

Dark-toned layers are composed of fine-size grains sometimes reworked by eolian processes. According with observations made in this layers, the particle size should be included between 0.5 mm and 5 mm [2]. Therefore, dark-toned layers are finer and less cemented than brighter layers, and according with CRISM data, they are composed in opaline silica [1].

The different mineralogy of the two recognized layers, is consistent with their different competence.

Layers shows a good lateral continuity both at individual layer scale and of the whole succession, with a total thickness of ~70 m.

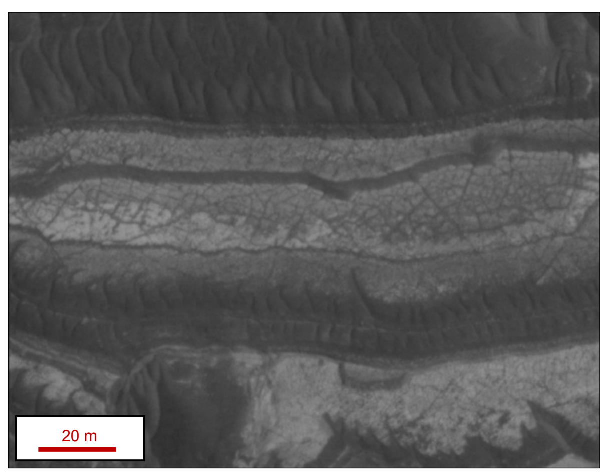

Fig. 3: Alternance between light-toned and dark-toned layers and visible polygonal cracks in brighter layers (PSP_003434_1755)

Interpretation and Conclusions: Layers shows good lateral continuity and horizontal geometry (Fig. 4-5) and entire unit is homogeneusly spread with the same thickness.

This caracteristics are consistent with a deposition made by settling and/or chemical precipitation processes. The deposits are visible only within the basin, ant its edge is not constant due to subsequent coverage, which makes an eolian origin very umprobable.

Polygonal cracks are widespread on Mars surface, and the processes that may have generated this structures can be due to thermal contraction [3], dehydratation of hydrated sulfates [4] or post-depositional genesis, due to weathering [5].

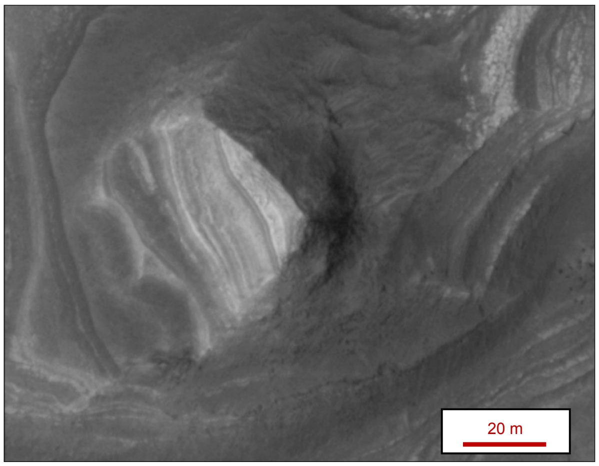

Fig. 4: Outcrop within the basin that showing horizontal layers (PSP_003434_1755)

These hypothesis seems to be probable in the examined area, as polygonal cracks are abundant on flat surfaces where weathering are more strong and they are also consistent in contraction structures in evaporitic sediments according with CRISM data. Polygonal cracks can be observed only in bright layers, with sulfatic composition.

In terms of chemical composition, opaline silica and sulfates are probably dissolved in acid acqueous solution bounded to hydrothermal environment.

Hydrotermal waters can enrich a pre-existent lake with its solved minerals.

Alternatively, the lake could be filled by groundwater upwelling cycles, saturated in sulfates, controlled by climatic variations of the planet. For example, brighter and more resistant layers could be formed in dry periods, with evaporation-dominated environment; the dark toned layers could be bounded to wet periods, with more abundant clastic input and less sulphate deposition.

Lastly, sulfates observed by CRISM may represent the last stage of the lake history.

References: [1] Bishop J. L. et al. (2009) *JGR, 114, E00D09*. [2] Jerolmack D. J. et al. (2006) *JGR, 111, E12S02.* [3] Schieber J. et al. (2007) *Science, 318,* 1760-1762. [4] Chavdarian G. V. and Sumner D. Y. (2010) *Sedimentology*, *58-2,* 407-423. [5] Chan M. A. et al. (2008) *Icarus, 194-1,* 65-71.

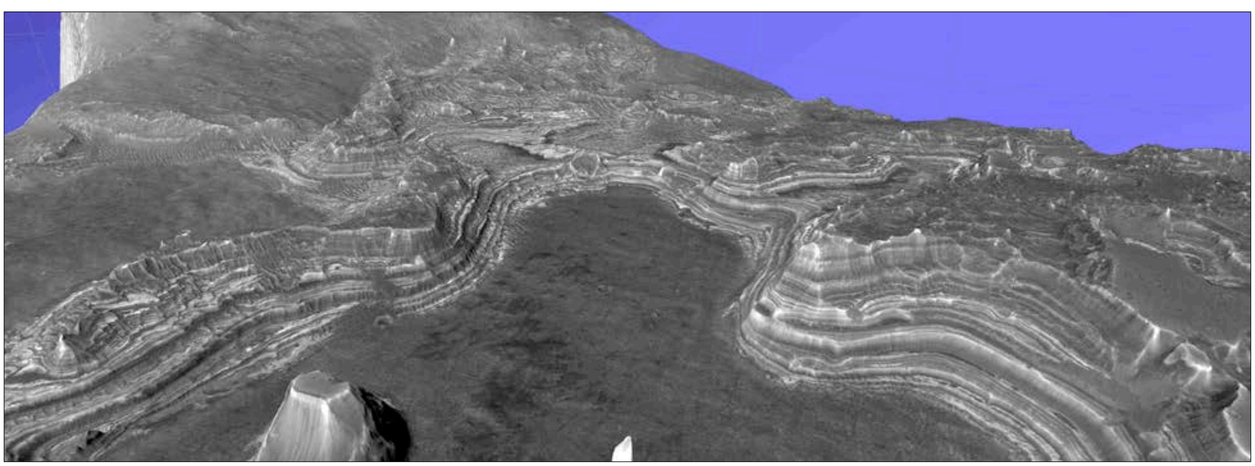

Fig. 5: Light-toned layered deposits in a 3D view (DTEEC_003434_755_003579_1755_U01 with V. Ex. 5X)