



Analysis of West Echus Chasma valleys, Mars, from HRSC/MEX images and DTM

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Dendritic patterns interpreted as ancient fluvial valleys are visible at the west of Echus Chasma canyon (278-281°E, 0-5°N). These valleys were identified from their difference of thermal properties on THEMIS images. HRSC provides the possibility to look in details their morphology and geometry with the nadir resolution at 13 m/pixel and DTMs derived from stereoscopic images. HRSC images show that valleys in Echus area are not restricted to the locations where they have been observed through THEMIS images. They extend over more than 200 km along Echus Chasma western plateau. Using manual mapping, the order of the valley system, i.e. the number of connections from the smallest tributary to the main river, is of 2 to 3 for these valleys whereas it reaches 5 for the most dendritic network. The drainage density, i.e. the ratio between the total length of valleys and the area of the watershed, permits to evaluate the level of maturity. The highest drainage system reaches a density of 1.4 km^{-1} mapped at 13 m/pixel resolution. It is 40% higher than the same drainage mapped with THEMIS at 100 m/pixel resolution. On the other hand, only few valleys are detected automatically on the MOLA topography using the hydromod tools. This shows that they are shallow landforms, less than 100 m deep, even if they could have been originally deeper and filled later by sand. When searched automatically from HRSC DTM, we find a much more developed networks characterized by several 50 to 100 m deep valleys. Valleys derived from HRSC DTM also fit exactly the manual mapping on visible imagery confirming their existence as 3D landforms and not only 2D structures. Comparison with terrestrial analogues and evolution models of the valleys will be presented at the conference.