FLUVIAL ACTIVITY RESULTED IN ALLUVIAL FAN IN ICARIA PLANUM, MARS. J. Raitala[1], J. Korteniemi[1], M. Aittola[1], V.-P. Kostama[1], E. Hauber[2], P. Kronberg[3], G. Neukum[4] and the HRSC Co-Investigator Team. [1]Astronomy, Univ. of Oulu, Finland, (jouko.raitala@oulu.fi), [2]DLR, Berlin, Germany, [3]TU, Clausthal-Zellerfeld, Germany, [4]Freie Universität, Berlin, Germany.

Introduction: The Claritas rift zone on the southern Tharsis slope has several indications of water and ice activity phases (Fig. 1, 39°S, 258°E) as seen from the Mars Express HRSC data [1,2]. Volatiles were transported from the peaks (1 in Fig. 1) into the basins of Claritas Fossae. Water filled the main basin (2 in Fig. 1), formed a paleolake and breached through the saddle valley forming a channel (3 in Fig. 1) to the west [2,3].

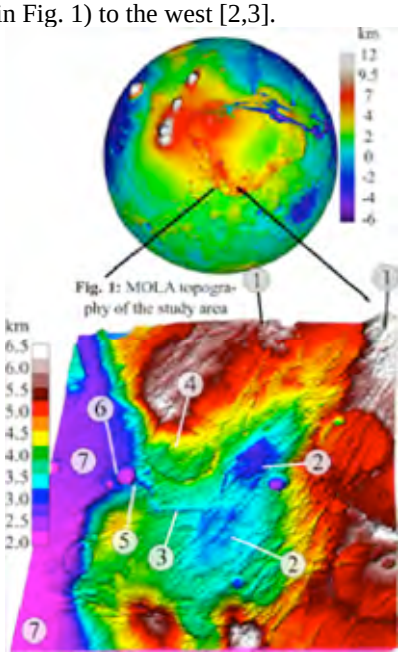

Fig. 1: MOLA topography of the study area

Along the channel, sapping (4 in Fig. 1) provided additional water. Close to Icaria Planum, the channel broke into an impact crater (5 in Fig. 1) and formed a temporary lake with a delta at the channel mouth. The flow breached further through the western crater rim (6 in Fig. 1). The crater floor is lower than the channel neck indicating another temporary paleolake. Water spread onto the Icaria Planum lowlands (7 in Fig. 1). The resulted alluvial fan in Icaria Planum was studied using the color HRSC data.

The Channel Features: At the point when the wide southern Claritas basin ("paleolake" in Fig. 1) was filled, the water broke through the saddle valley forming a channel from the paleolake into Icaria Planum (Figs. 2,3). The southern basin depression was subsequently drained leaving a more long-lasting lake remnant into the deeper northern depression.

The flow channel begins from the southern basin (upper right part in the HRSC red channel image; Fig. 3). It runs through the lowest paleolake rim valley (image center in Fig.3) and drained the lake into an impact crater (left in Fig.3) and further into northern Icaria Planum. Sapping provided additional water from the near-by crater (top in Fig.3).

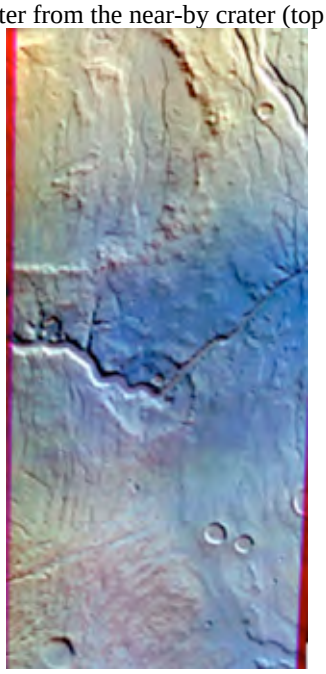

Fig. 2. The orbit 357 HRSC RGB (3 visible channels) image over the middle channel area where it broke through the saddle valley.

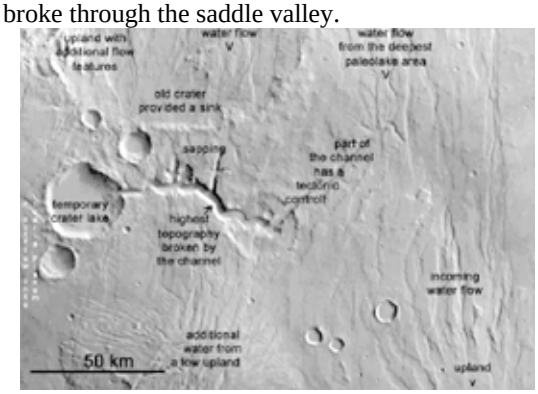

Fig. 3. The units of the middle channel.

Alluvial formations: The channel ends into the 30-km wide impact crater that was filled by water (Fig. 4). The temporary paleolake phase changed the crater morphology: A) The delta at the mouth of the channel was formed in a standing body of water; B) The crater rim terraces and the smooth floor indicate

erosion and deposition, respectively; and C) The channel neck out of the crater into the west is higher than the crater floor.

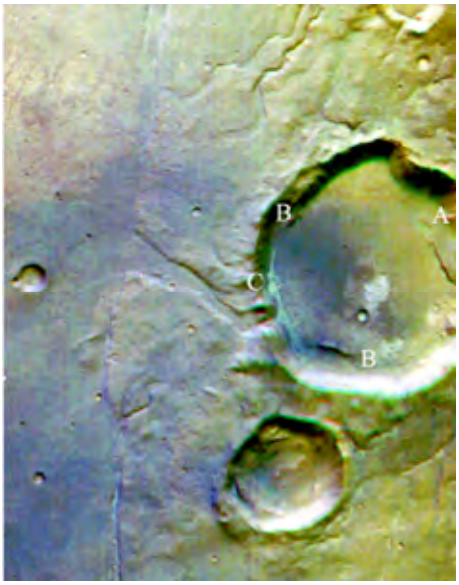

Fig. 4. The orbit 068 HRSC image shows the flooded impact crater and the related formations.

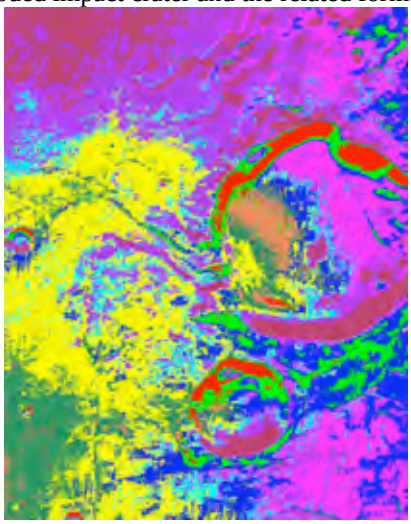

Fig. 5. Four-channel HRSC classification shows shadows with red, higher grounds with purples and alluvial deposits with brown, yellow and dark green.

During the period of lacustrine environment in the crater its western rim breached and part of the water was led out onto the Icaria Planum lowlands. The water-carried particles were spread as sedimentary flood deposits onto Icaria Planum in front of the short channel out from the crater. The process washed the dust away, sorted particles by size, oriented them and resulted in deposits which have minor variations in their color reflectance. The four-channel HRSC data set allows to find some of these units and formations. The alluvial deposits are made visible by the unsupervised four-channel HRSC classification (Fig. 5: red = shadows; purple shades = higher grounds; brown, yellow and dark green = identified deposits).

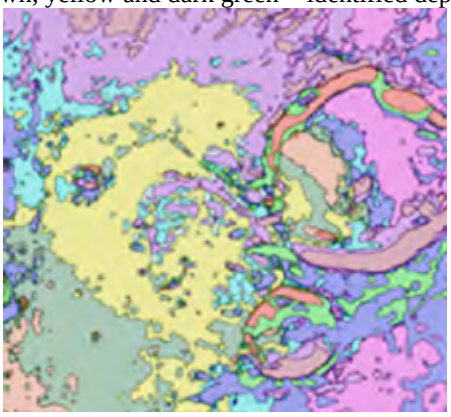

Fig. 6. The HRSC-based map of the alluvial fan in northern Icaria Planum, Mars, based on Fig. 5.

Conclusion. The southern Claritas region provides important additional key information of the fluvial channel formation tied to climate changes [1,2]. Accumulation of snow and ice on the peaks and the subsequent melting and accumulation of water into the major basin were responsible for the formation of the paleolake and the adjoining channel. The resulted channel and alluvial formations reflect the amount of water available, topography and regional slopes along the course of the channel. The hi-resolution multi-channel HRSC data provide advanced views into the erosion and sedimentation in the channel formation processes as well as into more subtle alluvial structures. Advanced remote sensing approaches will facilitate further mapping and timing of characteristic phases in development of paleolake, channel-forming and alluvial structures as well as recognition of the snow-, ice- and permafrost-related formations in the Claritas area.

References: [1] Rossi, A. P., Chicarro, A., Pacifici, A., Pondrelli, M., Helbert, J., Benkhoff, J., Zegers, T., Neukum, G. and HRSC Co-I Team, 2006. *LPSXXXVII* (this volume). [2] Raitala, J., Aittola, M., Korteniemi, J., Kostama, V.-P., Hauber, E., Kronberg, P., Neukum, G. and HRSC Co-I Team, 2006. *LPS XXXVI*, #1307. [3] Mangold, N. and Ansan, V., 2006. *Icarus* 180: 75–87.