OCCURRENCE OF REMNANT SEASONAL WATER ICE PATCHES AT THE SOUTHERN HEMISPHERE OF MARS. M. A. Gergacz[1,2] [1]ELTE Institute of Physics, [2]Konkoly Thege Miklos Astronomical Institute, Research Centre for Astronomy and Earth Sciences. (email: gergaczmira30@gmail.com)

Introduction: During the recession of the seasonal polar ice cap on Mars, small icy patches are left behind in shady places, which are important targets. Although the distribution of non-polar ice [1,2,3,4,5] and the possibility of ephemeral melting have been analyzed [6,7,8,9], but few works have been surveyed the melting possibility of ephemeral water ice patches. Due to the low thermal conductivity of the Martian surface and atmosphere, these patches might warm up substantially and melting emerges as a possibility [10].

Methods: During this research HiRISE images recorded at local spring were surveyed, 110 images out of the available 1400 that fit the selection criteria, and 37 images with smaller ice patches on them were identified. Their separation from other bright features, like clouds or lighter rocks were possible by their bluish color and strong connection to local topographic shading.

Results: The areas with remnant ice patches range between 140° and 200° solar longitude, and between -40° and -60° in the latitude band. The diameter of the ice patches ranges between 1.5-300 meters, and they remain on the surface even after the seasonal polar cap has passed over the area, for the duration range of 19-133 martian days.

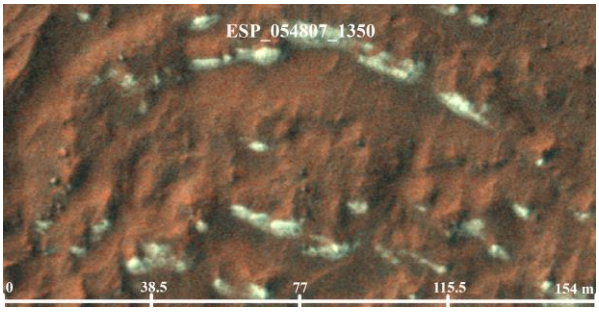

Figure 1: Part of ESP_054807_1350 HiRISE image. The 4-80 m sized ice patches are located on the southern side of the shading landforms.

Discussion: With the help of The Mars Climate Database (MCD, [11]) the surface temperature and predicted CO_2 and H_2O ice cover at 22 analyzed areas were simulated. Judging by the models, the average noon temperature does not reach the melting point of water, therefore the occurrence of liquid water on the macroscopic scale is highly unlikely, however there is a possibility that an interfacial premelting of ice (a few nanometers thick water layer) might form between the layered and the water ice [12]. If a liquid phase emerges, it might influence low temperature chemical changes on Mars [13].

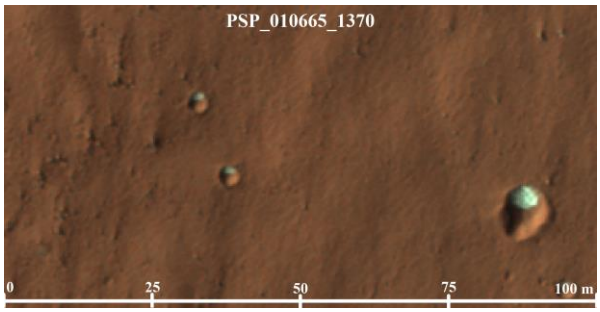

Figure 2:Part of PSP_010665_1370 HiRISE image. Bright ice patches often remain on the shaded side of smaller craters like the ones above.

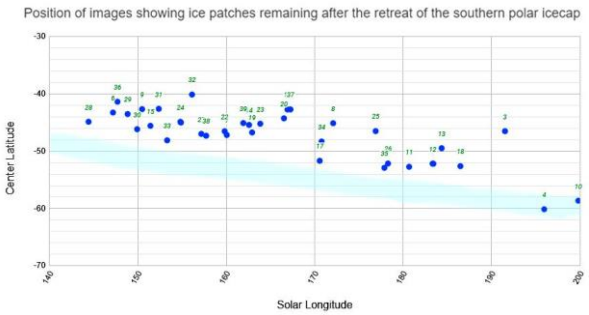

Figure 3: Distribution of images with ice patches that meet the criteria (dark blue dots on the graph) that follow the width averaged TES (Thermal Emission Spectrometer) Crocus line (light blue band) of the retreating carbon dioxide ice cap [14].

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