



Diminishing of Martian Southern Polar Cap in Apparition 2020–2021

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Observations and measurements

We present some results of diminishing of Martian Southern Polar Cap (SPC) during the apparition 2020–2021 by Finnish amateur data. We had ca 150 images taken by the members of the Lunar and Planetary group of Ursa Astronomical Association. Observations are made with 0.10-m up to 0.40-m telescopes with planet imaging cameras. Image data cover period from May 2020 to April 2021 [1].

We have selected a sample of images and converted them into a polar projection using the WinJUPOS software [2]. We have measured the northernmost latitude of SPC from each image.

Results of SPC data

Figure 1 shows the evolution of SPC northernmost latitude from May to December 2020. The polynomial fitting of the diminishing rate is consistent with to the data from earlier apparitions, e.g. by British Astronomical Association and American Lunar and Planetary Observers [3, 4]. The asymmetry of the polar cap cause some deviation to the measurements. Secondly, there are some variation in the image quality of the observations.

Due to poor weather conditions in midwinter 2020–2021 the disappearance of the SPC is unsolved. In January 2021, the SPC is not detectable in Finnish data, albeit there are some reports of its visibility in British Astronomical Association observations [5].

The SPC asymmetry is clearly visible. The center of SPC is misplaced from the Martian South Pole. The northern edge of the polar cap extends towards 0–60° latitudes. Asymmetry have been already noticed by Hyugens in 1672 and Maraldi noticed the misplacement from the pole in 1719 [6]. Later this is confirmed by Mars Missions data [7]. The phenomenon is explained by topographic and climatic features in Martian western hemisphere near the southern polar region [8, 9].

Novus Mons feature

Novus Mons, aka “Mountains of Mitchell” area was observable as a separated icy fragment near the edge of the SPC during the period 15–21 Aug 2020. The geographic location of this feature is 300–330° W and 75° S. O. M. Mitchell discovered it in 1845 [4]. The mountain region keeps shortly its ice cover when the SPC is melting and the edge is shrinking southwards.

Figure 2 is an example of observation with Novus Mons feature and figure 3 is the polar projected

version of this image.

References

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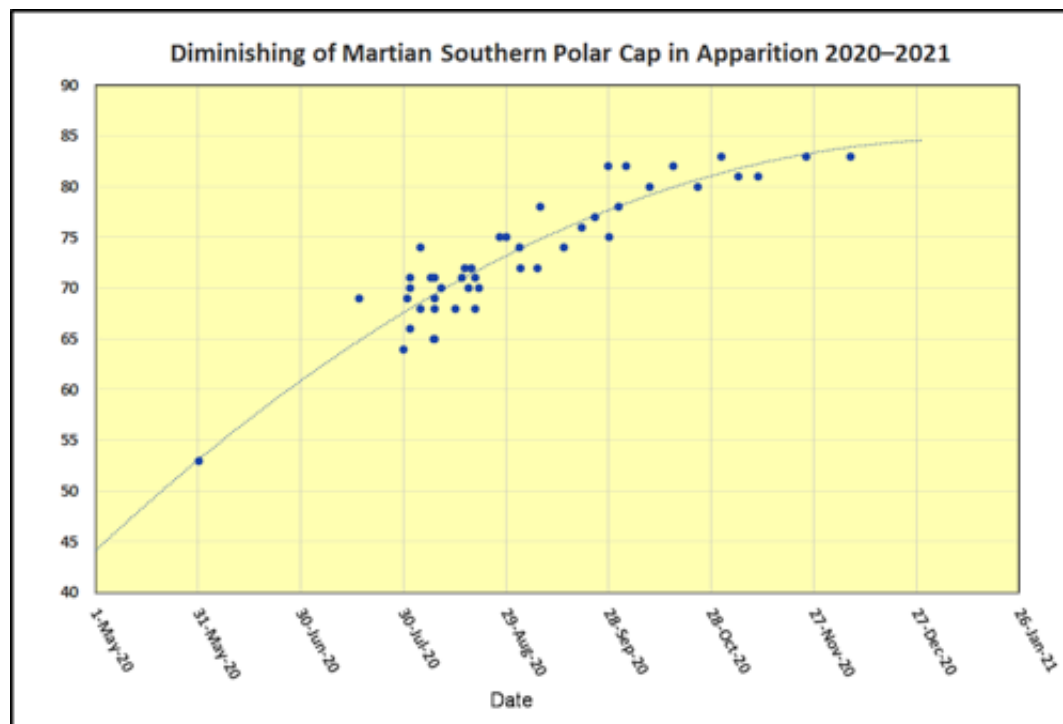


Figure 1. The northernmost latitude of the SPC edge by Finnish observational data. The dotted line shows a 2nd order polynomial fitting of the data points.

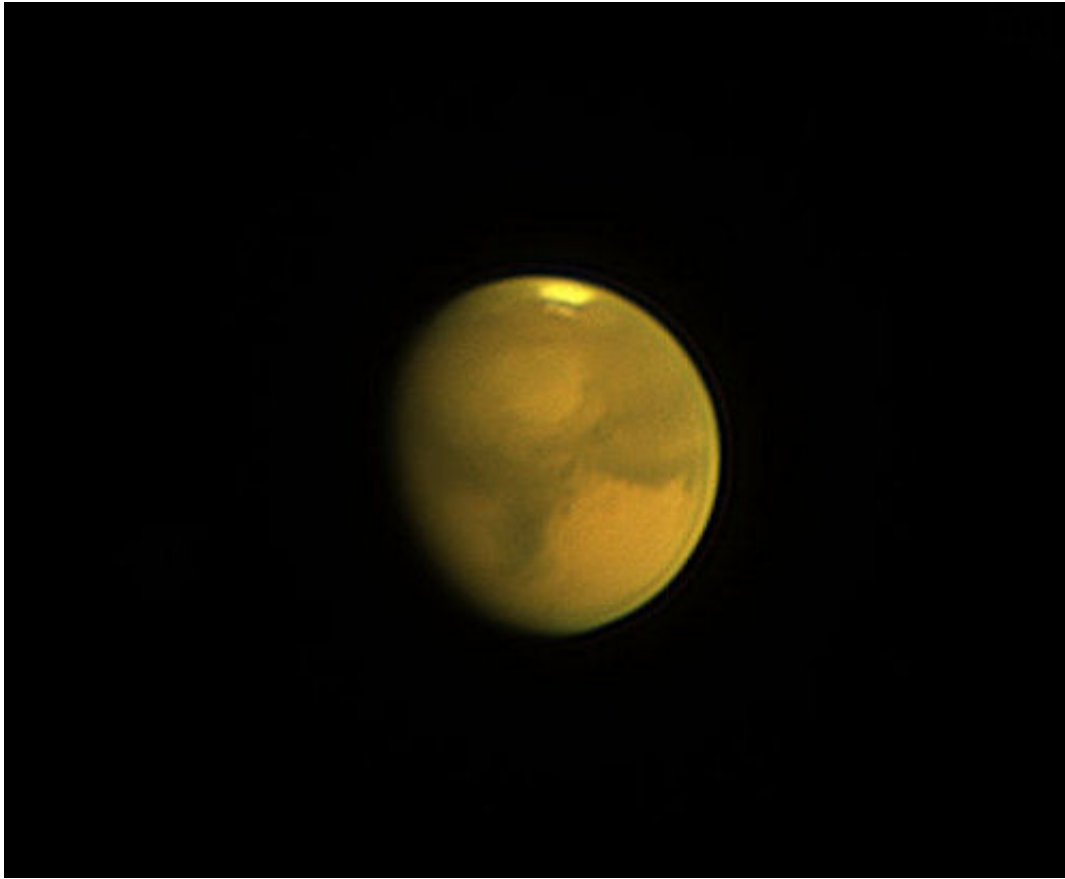


Figure 2. Image by J. Jantunen 19 Aug 2020 at 22:58–23:01 UT with 0.28-m SCT and QHY5III224 planet imaging camera. CM = 294°.

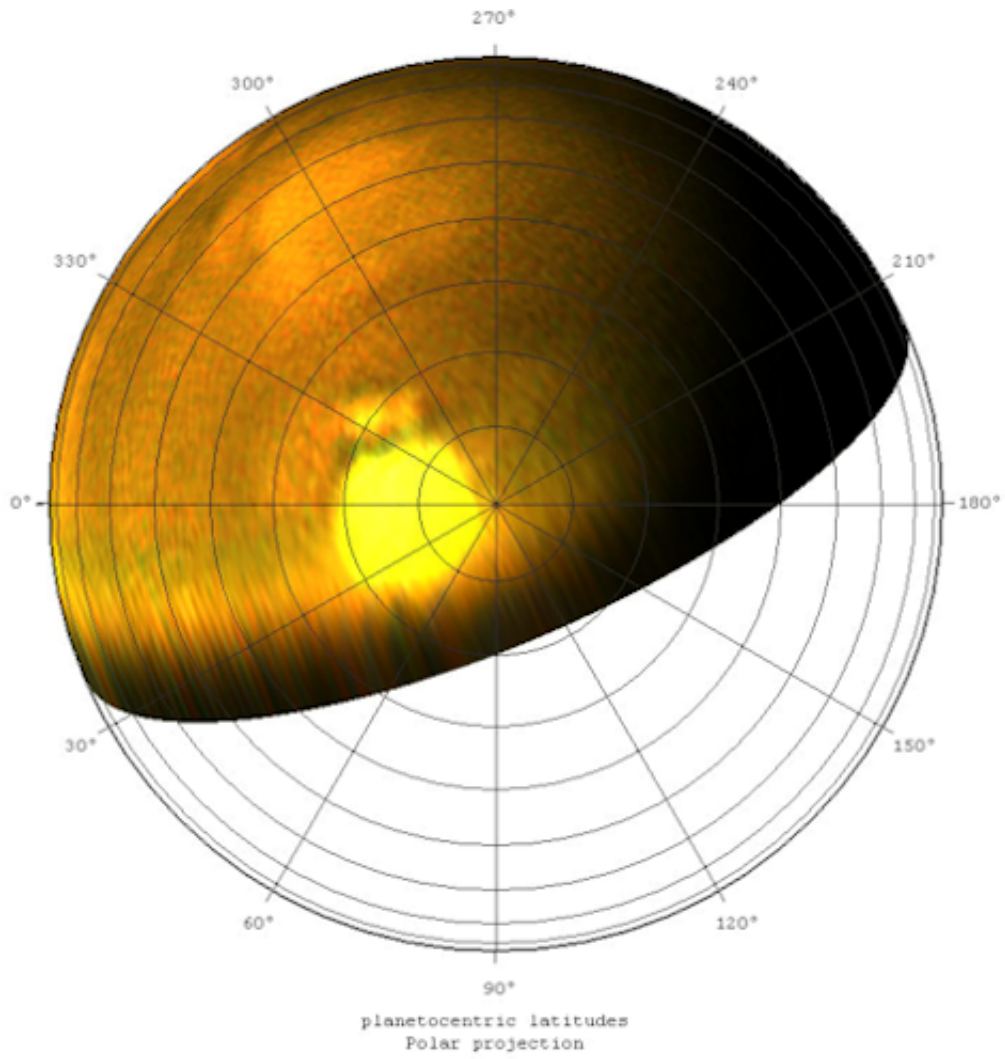


Figure 3. Polar projection of J. Jantunen's 19 Aug 2020 image with planetocentric latitude scale by WinJUPOS software. Novus Mons feature is visible approximately on the location 305–335° W and 65–75° S.