R005-49
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09:00-09:15

Real-time monitoring of polar mesospheric clouds utilizing Himawari-8 full disk images

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Polar mesospheric clouds (PMCs) or noctilucent clouds (NLCs) consist of water-ice particles, which can be produced in summer at the mesopause region, mainly at high latitudes. Since the first report on PMCs in 1885, various methods have been used to perform PMC observations. Optical observations by ground-based cameras, imagers, or lidars are often limited by weather conditions because a clear sky is required for such observations. Hence, satellite observations from space are valuable for more continuous observations, which enable significant systematic data coverage. Thus, many PMC observations have been done by low Earth orbit (LEO) satellites. By contrast, there are only few reports of PMC observations by geostationary Earth orbit (GEO) satellites, which includes Meteosat First Generation (MFG) and Meteosat Second Generation (MSG). These GEO satellites can provide full-disk images including the Earth's limb, which would give valuable opportunities for PMC observations by continuous limb-viewing from its almost fixed location relative to the Earth.
In this presentation, we will introduce PMC observations by the Japanese GEO meteorological satellite Himawari-8, that has been in the regular operation since 7 July 2015. In particular we will show our PMC detection method for application to the Himawari-8 data, which consists of two-step detections. The first detection is as follows. We calculate positions in each pixel of Himawari-8 full-disk image, as tangential points in the limb viewing. Then, based on the calculated position, we produce spatial averaged emission intensity data for each bin with 1? latitude and 1-km altitude, and thus height profiles in the averaged emission intensity are obtained at each latitude. We define a threshold based on a dark level determined from the the emission intensity above 90 km, and extract PMCs which have significant emission intensity compared with the threshold. In the second detection, in order to extract weaker PMC emissions, we remove emission profiles only due to atmospheric scattering (i.e., Rayleigh scattering) using polynomial approximation. After that, by setting a smaller threshold, weaker PMCs are extracted. This method is currently applied to real-time Himawari-8 data, and a website showing real-time PMC activity will be opened to the public shortly. This kind of data product would be of benefit for research on various PMC science.