

Studies of the polar upper atmosphere from comprehensive observations and GCM simulations

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The polar upper atmosphere is the window on near-Earth space. Since the energy from the solar wind is poured into the polar upper atmosphere through near-Earth space, we can obtain information of the outer world around the Earth from some observations in the polar region. For example, the auroral phenomena are the typical ones which visualize the variations of the space environments. The polar upper atmosphere is also the mirror for the climate change. Global cooling goes on in the upper atmosphere while global warming is the advancing problem in the troposphere. Since the effects of the global warming propagate upward with increasing their amplitudes with height, some people have tried to understand the global warming or climate change from the signals in the upper atmosphere. In particular, remarkable phenomena, such as the noctilucent cloud, have appeared in the polar upper atmosphere due to the changes in the troposphere. Furthermore, recent studies have clarified the effects of the sudden stratospheric warming (SSW) on temperature and wind variations in the mesosphere, thermosphere, and ionosphere. We overview the relationships between external forcing from above and below and variations of the polar upper atmosphere. Then, the recent progress of our understandings from comprehensive observations and GCM simulations are shown. The future targets in our research project will be also shown in this presentation.

Keywords: thermosphere, ionosphere, mesosphere, EISCAT, GCM, Na lidar