2021 Workshop: None storm time IT variations

Long title
Non-storm time variations in the ionosphere and thermosphere
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Description

Understanding the variabilities in the ionosphere and thermosphere (IT) system and their drivers is one of the CEDAR science challenges. Geomagnetic storms cause the largest IT variabilities.

Justification

Understanding the variabilities in the ionosphere and thermosphere (IT) system and their drivers is one of the CEDAR science challenges. Geomagnetic storms cause the largest IT variabilities. However, during non-storm time, the IT system still exhibits significant variations which may be more complicated due to competition among different drivers, such as high latitude energy input and impact from the low atmosphere. Investigating the non-storm time IT variations also provides a way to improve our understanding of the storm-time IT disturbances. We have identified invited speakers to provide introduction presentations on status of non-storm time IT variations based on observation and modeling work. We also welcome contributed presentations. We will reserve time for a round table discussion to summarize the findings and provide recommendation for future effort and collaboration.

It is well known that the ionosphere and thermosphere (IT) exhibit significant variations during geomagnetic storms when the Dst index drops to a large negative value. On the other hand, the IT system (neutral density and composition, electron density, electric field, etc.) also shows noticeable changes during non-storm periods with low geomagnetic indices (e.g. Dst index near 0 nT, low Kp index (<3), or low AE index (<500 nT). Such non-storm time variations have been usually attributed to the impacts from the low atmospheric wave forcing, such as by gravity waves, tides and sudden stratospheric warming. Recent observations provide evidence that some of

the non-storm time IT variations may also due to high latitude forcing from the magnetosphere and solar wind, especially energy inputs by localized Joule heating and particle precipitation which are associated with local geomagnetic variations and auroral activities. This localized high-latitude forcing may not be fully captured in global geomagnetic indices. Variations in the solar wind velocity and pressure during small or northward IMF cause disturbances and waves in the magnetosphere which, in turn, cause disturbances in the IT system. This session welcomes presentations on the drivers (low atmosphere waves and high latitude inputs) of non-storm time IT variations and the processes leading to such variations from both observations and model simulations.

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