

Modeling of disturbances in the polar ionosphere-thermosphere

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The thermosphere and the ionosphere in the polar region have been studied for a long time. Recent observations have shown that disturbances with various scales in the thermosphere and the ionosphere are present in the auroral region. In particular, strong local thermospheric winds generated by auroral activities have not been understood quantitatively. It is also pointed out that such mesoscale disturbances interact with large-scale thermospheric wind systems. However, it is not so easy to model mesoscale phenomena because hydrostatic balance is often violated when the horizontal disturbance scale is comparable or less than the vertical disturbance scale. Two- and three-dimensional nonhydrostatic thermosphere-ionosphere models have been developed and used to study mesoscale disturbances in the polar upper atmosphere. The model is described and some results obtained by the model are presented.