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Title: *Space Weather Dependent on Lower Atmosphere Source?*

Cluster: *Cross-Theme Theory and Data Analysis/SECTP*

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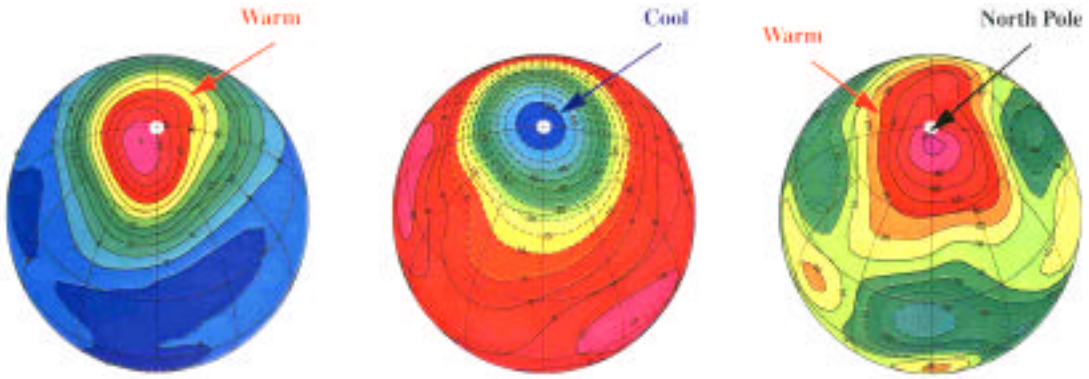
- **Troposphere Disturbances Affect Ionosphere/Upper Atmosphere**

TIME-GCM (Thermosphere Ionosphere Mesosphere Electrodynamics General Circulation Model) simulations of the state of the Earth's upper atmosphere and ionosphere were made for the stratosphere warming event of February 19, 1993. The warming, produced by a troposphere disturbance, was found to be associated with mesospheric cooling, which has been recently verified with measurements. The simulations indicated that the mesosphere cooling preceded the stratosphere warming, providing a way to predict the onset of stratosphere warmings. In addition, they revealed changes in the stratosphere, mesosphere and thermosphere wind systems, decreases in the atomic oxygen concentrations in the mesosphere and lower thermosphere and an increase in electron density in the polar E-region.

To predict space weather effects, emphasis is usually focused on solar and auroral energy inputs. These new results show it is also necessary to evaluate the influences of coupling with the lower atmosphere. The model employed could not have reached the level of sophistication it currently has without being supported by the SECTP. No other existing model has the capability to investigate coupling from the stratosphere to the exosphere (30-800 km).

Stratospheric warming (50°K)	Mesospheric cooling (55°K)	Thermosphere cooling (70°K)
40 km	**85 km**	**120 km**



Modeled Change In Neutral Gas Temperature During Stratosphere Warming*.*

Walterscheid, R. L et al., Mesospheric and lower thermospheric manifestation of a stratospheric warming event over Eureka, Canada (80N), *Geophys. Res. Lett.*, **27**, 2897-2900, 2000.