

# **Advances in Storm-time Modeling of the Mid and Low Latitude Thermosphere and Ionosphere**

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The dominant processes restructuring ionospheric plasma during a storm are electro-dynamics and neutral composition. The expansion of the magnetospheric convection electric field and ring current polarization fields erode and redistribute mid-latitude plasma early in the storm. Ionospheric depletions from neutral composition changes follow soon after. At low latitude, magnetospheric penetration and neutral wind dynamo electric fields are dominant, either reinforcing or competing in the plasma redistribution process. In extreme cases, particularly at solstice, neutral composition changes can reach low latitudes in the later stages of a storm. Neutral dynamics is the thread controlling the dynamo and composition change. Modeling the global response requires the interaction between inner magnetosphere electro-dynamics and the coupled thermosphere-ionosphere-plasmasphere system. Models are being developed to try to capture all the relevant physical processes responsible for the extreme changes at mid and low latitudes.