OBSERVATIONS OF THE APRIL 2002 STORM EVENT BY THE GLOBAL INCOHERENT SCATTER RADAR NETWORK WITH COMPARISON TO THE ASPEN MODEL

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In this presentation, the results of the April 2002 world-day campaign are reviewed. Initiated by the Haystack Observatory, this campaign unitizes the efforts of eight incoherent scatter radars (ISR) to collect ionospheric data during a major geomagnetic storm event beginning on April 17, 2002 (fig. 1). Because of the sparse ionospheric storm data available, this collected data-set provides a major source of information for atmospheric studies. In addition, the participating ISRs are located along longitudinal and latitudinal sectors, an arrangement that makes this campaign unique and invaluable for studying spatial and temporal effects of ionospheric storms. Emphasis is given to describing pre-storm electron density depletions, correlations between electron density and kinetic temperatures, and comparisons between the ISRs and TIMEGCM/ASPEN, a first principle physical model.

SUMMARY

• At all ISR sites, the geomagnetic storm creates a relative depletion in electron density after the onset of the storm.
• There is a clear correlation between electron density and temperatures. Namely, they are inversely proportional. This effect clearly exists at all locations; after the onset of the storm, temperatures are increased over all altitudes while density is, in general, decreased.
• These effects, however, do not take place at Kharkov (fig. 7) where post-storm measurements reveal a slight increase in electron concentrations and cooling of temperatures.
• Further developments of this study are attempting to answer the many looming questions about ionospheric reactions to high geomagnetic activity.
  • What is the penetration in latitude and altitude of the variation of plasma parameters due to the storm effects?
  • What is the global morphology of large-scale plasma density variations during this storm?
  • Are there wave structures (e.g. TIDs) generated during this storm?