



Upper Atmospheric Response to the April 2010 Storm as Observed by GOCE, CHAMP, and GRACE and Modeled by TIME-GCM

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We present the results of an investigation of the upper atmosphere during April 2010 when it was disturbed by a fast-moving coronal mass ejection. Our study is based on comparative analysis of observations made by the Gravity field and steady-state Ocean Circulation Explorer (GOCE), Challenging Minisatellite Payload (CHAMP), and Gravity Recovery And Climate Experiment (GRACE) satellites and a set of simulations with the National Center for Atmospheric Research (NCAR) thermosphere-ionosphere-mesosphere-electrodynamics general circulation model (TIME-GCM). We compare and contrast the satellite observations with TIME-GCM results from a realistic simulation based on prevailing meteorological and solar geomagnetic conditions. We diagnose the comparative importance of the upper atmospheric signatures attributable to meteorological forcing with those attributable to storm effects by diagnosing a series of complementary control TIME-GCM simulations. These results also quantify the extent to which lower and middle atmospheric sources of upper atmospheric variability precondition its response to the solar geomagnetic storm.