USING ENSEMBLE SENSITIVITY TO UNDERSTAND THE ROLE OF SEA SURFACE TEMPERATURES IN MIDLATITUDE STORM DEVELOPMENT IN THE GULF STREAM REGION

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The NCAR Weather Research & Forecasting (WRF) model is used to examine midlatitude storm development in the Gulf Stream region. QuikSCAT winds are used for verification and comparison of the models 10m winds. Ensembles of modeled storms are created in which the only parameter changed is the sea surface temperature (SST) boundary condition. There are three different ensembles: (1) uniform increase and decrease in the SST for the whole domain, (2) uniform increase and decrease of the SST on warm side or cold side of the SST front only, (3) changes to the SST that strengthen the meridional gradient but maintain the meridional mean SST temperature across the Gulf Stream extension. Characteristics of the developed storms are compared to determine the best metric of storm strength. It is found that the area averaged surface wind speeds are strongly correlated with the sea-level pressure minima, showing that the two metrics are consistent. This suggests that QuikSCAT winds offer a useful method for observing midlatitude storm strength. Linear regression analysis is applied to the ensembles to determine the most important factors that force changes in the storm strength. The storms strength is most sensitive to the vertically and horizontally integrated diabatic heating near the storms center, as compared to the surface fluxes of sensible and latent heat.