Worst case forecasting of Hurricane Irene (2011)

R N Hoffman, D Gombos, and B K Woods

AER, Lexington, United States (ross.n.hoffman@aer.com)

Worst case scenarios for wind damage from Hurricane Irene are estimated from an ensemble of surface wind speed forecasts. Damage at any point is modeled by applying a simple damage function to census data estimates of property values. The forecast damage ensemble provides an estimate of the covariance structure of the damage. Under the assumption that the damage is multivariate Gaussian (mG), the damage covariance defines a high dimensional ellipsoidal surface for any probability quantile. The damage maximizing point on that ellipsoid, i.e. the "exigent" scenario, is found by the method of Lagrangian multipliers according to the Exigent Analysis Theorem (EAT). We will present the evolution of the exigent scenario as calculated at different forecast initial times and compare these forecast worst case estimates to the actual damage. We will also explore methods to quantify deviations from the mG assumption and their impact on our analysis. The EAT also provides the least damaging (or best case) scenario and this enables us to present the relative uncertainty of the damage forecasts and how this uncertainty evolves in terms of worst case minus best case damage maps.