Form S-6: Hypothetical Events for Sensitivity and Uncertainty Analysis

Specifications

The following model input variables were examined:

- CP = central pressure (in millibars)
- Rmax = radius of maximum winds (in statute miles)
- VT = translational velocity (forward speed in miles per hour)
- GWRF = gradient wind reduction factor for converting the modeled gradient winds to surface winds
- FFP = far field pressure (in millibars)
- PWF = peak weighting factor which reflects the vertical slant in the hurricane eye

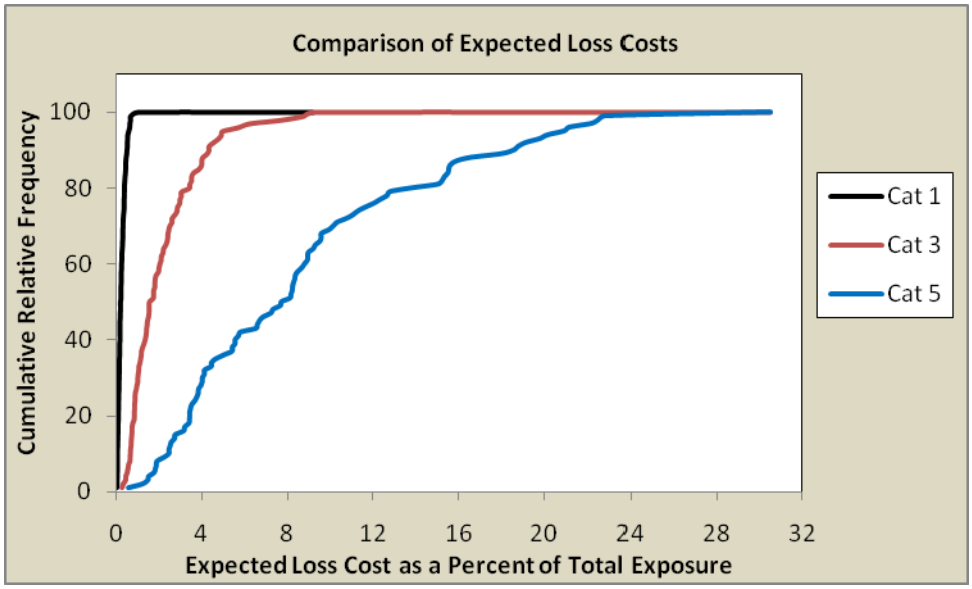
Specific values for CP, Rmax, VT and FFP, were taken directly from ***"FormS6Input09.xls"*** while the values of GWRF and PWF were based on the corresponding quantiles from ***"FormS6Input09Quantiles.xls."*** The values of CP and FFP were used as separate input variables in the calculations.

Loss Cost

1. Aggregated loss costs over the 682 land-based vertices in the grid in *Figure 8* for each input vector and each hurricane category have been provided on CD in an ASCII file and a PDF file named ***"AIR09Expected Loss Cost."***

   These results are displayed as a cumulative empirical distribution function.

Figure 1: Comparison of CDFs of Loss Costs for all Hurricane Categories



2. The mean loss cost at each of the 682 land-based vertices in the grid in *Figure 8* over all 100 input vectors for each hurricane category have been provided on CD in an ASCII file and a PDF file named ***"AIR09Loss Cost Contour."***

   The mean of the 100 input vectors are displayed as contour plots for each hurricane category in Figures 2-4.

Figure 2: Contour Plot of Loss Cost for a Category 1 Hurricane

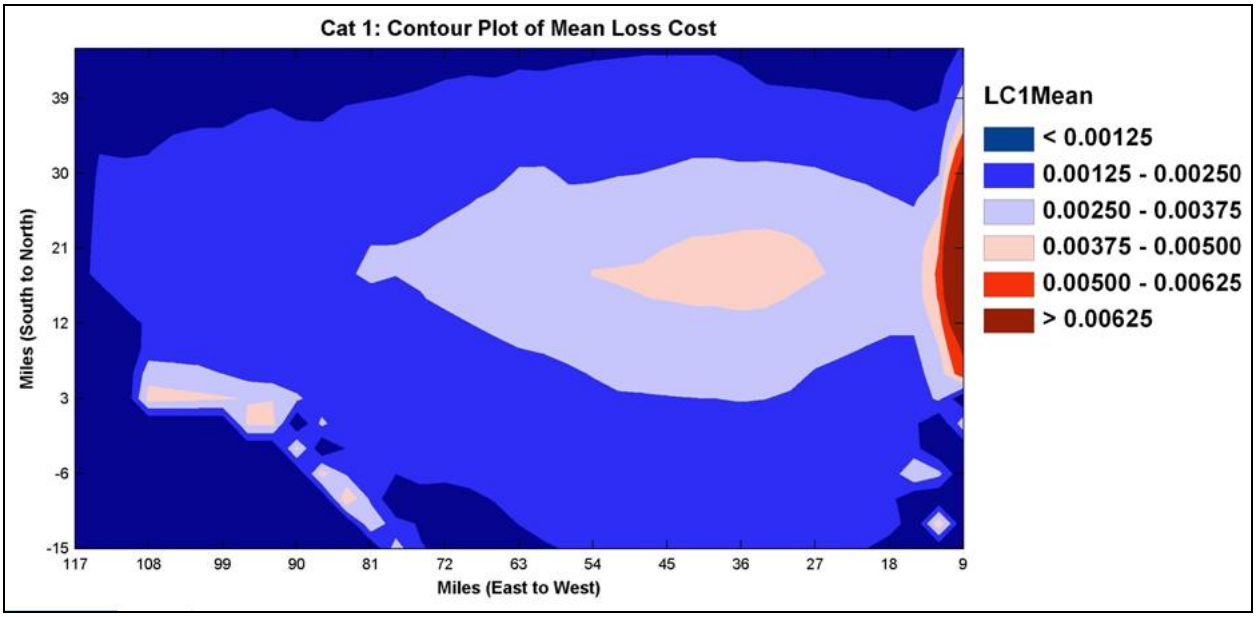


Figure 3: Contour Plot of Loss Cost for a Category 3 Hurricane

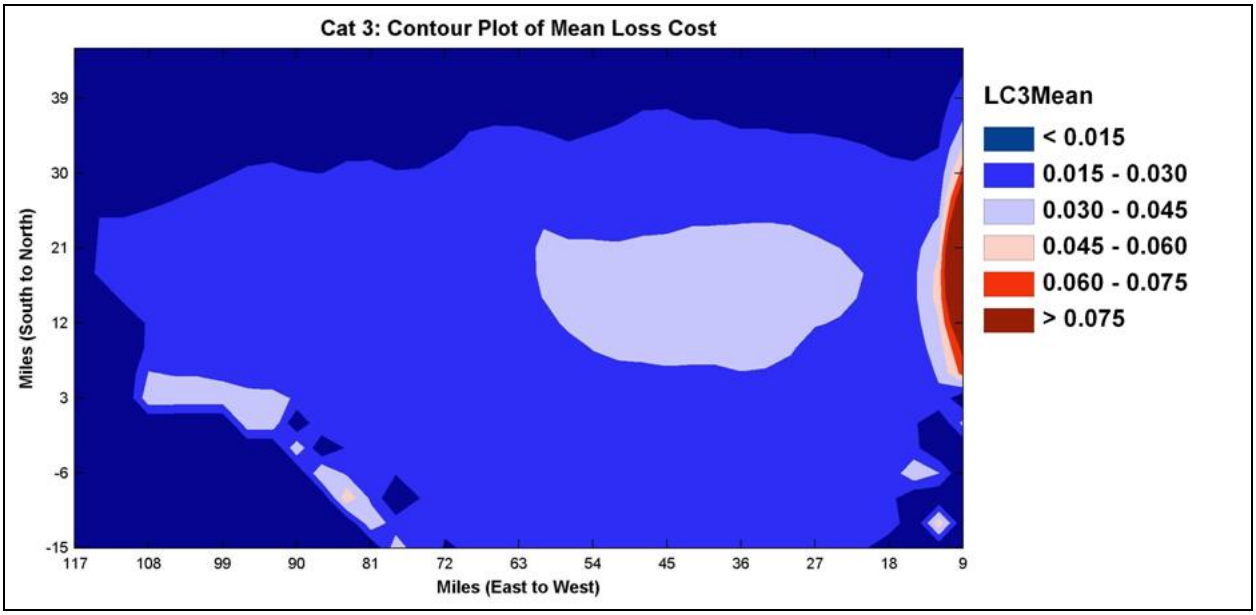
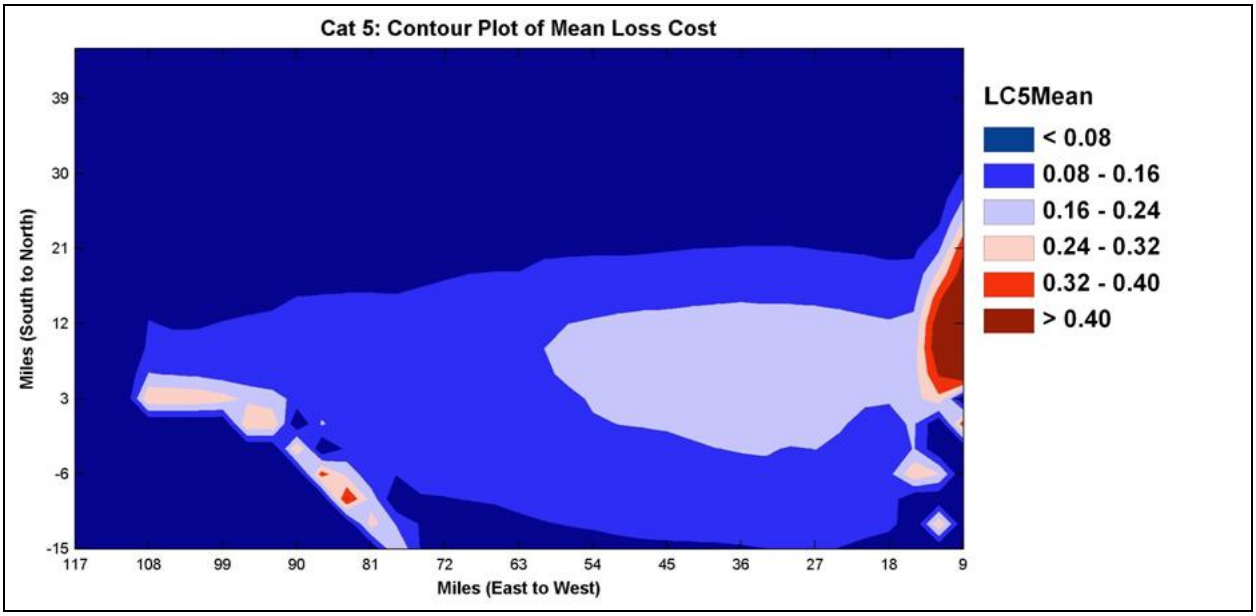


Figure 4: Contour Plot of Loss Cost for a Category 5 Hurricane



Uncertainty and Sensitivity Analysis for Loss Cost

Sensitivity analyses are based on standardized regression coefficients (SRC) for each model input variable used in the calculation of loss costs in Form S-6, following the guidelines provided by Iman, Johnson, and Schroeder, (2001).

The SRC's in these sensitivity analyses are summarized as follows:

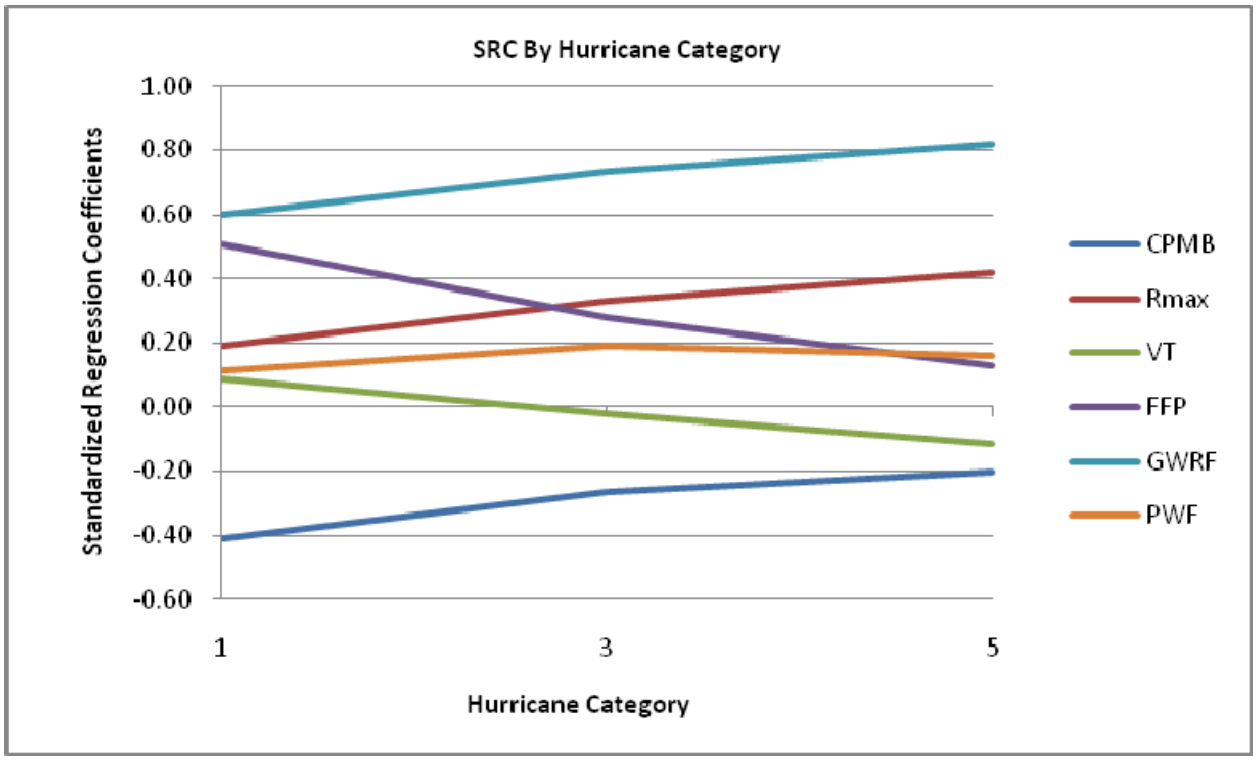
Category	CP	Rmax	VT	FFP	GWRF	PWF
1	-0.4091	0.1914	0.0888	0.5055	0.5999	0.1150
3	-0.2665	0.3333	-0.0185	0.2777	0.7363	0.1933
5	-0.2005	0.4196	-0.1145	0.1280	0.8195	0.1620

Figure 5 presents graphs of these SRCs for all six input variables for each category of hurricane. This figure shows that the GRWF has the most influence on the magnitude of the loss cost for Category 1, and this relationship is positive. FFP has the second most influence on the magnitude of loss cost (positive) followed by CP (negative relationship), Rmax (positive), PWF. VT had the least influence.

The Category 3 results in Figure 5 show that GWRF continues to have the most influence on the magnitude of loss costs, followed by Rmax, FFP, CP, PWF and VT.

The SRCs for Category 5 in Figure 5 show that GWRF has the most influence, followed by Rmax, CP, PWF, FFP and VT.

Figure 5: SRCs for Expected Loss Cost for all Input Variables for all Hurricane Categories



Uncertainty analyses are based on expected percentage reduction (EPR) for each model input variable as suggested by Iman, Johnson, and Schroeder, (2001).

The EPRs in these uncertainty analyses are summarized as follows:

Category	CP	Rmax	VT	FFP	GWRF	PWF
1	15.7%	4.7%	0.0%	27.3%	46.0%	1.4%
3	3.2%	7.9%	0.1%	5.4%	46.1%	1.5%
5	3.4%	13.2%	0.1%	3.4%	94.4%	3.8%

Figure 6 presents graphs of these EPRs for all six input variables for each category of hurricane. This figure shows the GWRF makes the largest contribution to the uncertainty (46.0%) in loss cost for a Category 1 hurricane. FFP makes the next largest contribution (27.3%) followed by CP (15.7%), and then Rmax (4.7%). PWF (1.4%) and VT (0.0%) made very little contribution to the uncertainty in loss cost.

The Category 3 results in Figure 6 show that GWRF continues to make the largest contribution to the uncertainty (46.1%) in loss cost followed by Rmax (7.9%), FFP (5.4%) and CP (3.2%). PWF (1.5%) and VT (0.1%) again make very little contribution to the uncertainty in loss cost.

The Category 5 results in Figure 6 show that GRWF continues to dominate the uncertainty in the loss costs (94.4%) and increases in influence for the largest hurricanes. We also see an increase in influence in Rmax (13.2%). PWF (3.8%) shows a slight increase in influence as well though it continues to contribute very little to the uncertainty in loss cost. The remaining parameters CP (3.4%), FFP (3.4%) and VT (0.1%) also contribute very little to the uncertainty in loss cost.

Figure 6: EPRs for Expected Loss Cost for all Input Variables for all Hurricane Categories