# RMS® CCRA® Training Program
## Tropical Cyclone Modeling Exercise

### Learning Objectives:

Assume that you are a catastrophe analyst for a fictitious primary insurer called Coast to Coast Insurance Company that writes properties exposed to Hurricane Wilma. You have been asked to analyze your company's Florida commercial hurricane portfolio and provide a report of the modeled risk as the hurricane is threatening landfall in Florida.

Your goals are to assess Coast to Coast's modeled risk using the stochastic storms IDs provided by RMS prior to landfall, and to calculate and understand the contributors to the uncertainty around modeled mean losses.

### Overview

The following workbooks are available to you to complete this exercise:

1. FL Exposure Summary.xls, which contains exposure data profiles for the Coast to Coast portfolio
2. HUWilma_StochasticTracks_EP.xls, which contains:
   - Read Me tab with important background information and instructions
   - Four tabs with stochastic EP (STEP) results for 36, 24, and 12 hours prior to landfall, and at landfall. Each tab has an exposure map with the stochastic storm tracks plotted on it.
   - Storm Info tab with stochastic storm parameter information

Note: You will not need to use the STEP Tool for this exercise. However, if you are interested, information can be created from templates that can be downloaded from the Cat Updates section of www.rms.com after an event and used in the RMS Stochastic EP (STEP) Tool. The STEP tool calculates an *event-specific* loss EP curve for a given analysis using data from the RDM_port table. You can download the Stochastic EP Tool and installation instruction from the client log-in section of RMS Owl.

Portfolio Summary

- Florida Hurricane, all lines of business
- Wind only policies
- 600 accounts covering 1,005 locations
- Total Values: $3,301,973,092
- Total Limits (i.e. Insured Values): $3,295,610,004
- Primary building characteristics are captured
- Secondary characteristics are not captured

Portfolio Analysis Summary

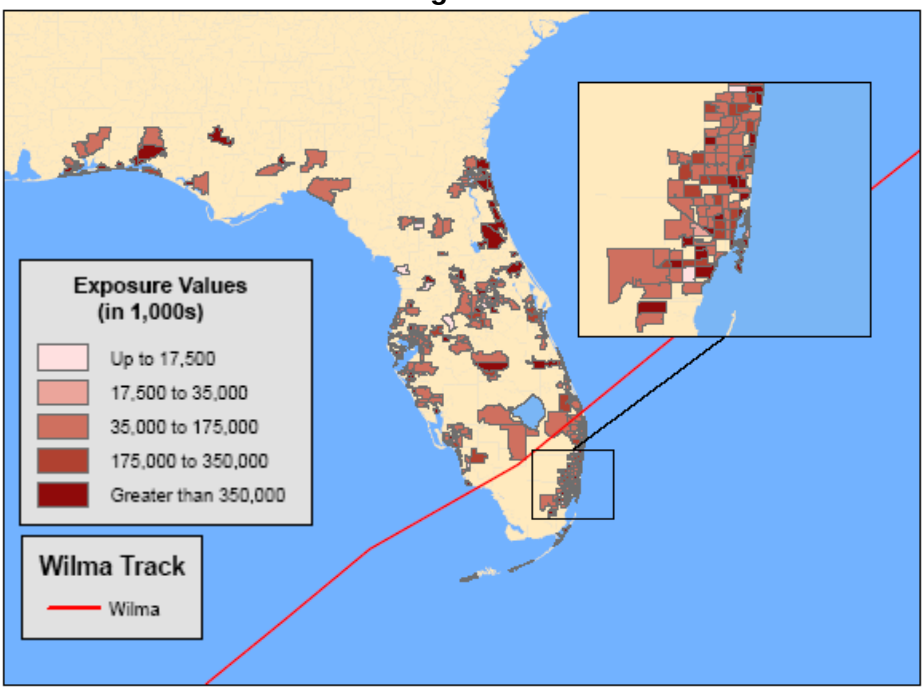
- Distributed U.S. hurricane EP portfolio level analyses
- Wind losses only
- RMS 2011 Stochastic Event Rates
- Analysis 1: Without loss amplification
- Analysis 2: With loss amplification

## Background Information on Hurricane Wilma

Hurricane Wilma made landfall on the southwest Florida coast near Cape Romano on October 24, 2005 and was a category three hurricane at the time of landfall. At landfall, Wilma was a very large hurricane with maximum sustained winds of 120 mph (193 km/hr), a central pressure of 950 mb, and an eye diameter of over 70 miles (112 km). Hurricane force winds extended out to around 90 miles (145 km) from the eyewall.

Figure 1 shows the distribution of Coast to Coast's exposure relative to the track of Wilma (shown in red). The inset area shown on the right side of the map is the Miami/Fort Lauderdale region.

**Figure 1**




## Part 1: Wilma Pre-Landfall Analysis

As Hurricane Wilma is approaching the Florida coast, you retrieve the suite of RMS stochastic tracks through the Cat Updates service at 36, 24, and 12 hours before projected landfall. At each point in time (36, 24, and 12 hours) you analyze your portfolio using the Stochastic EP (STEP) Tool templates and assess the potential range of losses at landfall. Use the data provided for each time period in HUWilma_StochasticTracks_EP.xls, to answer the following questions.

1. Refer to the T36 tab of the workbook to compare the mean loss 36 hours before landfall including loss amplification to the same loss excluding loss amplification. Explain why losses including loss amplification are higher than those without.

List two reasons why the events shown on the ‘T36’ tab are not classified as Super Cat storms.

i.

ii.

2. Look at the stochastic events used to estimate losses 12 hours prior to landfall using the data on the Storm Info tab (Rows 28-32) and the associated map. Compare the following parameters to those for Wilma at landfall stated below.

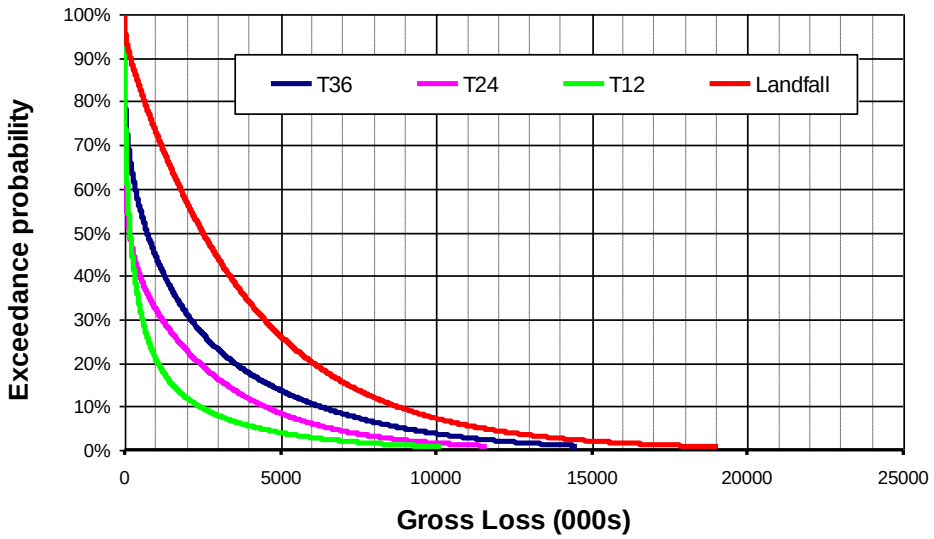
   - Rmax: ~ 35 miles
   - Central Pressure: 950 mb
   - Location of landfall: Near Cape Romano, FL
   - Category: 3

   Provide an explanation of how the parameter value differences translate to the modeled loss differences.

## Part 2: Wilma Post-Landfall Analysis

Assume that Wilma has now made landfall, and RMS has issued a post-landfall suite of tracks, shown in the map on the Landfall tab of the workbook. Analyze the EP curve with loss amplification for these storms along with those of each previous suite of stochastic storms released prior to landfall (shown in Figure 2 below).

**Figure 2**




4. What is the approximate percentile associated with the modeled mean gross loss with loss amplification for each of the four time periods in the table below?

| | Gross Mean Loss | EP |
|---|---|---|
| **T36** | | |
| **T24** | | |
| **T12** | | |
| **LANDFALL** | | |

5. Using the gross mean loss analysis results and exposure maps provided, list two reasons for the differences between the pre-landfall and landfall values.
   i.

ii.

6. What are the 20th and 80th percentile gross losses, for each time period listed in the table below with loss amplification?

| | 20% | 80% | Range of 20% to 80% Gross Losses |
|---|---|---|---|
| **T36** | | | |
| **T24** | | | |
| **T12** | | | |
| **LANDFALL** | | | |

   a. Explain what the percentile values mean.

   b. What trend do you see in the range of percentile gross losses? Provide a reason for this trend.

**Part 3: Contributors to Loss Uncertainty**

Initial claims losses for this portfolio are approximately $4.5M. You have been asked to determine why the actual losses are higher than the modeled gross mean loss from the Landfall suite of stochastic storms.

7. At approximately what percentile of the gross loss distribution with loss amplification do the initial claims losses of $4.5M fall? _____

8. Review the data in the FL Exposure Summary.xls spreadsheet and provide two examples of how exposure data uncertainty might be contributing to the loss uncertainty.
   i.

   ii.

9. The stochastic event from the Landfall suite that most closely approximates initial claims losses is ID 448986 with an assigned weight of 0.00708. The tables below show the details for this stochastic event.

| EVENTID | EVENTLOSS | EXP | STDDEVI | STDEVC | MDR | CV |
|---|---|---|---|---|---|---|
| 448986 | $5,319,635 | $169,260,575 | $2,142,134 | $1,755,068 | 0.031429 | 0.732607 |

| *DESCRIPTION* | *RMAX LEFT* | *RMAX RIGHT* | *CP* | *CAT* | *LAT* | *LONG* |
|---|---|---|---|---|---|---|
| FL-SW_Cat4 | 23.5015 | 23.5015 | 934.04 | 4 | 25.9 | -81.575 |

   a. Explain why event 448986 was given a lower relative weight than most of the other storms listed in Stochastic Events table on the ‘landfall’ tab (Rows 16-24).

   b. Provide two potential contributors to parameter uncertainty that would contribute to differences between actual and modeled losses.
      i.

ii.

10. What trend do you see between the landfall suite of gross mean stochastic event losses with loss amplification and the CV (Rows 27 – 35)? Provide an explanation for this trend.

11. Based on the tables that provide the stochastic event uncertainty distribution parameters, list two ways to arrive at the total event standard deviation for each storm.
    i.

    ii.