Public Hurricane Loss Model v 6.2

Meteorology

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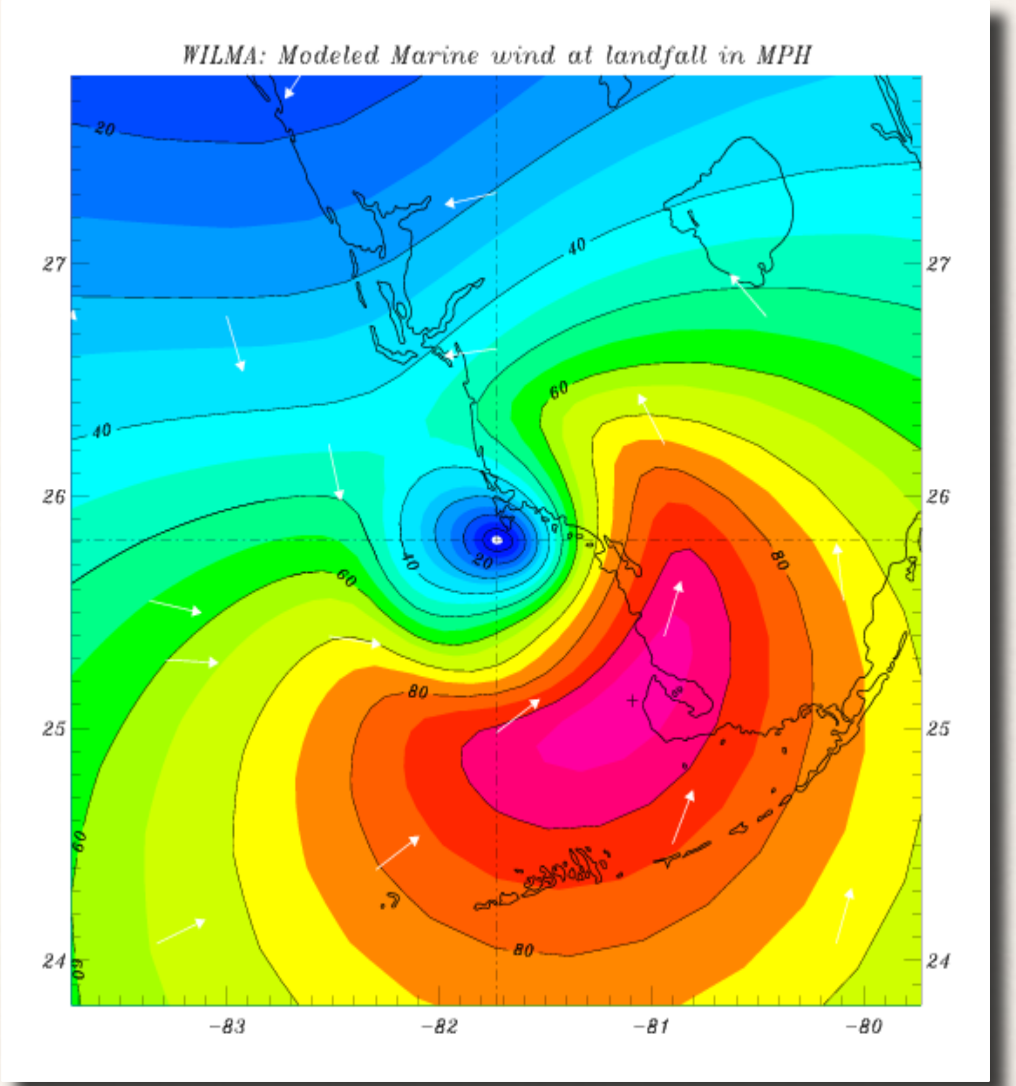


Met Components

- Storm Track Generator
  - generates tracks which have position, intensity and storm parameters for duration of storm
- Wind Model
  - generates surface wind field for each storm
- Terrain Adjustment
  - adjust winds to terrain conditions and determines gusts

Storm Track Generator

- Storm seeds based on historical storms that entered a threat area surrounding Florida and neighboring states
  - Initial seed position started at the historical position of the storm 36 hours prior to entering threat area, plus uniform random perturbations
  - Initial speed and intensity based on historical data plus random perturbations
- Changes in speed, direction and relative intensity are sampled from empirical PDFs derived from HURDAT data, with random perturbations added. PDFs depend on location and current motion or intensity
- Storm parameters (Rmax and Holland B) are sampled from distributions derived from historical data

Storm Track Generator

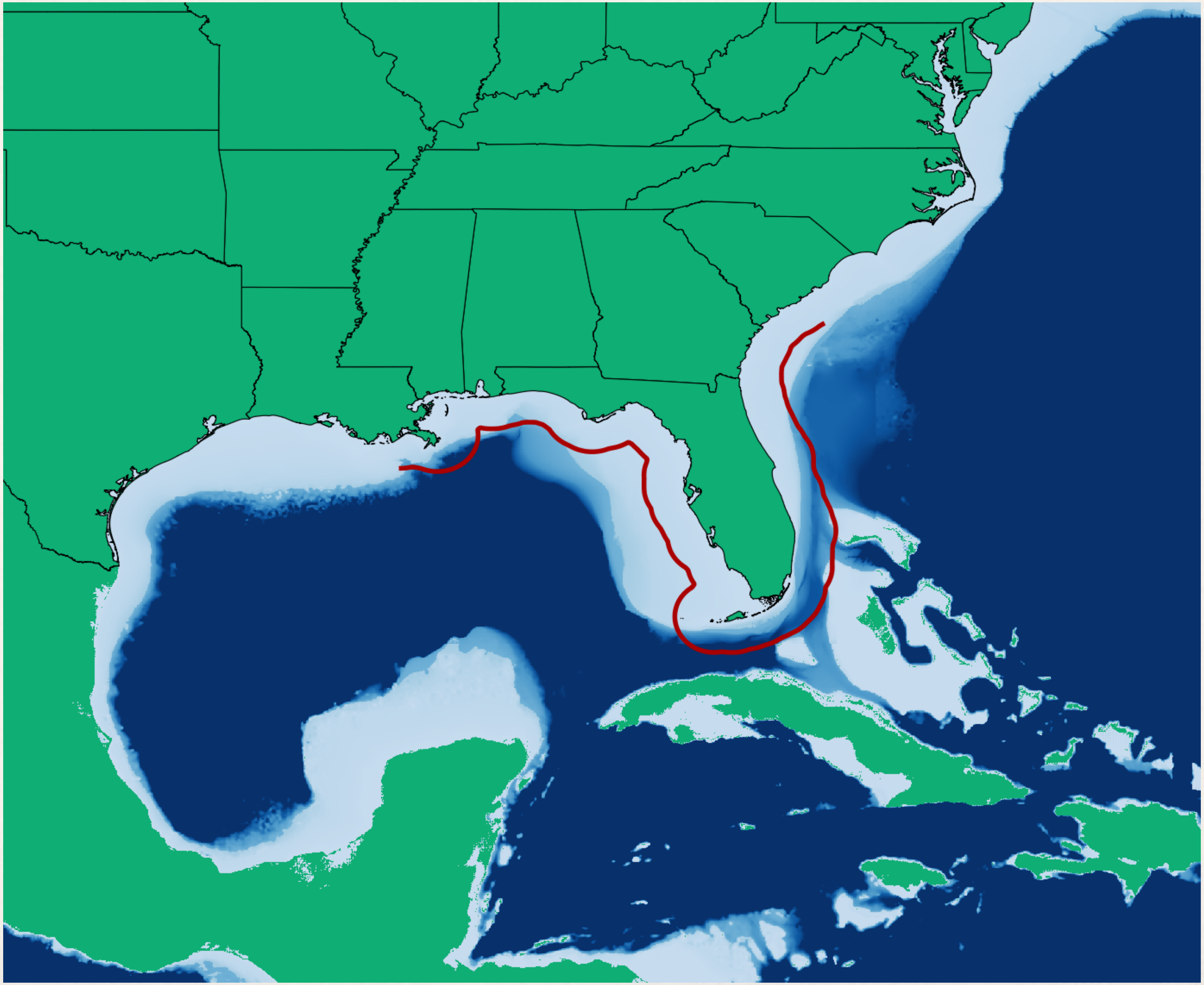
- When storm is over land, a pressure filling model is used (exponential decay of central pressure deficit in time). If storms re-enters water, intensity changes are again resampled from the PDFs derived from HURDAT.

- Storms seeds are recycled, but with new random perturbations, to generate more than 50,000 years of storms

- Storm tracks are in 1 hr increments, and includes position, intensity (pressure), date and storm parameters (Rmax, B)

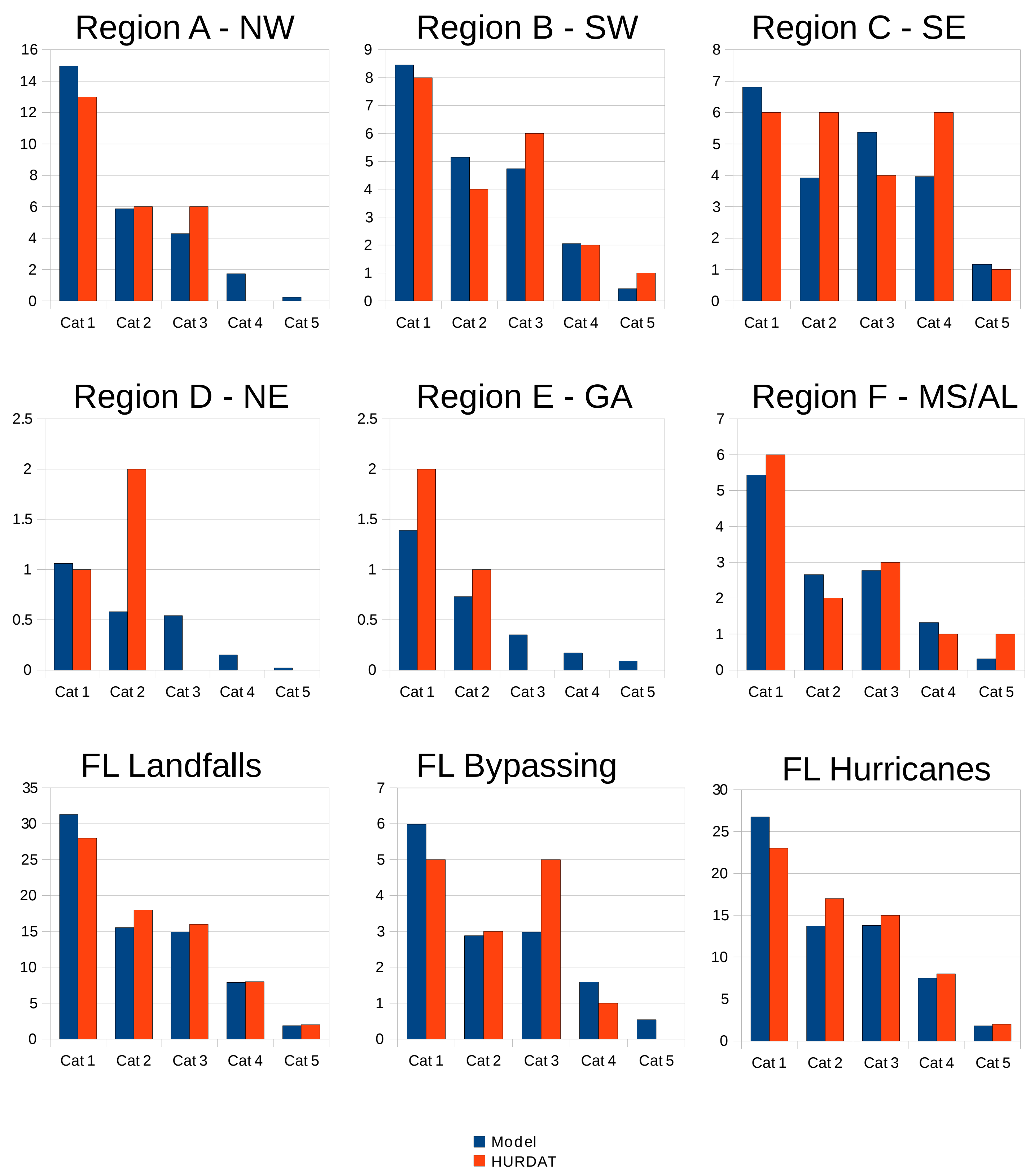
- Storm terminates when it exits domain or central pressure exceeds 1011 mb

Model Domain



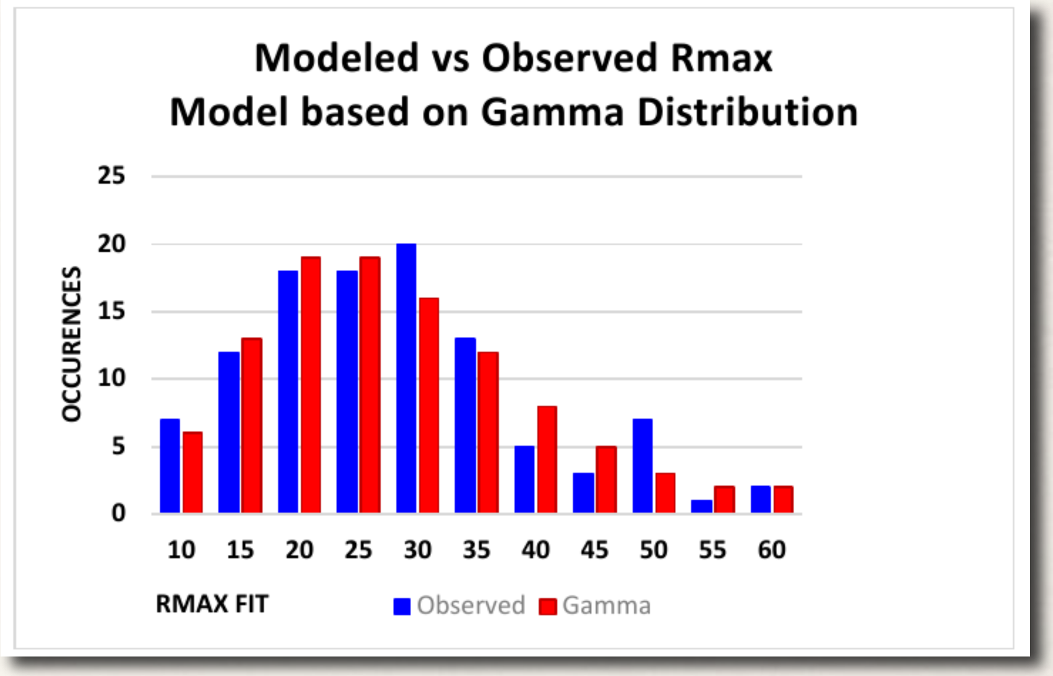
Sample Stochastic Tracks

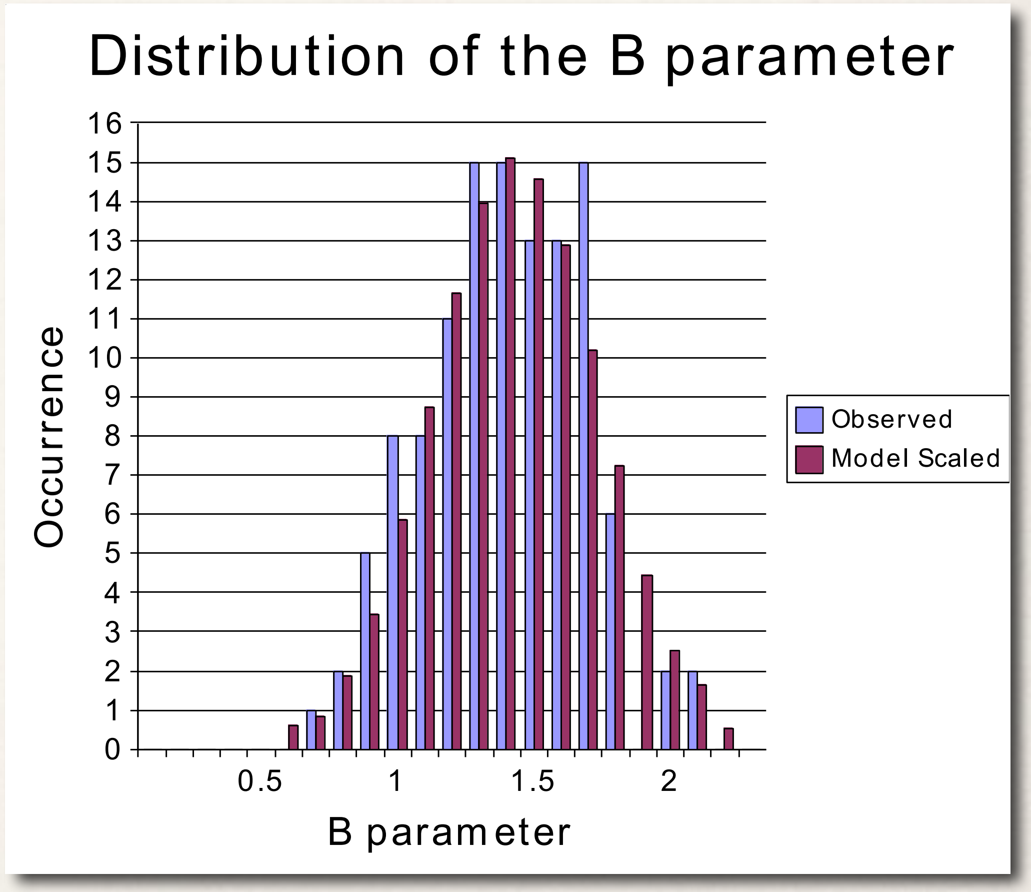
Landfall by SS Category and Region



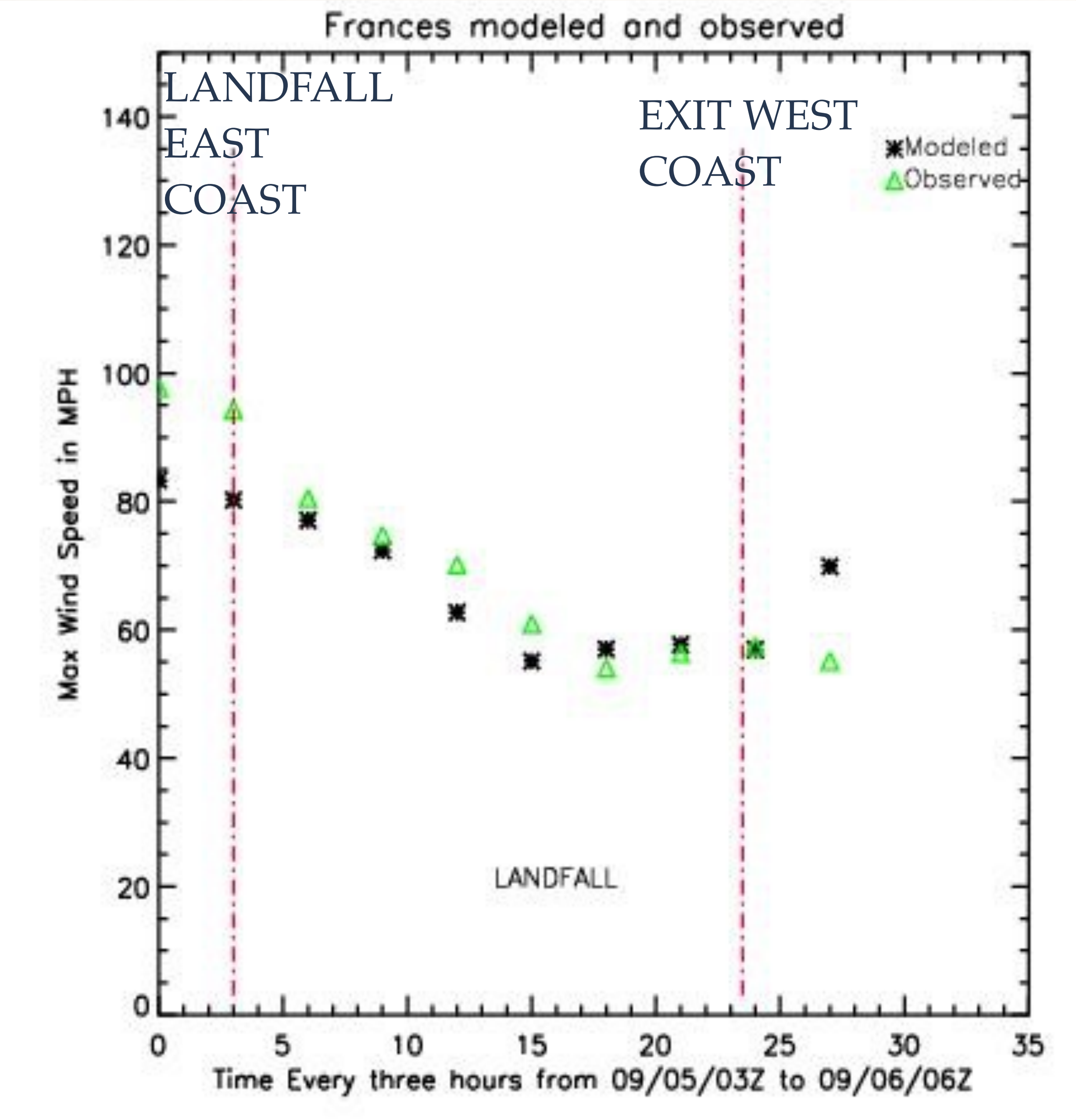
Storm Parameters

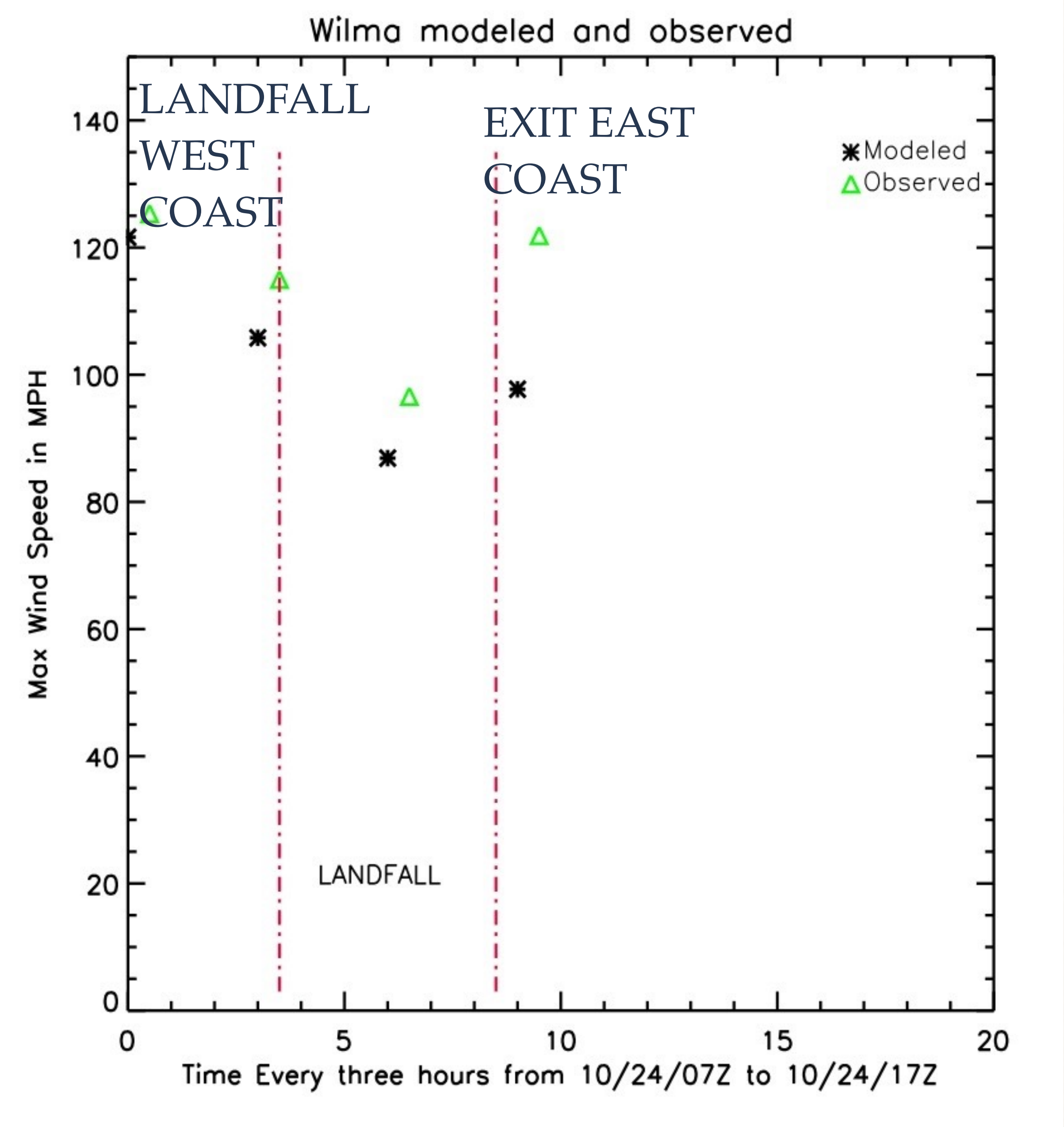
- Rmax modeled by Gamma distribution
- Holland B modeled by linear regression with residual fitted by a Gaussian distribution





- Landfall decay





Wind Model

- Numerical solution of a “slab” model of the hurricane boundary layer, 450 m deep over ocean, 1 km deep over land (see Powell et al, 2005)
- Includes surface friction, with different drag coefficient over land vs water. Based on GPS sonde data.
- Initialized by a vortex in gradient balance with pressure field described by a Holland B profile.
- Mean wind of the slab is converted to a surface wind based on GPS sonde research

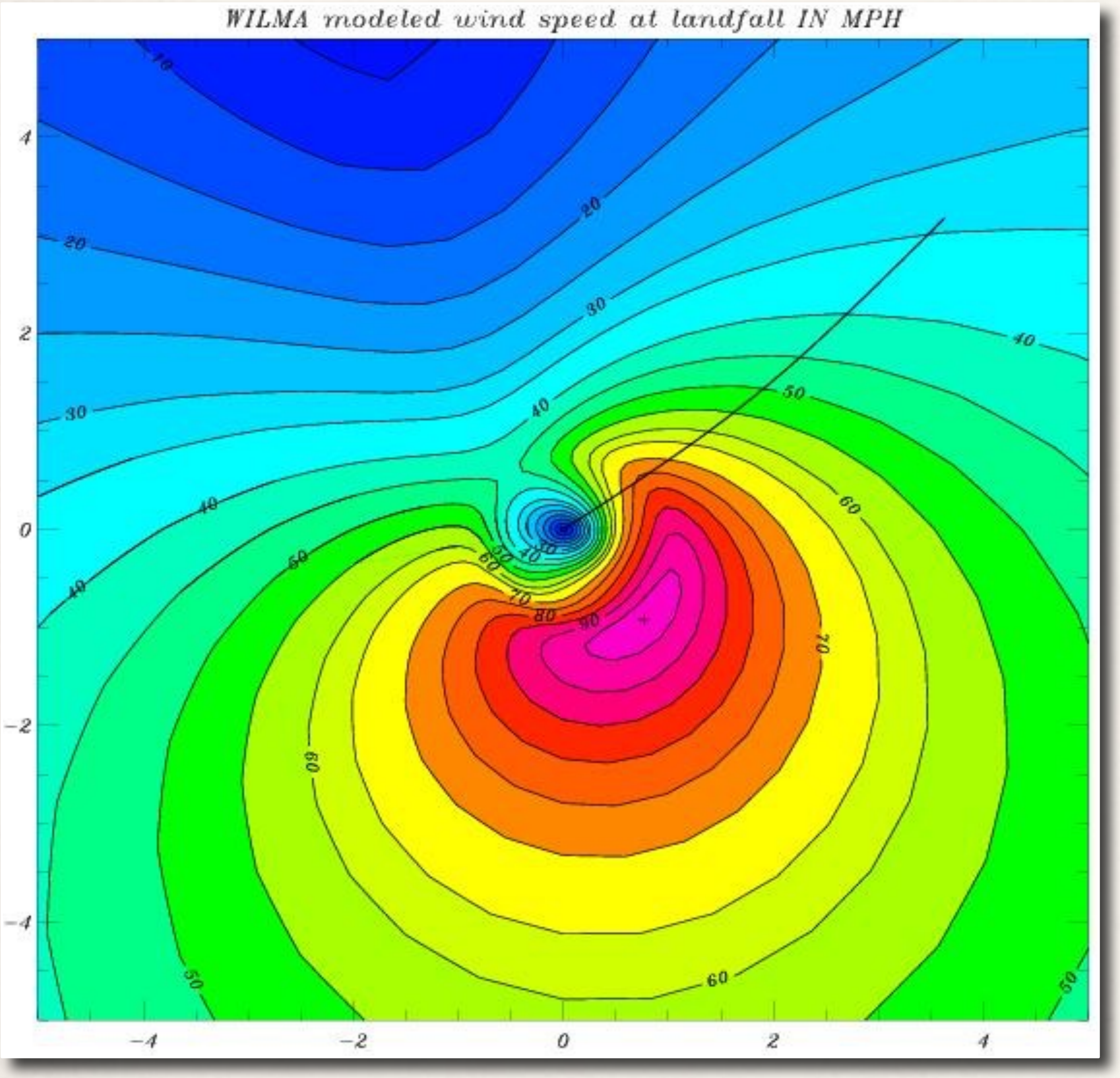
Wind Model Validation

Comparison and analysis vs H*Wind

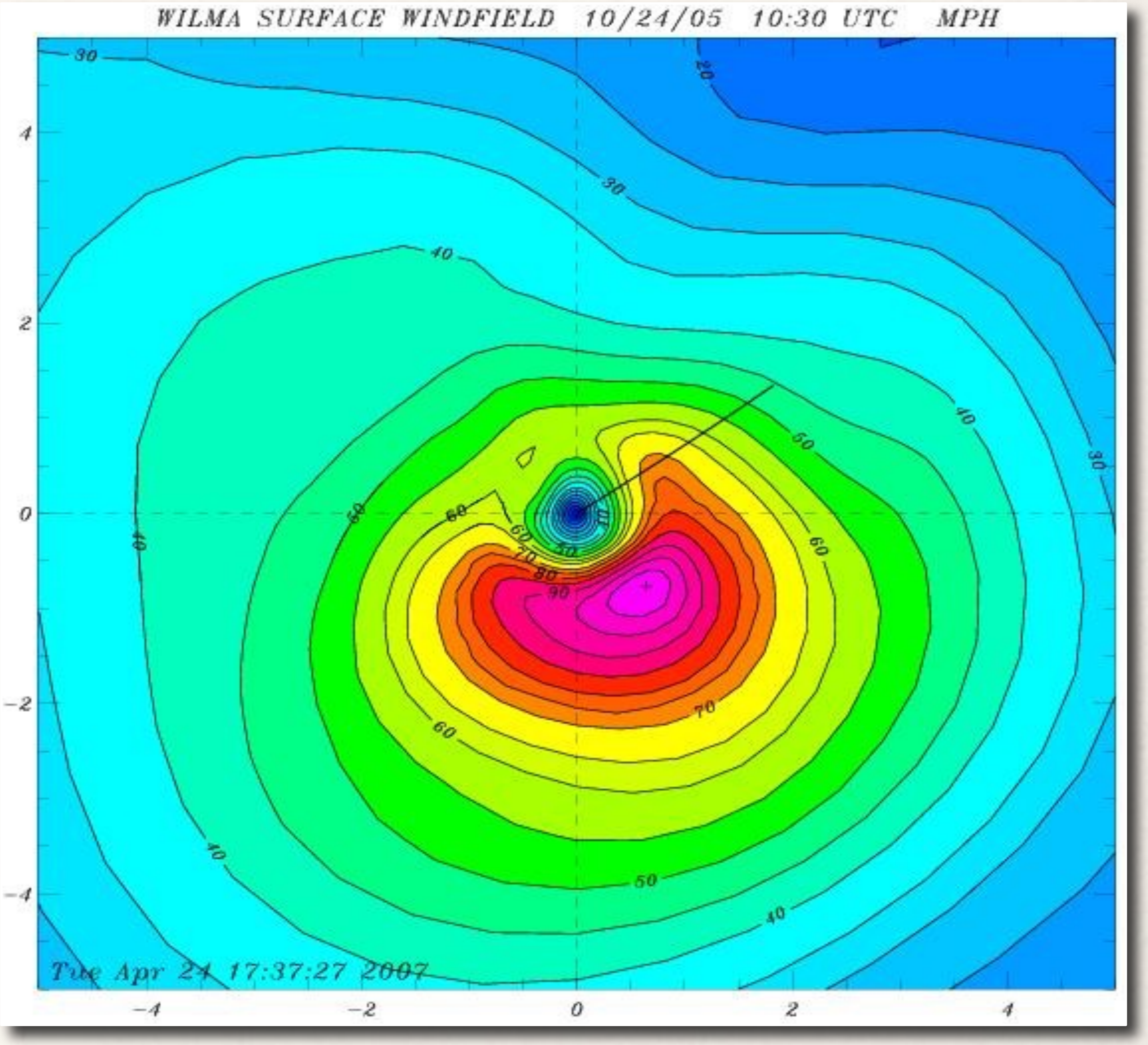
- 1992: Andrew
- 2004: Charley, Frances, Ivan, Jeanne
- 2005: Dennis, Katrina, Rita, Wilma

MODEL VS H*WIND snapshot

WILMA
MODELED

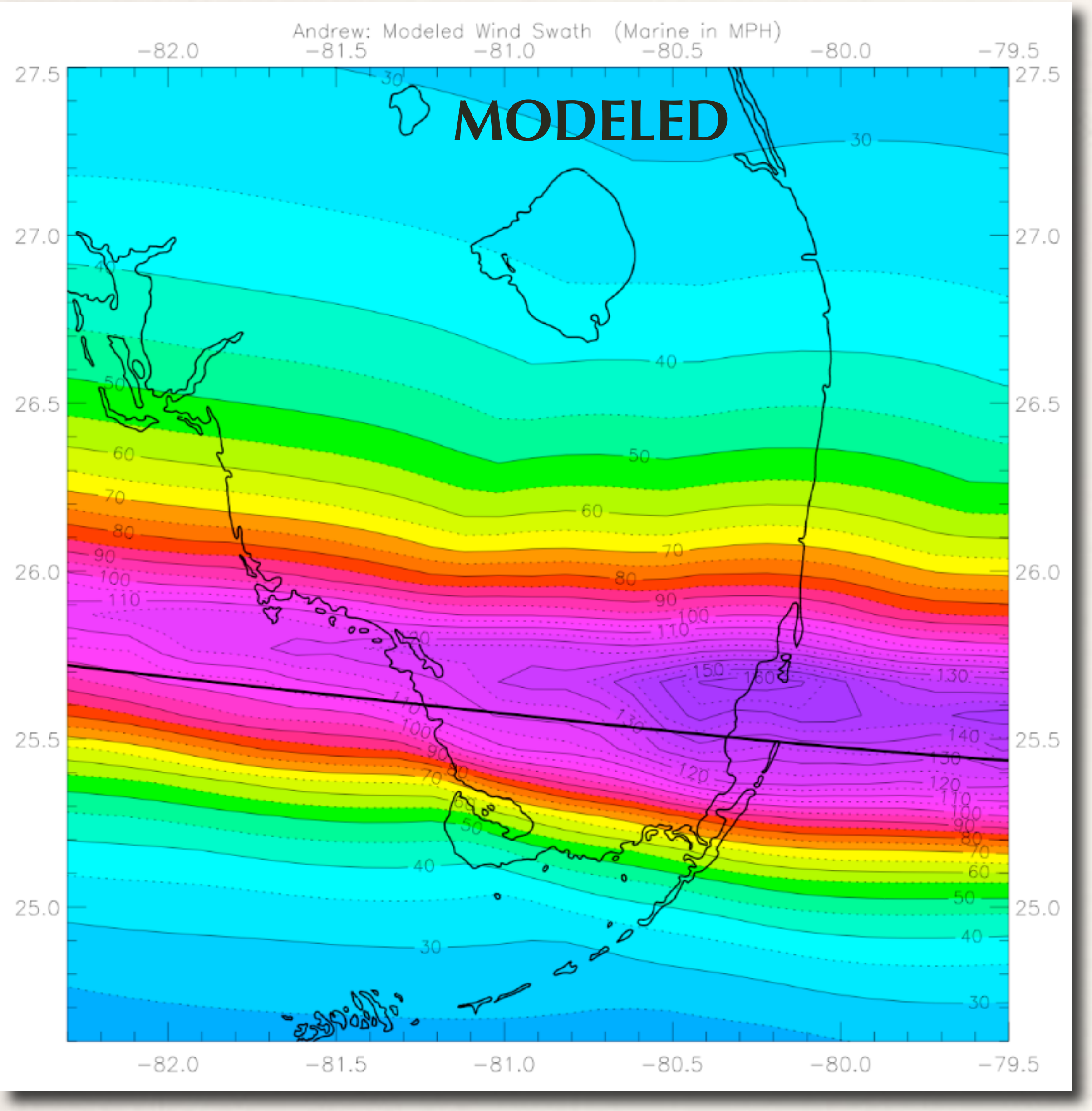


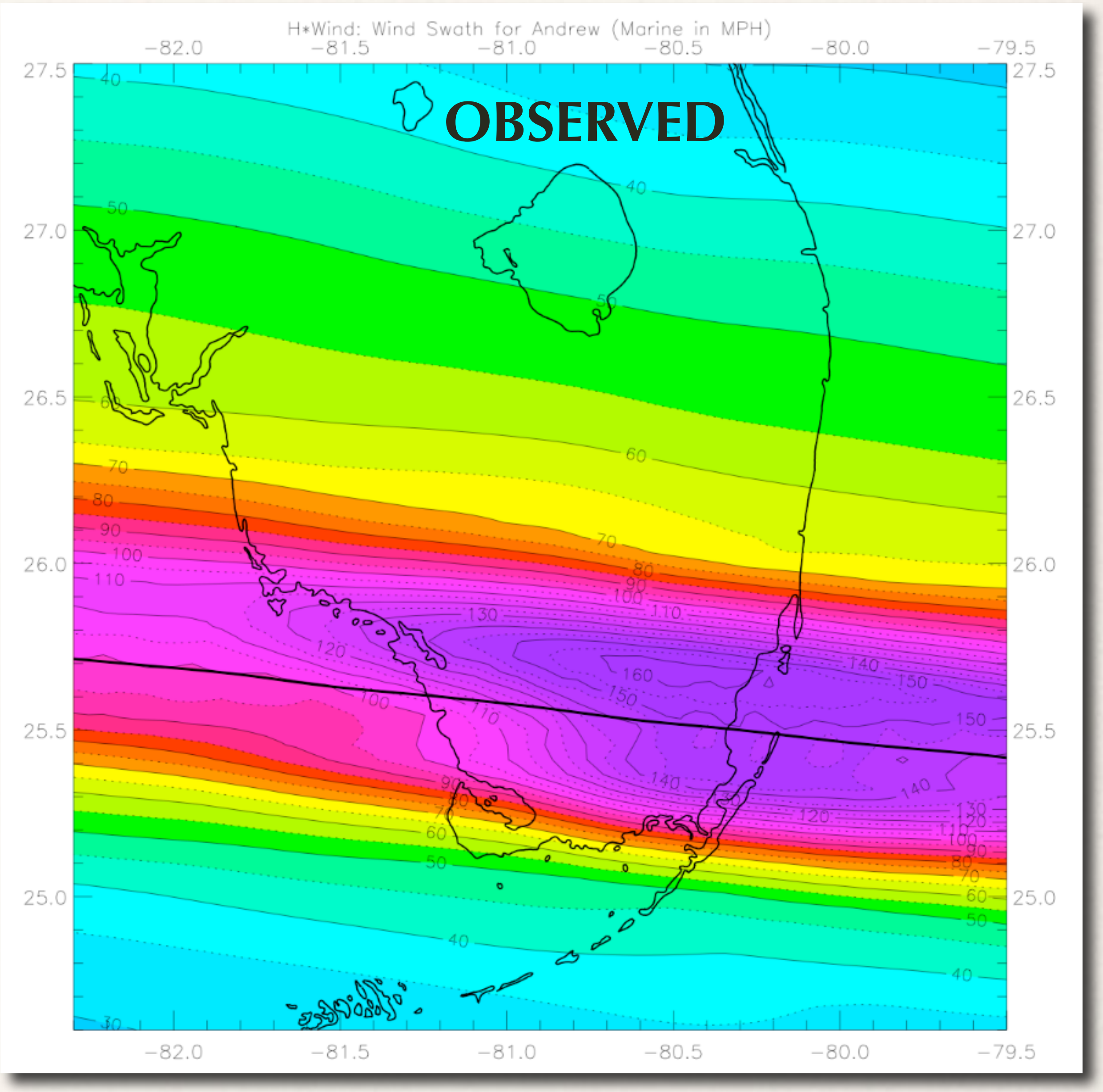
WILMA
OBSERVED



MODEL VS H*WIND SWATH

ANDREW





Terrain Adjustment

- Winds are adjusted to terrain conditions using an effective roughness model and a coastal transition function for locations near the coast

- The effective roughness model determines the effect on roughness due to upstream land cover elements in each 45 degree sector.

- Effective roughness is computed at roughly 90 m resolution over Florida. For ZIP code policies, the roughness used is the population weighted effective roughness over the ZIP code.

- Roughness derived from 2011 National Land Use / Land Cover and Florida Water Management District data (2004-2011)

Terrain Adjustment

- For locations near the coast, a coastal transition function is used to account for the transition of the wind being in equilibrium with marine roughness to subsequently being in equilibrium with land roughness.

- Gust factor model based on ESDU is used to determine 1 minute sustained and 3 second gusts at the 10 m reference level.

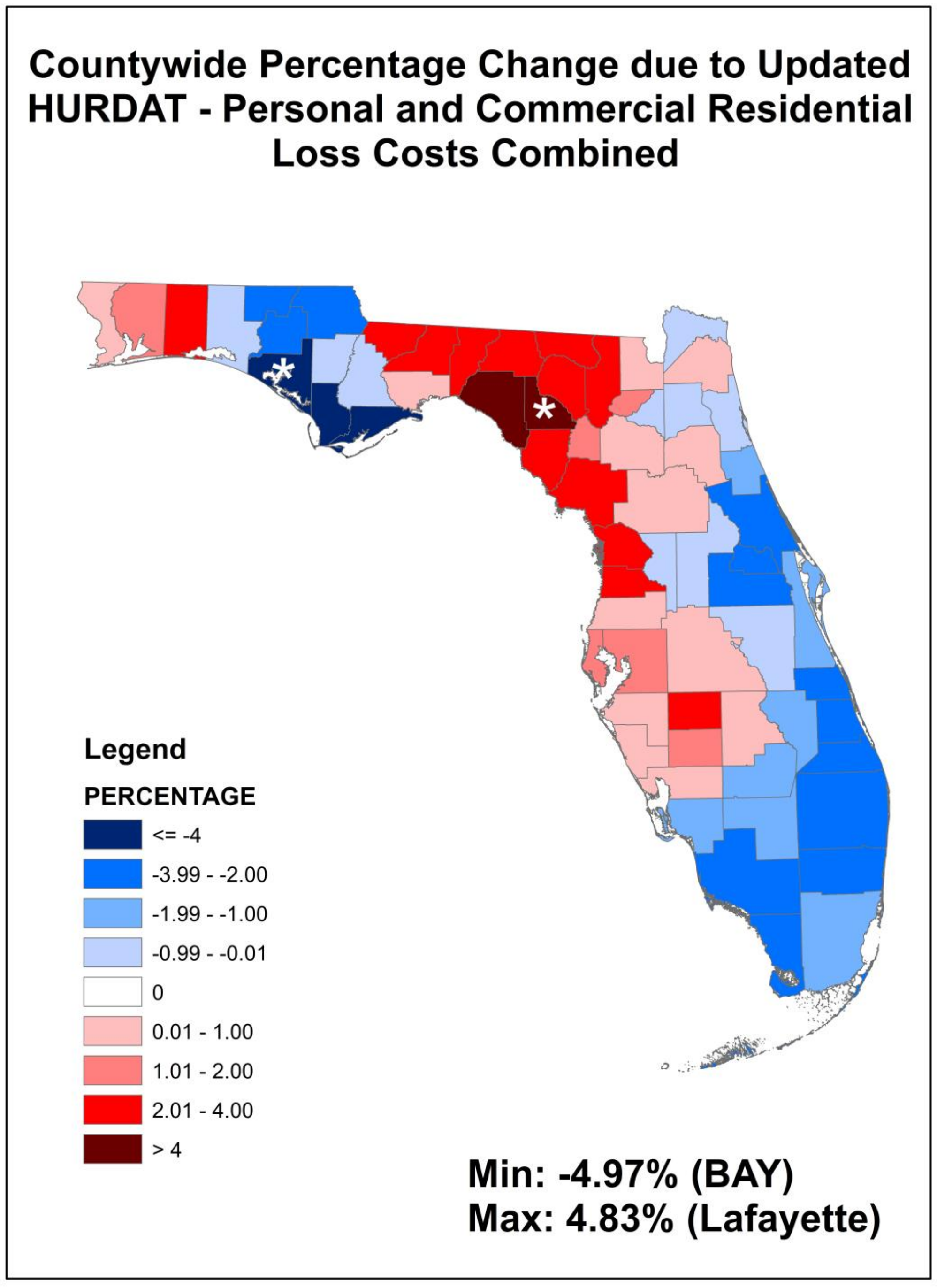
MET Changes from v6.1 to v6.2

- Storm seeds and motion/intensity change PDFs were updated using a new version of HURDAT2: FPHLM v6.2 uses the February 2016 version, while v6.1 used the April 2014 version.

- ZIP code database was updated: FPHLM v6.2 uses the March 2015 version, whereas v6.1 used the December 2013 version.

Impact of MET Component Changes

HURDAT: -1.54%



Zip Code : -0.02%