



## Work Unit 1.3

# Enhancements to Long Lead Forecasting and Projection of Extreme Events

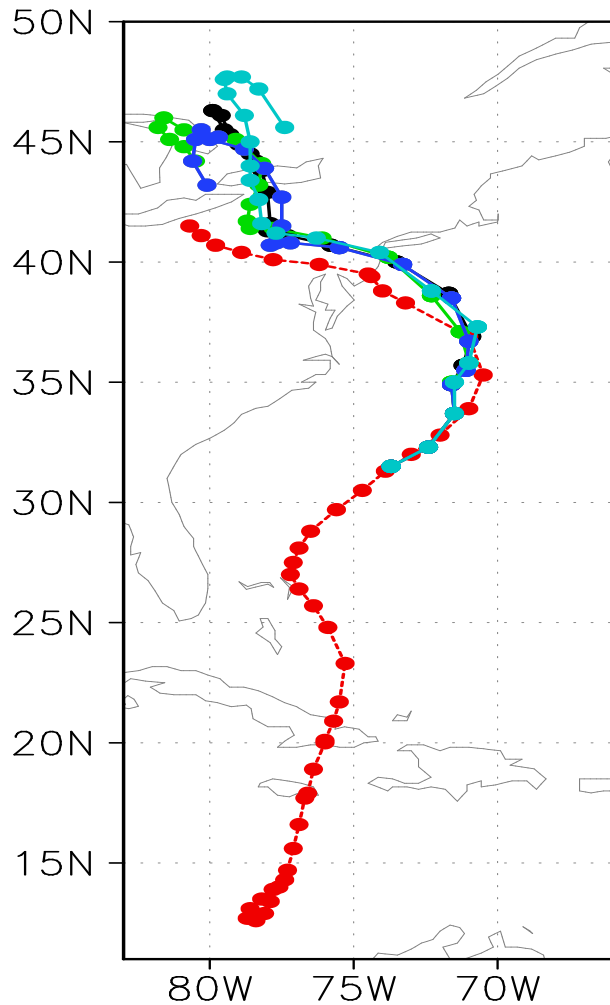
- **Stony Brook Team:**
  - Edmund Chang (SBU lead, Professor)
  - Ping Liu (Assistant Research Professor)
  - Hyemi Kim (Assistant Professor)
  - Albert Yau (Ph.D. student)
- **Stony Brook team focuses on two different time scales**
  - Medium range: 4-14 days forecast
  - Extended range: One month to seasonal extended outlooks

# Medium Range (4-14 days)

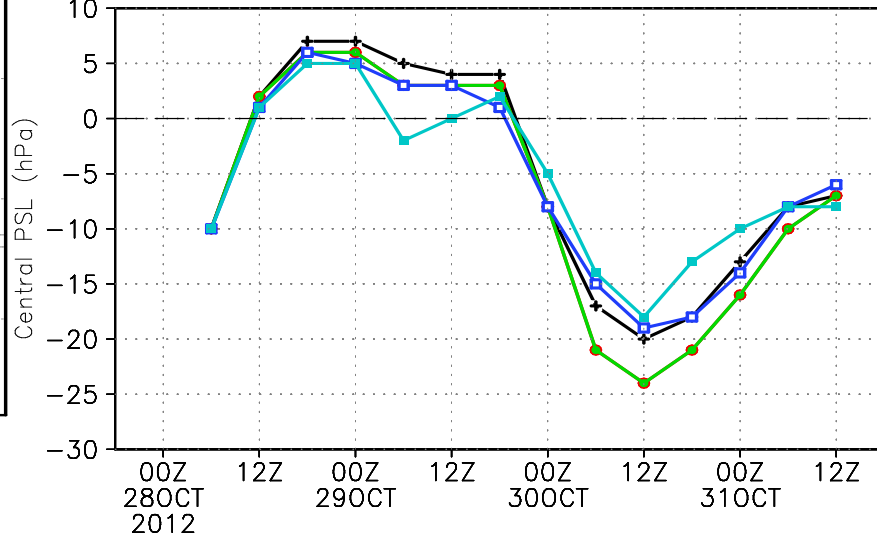
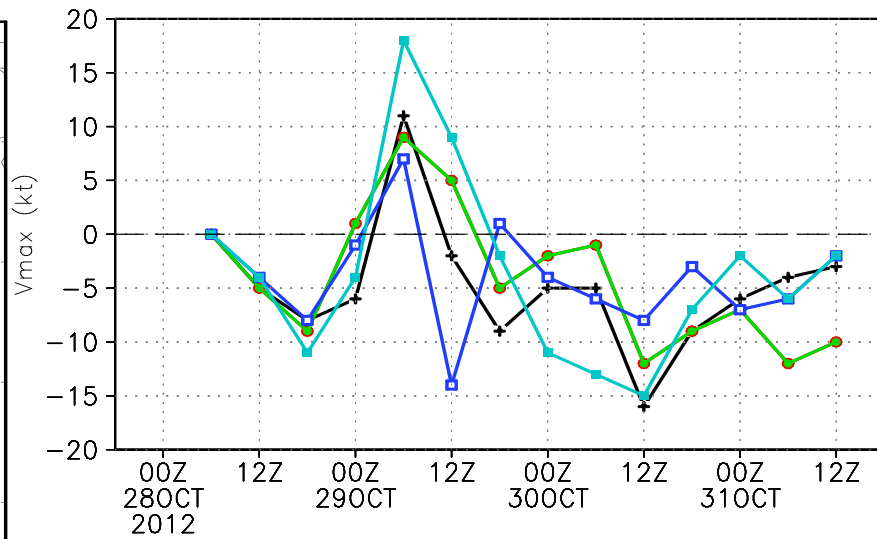
- Task 1:
  - Deliverable: A NYS RISE report on evaluation and calibration of NCEP Global Ensemble Forecasting System (GEFS) based medium range ensemble forecast of winter upstate NY extreme precipitation events
  - Approach: Analyses of newly available GEFS reforecast version 2 reforecast data
  - Progress:
    - GEFS reforecast data, as well as actual precipitation data for assessment, have been acquired and processed
    - Preliminary analyses confirmed previous studies showing useful short range (1-3 days) predictions for extreme events
    - Currently evaluating and calibrating ensemble based medium range forecasts

# Medium Range (4-14 days)

- Task 2:
  - Deliverable: A NYS RISE report on evaluation of the quality and potential utility of medium range ensemble hindcasts of landfalling hurricanes
  - Approach: Perform medium range ensemble hindcasts of Sandy and Irene using the Hurricane Weather Research and Forecast Model (HWRF)
  - Progress:
    - Forecast skill for hurricane Sandy has been assessed
    - The HWRF model has been set up for extensive reforecast experiments to investigate
      - How Sandy interacted with the planetary-scale steering flow
      - How the different physical packages affected such interactions
      - How these different factors impact forecasts of Sandy beyond 4 days



RED—OBS; BLK—SAS; GRN—Tdk  
 GRY—KF; DBLU—NSAS; LBLU—WSM6



Examples showing how different physical packages in HWRF affect the track and intensity of Sandy at a lead-time of 48 hours. Initial and boundary conditions for medium range hindcasts are being prepared and these experiments will be conducted soon.

# Extended Range (Monthly to Seasonal)

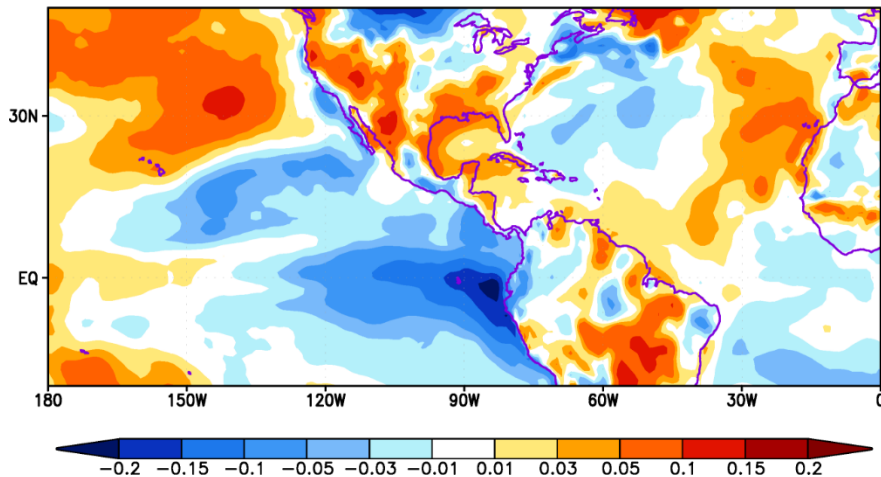
- Task 3:
  - Deliverable: A NYS RISE report on the relationship between basin wide and landfalling tropical cyclone (TC) statistics to the different phases of ENSO
  - Approach: Generate the statistics of basin-wide and landfalling TC statistics and relate to large-scale sea surface temperature (SST) variability

Progress:

Preliminary results suggest the followings:

- Seasonal mean landfalling TC statistics are not correlated to the basin-wide TC activity
- Seasonal mean landfalling TCs are modulated by large-scale SST variability, especially the SST over the tropical Eastern Pacific
- These results suggest that predicted SST from climate models (e.g. CFS) may be used to predict landfalling TC statistics in seasonal timescale.

a) Regressed pattern: 2m Temperature



# Extended Range (Monthly to Seasonal)

- Task 4:
  - Deliverable: A NYS RISE report on evaluation and calibration of NCEP Climate Forecasting System (CFS) based long range outlooks of coastal winter storm (noreaster) activity
  - Approach: Analyses of newly released CFS reanalysis and reforecast data, including relationship between winter storm activity with teleconnection patterns
  - Progress:
    - CFS reanalysis and reforecast data have been acquired and processed
    - Preliminary results suggest that CFS forecasts have some useful skill in monthly outlook of winter storm activity.
    - These skills are being further quantified and calibrated.