

## Roadmap - Long term Climate Scenarios (Wendy Graham)

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**Objectives:** The objectives of this group are to:

1) Evaluate and share with the working group the ability of large-scale (e.g.  $\sim 2.5^\circ$ ) reanalysis data, dynamically-downscaled<sup>1</sup> reanalysis data, statistically-downscaled<sup>2</sup> reanalysis data, retrospective raw GCM output, dynamically-downscaled retrospective GCM output and statistically-downscaled retrospective GCM output to reproduce:

- a) ENSO-SST patterns and their teleconnections to rainfall over Florida
- b) Monthly and seasonal climatology (means and variances of precipitation, average number of rainy days, temperature, and evapotranspiration by month) over Florida
- c) Daily rainfall transition probabilities, by month, over the state of Florida
- d) Statistics quantifying diurnal rainfall characteristics over the state of Florida
- e) Intensity-Duration-Frequency of hydrologically significant extreme rainfall events over Florida
- f) Spatial statistics of daily precipitation over Florida (i.e. variogram, Moran's I index, Geary's C index spatial variance of rainfall vs magnitude of spatial average precipitation. number of rainy grids vs magnitude of spatial average precipitation)
- g) Monthly and seasonal hydrologic patterns (means and variances of surface flows and/or groundwater elevations over five watersheds in the state of Florida)
- h) Recurrence intervals for "hydrologically-defined" floods and droughts over five watersheds in the state of Florida

2) After "kinks" have been worked out with the reanalysis and retrospective evaluations, the future projections from the GCMs will be downscaled and evaluated in a similar manner, and changes from the retrospective simulations quantified.

**Technical approaches:** We will all use ERA40 and NCEP-DOE R2 re-analysis products. We will use the CCSM, GFDL and HADCM3 GCM outputs. Dynamical downscaling (with possible bias-correction) will be conducted by FSU using the RSM model. Statistical downscaling will be conducted by UF and will use the BCSA method (developed by Hwang) and/or the BCCA method developed by (Brekke et al). Comparisons will be made using a to-be-agreed upon set of historical gridded and point measurements of precipitation and rainfall. The FSU group will pursue hydrologic implications for the Peace river at Arcadia, and the St. John's River near Deland. The UF group will pursue hydrologic implications for the Tampa Bay region (Hillsborough and Alafia River watersheds) and SFWMD will pursue hydrologic implications for the Everglades region.

Note: If time permits NARCAAP products may also be analyzed.

**Relevance to utilities:** Input from utilities will be sought to establish the definition of "hydrologically significant extreme rainfall events" over each utilities service area, and

“hydrologically-defined” floods and droughts for the seven watersheds. Results of the analysis will help utilities understand the uncertainty associated with using current climate data/models predictions at utility relevant space-time scales.

**Any bottlenecks:** Time and human resources!

**Next steps:**

1. Agree on gridded and point climate observation data sets to use for evaluating retrospective predictions (Alison, Vasu, Obey, Wendy, Syewoon)
2. Request input from all utilities on the definition of “hydrologically significant extreme rainfall/temperature events” for their operation (Wendy)
3. FSU to perform dynamic downscaling and evaluations for GFDL and HADCM3 models (CCSM already completed)
4. UF to perform statistical downscaling and evaluations for the ERA40 and NCEP-DOE R2 reanalysis data as well as the retrospective data for CCSM, GFDL and HADCM3
5. FSU, UF and SFWMD to conduct hydrologic evaluations.