Florida Water Climate Alliance Webinar Summary:
Data, Decisions and Dynamics: Integrating Seasonal Forecasts into Utility Operations
April 15, 2022

Introduction:

The Florida Water Climate Alliance (FloridaWCA) is a stakeholder-scientist partnership committed to the co-development of locally relevant and actionable climate science to support informed decision-making in water resource management, planning and supply operations in Florida. The April 15th webinar, hosted by FloridaWCA and UF Water Institute, focused on the FloridaWCA NASA-funded project, which provides a case study for the development, implementation and refinement of seasonal forecasts using NASA Earth Systems data that can be used to help utilities make decisions about water resource allocations. Over 90 participants joined the webinar and came from varied backgrounds and agencies including water utilities, Water Management Districts, government agencies, non-governmental organizations, universities and consulting firms. Approximately one-third of the attendees were new to FloridaWCA workshops/ webinars, while the remaining two-thirds had participated in a previous webinar or workshop. The next webinar will take place in early fall 2022.

To access a recording of the April 15, 2022 webinar as well as presenter slides, click here.

Presentations:

1. Integrating NASA Earth Systems Data into Decision-Making Tools of Member Utilities

Dr. Chris Martinez (UF) provided an overview of the FloridaWCA project, Integrating NASA Earth Systems Data into Decision-Making Tools of Member Utilities, which began in summer 2019 and is funded by the NASA Earth Systems Program. The goal of the project is to use NASA observed precipitation and soil moisture data to improve seasonal forecasts for Florida's dry season that can be used by water suppliers, utilities, and Water Management Districts (WMDs) to make decisions about water resource allocations. Two member utilities of the FloridaWCA, Peace River Manasota Regional Water Supply Authority (PRMRWSA) and Tampa Bay Water (TBW), are collaborating on the project to assess how they might integrate the "customized" seasonal forecasts into their operations. Another goal of the project is to better understand how participating in a scientist-stakeholder partnership like the FloridaWCA might affect adoption and integration of the project's tools. The outcomes of these proposed activities are presented in the following talks.

2. High-Resolution Model Forecasts for Florida for the Winter Season

Dr. Vasu Misra (FSU) presented the results of the experimental seasonal **CLI**mate **F**orecasts for **F**lorida (CLIFF) for the dry season. CLIFF is an ensemble of 30 forecasts produced from a regional atmospheric model, downscaling the forecast at 10 km grid resolution from a global atmospheric model at 250 km grid resolution forced by forecasted SST from Community Climate System Model version 4 (CCSM4; produced by Prof. B. Kirtman, U. Miami). CLIFF was initiated from November 1 and integrated through March 1 of the following year for 20 years (2000-2019). The analysis of the CLIFF skills for these 20 seasons showed reasonable skill that improved upon climatology and persistence. Once confidence in CLIFF forecasts was established, real-time predictions were initiated for the dry (winter) seasons of 2020-21 and 2021-22. These forecasts were largely verified by the observed trends in the post-seasonal analysis. They showed that the canonical El Niño and the Southern Oscillation (ENSO) teleconnections do not necessarily apply when the resolution of the forecasts is specific for application at the WMD levels or at the watershed scale of the Peace, Hillsborough, Alafia Rivers, demonstrating the practical significance of CLIFF.

3. Summer Monitoring of Florida's Rainy Season

Dr. CB Jayasankar presented on the wet (summer) season outlook for Florida. As for the dry season forecasts, the granularity of the wet seasonal outlook is at the scale of Florida WMDs and the Tampa Bay and Peace River watersheds. Using the gridded precipitation product of the Global Precipitation Mission (GPM) of NASA, the onset and demise dates of the wet season were established for the WMDs and two watersheds from 2000 to 2021, and were defined as the first and the last day of the year when the annual mean climatological rainfall is exceeded. In the majority of these regions (except the Suwannee River WMD), an early onset date was associated with a longer and wetter season, while a later onset date was associated with a shorter and drier wet season. Therefore, by monitoring the onset of the wet season, one can provide an outlook of the forthcoming season. A real-time outlook of the wet season for 2022 was provided in early June and was similar as the observed trend for the WMDs and watersheds, except for the Suwannee River and St. Johns River WMDs. These seasonal outlooks provide a useful alternative to numerical climate forecasts, which have poor wet season skill.

4. Customized Regional Climate Model Outputs to Enhance Dry-season Streamflow Forecasts

Dr. Hui Wang applied dry season precipitation forecasts from CLIFF to produce monthly streamflow forecasts for Nov-Feb for Hillsborough and Alafia Rivers to serve the needs of TBW. Multivariate linear regression models were used for the streamflow forecast. The analysis of these streamflow forecast results show that CLIFF based forecasts provide relatively high skill when compared to observed streamflow values and can be used as a promising alternative of rainfall forecast. Transition months as well as the rainy season could be important to evaluate using CLIFF based streamflow forecasts in future work.

5. Using Regional Climate Model Outputs to Improve Urban Water Demand Forecasts

Dr. Solomon Erkyihun presented results on demand water forecasting for TBW for the dry season from 2005-2020. The historical demand of water is conceived as a product of three components: trend, seasonality, and random components. Trend is a proxy for demand variability due to socio-economic factors; seasonality represents a typical monthly demand variability, and the random component is a factor of rainfall and temperature. CLIFF based demand forecast was compared with climatology based and observed weather based demand. CLIFF based demand forecast captured the observed demand within the interquartile range except for 2016-2017 (due to extreme weather conditions), and it performed much better than the current climatology-based estimate. Looking at individual month forecasts, the CLIFF skill of the February demand was low. February demand is typically one of the lowest for the TBW service area due to reduced outdoor irrigation in that month.

6. Decision Making in Water Resource Management

Dr. Tracy Irani and Reagan Anderson presented results from surveys conducted with TBW and PRMRWSA to better understand factors that affect adoption and integration of the NASA project forecasts and tools for water resource decisions. Their surveys found that the two utilities are interested in tools to help reduce uncertainty for water resource allocations, such as accurate water demand projections, onset and duration of drought seasons and seasonal forecasts. These utilities did not find evapotranspiration information as useful as precipitation when it came to making water management decisions. Concerns to adopt new tools included risks such as demand-supply imbalance and inaccurate water projections. The research team plans to conduct additional interviews this summer with other water managers in the state to get a better understanding of barriers and enablers associated with decision support tools.