

Monitoring of the 2021 Rainy Season over Florida's Water Management Districts

Vasubandhu Misra & C. B. Jayasankar

Acknowledgements:

NASA Earth Science Division



The Dept. of Earth, Ocean and Atmospheric Science
Center for Ocean-Atmospheric Prediction Studies
Florida Climate Institute
@ The Florida State University



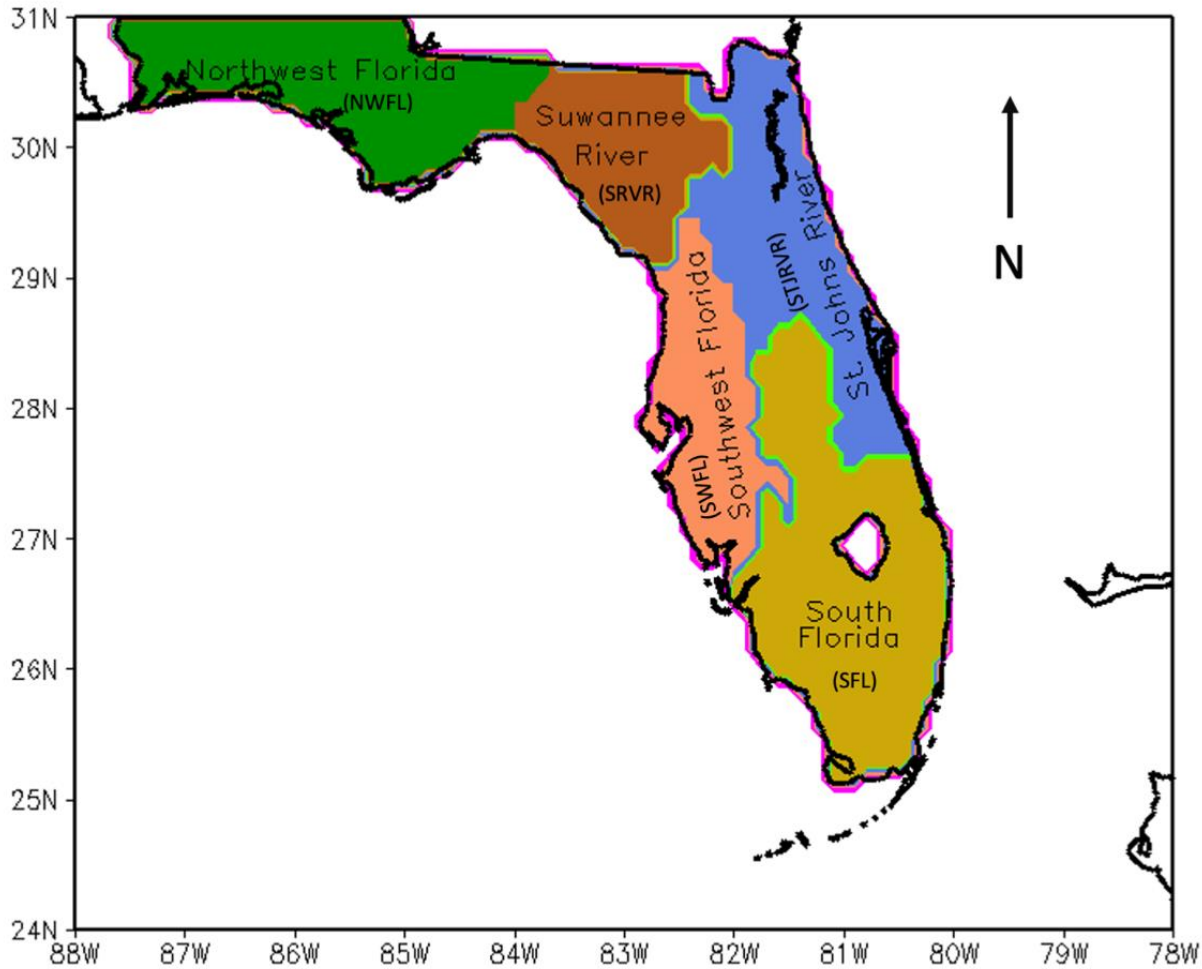
Objectives of the NASA Project



Presented in
Summer 2021

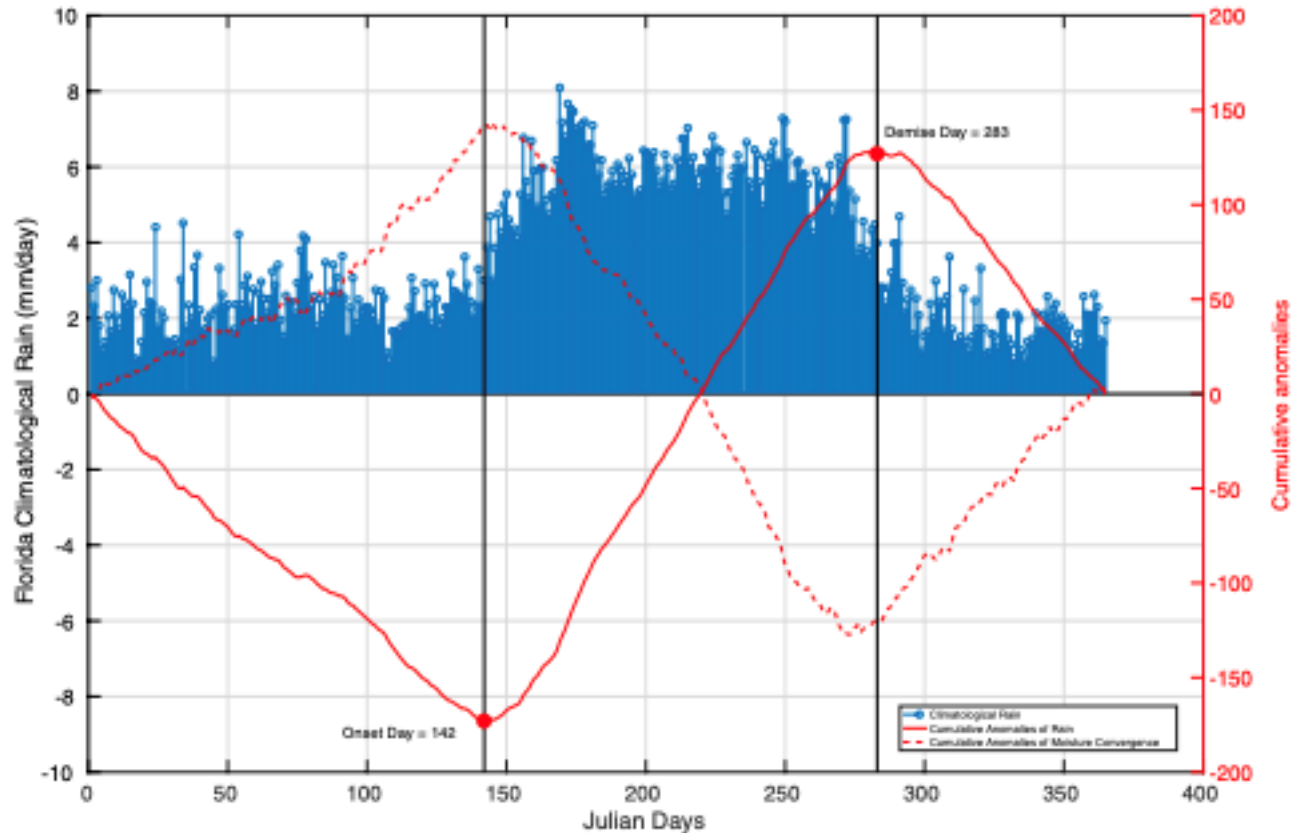
- Dynamical high-resolution model forecasts for the winter season
- Real time monitoring of the onset/demise of the wet season
- Transition of forecasts to operations in Tampa Bay Water and Peace River Manasota Regional Water Supply Authority

The Five Water Management Districts of Florida



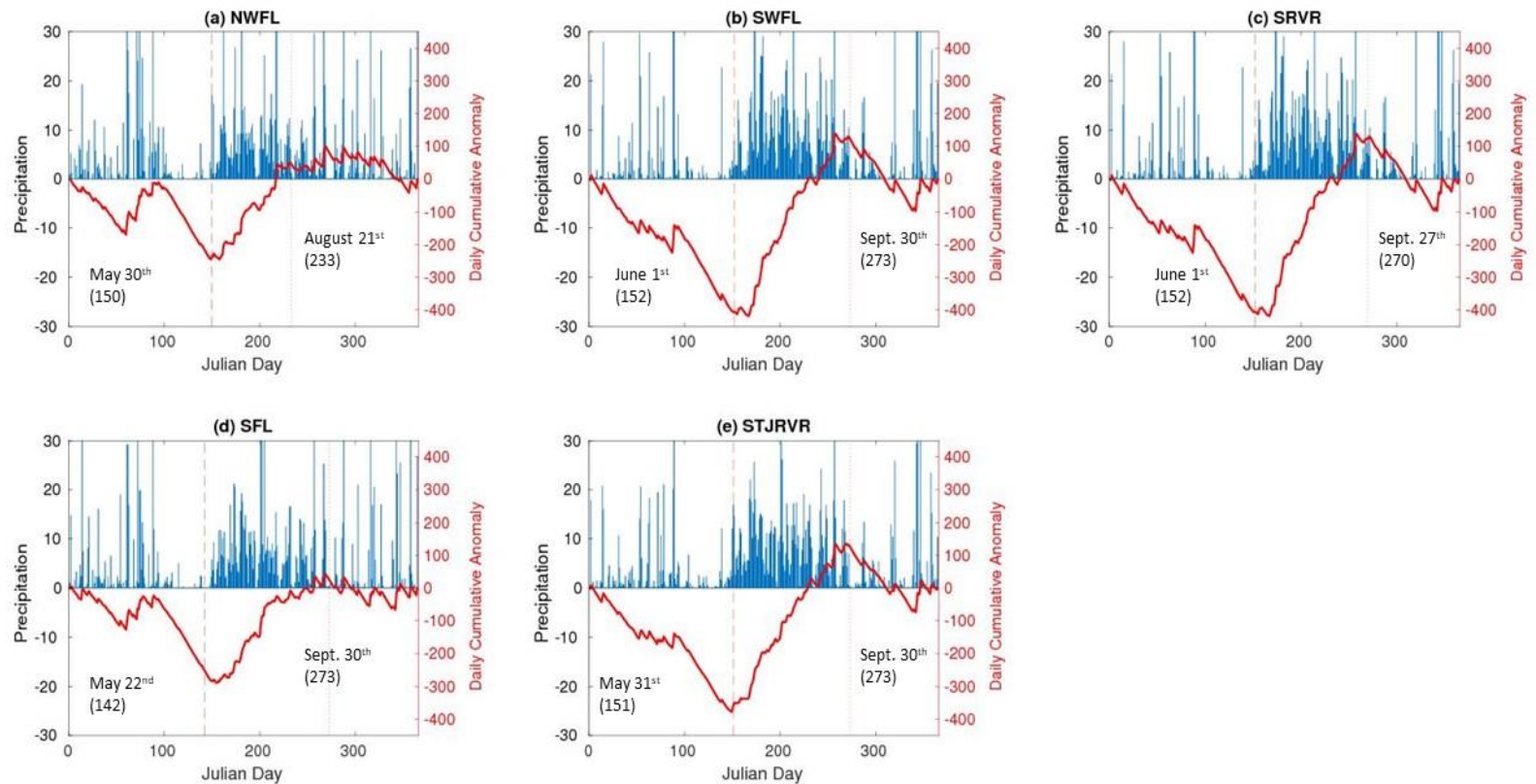


The Seasonal Cycle of Rainfall over Peninsular Florida



The time series of daily climatology of rainfall (mm/day) averaged over Peninsular Florida

Seasonal cycle of rainfall over the WMDs



The time series of daily climatology of rainfall (mm/day) over the WMDs.



Benefit of monitoring onset/demise of rainy season

Region		Demise	Seasonal Length	Seasonal Rainfall
SFWMD	Onset	0.17	-0.46	-0.41
	Demise	1	0.80	0.53
SWFWMD	Onset	-0.39	-0.79	-0.57
	Demise	1	0.87	0.64
SJRWMD	Onset	0.11	-0.45	-0.40
	Demise	1	0.84	0.47
SRWMD	Onset	0.11	-0.48	-0.24
	Demise	1	0.82	0.66
NFWWMD	Onset	0.38	-0.40	-0.50
	Demise	1	-0.69	0.34

The correlations of onset and demise dates of the rainy season with the seasonal length and seasonal rainfall anomalies over the five WMDs of Florida. Bold values are significant at 10% significance level according to t-test.

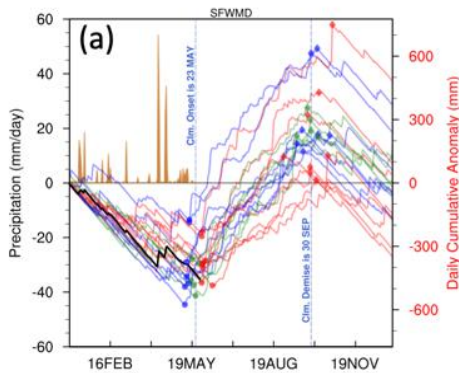
“Early onset of the rainy season leads to wetter and longer rainy season”

Monitoring 2021 rainy season

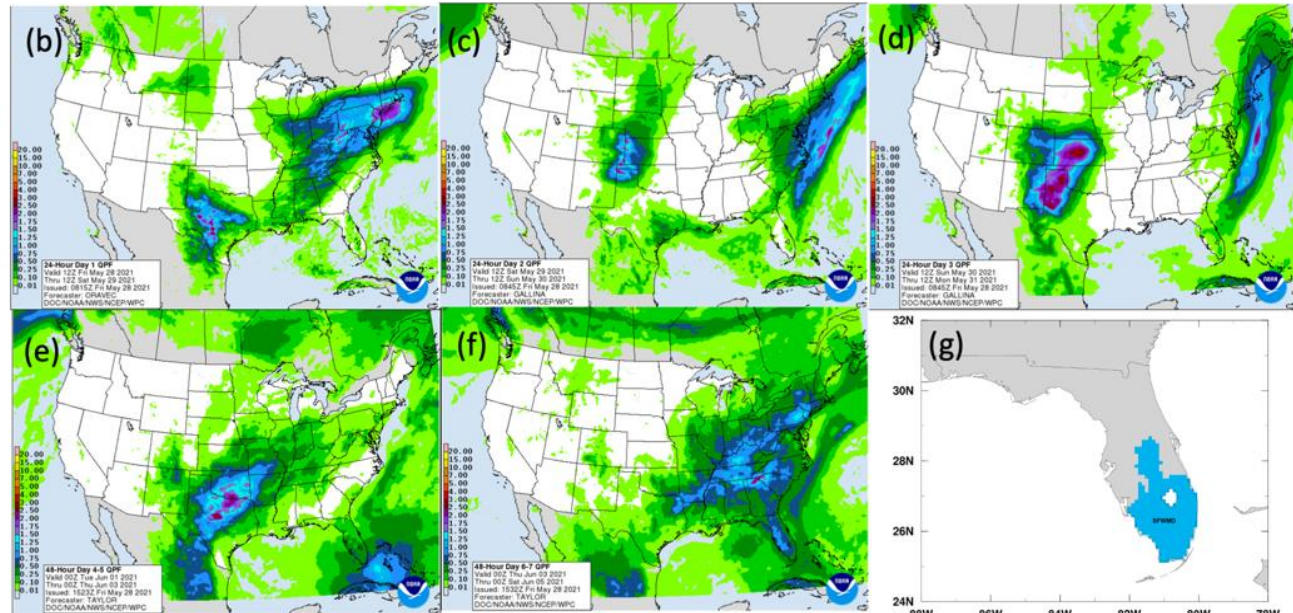


A typical discussion of the monitoring of the onset date

Monitoring onset/demise of the rainy season over South Florida (SFWMD): May 28, 2021



(a) The daily rainfall from IMERG-12hour latency dataset for 2021 is in brown. The daily cumulative rainfall anomaly curve is in blue, red and green for early, late and neutral onset seasons based on IMERG-12hour latency dataset over the time period of 2000-2020, respectively. The anomalous onset seasons are based on terciles. The corresponding dots and diamonds in the curve mark the onset and the demise of the rainy season, respectively. The daily cumulative anomaly curve for the current rainy season in 2021 is in bold red.



(a-f) The quantitative short-term precipitation forecast from NOAA's Weather Prediction Center (<https://www.wpc.ncep.noaa.gov/qpf/qpf2.shtml>)

(g) Mask of South Florida Water Management District (SFWMD)

Discussion:

1. The range of onset dates from the historical 20 years shows that the earliest was on 11 May 2018 and the latest was on 11 June 2011
2. The onset has not reached for this region as of 27 May 2021.
3. The onset of the rainy season is delayed relative to the climatological onset date (23 May).
4. Given the precipitation forecasts for the next few days, it is anticipated that the onset of the rainy season could occur in the next few days.

Monitoring of the Rainy Season 2021



Outlook issues on June 15, 2021

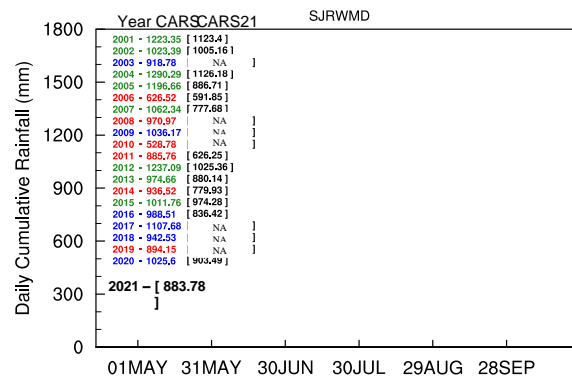
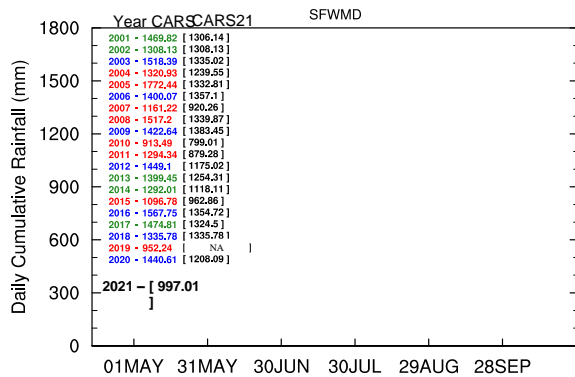
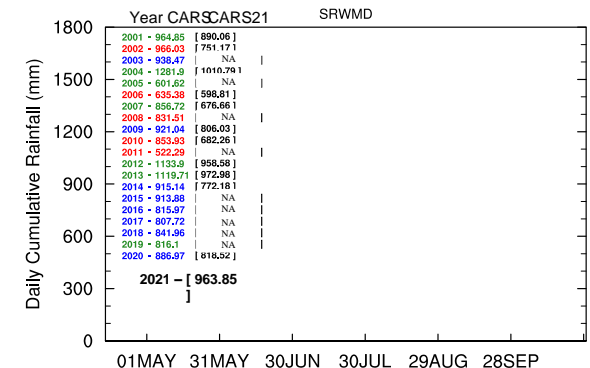
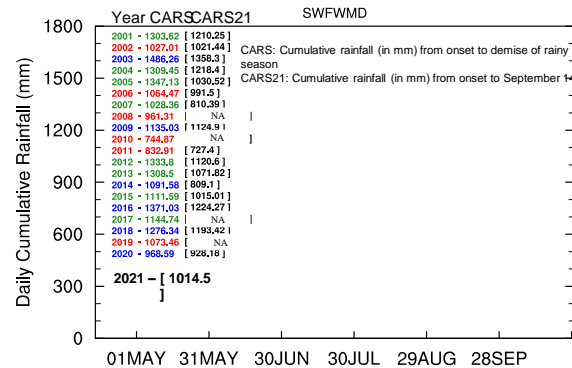
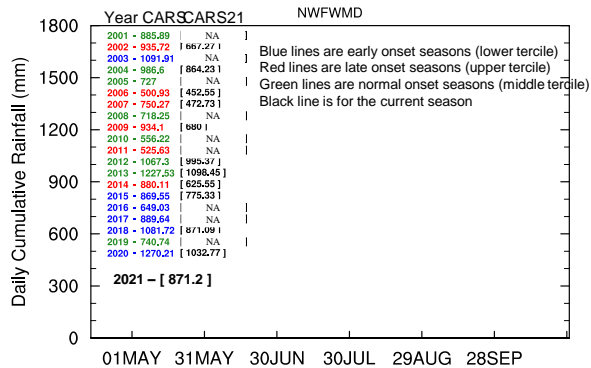
Region	Onset date Climatology	Delay of 2021 rainy season onset relative to onset date climatology (Date of onset in 2021)
SFWMD	23 May	6 (May 29)
SWFWMD	30 May	3 (2 June)
SJRWMD	29 May	4 (2 June)
SRWMD	30 May	7 (6 June)
NFWWMD	11 Jun	4 (15 June)

- We find that SFWMD, SJRWMD, and SRWMD had late onset seasons and follow in the low tercile. Therefore, these WMDs are anticipated to have a **drier than normal rainy season in 2021**.
- The NFWMD and SWFWMD had their onset of the rainy season within the middle (normal) range. Therefore, **these two WMDs are anticipated to have a near normal rainy season in 2021**.

Cumulative Rainfall From Day of Onset



Discussion from Septmeber 16, 2021



Discussion

- In the legend we provide the total accumulation of rainfall (in mm) over the length of the season for early (blue), late (red), and normal (green) and for 2021 from date of onset to Sept 14.
- In NFWWMD and SWFWMD, the onset date for 2021 is embedded in the cluster of onset dates of the green lines (normal onset season). In both these WMDs the cumulative rainfall for 2021 also cluster around the green lines so far, which implies that the current season is tracking the normal season evolution.
- SRWMD is clearly tracking the cluster of blue lines since late June, suggesting a wet season for 2021 contrary to our earlier assessment. (It should be noted that the historical data for this WMD reveal that onset date anomalies of the rainy season does not seem to distinguish normal and wetter than normal rainy season as well as other WMDs).
- In the remaining two WMDs (SFWMD, and SJRWMD), the rainfall is tracking along the margins of the green (normal) and red (drier than normal) seasons. In these two WMDs it may at best be a weak dry anomaly season.



Summary of Outlook from September 16

- The current outlook is identical to the previous month. There is no change in the assessment of the evolution of the rainy season 2021 from the last month outlook.
- We are nearing demise of the rainy season in all WMDs, with NFWMD and SRWMD being closest to their climatological demise date.
- The outlook for NFWMD and SWFWMD continue to hold with both these WMDs tracking a near normal evolution of the rainy season
- Over SFWMD and SJRWMD the rainy season is evolving in the margins of a near normal season and a drier than normal season. This implies that the current evolution of the rainy season in these two WMDs may render 2021 rainy season to be at best a weak dry anomaly season.
- The trajectory of the daily cumulative rainfall anomaly curve in SFWMD (never goes above the zero line) in slides 4 and 11 is very revealing in the fact that SFWMD will certainly not witness a wetter than normal rainy season this year, while it can be the “driest” normal season or weak drier than normal season.
- The rainy season over SRWMD is tracking a wetter than normal season contrary to our earlier assessment of drier than normal 2021 rainy season. (It should be noted that the historical data for this WMD reveal that onset date anomalies of the rainy season does not seem to distinguish normal and wetter than normal rainy season as well as other WMDs).