The Florida Big Bend and Panhandle Sea Breeze Cloud Climatology and Forecasting Project

In the summer months of June, July, and August, much of the convection in the Florida Big Bend and Panhandle can be attributed to the Sea Breeze Circulation. To aid in forecasting this convection, a Sea Breeze Cloud Climatology was developed based on Regimes, in conjunction with a Thermodynamic Climatology from Modified Tallahassee Upper Air Soundings.

Radar, Lightning, and Probability of Precipitation (POP) Climatologies of the Sea Breeze have also been composed, and these are currently being used in concert with the Cloud and Thermodynamic Climatologies as part of a Graphical Forecast Editor (GFE) Smart Tool developed by Bryan Mroczka. This tool will enter its second year of implementation in 2009, and it is believed that our summertime convective forecasts will continue to markedly improve, especially after an updated version of the Workstation WRF Mesoscale Model is implemented at the Tallahassee Weather Service Office (WFO TAE) later this year. Shown below will be excerpts from the Cloud Frequency Climatology developed by the Cooperative Research Institute for Research in the Atmosphere (CIRA) and WFO TAE at select times for select Regimes. Complete Loops for each Regime and additional reference material can be obtained at the following web site:

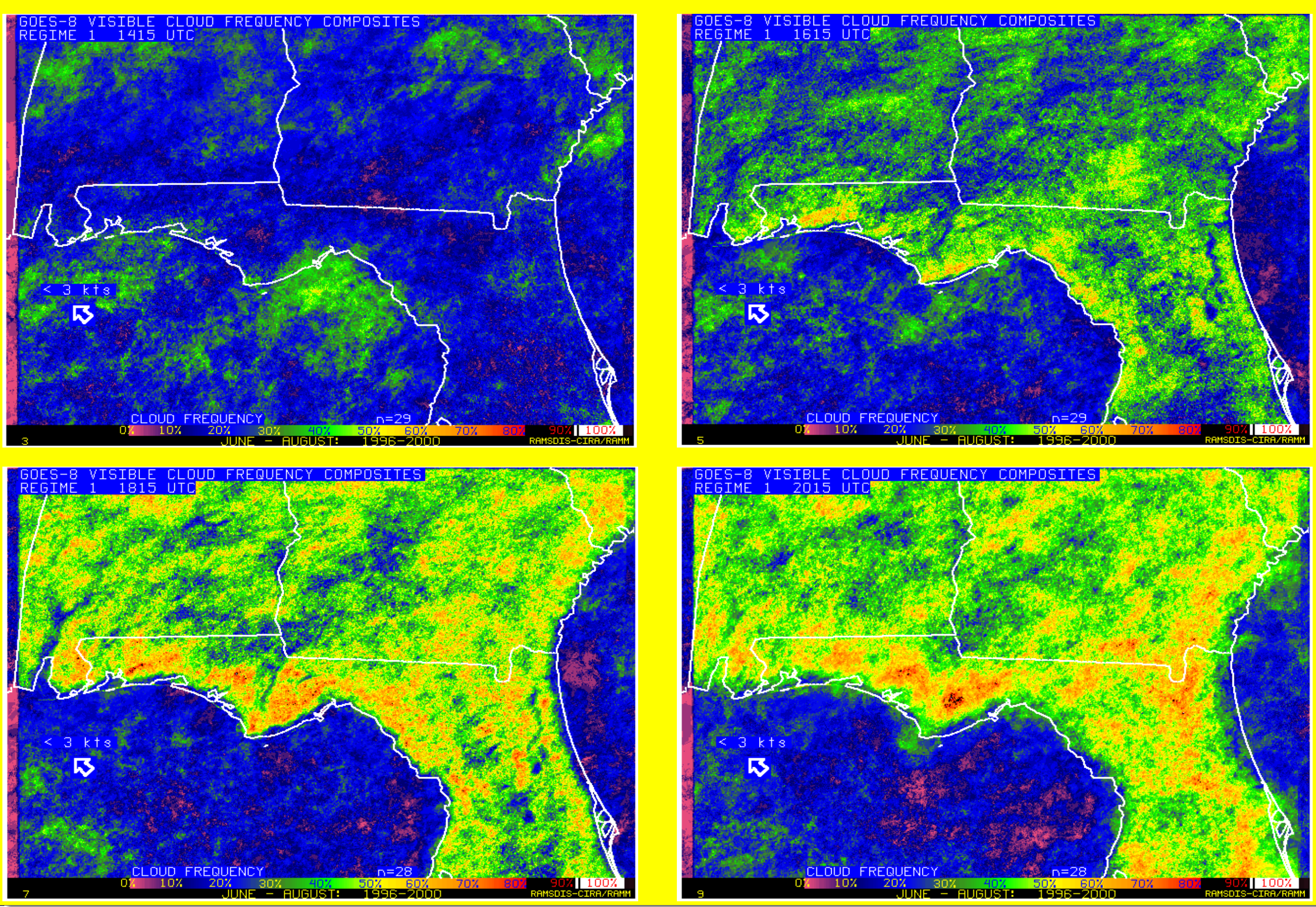
http://www.cira.colostate.edu/cira/RAMM/clim/menutal2.html

The Regimes were stratified by the 1000-700 mb Mean Layer Vector Wind (MLVW)

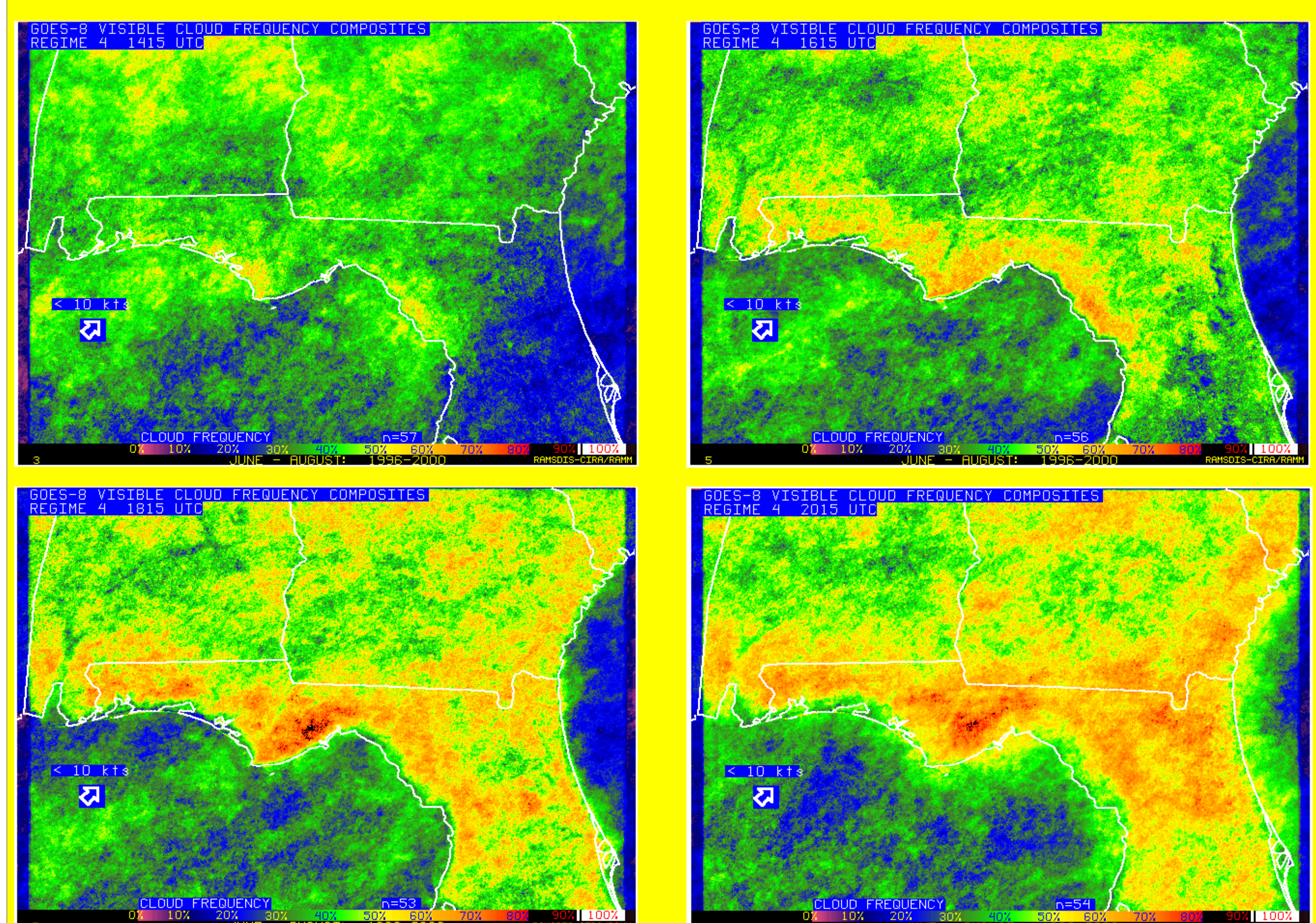
- Regime 1: Light and Variable or Light SE
- Regime 2: Light to Moderate E to NE (3 to 10 kts)
- Regime 3: Strong E to NE (> 10 kts)
- Regime 4: Light to Moderate W to SW (3 to 10 kts)
- Regime 5: Strong W to SW (> 10 kts)
- Regime 6: Moderate SE to S (6 to 10 kts)
- Regime 7: Strong Se to S (> 10 kts)
- Regime 8: Light to Moderate N to NW (3 to 10 kts)
- Regime 9: Strong N to NW (>10 kts)

Notes: Regime 10 (Suppressed) and 11 (Disturbed) were not compiled in the Cloud Climatology. Also, light to moderate wind speeds are separated from strong flow because of the impact on development and inland penetration of the sea breeze. Opposing synoptic flow as in Regimes 8 and 9, inhibits the inland penetration of the sea breeze, but enhances the convergence and vertical motions along the sea breeze front. Conversely, onshore synoptic flow as in Regimes 1 and 4-7, aids the inland penetration of the sea breeze, but reduces convergence and upward vertical motions.

Regime 1 at 1415, 1615, 1815, and 2015 UTC. Note the land breeze convection Over Apalachee Bay in the morning with the development inland during the day.

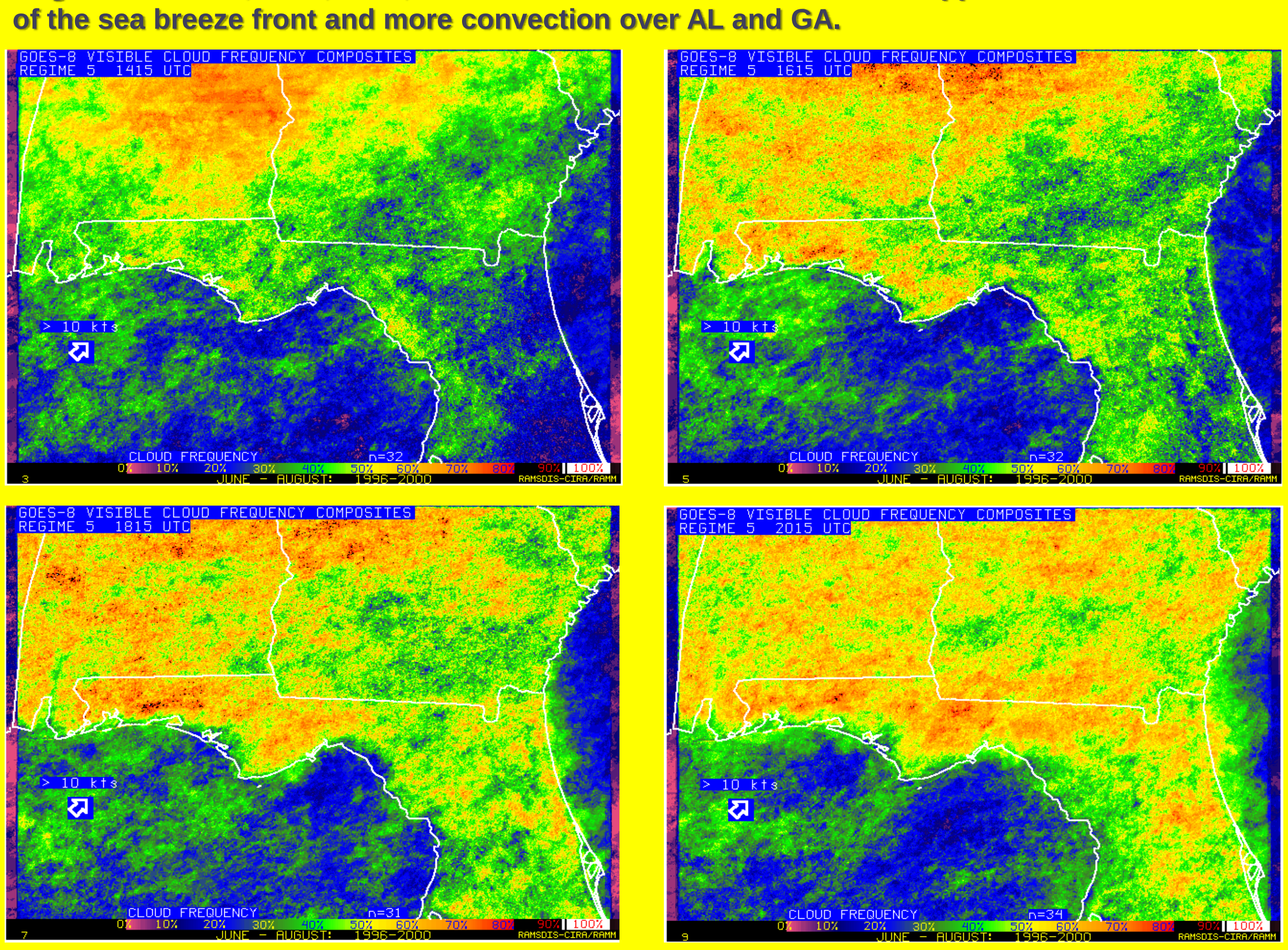


Regime 4 at 1415, 1615, 1815, and 2015 UTC. Note the earlier start to the convection and increased penetration inland in the afternoon.

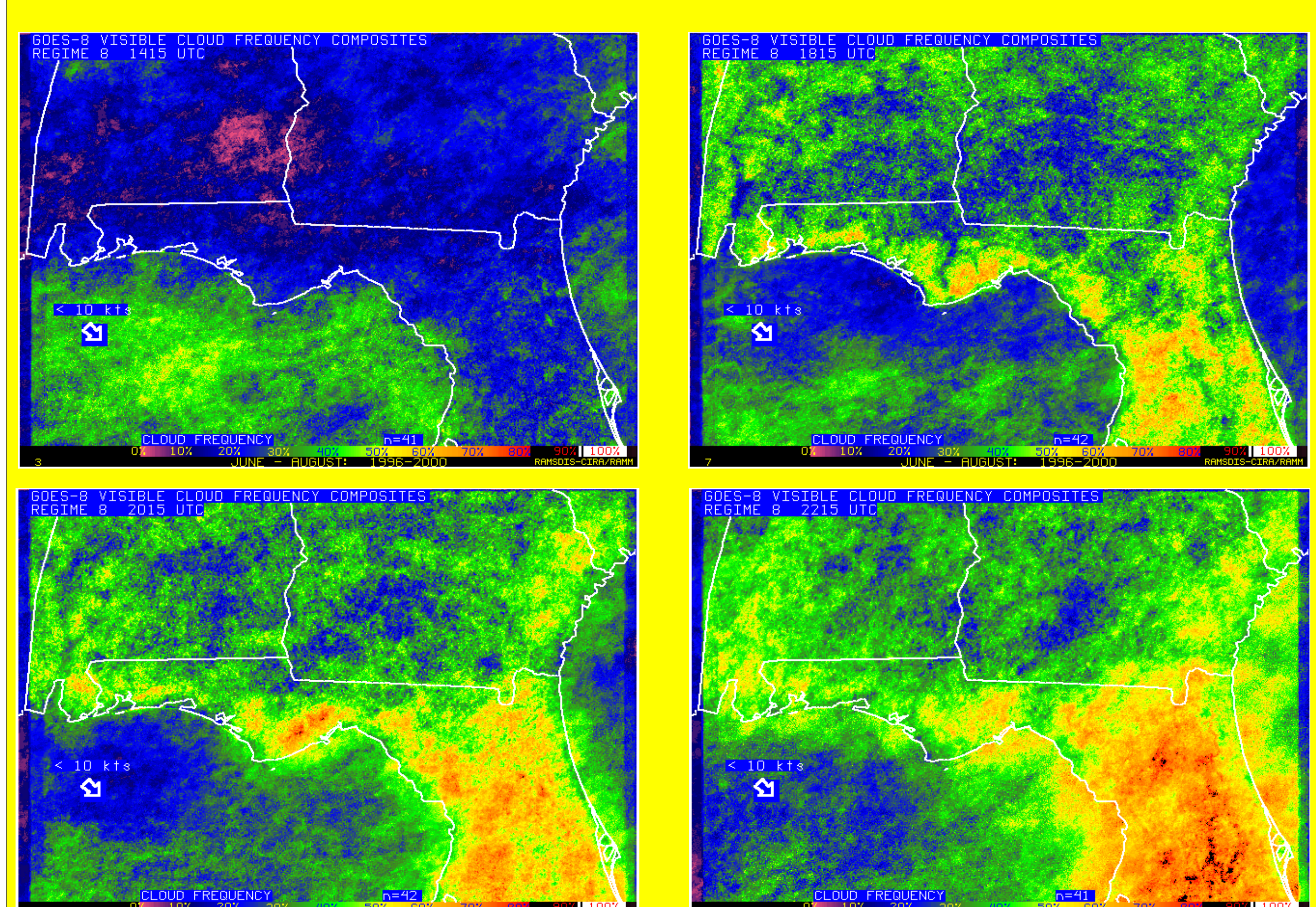


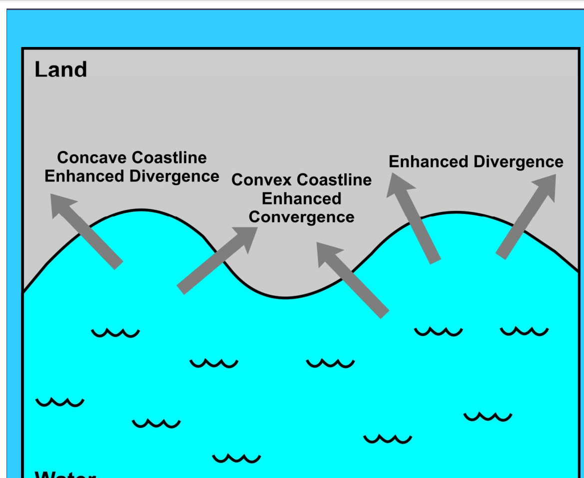
The visible satellite images used in the climatology were composited from 1 km resolution data, and were averaged, by regime, at hourly intervals throughout the day. In the hourly graphics, n is the number of images (or days) in the average. The individual images were broken down into binary by cloud (1) or no cloud (0) before averaging and then are shown as cloud frequency in % with an enhanced color table.

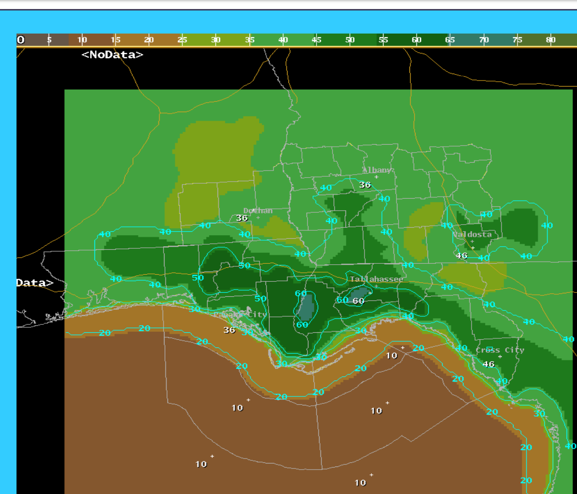
Regime 5 at 1415, 1615, 1815, and 2015 UTC. Note the more diffuse appearance of the sea breeze front and more convection over AL and GA.



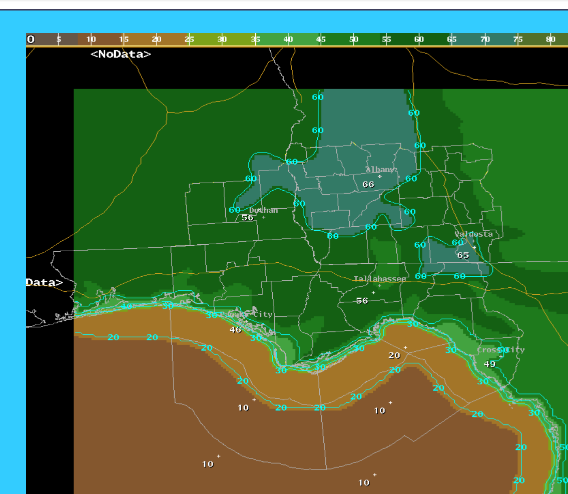
Regime 8 at 1415, 1815, 2015, and 2215 UTC. Note the decreased cloud cover over the interior and later initiation of the convection.

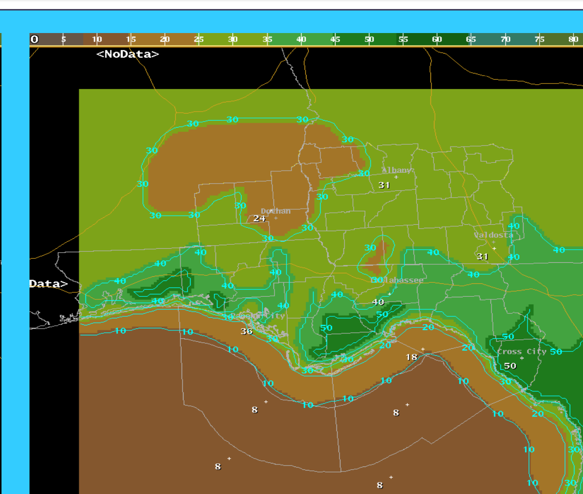






From left to right, we have a diagram showing the effects of coastline shape on the sea breeze, as well as sample daytime POP grids from the GFE Smart Tool for Regimes 1, 5, and 8 respectively.





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