Research to Operations in NWS Eastern Region: Applications of New Satellite Products

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NWS Eastern Region is an active participant in the GOES-R Proving Ground and in transferring new satellite products, visualization techniques and algorithms to forecasting operations. Current Eastern Region participants (Fig. 1), their partners and selected examples that address regional forecasting challenges through use of satellite interpretation in the forecast process are depicted below.

1. Aviation Forecasting

" ..MAIN FORECAST CHALLENGE TONIGHT CONTINUES TO BE SKY CONDITIONS...AND HOW THESE IMPACT FOG DEVELOPMENT AND TEMPERATURES. EXPERIMENTAL CIRA GOES CLOUD/FOG CHANNEL SHOWS THIS WELL. -WFO Buffalo, NY Area Forecast Discussion 3/17/11.

Detecting the onset, dissipation and spatial variability of fog is critical for the busy eastern U.S. airspace. Algorithms that differentiate between clouds and fog help forecasters to more accurately assess ground conditions in airport vicinities.

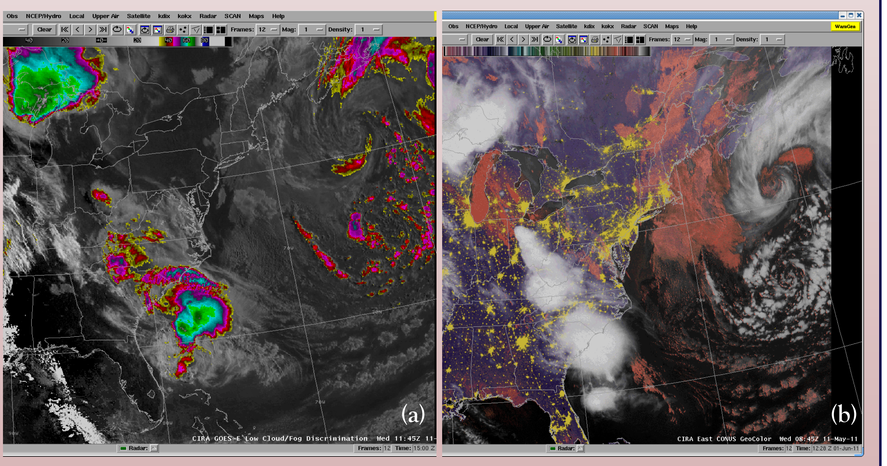

Figure 2. (a) CIRA low cloud and fog discrimination product and (b) nighttime GOES GeoColor with fog detection examples in AWIPS.

2. Decision Support Services

Air quality can be impacted by dense smoke far away from the source. Smoke from wildfires in Florida and Georgia are noted in the UW- CIMSS MODIS visible imagery wrapping around a low off the South Carolina coast (Fig. 3a). Relatively warm water river discharge into the ocean from snowmelt in the spring can affect local ecosystems and water chemistry (Fig. 3b).

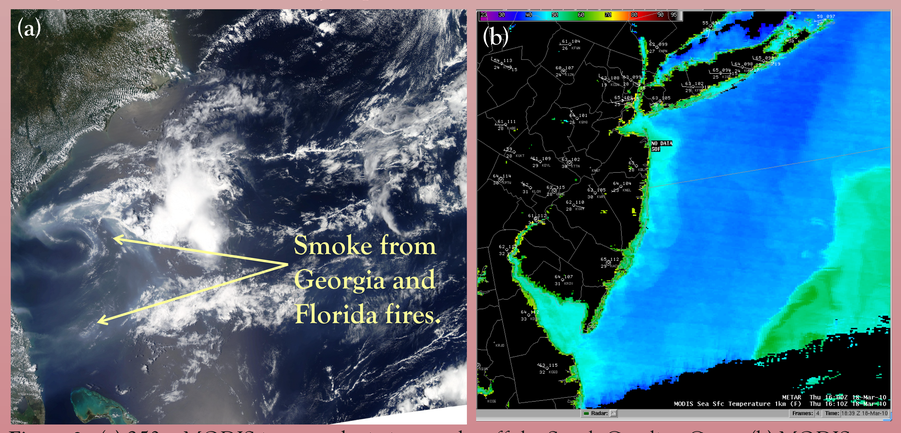

Figure 3. (a) 250m MODIS imagery depicting smoke off the South Carolina Coast. (b) MODIS-derived SSTs (F).

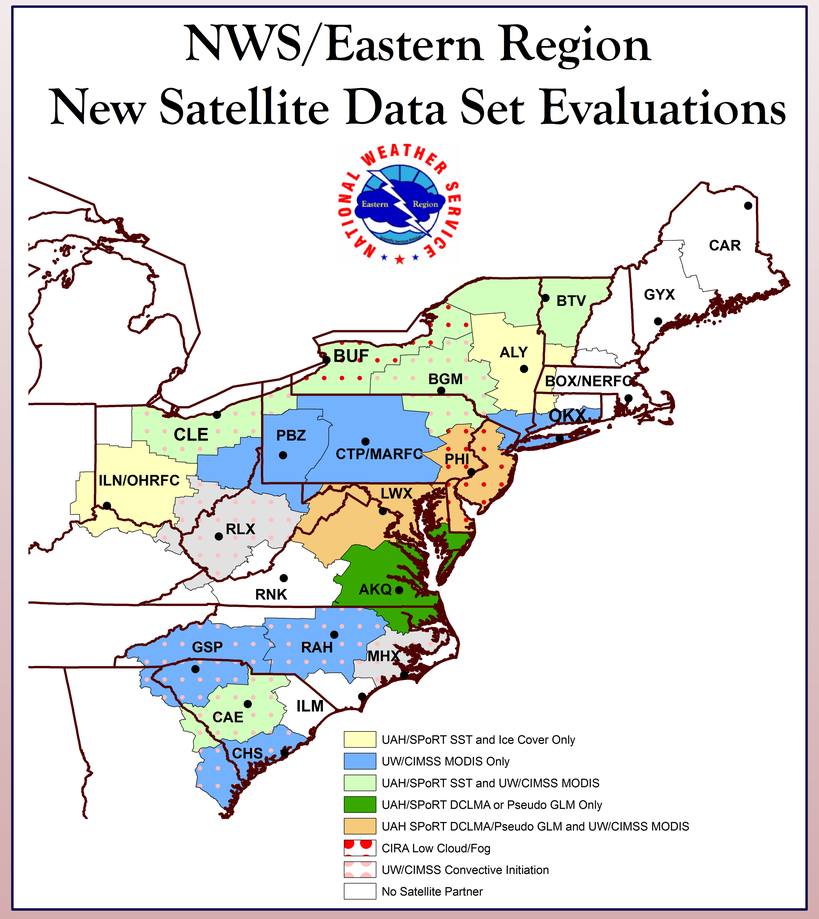

Figure 1. NWS/ER offices participating in the evaluation of new satellite products, visualizations and algorithms.

3. Severe Weather Forecasting

As part of the national GOES-R Aviation Proving Ground efforts, several WFOs in Eastern Region are evaluating the UW/CIMSS Convective Initiation (UW-CI) algorithm. The algorithm has been noted to perform better under weakly forced convection and is often preceded by cloud-to-ground lightning strikes (Fig. 4). An example from WFO Charleston, SC, via the Columbia, SC radar (KCAE) depicts 5-8 minutes of lead time (Fig. 5) for cells developing to the west of the Charleston County Warning Area.

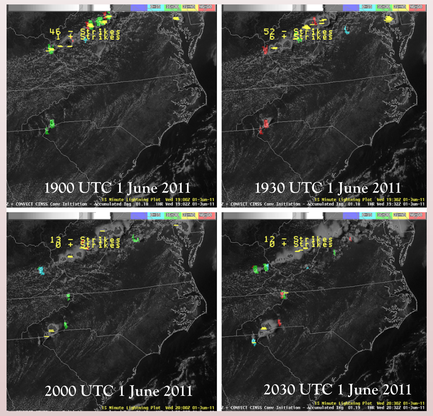

Figure 4. UW-CI with lightning and GOES visible satellite imagery from WFO Raleigh.

Table 1. Thunderstorm characteristics from WFO Charleston, SC. The cells were flagged at 2345Z by UW-CI.

Cell 1					Cell 2				
	Base Ref.	Comp. Ref	POSH	Cell VIL		Base Ref.	Comp. Ref	POSH	Cell VIL
2343Z	-2	33	none	none	2343Z	0	18	none	none
2347Z	0	53	0	12	2347Z	0	38	none	none
2352Z	21	63	60	39	2352Z	11	53	0	10
2356Z	44	68	60	38	2356Z	36	63	60	45
0000Z	59	68	30	34	0000Z	55	68	50	48
0004Z	57	63	20	39	0004Z	59	63	70	59
0008Z	55	63	20	43	0008Z	58	63	40	41

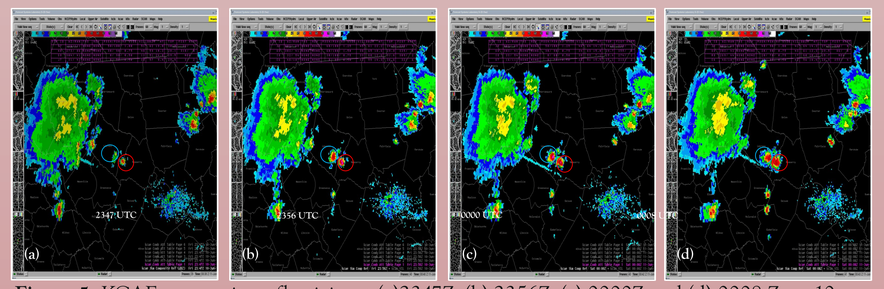

Figure 5. KCAE composite reflectivity at (a)2347Z; (b) 2356Z; (c) 0000Z and (d) 0008 Z on 10 and 11 June 2011.

4. Winter Weather Forecasting

"...WITH CURRENT LAKE TEMPS HOVERING ROUGHLY 3°C PER LATEST SPORT SATELLITE DATA...EXPECT MODERATE LAKE DELTA TS AND THE DIFFERENCE APPROACHES 20°C." -
-WFO Binghamton, NY Area Forecast Discussion 3/25/11.

Eastern Region offices whose weather is influenced by the Great Lakes are evaluating the SPoRT 1-km MODIS sea surface temperature and Ice cover composite (Fig. 6). The data are also used as initial conditions in local WRF-EMS mesoscale models, as part of a subregional ensemble run at the Great Lakes offices. In addition, several WFOs in the southeast use the SST product in local WRF models to help predict "Northwest Flow Snow" events, which have moisture connections to the Great Lakes.

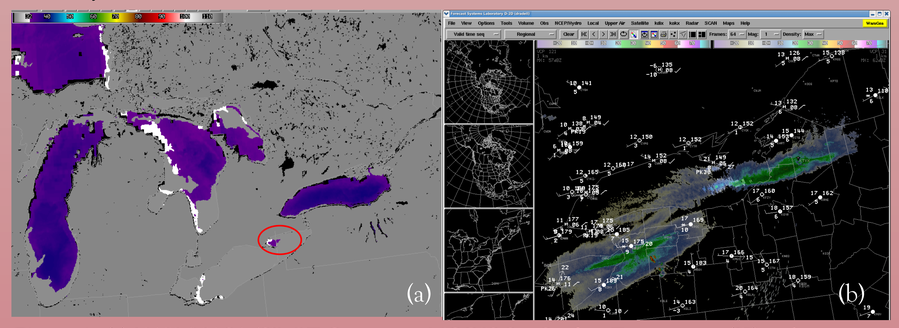

Figure 6. (a) UAH/NASA/SPoRT Composite MODIS Sea Surface Temperature (°F) and ice cover analysis (%). (b) Lake effect snow event via 0.5° reflectivity from KTYX and KBUF WSR-88Ds.

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