Synthetic Imagery of Fog and Wave Clouds

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Topics: Non-Convective Forecast Applications

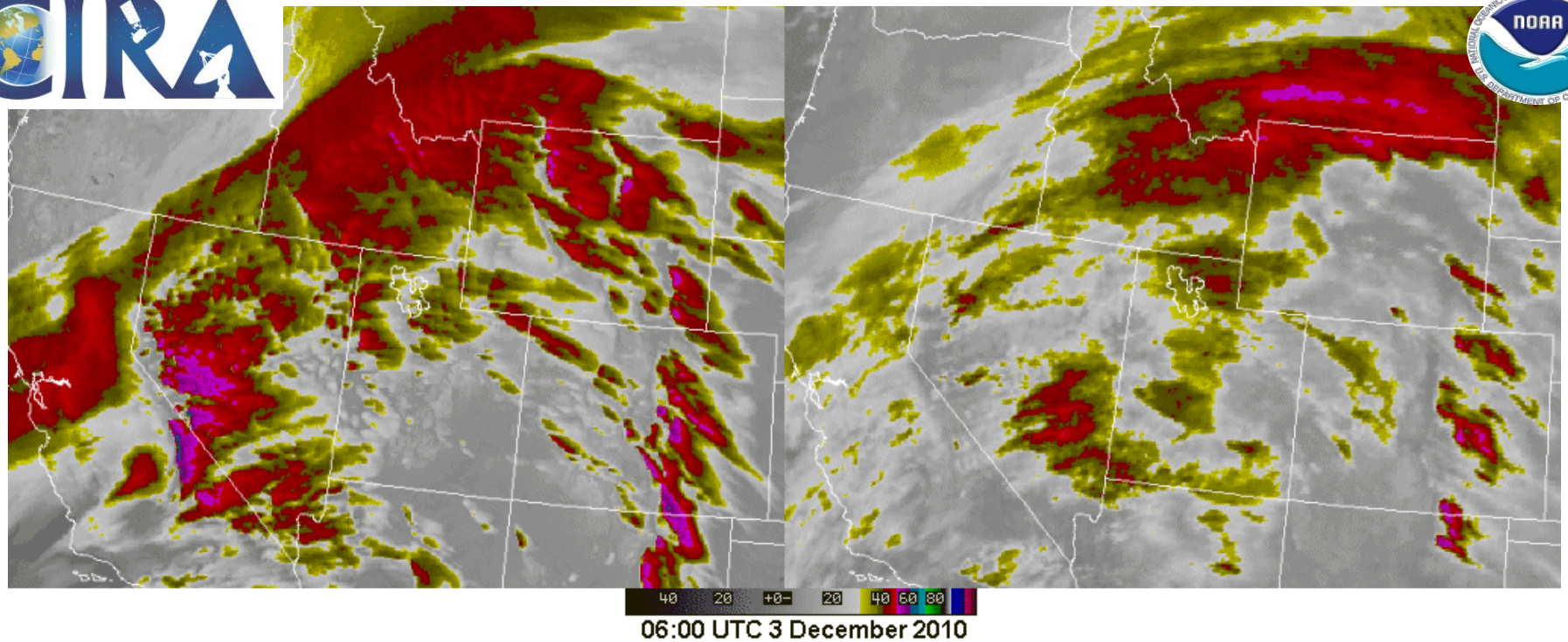
Program: Proving Ground

2. Introduction

- Synthetic imagery from the 4-km NSSL WRF-ARW produced at CIRA
- Motivation:
  - Help with interpretation of observed imagery.
  - Serve as proxy data for the ABI on GOES-R.
  - Allow forecasters to efficiently view forecast cloud locations

3. Methodology/Expected Outcomes

- 4-km NSSL WRF-ARW model run at 00Z.
- Certain model output fields sent to CIRA.
- Those fields are used as input to CRTM model, which calculates brightness temperatures for specific wavelengths.
- Synthetic imagery is made available via AWIPS, N-AWIPS, and on the web as a GOES-R Proving Ground product.



WRF-ARW **GOES**

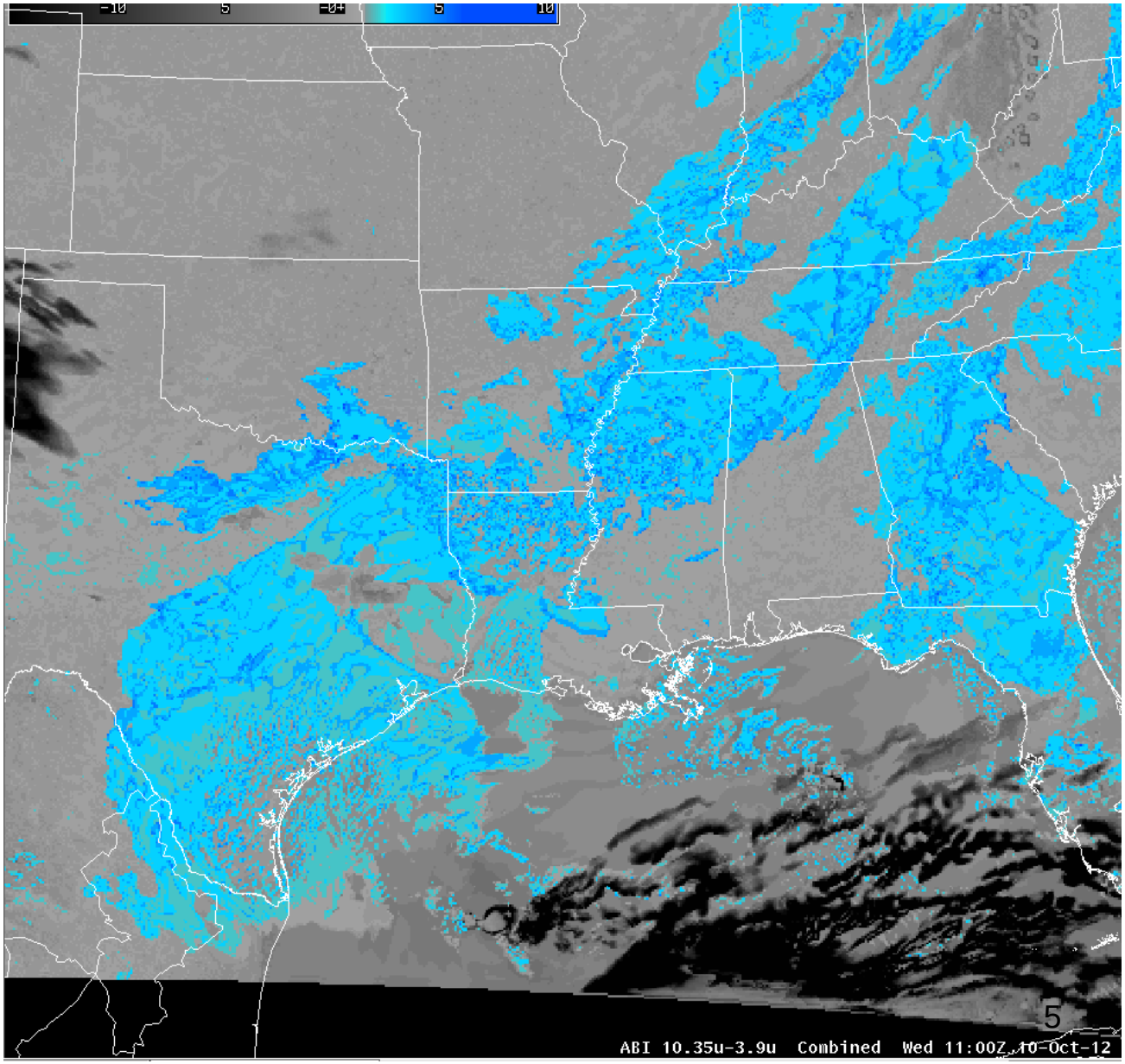
- Compare 30 hr forecast synthetic 10.35 µm to GOES 10.7 µm at 06:00 UTC 3 December 2010.
- Orographic cirrus is more readily identified compared to looking at traditional model output fields such as relative humidity.
- Increased temporal resolution – hourly rather than model output times (NAM – 3 hourly ; GFS - 6 hourly)

WRF-ARW Synthetic 10.35 – 3.9 µm product

Blue:
Low cloud OR Fog
(liquid phase)

Black / gray:
Higher level clouds
(ice phase)

Model forecast low clouds / fog from Texas to Georgia at 1100 UTC 10 October 2012



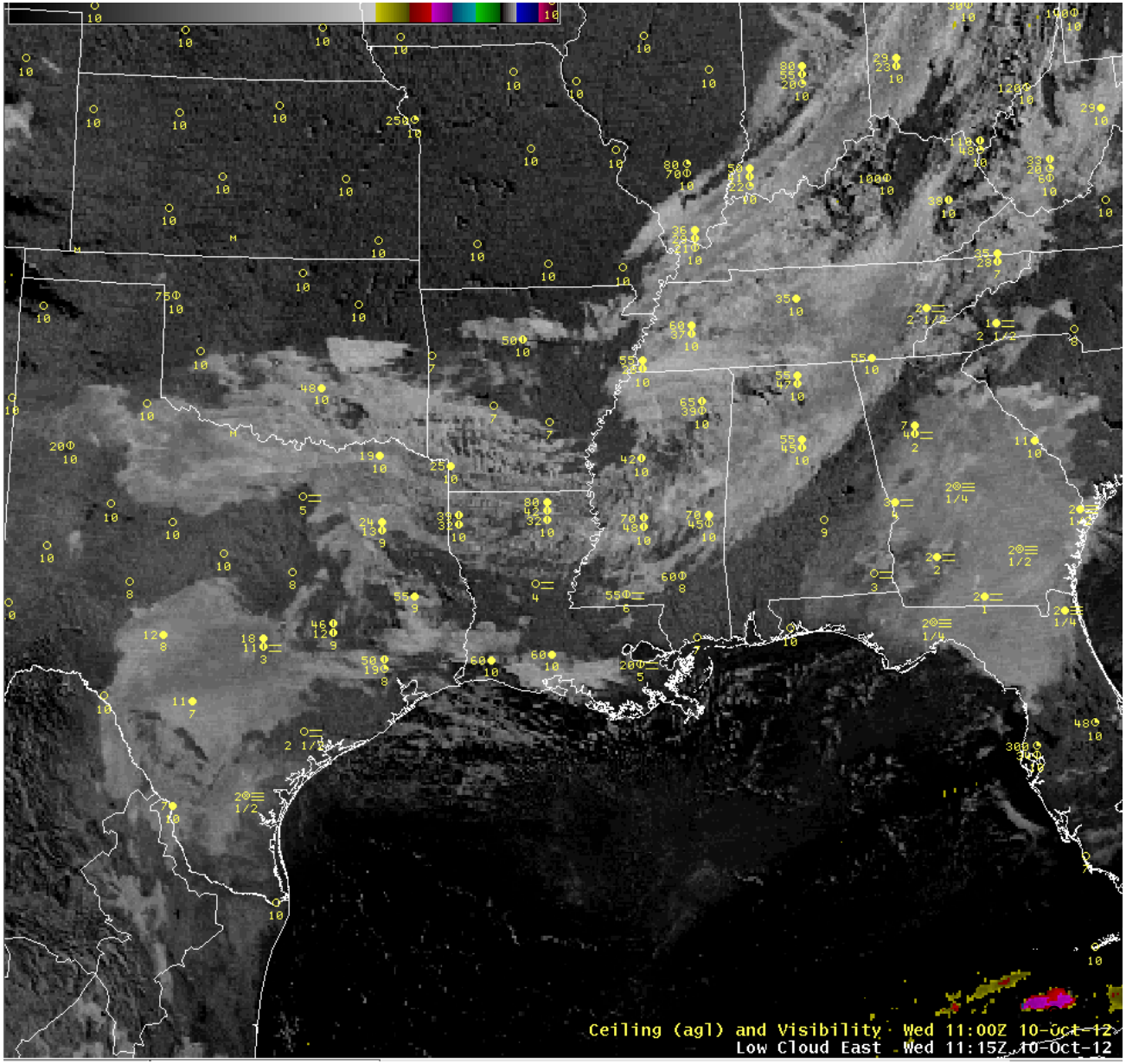
CIRA low cloud / fog product

Gray:
Low cloud OR Fog
(liquid phase)

Color enhanced:
Higher level clouds
(ice phase)

Ceiling / visibility obs:
Discriminate between
Low cloud and fog.

Example:
Fog in Georgia.
Low cloud in
north / central Texas.



5. Possible Path to Operations

- Currently made available to NWS WFO's via the regional HQ's (utilizing the LDM) and to NCEP national centers as part of the CIRA GOES-R Proving Ground products suite.
- Potential transition to operations in the future.

6. Future Plans

- Additional high-resolution models.
- Additional channels.
- Products derived from channel differences.

7. Publication List

- Project Publications
  - Bikos, D., Lindsey, D.T., Otkin, J., Sieglaff, J., Grasso, L., Siewert, C., Correia Jr., J., Coniglio, M., Rabin, R., Kain, J.S., and S. Dembek, 2012: Synthetic Satellite Imagery For Real-Time High Resolution Model Evaluation. *Wea. Forecasting*,**27**,784-795.
  - Grasso, L.D., M. Sengupta, J.F., Dostalek, R.L. Brummer, and M. DeMaria, 2008: Synthetic Satellite Imagery for Current and Future Environmental Satellites. International Journal of Remote Sensing. 29:15, 4373.