IMAPP Direct Broadcast CIMSS Regional Assimilation System (DBCRAS)

Robert Aune
Advanced Satellite Products Branch, NOAA/NESDIS/STAR/CoRP
Cooperative Institute for Meteorological Satellite Studies, University of Wisconsin – Madison

Kathy Strabala
SSEC/CIMSS
University of Wisconsin-Madison

CONCEPT
Construct a re-locatable, easy to implement, numerical weather prediction package capable of generating reliable weather forecasts in real-time, initialized with locally generated IMAPP parameters.

A version of the CIMSS Regional Assimilation System (CRAS) was configured to assimilate total precipitable water and cloud parameters retrieved from the Moderate Resolution Imaging Spectroradiometer (MODIS) using IMAPP software.

Since 1996 CRAS development has been guided by validating forecasts using information from the GOES imager and sonde, making it “satellite friendly”.

DEPLOYMENT
Since October, 2007 DBCRAS forecasts have been generated in real-time for North America using total precipitable water and cloud-top pressure retrievals generated locally by IMAPP.

Cloud-top pressure and effective cloud amount are used to adjust cloud water mixing ratio. Cloud checks are performed for low, high, and multi-layer clouds.

Background MODIS Operation
Clear: Clear, nothing (check RH)
Cloudy: Adjust cloud, RH, match top (up to two layers)
Clear: Clear cloud, adjust RH
Cloudy: Cloudy, build new cloud, adjust RH

Water Vapor Adjustments using total precipitable water retrievals are performed at clear fields-of-view.
1) Mean background mixing ratio profile is computed.
2) Perturbations are removed
3) Mean profile is adjusted to match MODIS Total PW using 1D var (strong constraint).
4) Perturbations are added to adjusted profile.
5) RH profile checked for “clearness”.

Since 1996 CRAS development has been guided by validating forecasts using information from the GOES imager and sonde, making it “satellite friendly”.

NEXT GENERATION DBCRAS
A new release of DBCRAS is nearly complete. The release is in response to feedback obtained from DBCRAS users around the globe. The release is expected to occur late in FY2013.

Scheduled Changes to DBCRAS – Version 2.0
Grids: 40km outer grid, 13km nest, Arakawa C
Maps: Polar stereo, Lambert Conical, Mercator
Levels: 38 sigma levels, floating top
BCs: 1/2 degree GFS, 6-hourly to 72 hours
Initial: 12-hr spin-up using additional parameters from IMAPP
Improved surface climatologies
Dynamics: Added gravity wave drag
Physics: Improved cloud physics

Platorm: Newer multi-core Intel Xeon , 8Gb memory

POSSIBLE ADDITIONS
• A self-cycling option is being considered to allow DBCRAS forecasts to continue when boundary condition grids are unavailable due to internet outages. DBCRAS would continue to cycle for two - three days using satellite data to update model grids from previous DBCRAS forecasts.
• Include routines to assimilate parameters from additional satellites processed by IMAPP.

Contact: Robert.Aune@noaa.gov