



GPM: Radar Observations and Simulations with the Local Analysis and Prediction System (LAPS)

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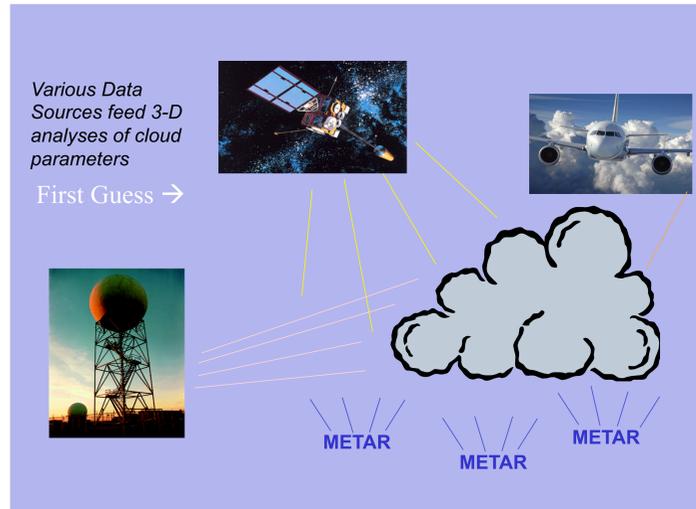
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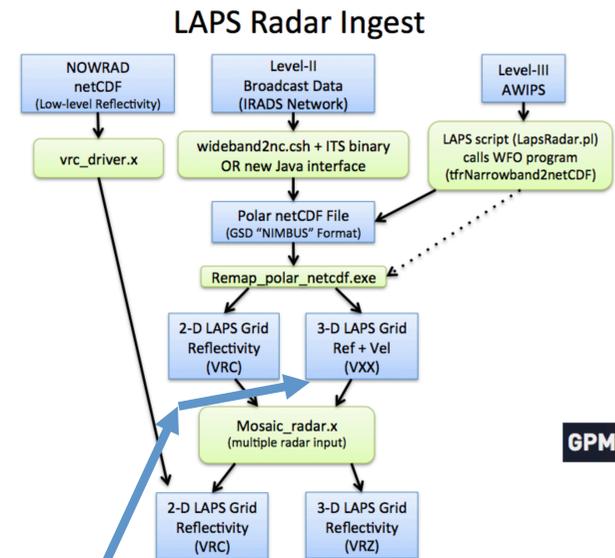
Introduction

- Local Analysis and Prediction System (LAPS) is used for data assimilation, nowcasting, and model initialization/post-processing
- High Resolution and Rapid Update
- Blends a wide variety of in-situ and remotely sensed data sets (e.g. METARs, mesonets, radar, satellite)
- About 150 group and individual users worldwide
- Federal, state agencies (e.g. NWS, USAF, California Dept. Water Resources)
- Private Sector (e.g. Greenpower Labs)
- Academia (e.g. University of North Dakota)
- International (e.g. Taiwan CWB, FMI, CMA, KMA)
- System can be used to analyze and forecast clouds and related sky conditions**

Three-Dimensional Cloud Analysis

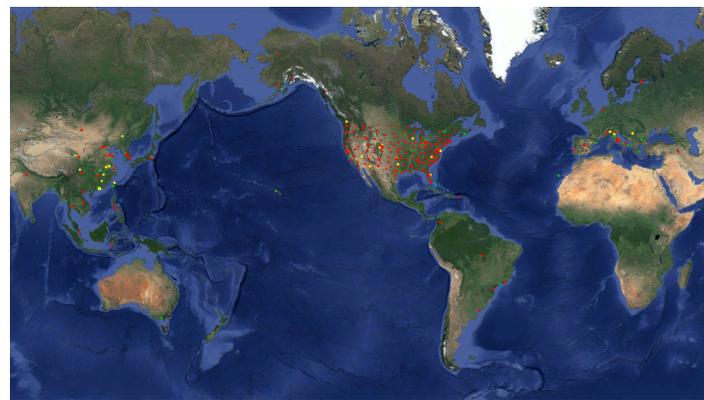


Radar and Cloud Analysis Flow Charts



Status of Simulations

- TRMM case has been selected (7/26/2013)
- Convection occurring over Florida
- Radar data remapped to Cartesian model grid as "look-alike" ground based reflectivity
- Next steps – run analysis and forecast:
- Three assimilation experiments using non-radar observations plus:
 - TRMM radar
 - Ground-based radar
 - Neither source of radar

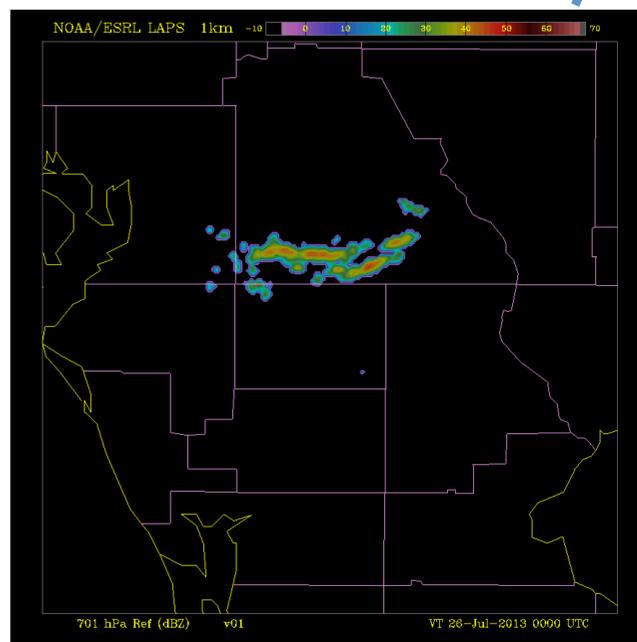


Sites around the world where LAPS is being used

Case Study July 26, 2013

- 3-D LAPS 1km Resolution Gridded Analyses
- TRMM radar initial remapping with Bob Morris' IDL software
- Converted to LAPS 3D Cartesian grid (vxx) reflectivity NetCDF file to further mimic how a ground-based radar is brought into LAPS

Horizontal Slice Through Remapped TRMM Radar Reflectivity



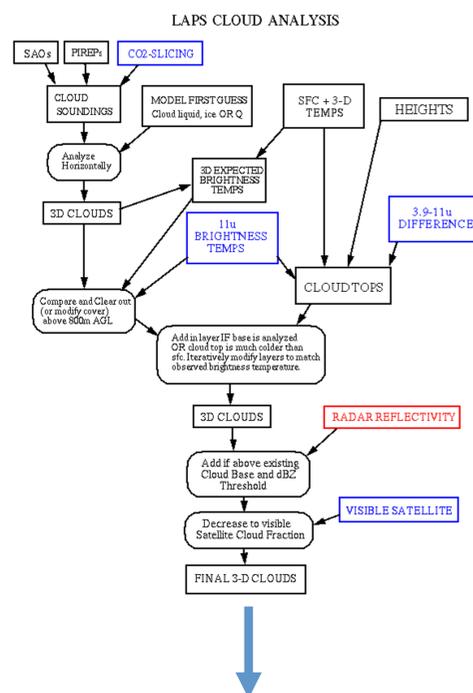
LAPS Attributes

- Analysis has variational and "traditional" options
- LAPS analyses (with active clouds) are used to initialize a meso-scale forecast model (e.g. WRF)
- Highly portable and efficient software with adjustable resolution
- Utilizes 1km, 15min visible satellite imagery along with IR for rapid updating**
- More information: <http://laps.noaa.gov> (steve.albers@noaa.gov)**

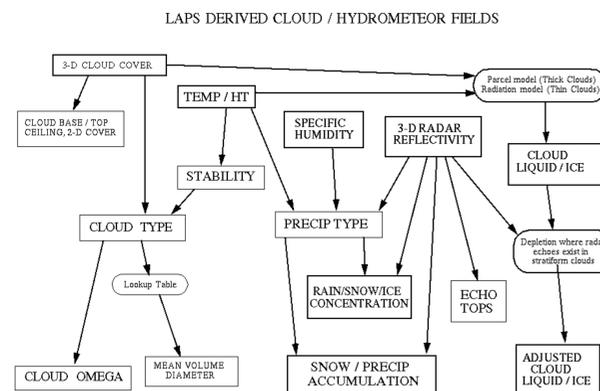
Radar Assimilation Experiments

- Use TRMM radar as proxy for GPM
- Radar reflectivity remapped to look like ground based radar
- Assimilated into LAPS cloud/reflectivity analysis
- Analyses used to initialize WRF forecast
- Compare to similar analysis/forecast using only ground based radar

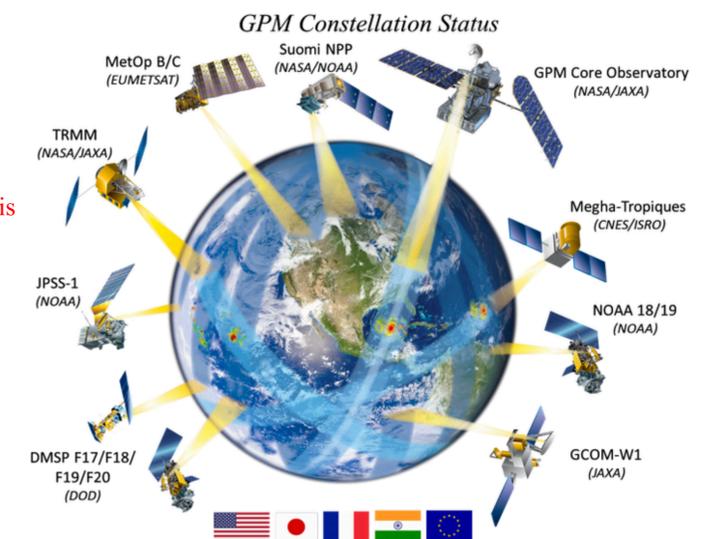
First sequence of steps in LAPS cloud analysis



Second sequence of steps in LAPS cloud analysis



GPM Constellation



Big Picture Considerations

- GPM Core Observatory radar coverage is limited in space and time
 - Potentially less operational model benefit
- 4DVAR can help increase impact (particularly in a global model)
 - Spreads obs in time and space
 - Helps compensate for latency
- Use GPM radar / MI data to calibrate microwave data from other GPM constellation satellites
 - More frequent satellite microwave passes compared with radar
 - Hydrometeor climatological covariance between various species
 - Fill in ice phase information
 - Leverage related climate research