2nd NOAA User Workshop on the Global Precipitation Measurement (GPM) Mission

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Session 2 Panel Discussion:
Enhancing R&D And Innovation of GPM-era Data at NOAA

NCEP Model Products

- U, V, W (Ω), T, Q, 1 or more Q_{cld} &/or Q_{pcp}
- Many more derived quantities from our unified post processor (e.g., dBZ from NAM)
  - Uses the Community Radiative Transfer Model (CRTM) for calculating satellite radiances
  - Option to account for non-nadir satellite view-angles, but not partial beam filling (HWRF only)
  - Simulated GOES (3.9, 6.7, 10.7, 12 μm), AMSR-E (36 & 89 GHz H/V), & SSM/I (37 & 85.5 GHz H/V)

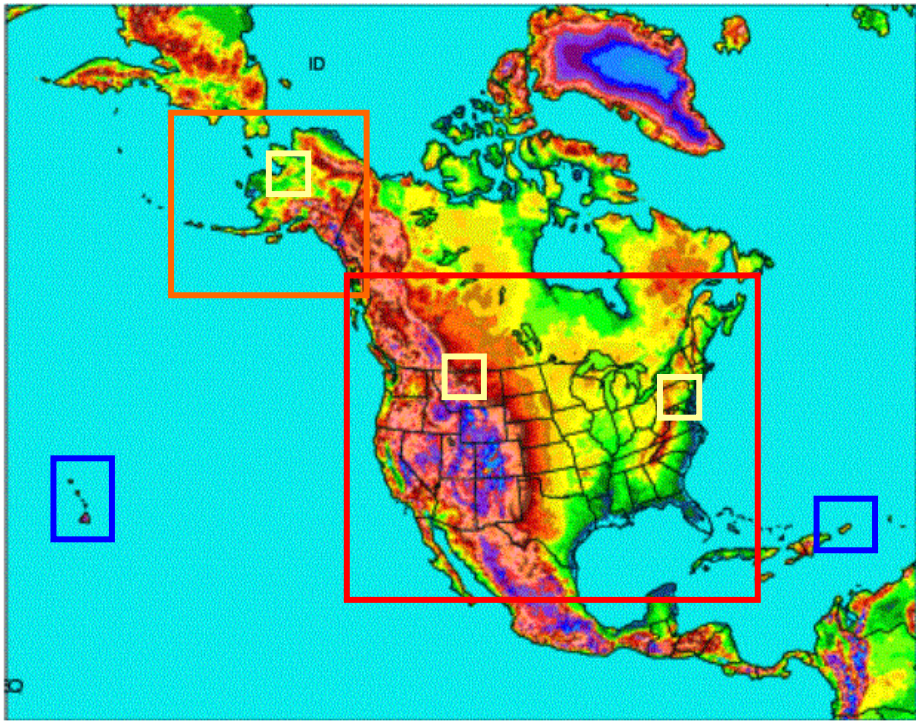
NCEP Model Products (1 of 2)

- Global Forecast System (GFS)
  - Mixing ratios of Qcw or Qci => no dBZ
  - SAS cumulus scheme (Cu)
- North American Mesoscale (NAM) model
  - Qcw, Qci, Qr, Qs, rime factor (Qs density) => dBZ
  - 12km/60L parent + multiple nests (next slide)
- 13-km/50L Rapid Refresh (will replace RUC)
  - Qcw, Qci, Qr, Qs, Qg, plus Ni, Nr => dBZ
  - Grell Cu

NCEP Model Products (2 of 2)

Multi-nested NAM model

- NEMS-based NMMB (B-grid)
  - 12-km parent (BMJ Cu) to 84 h
  - 4 km CONUS nest to 60h
  - 6 km Alaska nest to 60h
  - 3 km HI & PR nests to 60h
  - Relocatable 1.33 km Fire WX nest to 36h
- Nests call a modified version of the BMJ convective that triggers much less and is much less active (Janjic)



Must take into account subgrid-scale parameterized convection when evaluating against satellite observations, particularly for >4-km NWP models

Data Requirements, Verification Tools

- NCEP needs data in a WMO-friendly format
  - BUFR for profiles w/ 4D geodetic information
  - GRIB for gridded products or analyses
- Objective verification methods
  - "Grid-to-obs" => compare matched pairs from a forecast against point observations (e.g., sfc obs or rawinsondes) matched in time and space
  - "Grid-to-grid" => compare forecasts against a gridded analysis (e.g., CLAVRx or WWMCA total cloud fractions)

GPM Data for Model Validation

- Starts as an R2O effort (partnership)
  - Through NOAA testbeds that work with EMC
  - Partner w/ other centers through NUOPC (National Unified Operational Capability Initiative)?
- Verification as a prerequisite for assimilation?
  - Ops products may not be sufficient at the start
  - May require a research partner to make runs using a “functionally equivalent” operational system
  - Begin with standalone validation, work towards using merged, multi-sensor products?

Future Modeling Trends

- More sophisticated physics
- Higher spatio-temporal resolutions
- Ensemble systems, which may include
  - Multiple forecast systems (e.g., NMMB, WRF NMM, ARW), physics & initial condition diversity
- EnKF = ensembles + data assimilation