



NCEP CONDUIT UPDATE

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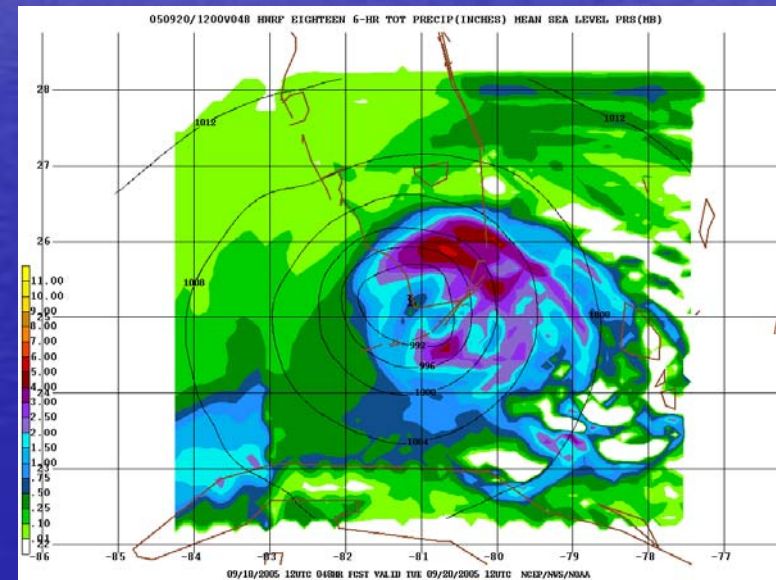
“Where America’s Climate, Weather and Ocean Services Begin”

Topics

- 2007 Changes to NCEP Model Suite
- 2008 Planned Changes to NCEP Model Suite
- GRIB1 Demise
- Keeping in Touch with NCEP Activities
- Inventory of Data Currently Available on CONDUIT
- Growth Potential for CONDUIT
- Future of CONDUIT – NOMADS - FastGRIB

2007 Changes to NCEP Model Suite

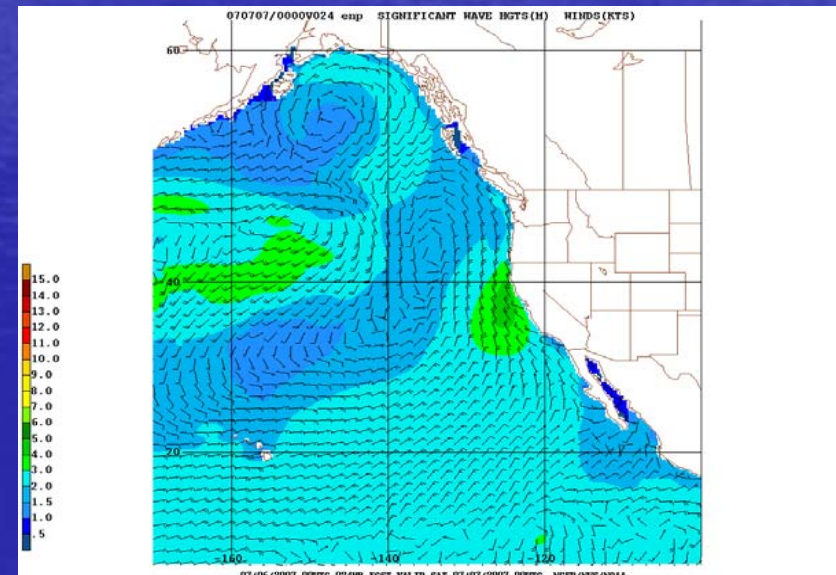
- Global Forecast System (GFS)
 - Hybrid Sigma-Pressure GFS Grid-Point Statistical Interpolation (GSI) Analysis
 - Unified Postprocessor
- NAEFS (GFS Ensembles)
 - Increase U.S. Membership from 15 to 21 per cycle
- Hurricane Modeling
 - Hurricane WRF in parallel operations (Still run GFDL)
 - Probabilistic Storm Surge (US Coast Only)



HWRF Surface Forecast

2007 Changes to NCEP Model Suite

- Air Quality Forecast
 - Expanded domain to cover entire CONUS
- Ocean Modeling
 - RTOFS/HYCOM data assimilation upgrade
- Current Model Suite Presented in Appendix



2008 Changes to NCEP Models

- Global Forecast System (GFS) (Q3FY08)
 - Add new observational data sources (WindSat & SBUV)
 - Upgrade GSI Analysis & GFS model
- NAEFS (GFS Ensembles) (Q4FY08)
 - Increase in vertical resolution
 - New Products (TIGGE)
- North American Mesoscale (NAM) (Q2FY08)
 - Physics Upgrade – gravity wave drag, new horizontal diffusion algorithm, improved computation of surface longwave radiation, and more robust land-surface physics
 - Expand Domain by 18%
 - New GSI Analysis
 - Upgrade WRF Model & Preprocessing codes
 - Fall Bundle – Details TBD (Q4FY08)

2008 Changes to NCEP Models

- Ocean Modeling
 - Great Lakes Wave Update (Q2FY08)
 - Wave Ensemble (Q3FY08)
- RUC (Q3FY08)
 - Assimilation of additional data sources
 - Level-2 Radar reflectivity
 - TAMDAR
 - Upgrade radiation, convection, and land-sea parameterization
- Real-Time Mesoscale Analysis
 - RTMA upgrade & 5 km CONUS Grids, 6 KM Alaska (Q2FY08)
 - Hawaii, Puerto Rico & Guam (Q4FY08)



2008 Changes to NCEP Models

- Short Range Ensemble Forecast (SREF)
 - Bias Correction for Precipitation – **Completed 4 Dec 2007**
 - Resolution Increase and more WRF members (**Q4FY08**)
- Climate Forecast System (CFS)
 - **Completed 00Z 23 Jan 2008**
 - Increasing from 2 to 4 runs per day
 - Decreasing lag of data assimilation/analysis from 7 days to 1 day
- Hurricane Modeling (**Q3FY08**)
 - TBD

Removal of GRIB1

- Both GRIB1 & GRIB2 data have been available since June 2007
 - Information regarding product equivalents for GRIB1 and GRIB2 on the NCEP and NWS servers is available at:
http://www.nco.ncep.noaa.gov/pmb/docs/GRIB1_to_GRIB2.shtml
 - Utilities to convert between GRIB2 and GRIB1 are available at:
<http://www.nco.ncep.noaa.gov/pmb/codes/GRIB2>
- On **28 January 2008** GRIB1 datasets will be removed from the NWS and NCEP FTP servers

NCEP Change Notification

- NCO WEB Site
 - <http://www.nco.ncep.noaa.gov/pmb/changes/>
- Mailing List
 - Notification of availability of test data for major model upgrades
 - <https://lstsrv.ncep.noaa.gov/mailman/listinfo/ncep.list.modelevelinfo>
- Weekly Change Memo
 - List of every module, script, or data flow change
 - <https://lstsrv.ncep.noaa.gov/mailman/listinfo/ncep.list.jifmemo>

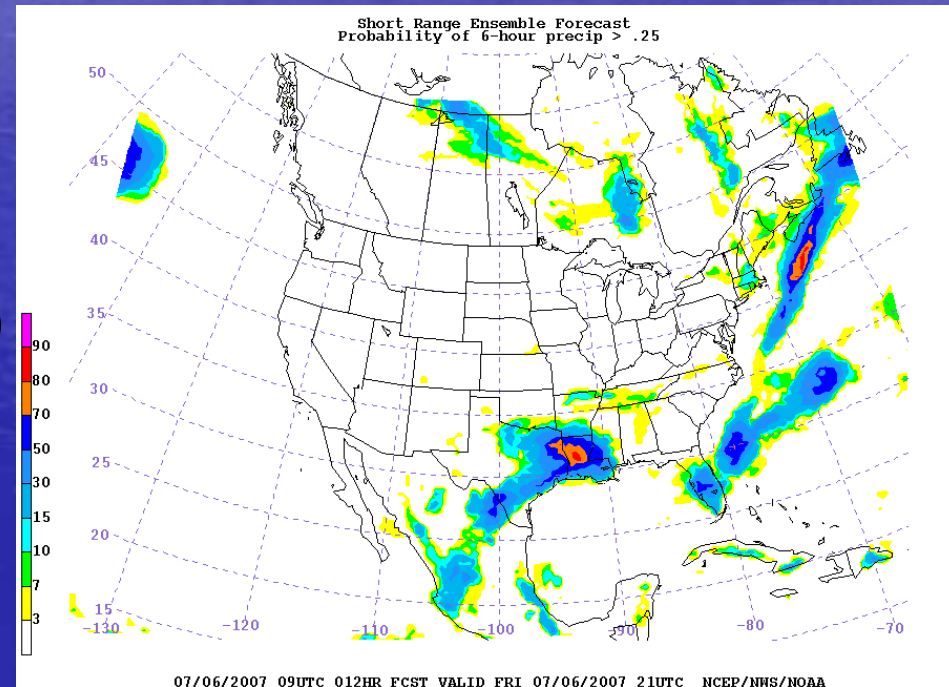
CONDUIT Inventory

- Serving ~42 GB per day to three top tier sites
 - Down from a peak of 50 GB per day with the removal of some GRIB1 data sets.
- Exclusively GRIB2

CONDUIT Inventory

Current Data Sets per Community Demands –

- GFS
 - 0.5 deg. – 00-180 hours
 - 1.0 deg. – 00-180 hours *
 - 2.5 deg. – 192-384 hours
- NAM (All grids 00-84 hours)
 - 12 km CONUS (Surface fields only)
 - 40 km CONUS
 - 90 km CONUS
 - 45 km Alaska



SREF Probability of Precip > .25 inch/6hr

* - Can these be removed?

CONDUIT Inventory

- NAEFS (NCEP GFS Component)
 - Both NAEFS and TIGGE data sets for 21 members per cycle
- RUC (hourly time steps to FHR Max)
 - 20 and 40 km* Surface, Pressure, and Hybrid level files
 - 80 km Pressure files *
- MRF (Yes, the MRF!) *
 - 2.5 degree data – 00 - 168 hours

* - Can these be removed?

CONDUIT Growth

- CONDUIT currently fed by three, load balanced, high end servers
- Servers located at the edge of NCEP's network at the NOAA Web Operations Center (WOC)
- Currently serve 42 GB of GRIB2 data per day to three top tier CONDUIT systems.

CONDUIT Growth

We have room for growth.

- Climate Forecast System (CFS)?
- More Ensemble data – SREF/NAEFS?
- High Resolution Windows – Both WRF Cores?
- Real Time Mesoscale Analyses?
- Hurricane Runs – HWRF/GFDL?
- Full Domain NAM?

Technical Considerations for the Future

- Can we go beyond LDM?
 - It is a robust system, but what may be on the horizon?
- NOMADS being made operational at the NOAA/WOC in FY08
 - Allows for slicing and dicing
- THREDDS
- Wesley Ebisusaki's (NCEP/CPC) FastGRIB – allows for users to pull out individual GRIB messages out of large files.
 - http://www.cpc.ncep.noaa.gov/products/wesley/fast_downloading_grib.html
- What else is out there?

Questions/Discussion

NCEP Operational Models

North American Mesoscale Model (NAM)

12 km, 60 levels, 84 hrs at 0 , 6, 12 and 18Z

Global Forecast System (GFS)

T382 (~35 km) to 7.5 days (180 hrs), 64 levels

T190 (~70 km) to 16 days (384 hrs), 64 levels

16 days (384 hrs)/4 times per day

Rapid Update Cycle (RUC)

13 km, 50 levels

12 hrs at 0,3,6,9,12,15,18,21Z

9 hrs at 1,2,4,5,7,8,10,11,13,14, 16,17,19,20,22,23Z

Ensembles

global 21 members at 00, 06,12,18Z (84/day)

T126 (~105 km) to 384 hrs

28 levels, 16 days (384 hrs)

regional 21 members at 6, 9, 15 and 21Z (84/day)

WRF/NMM, WRF/ARW, Eta, RSM

32-45 km, 60 levels, 87 hours

waves 10 members 4 times per day

1.25 x 1.0 deg lat/lon, 1 level, 126 hours

Wave Models

global - 1.25 x 1.0 deg lat/lon

8 grids ranging from 30' to 4' resolution

deep ocean – 30', off-shore – 10'

coastal – 4'

1 level, 180 hrs/4 times per day

North Atlantic Hurricane (seasonal)

North Pacific Hurricane

.25 x .25 deg lat/lon

1 level, 126 hours/4 times per day

Great Lakes

4 km, 1 level

84 hours/4 times per day

Real-Time Ocean Forecast System

Atlantic Ocean

4-15 km

25 levels, 120 hours from 00Z

Climate

T62 (~200 km), 64 levels, 10 months
(60 members)

(120 members: 4/day starting Jan 22¹⁷)

NCEP Operational Models

High Resolution Window (2 WRF runs/nested region)

- 1) WRF-NMM 4.0 km, 35 levels, 48 hrs at 0 , 6, 12 and 18Z
- 2) WRF-ARW 5.1 km, 35 levels, 48 hrs at 0 , 6, 12 and 18Z

Eastern 2/3 CONUS & HI at 00Z

Western 2/3 CONUS & PR at 06Z

Eastern 2/3 CONUS & Hawaii at 12Z

AK & PR at 18Z

HYSPLIT Dispersion Model

Lagrangian

at 12km/60lvl within NAM 35km/64lvl within GFS

48 hours on demand for volcanic ash or other emission source

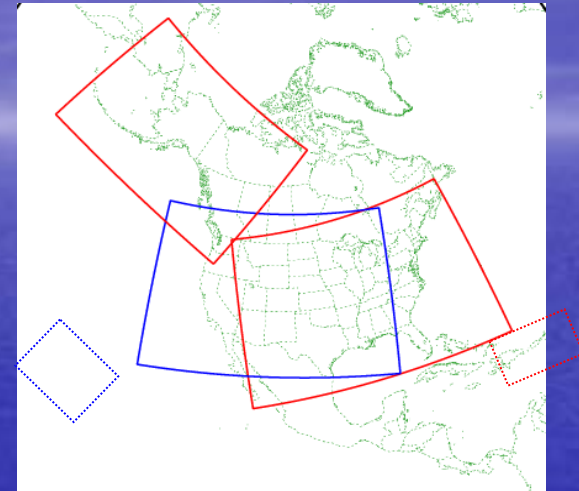
48 hours from 6Z daily for wildfire smoke

Air Quality-Ozone (CONUS)

12 km

22 levels

48 hours from 6 and 12Z



Hurricane WRF

Movable, two-way nested grid 9km inner;

27km outer

42 levels

126 hrs at 00, 06, 12 and 18Z

GFDL Hurricane Model

coupled ocean-atmosphere

Three nests (0.5, 1/6, 1/12 deg lat/lon)

42 levels

126 hrs at 00, 06, 12 and 18Z