NCEP Update

Brent Gordon
NCEP/NCO/Systems Integration Branch

Unidata Policy Committee Meeting
Arlington, VA

May 12, 2009

"Where America's Climate, Weather and Ocean Prediction Services Begin"

Overview

- NAWIPS/GEMPAK Transition to AWIPS-II
- CONDUIT

NAWIPS → AWIPS-II

Project Overview

- NCEP has ceased all development of its NAWIPS software system
  - Bug and emergency fixes being the exception
- Full NAWIPS system to be ported to AWIPS-II
- Software ready for Operational Testing and Evaluation by Q1FY11
- No changes to forecaster workflow
  - Some visual differences may be unavoidable
- Capitalize on new technology

Project Overview

- AWIPS-II represents a merging of two software systems - NAWIPS and AWIPS
  - Will allow for better collaboration between NCEP and NWS forecasters
  - Economic benefits as well.
- The combined system will contain components from AWIPS and NAWIPS
  - NMAP, NCEP Product Generation, GEMPAK, Data decoders/encoders, D2D, GFE, Hydro Apps, etc.

Project Overview

- N-AWIPS migration will leverage Raytheon baseline functionality wherever possible
  - Some functionality implemented directly
    - Animation, image manipulation
  - Some functionality enhanced
    - NCEP decoders, Grid diagnostics
- NCEP views this as a software and hardware consolidation
- No NCEP functionality is going away!
  - No forecaster workflow changes

Who NAWIPS Supports

- NCEP Central Operations (NCO) develops and maintains forecast application software systems called N-AWIPS
- NAWIPS Users:
  - NCEP Forecast Centers (~300 FTE plus contractors)
  - NCEP Central Computing System
  - NCEP Environmental Modeling Center
  - NESDIS Satellite Analysis Branch
  - NWS Alaska & Pacific Regions
  - NWS River Forecast Centers
  - NWS Central Pacific Hurricane Center
  - Unidata (~300 universities + private industry)

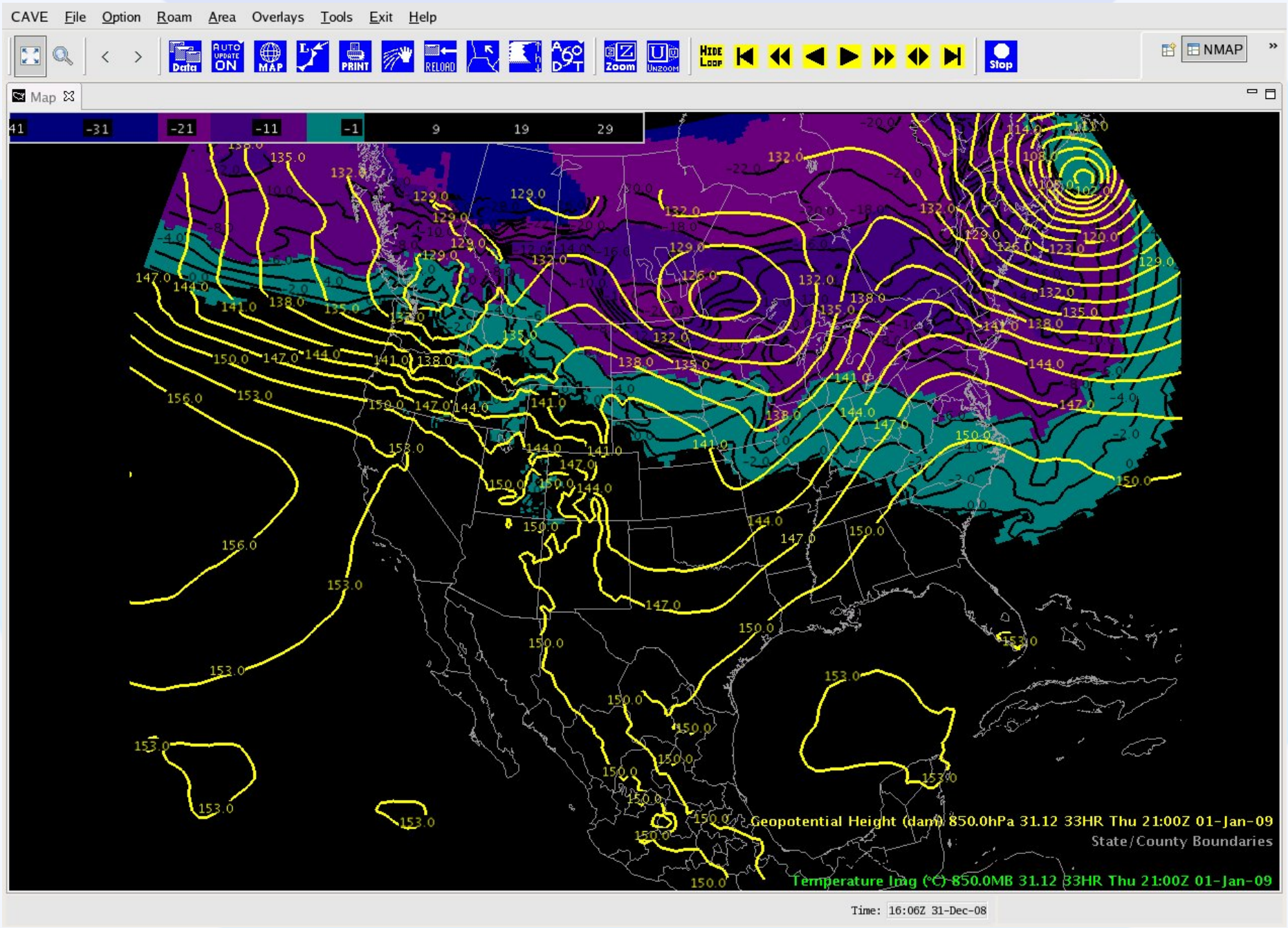
Schedule

Transition efforts are on schedule

- First Major Release to NCEP Centers and Unidata – April 1, 2009
- Additional releases to occur every six months
  - May increase to every three months after October 2009 release
- All NAWIPS applications to be ported by October 1, 2010
  - Operational Test & Evaluation to begin at that time
  - National Centers and Unidata involvement

FY09-FY10 Activities
NAWIPS Transition Activities

- NAWIPS software migration is broken into four major activities
  - Data Display capabilities (NMAP2, NTRANS, NSHARP, NWX)
  - Data decoders
  - Product generation
  - GEMPAK (legacy command line interface) – Local Apps
    - Working on a forward capability for this one
- Periodic incremental releases will allow for our customers to evaluate our progress
  - Full IV&V process
  - First release delivered on April 1, 2009
  - Future Releases every 3-6 months
- Version 1 of NAWIPS in AWIPS-II is targeted for October 2010.
  - Full OTE with NCEP customers planned
  - Delivery to NCEP customers via national baseline release
    - No longer a direct release from NCO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State/County Boundaries
Temperature (°C) 850.0MB 31.12 33HR Thu 21:00Z 01-Jan-09
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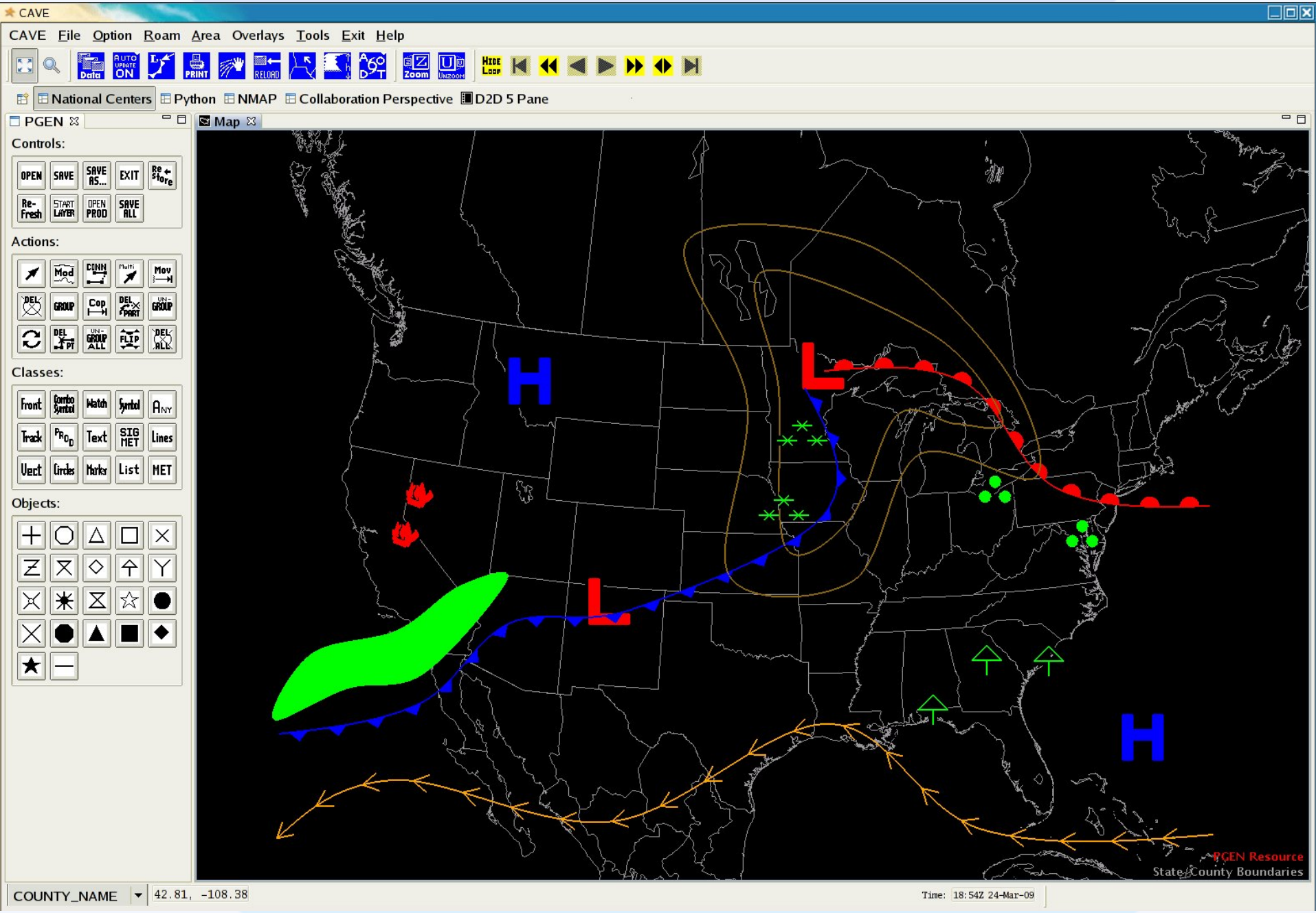
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PGEN
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FY09 Activities
NAWIPS Transition

- Continue to work closely with the NWS AWIPS Program Office
- One-on-one TIMs with Raytheon have been extremely helpful
  - Validated NCEP's approach to conversion
  - NCEP received commitment from RTS for incremental code delivery
  - RTS agreed to consider "Sample Code" from NCEP for inclusion into TO11 baseline
    - Allows for NCEP codes to be incorporated into national baseline ahead of Oct 2010 milestone

GEMPAK

- GEMPAK
  - All current applications to be available in AWIPS-II era
  - Will no longer require GEMPAK file format – will still support it
- Forward compatibility – GEMPAK DM library access to AWIPS-II Database
- Provides a stop-gap capability for users migrating to AWIPS-II who run stand-alone GEMPAK applications
- Development starting now
  - SF-type db requests complete
  - SN-type db requests next
- Capability will become available with “GEMPAK 6.0” release
  - Expected with October 2009 release
- Still planning to move all GEMPAK applications into AWIPS-II

Unidata Involvement

- Monthly migration telcons
- IV&V, OT&E (baseline + NAWIPS extensions)
  - Test plans, cases and execution
- User training (limited) – web based
- Developers conference scheduled July 15-16 2009
- Design and development collaboration
- Liaison with University community
- **NCEP continues to view Unidata as a very important partner for NCEP's total mission.**

Hardware Configuration

- Minimum configuration
  - EDEX (Data server) requires 2G RAM
  - CAVE (workstation) requires a video card that supports OPEN GL w/ 256M video RAM
    - NCEP tested – nVidia: GeForce 7600GT, GeForce FX 5200, Quadro FX 5500, Quadro FX 3450, Quadro Nvs 285
    - ATI: Radeon X1400 (untested)
  - Red Hat Enterprise 5.0
- Our experience
  - 4G RAM to run both

Training

- **Training Portals:**
  http://www.nwstc.noaa.gov/AWIPS/ADE/ADE_resources.html

- **Links to AWIPS Migration training and resources:**
  http://www.nwstc.noaa.gov/nwstrn/awips.htm
  - Includes new AWIPS2 SOA module

- **Suggested**
  - Java, Advanced Java (best practices)
  - Note that Java allows “wrapping” of C
    - Best implemented when performance is an issue

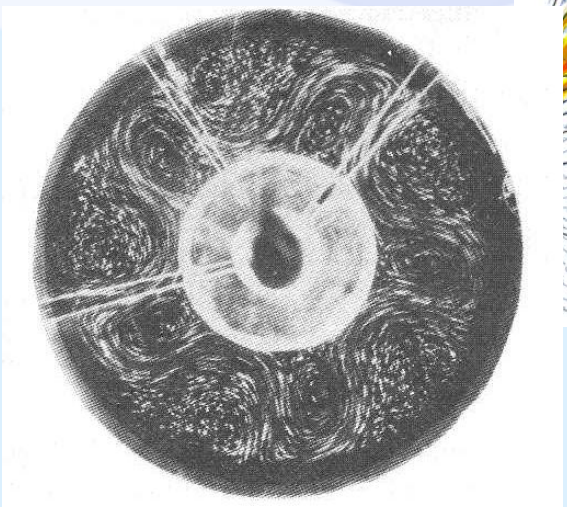
CONDUIT

CONDUIT

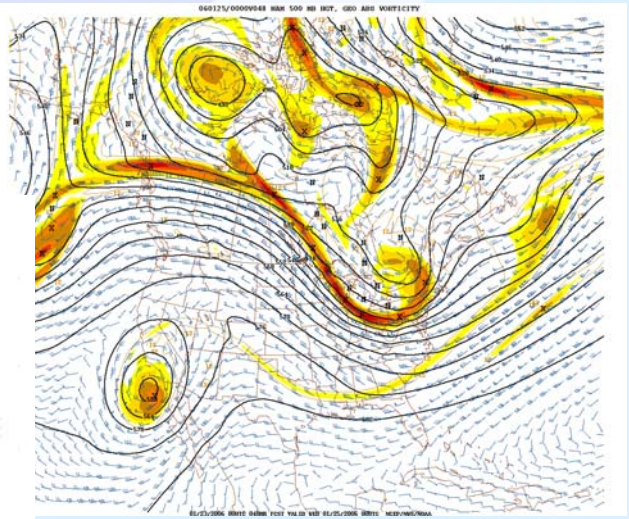
- CONDUIT - Cooperative Opportunity for NCEP Data Using IDD Technology
- Historical Perspective
  - USWRP sponsored project, initiated in 1997 timeframe
    - Was the highest priority of the USWRP/Science Steering Committee
- Link between NCEP and UNIDATA emphasized
  - Serve the University Community
- Importance to NCEP/Community recognized
  - Research done with operational models will ultimately help improve those models
  - NCEP set goal to become “First Choice” for the research community

CONDUIT

- Working towards providing real-time access to higher resolution gridded operational model data
  - NAM
  - GDAS
  - GFS
  - RUC
  - NAEFS
  - SREF



Reproduced from Holton, 3rd Edit. Fig 10.19
Photo by Dave Fultz



NAM 48h forecast of 500 mb heights, and absolute vorticity, valid 012500Z

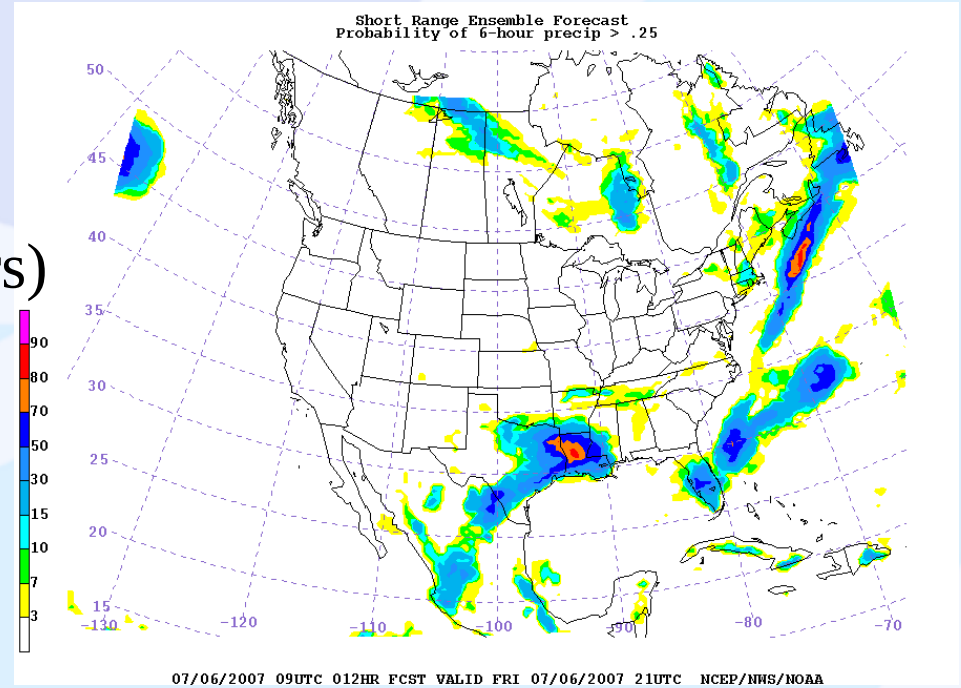
CONDUIT

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

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

CONDUIT Inventory

- NAEFS (NCEP GFS Component)
  - Both NAEFS and TIGGE data sets for 21 members per cycle
- RUC – hourly time steps to FHR 12 (9)
  - 20 and 40 km Surface, Pressure, and Hybrid level files
  - 80 km Pressure files

NCEP Atmospheric Models

Model application	CFS Climate	GFS Global/Wx	GEFS/ NAEFS Global Ensembles	NAM Regional/ SevereWx	SREF Regional Ensembles
Domain	Global	Global	Global	No. Am.	No. Am.
Resolution	T62 (~200km) 64 levels MOM3 1 deg 40 lev	T382(~35km) to 7.5days T190(~70km) to 16 days 64 levels	T126 (~105km) 28 levels	12 km 60 levels	32-45 km/ 28-60 lvls
Forecast length	9 months 4/day	16 days 4/day	16 days 4/day	84 hrs 4/day	87 hrs 4/day
# of Members	120/month	N/A	84/day	N/A	84/day

NCEP Atmospheric Models

Model	RUC Domestic Aviation & Severe Wx	Air Quality Domestic Sfc Ozone [Smoke]	HiRes-Window Severe Weather	Fire Wx/ IMET Support [Homeland Security]	Hurricane track & intensity
Domain	CONUS	CONUS [CONUS & Alaska]	2/3 CONUS Alaska Hawaii & PR	Selectable 4-8 State [1-3 state]	Storm Movable nest
Resolution	13 km 50 levels	CMAQ 12 km / 22 levels [HYSPLIT off the 12 km NAM]	WRF-NMM 4.0 km 35 lvls WRF-ARW 5.1 km 35 lvls	NMM [+ HYSPLIT] 8 [4] km 50 lvls	HWRF & GFDL 9 km 42 levels
Forecast length	12 hours 24 / day	12-48 hours 2 / day [4/day]	48 hours 1 large nest + 1 small nest 4/day when no hurricanes	48 [30] hrs 4/day	120 hrs 4 storms 4/day

FY09 Model Implementations

- GFS Upgrade – physics changes and downscaled GFS output for NDFD, NDFD Guam grid
- GEFS Upgrade - resolution increase to T190, stochastic forcing, concurrent generation
- SREF Upgrade - resolution increase to 32 km, 10 WRF members, increased physics diversity, improved BUFR output
- RUC – extend to 18 hrs
- RTMA – Guam

CONDUIT Issues

- Lack of Feedback/Participation from data users
  - CONDUIT users meetings not well attended by users
  - Is this still the preferred method for the University and Research community to access NCEP data?
- Has content gone stale? – No longer cutting edge grid sets?
- Do users realize they can submit new requirements to Unidata for CONDUIT?

Questions?

Contact Info:

Brent.Gordon@noaa.gov
Systems Integration Branch Chief
NCEP Central Operations
Camp Springs, MD
301-763-8000 x7193