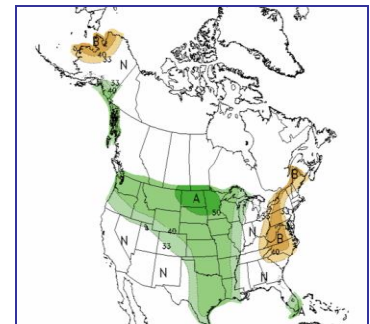
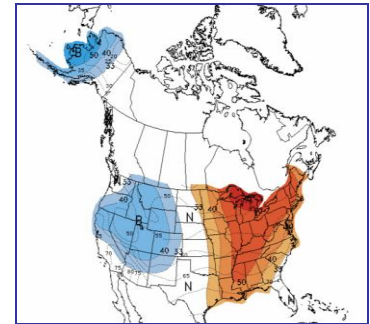


CPC Products: Present and Future

Motivation:

- **Panel Discussion:** “Improving NWS Products and Services in Partnership with the External Community”
- **Objective:** To develop actions for partnerships between NWS (CPC and CSD) and the CPAS community to enhance the NWS product suite
- **Background Presentation:** Status report on CPC products



Wayne Higgins and Mike Halpert
Climate Prediction Center/NCEP/NWS/NOAA
March 26, 2009

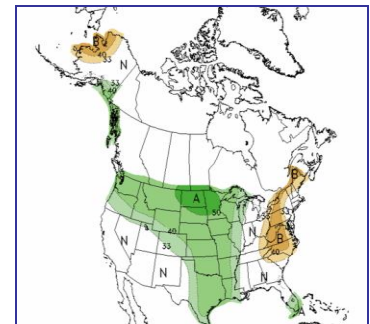
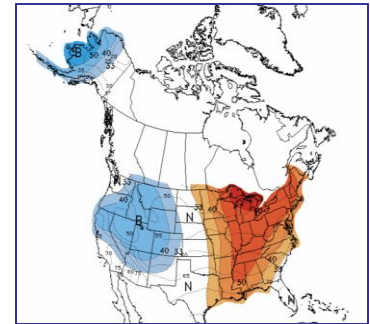
CPC Products: Present and Future

Key Questions:

- Who are the users of the information provided (both internal and external)?
- How do we know if the support we provide is having an impact on decision making?

Desired Outcomes:

- Identify your expectations for increased advisory role in developing CPC products (e.g. based on user needs).
- Establish what CPC can expect in return.



Take Away Message

- CPC is working to improve the product suite in two important ways:
 - *Improve the skill of official outlooks, and*
 - *Expand / improve the product mix and presentation.*
- We are asking help from the CPAS community in the second area, especially based on your interactions with users.



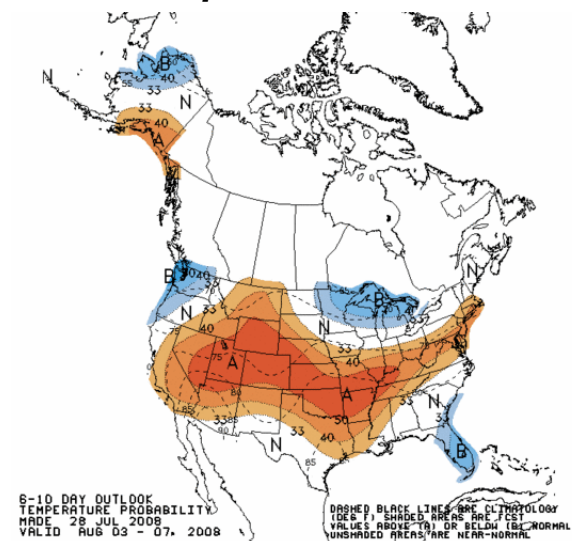
CPC Mission



We deliver climate prediction, monitoring, and assessment products for timescales from weeks to years to the Nation and the global community for the protection of life and property and the enhancement of the economy.

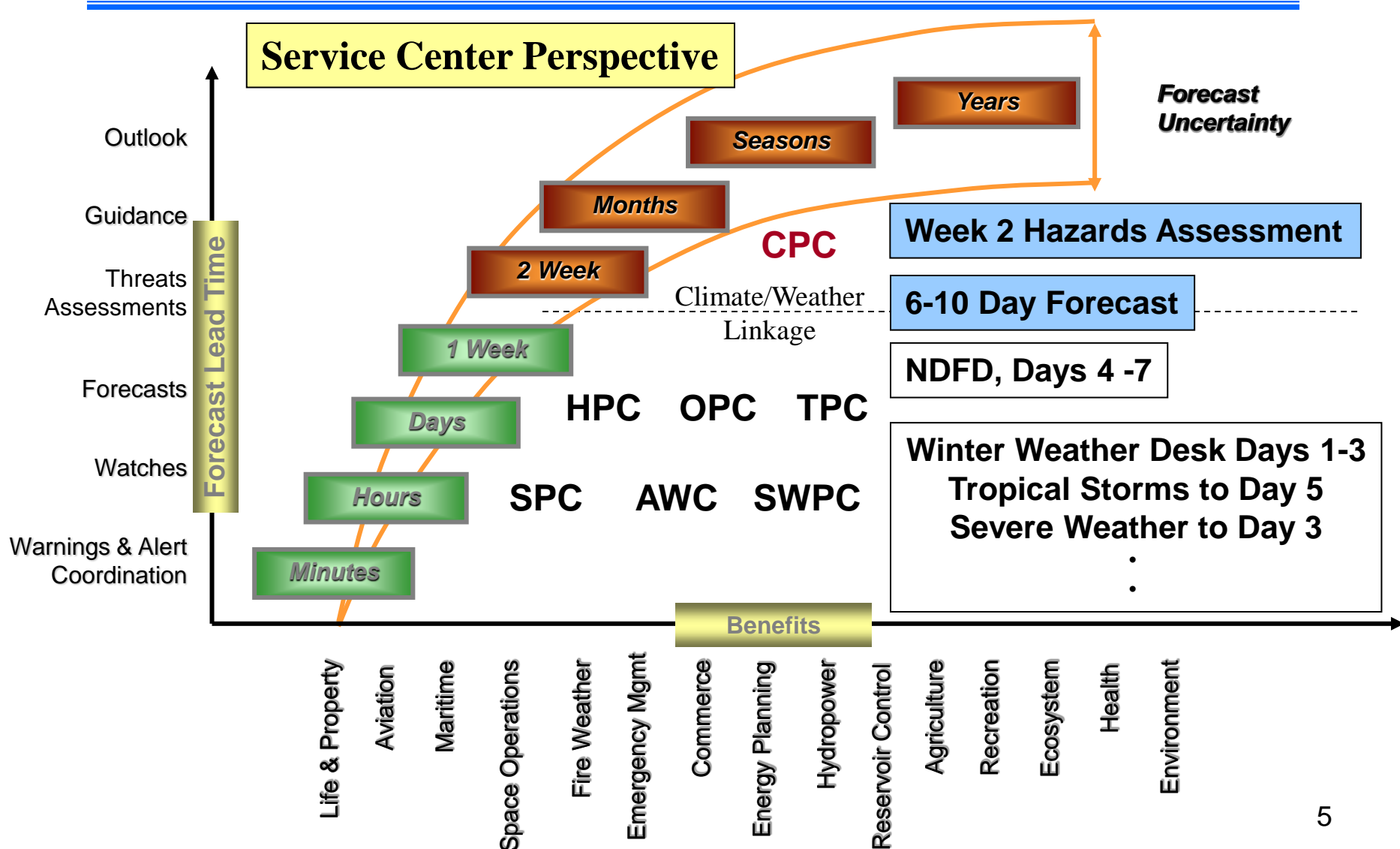
- National temperature and precipitation outlooks, but not monthly / seasonal rankings
- Focus: weeks, months, seasons, years (i.e. short term climate)
- Forecasts in collaboration with other NCEP Centers, NOAA line offices, other agencies and labs
- Integral to NWS Seamless Suite of Products

Temperature Outlook



Note: We are asking for your help to reach more users.

CPC Supports the NOAA Seamless Suite of Forecast Products Spanning Climate and Weather



Looking Ahead: Next 5 Years

- New NCEP Strategic Plan (FY09-13) and NOAA Strategic Plan (FY10-15)
 - *CPC 5-Year Implementation and Operations Plan (FY09-13)*
- Move to NOAA Center for Weather and Climate Prediction
 - *Opportunities for expanding collaboration*
- Establishment of NOAA Climate Services
 - *Emphasis on water, coasts, and living marine resources*
 - *Deliver useful climate information to characterize risks in decision making*
- Climate Prediction
 - *Enhance climate forecasts on Intraseasonal-to-Interannual timescales*
 - *Increasing emphasis on multi-model ensembles across time scales*
 - *Enhance transition activities (Climate Test Bed; Model Test Facility)*
- Improve Interactions with Broader Science and Service Community

Looking Ahead: Major Thrusts of CPC 5-Year (FY09-13) Implementation Plan

- Develop a process for collecting and analyzing user input to arrive at CPC requirements (*Customers and Partners*).
- Improve operational climate outlook, monitoring and assessment products (e.g. objective verification; outlooks for week 3 - week 4) (*Products and Services*)
- Improve delivery of climate products and services and measure success to users (conversion to GIS; Climate Portal; customer surveys) (*Information Systems*)
- Accelerate the transition of science and technology advances to improved operational climate models and forecasts (e.g. CTB) (*Science and Technology*)
- Increase collaborative products and services (*Business Process*)

The CPC 5-Yr Plan (FY09-13) has annual milestones and metrics for these areas

CPC Operational Products

- **Outlooks (GPRA Measure - US Seasonal Temperature)**
- **Real-time Monitoring Products**
- **Assessment Products**

How do we accelerate improvements in the above?

- **Outreach and Feedback**
- **Partnerships**
- **Applied Research**
- **Transition Activities (R2O; O2R)**



- ☐ **6-10 Day & 8-14 Day
Precipitation & Temperature Outlooks**
- ☐ **Day 3-14 Hazards Assessments
(US, Global Tropics)**
- ☐ **Monthly & Seasonal
Precipitation & Temperature Outlooks**
- ☐ **Seasonal Drought Outlook**
- ☐ **Seasonal Hurricane Outlooks
(Atlantic and Eastern Pacific)**
- ☐ **Monthly ENSO Prediction**

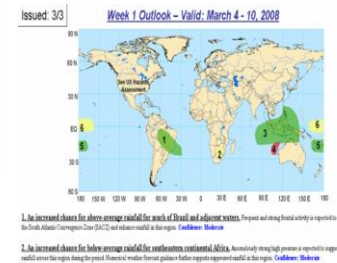
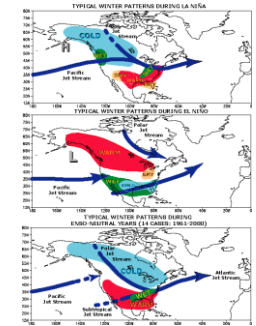
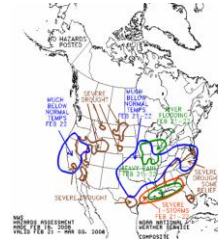




Climate Assessment Products



- ☐ Climate Diagnostics Bulletin (monthly, web)
- ☐ ENSO Diagnostics Discussion (monthly, PDF and WORD)
- ☐ Weekly ENSO / MJO / Monsoon / Ocean updates (.ppt, PDF, web)
- ☐ Seasonal Climate Summaries (web)
- ☐ Special Climate Assessments (extreme events, web)
- ☐ Annual Climate Assessment (multi-agency; published in the AMS Bulletin)
- ☐ Hazards Assessments (US, Africa, & Global Tropics) Day 3-14 – WX/CX Connection



Note: *These products should connect climate to people's lives. How should we expand and improve the current suite of products to meet user needs?*



Outreach & Feedback



- Product dissemination via internet, AWIPS, etc
- NOAA News releases, press conferences, web articles (ENSO, drought, extreme climate anomalies)
- NWS, WFO staff training & briefings
- Public outreach materials (tutorials; fact sheets)
- Briefings (e.g., USDA-daily, USAID-weekly, WFOs...)
- NCEP Product Review (annual)
- Climate Test Bed seminar series
- Annual Workshops (CPASW, CDPW, CTB)



Applied Research Activities



- Forecast tool development / improvement
- Climate monitoring tool development / improvement
- Climate model diagnostics and evaluation
- Understanding atmospheric and oceanic predictability
- Understanding climate trends
- Weather / climate links
- Attribution of climate anomalies
- Drought / floods and other extreme events

CPO and NCEP have partnered to accelerate the transition of research advances into operations (Climate Test Bed)



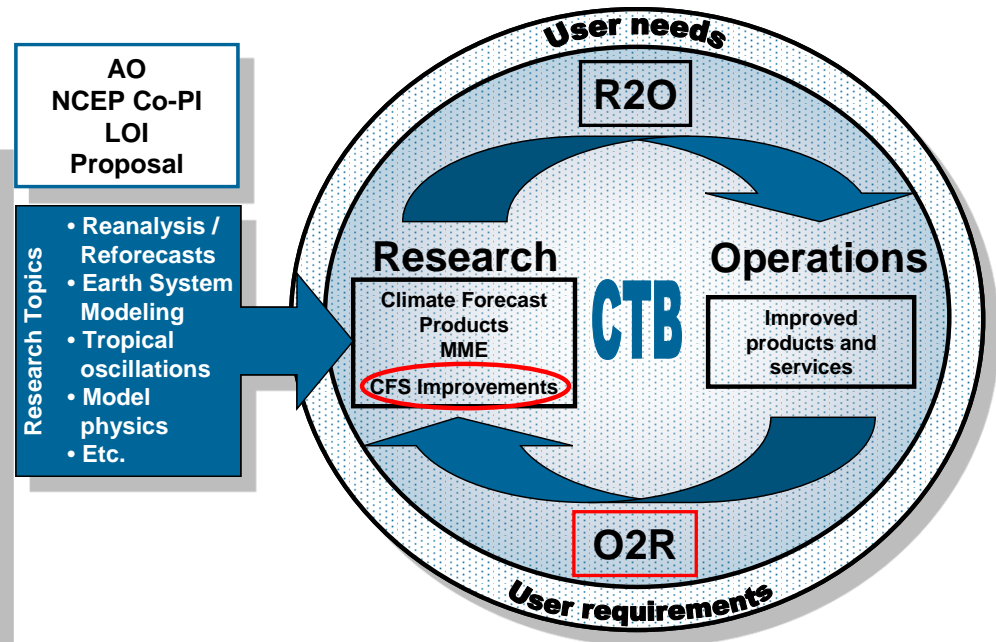
Advancing Climate Prediction: The Climate Test Bed



- Jointly established in 2004 by NCEP and NOAA Climate Program Office
- Serves as conduit between the operational, academic and research communities

Mission

- To accelerate the transition of scientific advances from the climate research community to improved NOAA climate forecast products and services.



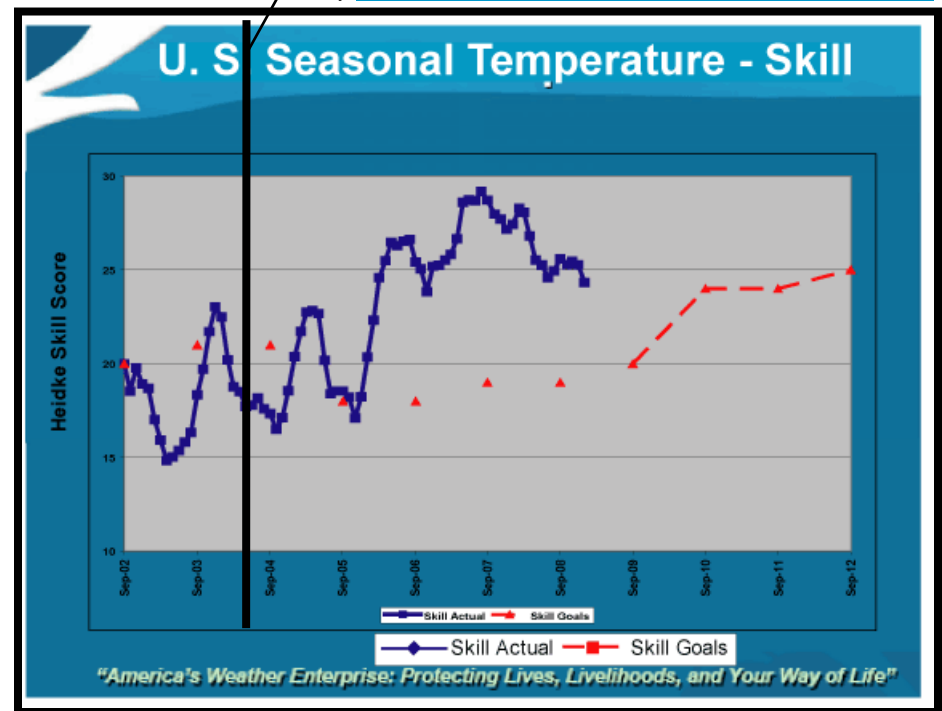


Climate Prediction Advances at NCEP



- **CFS – NCEP operational dynamic coupled climate forecast model (implemented Aug 2004)**
- **Increases in the skill of CPC official seasonal outlooks (20% or more; O'Lenic et al. 2008) due in part to CFS and to CTB milestones (e.g. consolidation tool implemented in 2006)**
- **Improvements to CFS will result in improved forecast skill**

**CFS Implemented
CTB Established**



Customers and Partners

- **Who are the CPC Customers and Partners?**
- **How does the CPC receive, measure and meet customer demand?**

Mike Halpert will discuss the CPC strategy for this. Key elements:

- *Internet Monthly Reports*
- *NCEP User Requirements Process*
- *User Satisfaction Survey*
- *Focal Point Directory*
- *“White Paper” on Developing Products with Partners*

Information Systems

(from CPC 5-Year (FY09-13) Implementation Plan)

Goal: Improve CPC's delivery of climate prediction products and services and measure success to users

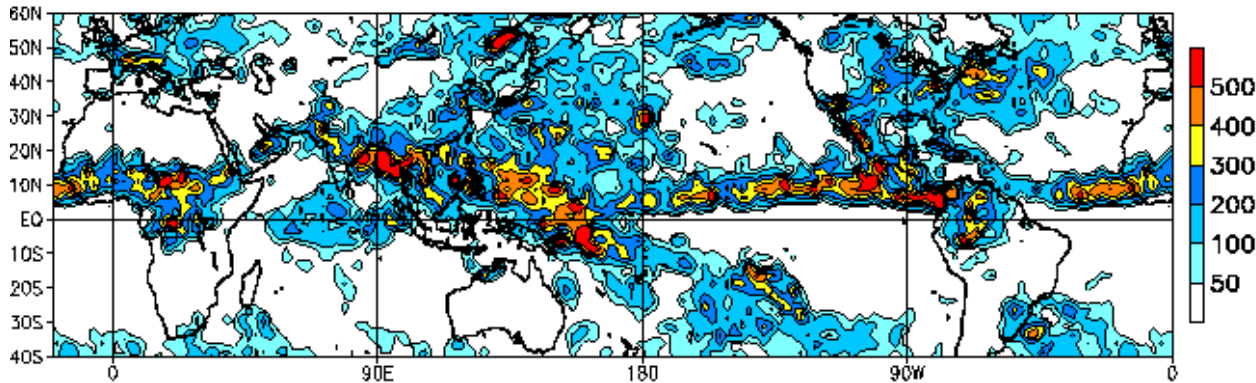
- **Developmental:**
 - Provide CPC seasonal forecast archive & verification data base via the web
 - Convert CPC extended range, monthly, and seasonal outlooks to GIS format
 - Contribute CPC products to National Climate Service Portal
 - Integrate CPC products with NWS "Point and Click" & "Hourly Weather Graphics"
- **Performance Metric:**
 - Percentage growth in number of visitors to CPCs website over FY08 baseline

Message: CPC is improving access to its climate outlook, monitoring, and assessment products.

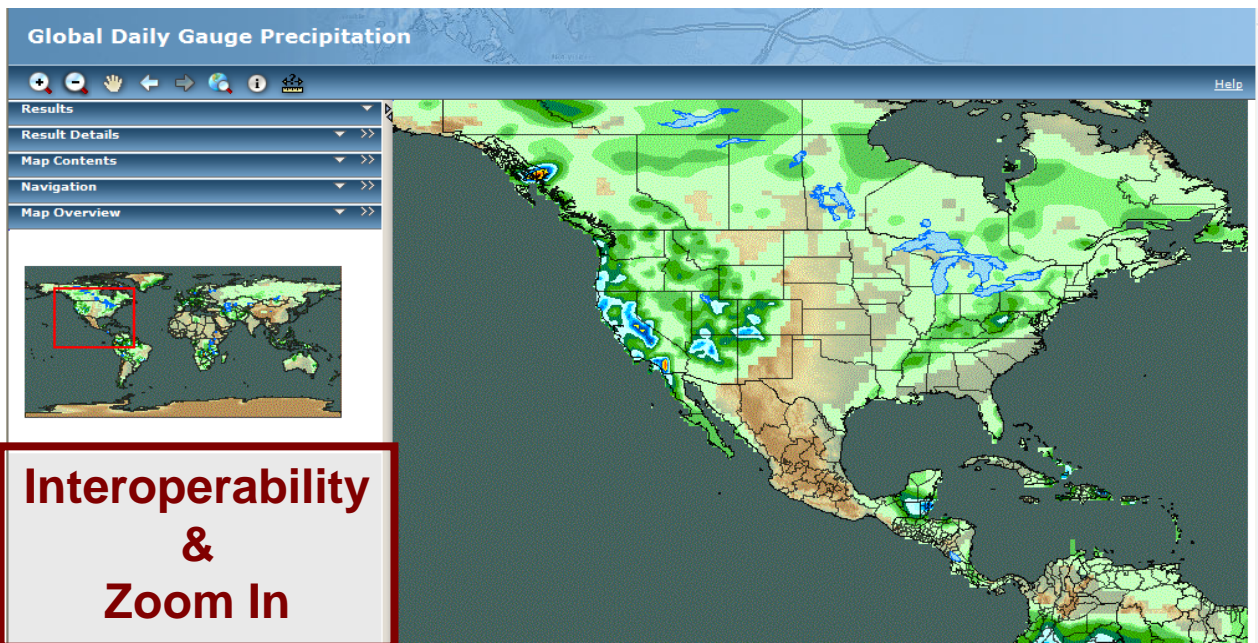
Are these improvements meeting user needs for decision making?

Conversion of CPC Products to GIS Format

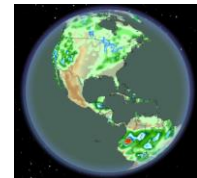
BEFORE



AFTER



**Interoperability
&
Zoom In**



Products and Services

(Examples from CPC 5-Year (FY09-13) Implementation Plan)

Official Outlooks and Assessments

- Objective drought monitor and seasonal drought outlook
- New climate outlooks (e.g. week-3 and week-4), including a prediction capability for extreme events
- Develop climate outlooks for variables beyond P&T (e.g. snow, sea level)

Verification of Official Outlooks

- Implement CLIMAS Forecast Evaluation Tool (FET) for CPC outlooks
- Provide a suite of fully verified extended range, monthly & seasonal outlooks

Message: CPC verification products provide users with a better assessment of the accuracy of CPC outlooks.

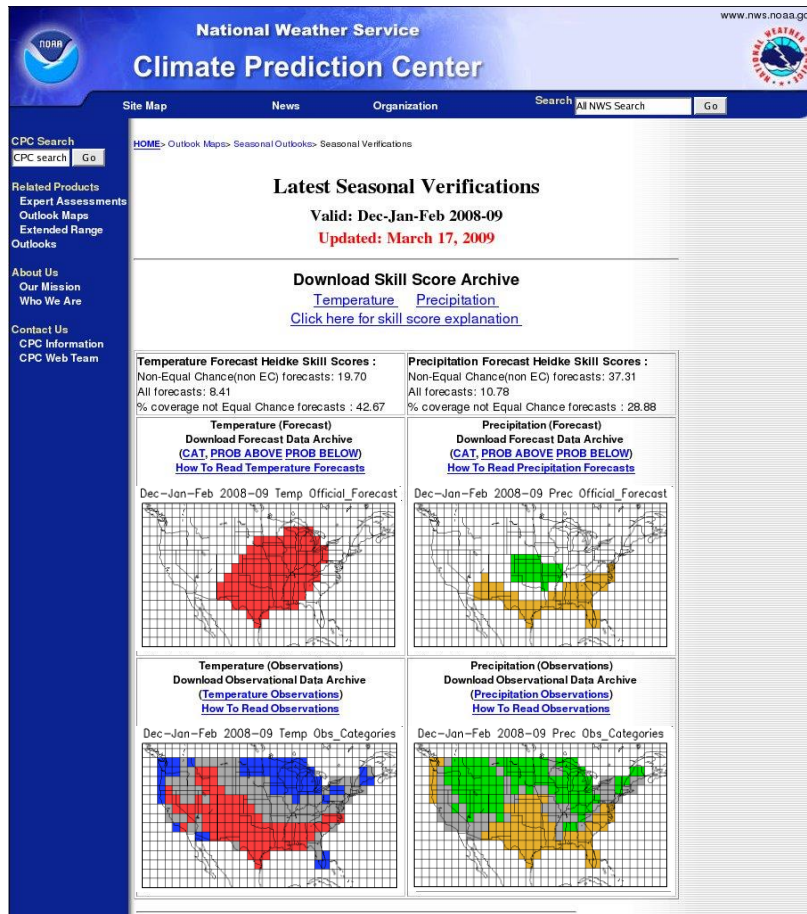
Are CPC outlooks and associated verification products having an impact on decision making (e.g. assessments of risk)?



Outlook Verification Tools



http://www.cpc.ncep.noaa.gov/products/predictions/long_range/tools/briefing/seas_veri.grid.php



- **CPC provides real-time gridded verification of its seasonal outlooks**
 - downloadable archive
 - observations
 - performance metrics
- **Current/planned extension:**
 - monthly outlooks
 - regional extended range
 - performance metrics

Products and Services

(Examples from CPC 5-Year (FY09-13) Implementation Plan)

Reanalysis and Reforecasts

- CFS Reanalysis (CFSR) based real-time monitoring
- Extend CFSR back to 1948
- Provide CFSR to the user community (1979-present)
- CFS Reforecasts to calibrate operational prediction

Composites

- Extend the scope of ENSO, MJO, AO composites

Real-Time Monitoring

- Develop regionally specific surface, tropospheric, stratospheric and oceanic real-time monitoring tools

Message: CFSRR is an important near-term opportunity as it contains a new suite of probabilistic information that will help users assess risks in their decision making.

Can the CPAS community track user needs for CFSRR-based products?

Challenges

Develop Seamless Weather-Climate Prediction Capability

Probabilistic forecasts for weeks 3 & 4

Objective drought monitoring and prediction

Probabilistic ENSO forecasts

Develop In-House Reanalysis and Reforecast Capabilities

CFS Reanalysis and Reforecasts

Using Reanalysis (e.g. use probabilistic information to characterize climate risk)

Attribution of Climate Events

Understanding prediction skill; climate variability

Resource Transition Activities

Climate Test Bed (R2O); Model Test Facility (O2R)

Develop NOAA Climate Services

Climate Service Implementation Team

Climate Portal

Partnerships (e.g. JAWF)

Summary

CPC:

- Delivers a suite of “operational” climate prediction, monitoring, and assessment products
- Actively pursues collaboration with other NCEP Centers, the NWS, and the broader climate community
- Accelerates advances in climate prediction and fills gaps in the “seamless suite” of climate products
- Plays a unique and critical role in NOAA climate services
- Will play a central role in NOAA’s emerging strategy for a National Climate Service

Take Away Message

- CPC is working to improve the product suite in two important ways:
 - *Improve the skill of official outlooks, and*
 - *Expand / improve the product mix and presentation.*
- We are asking help from the CPAS community in the second area, especially based on your interactions with users.