Northwest River Forecast Center

Emerging NWS RFC Service Requirements and Operational Implications

NOAA Water Cycle Science Challenge Workshop
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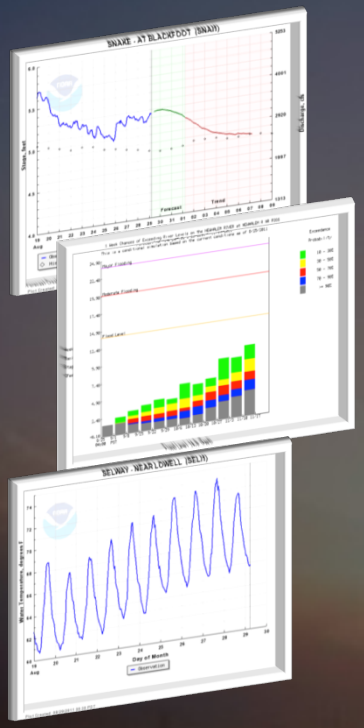
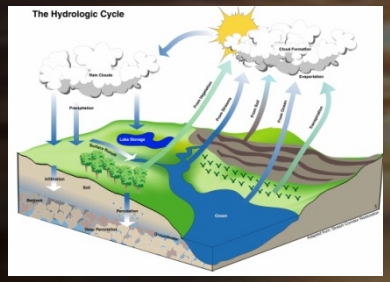
NWS Hydrologic Services

- NWS is all about High Impact Decision Support
  - *RFCs have been focused on meeting user's needs for flood forecast information for 50+ years.*
- Job #1 is providing reliable flood forecast at lead time that permit non-structural mitigation.
- Water Resources Services is an emerging theme.

Big Shifts in Hydro Services





- More locations
- More detail
- Longer lead times
- Bridging the R2O gap
- Uncertainty estimation
- Low or sub-flood critical flow forecasts
- Water temperature (fisheries)
- Estuary / Delta management
  - *Salinity*
  - *Tidal influences*
- *Spatial estimates of water cycle parameters and components*

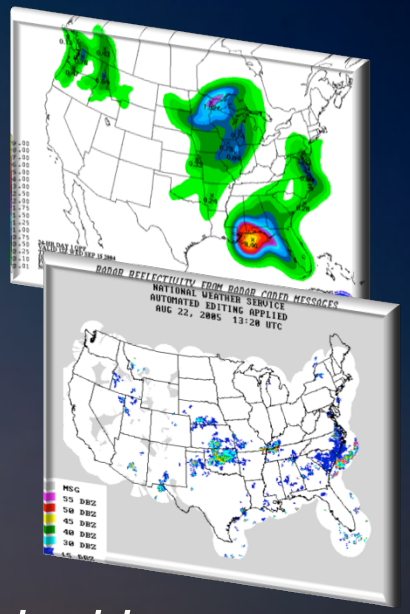
Implications

- Improvements to stream gaging network
- Improvements to precipitation data
- Development of consistent historical forcings data
- Development of reliable uncertainty information

Steam Gaging

- Current stream gaging network is inadequate
  - *USGS network is underfunded*
    - Constant threat of lost observational sites due to loss of non-federal cooperator funds.
    - Additional sites needed to validate modeling and meet expanding water resources services.
  - *Rating curves are often unreliable at high flow and at the lowest flows where value is greatest.*

Precipitation Data

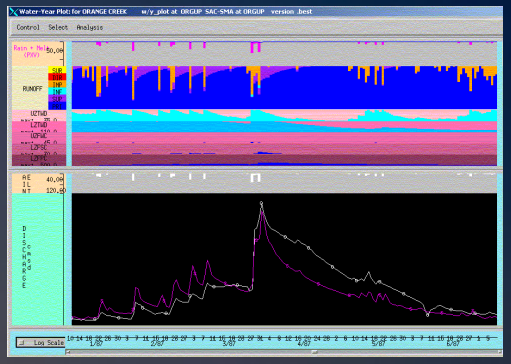


- Precipitation data need to improve
  - *Inconsistent rain gage network*
    - Distribution
    - Performance and maintenance vary widely
    - Issues magnified in mountainous terrain
  - *Multi-sensor precipitation processing is still lacking*
    - Rain gage
    - Radar
    - Satellite
    - NWP Models
    - Climatology

Balanced / Objective / Dynamic

Historical Model Forcings

- Analysis of Record (AOR)
  - *Precipitation, Temperature, PET*
  - *Hourly, 6-hourly, daily*
  - *Needed for*
    - consistent watershed model calibration
    - consistent ensemble streamflow prediction
  - *Major labor savings for RFCs*
  - *Science/techniques needed to accommodate shifts in observation networks (e.g. pre and post radar) over time.*



Data Assimilation

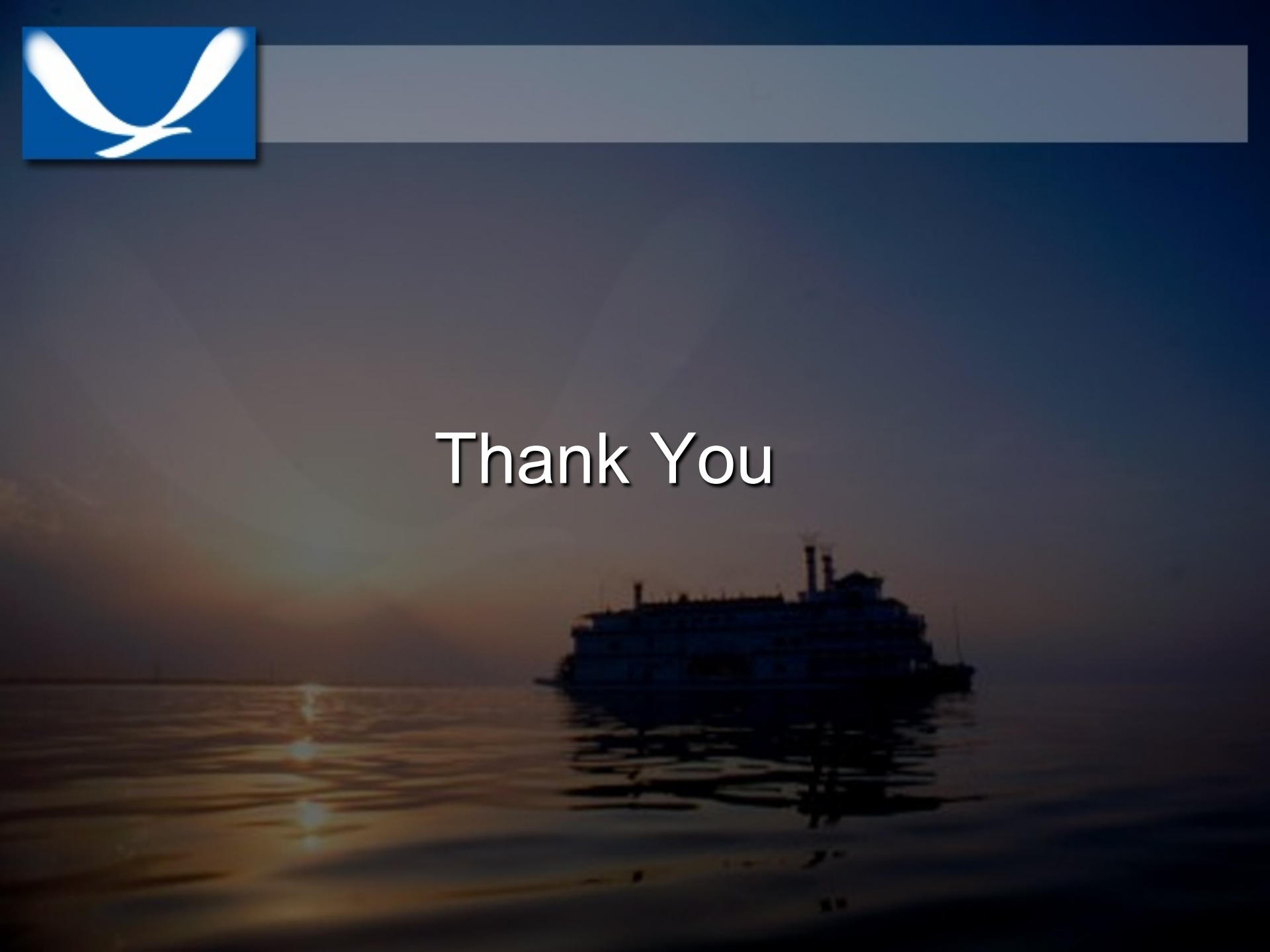
- Operational pathway for remotely sensed data into watershed model states (updating) is lacking.
- NWP projections of precipitation and temperature not appropriate for direct use.
- Creates a “gap” between researchers and operational practitioners.

Uncertainty

- Improvements in single-value (deterministic) forecasts are slow.
- Value in accurately describing the uncertainty in forecasts and integrating it into our customer's decision support tools is massive.
- Reliable (unbiased, accurate spread) probablisitic hydrologic forecasts for lead times from hours to years is the "brass ring" for hydrologic services.

Uncertainty – cont.

- Much work remains to operationally develop and validate reliable ensemble forecasts.
- Strong ties to NWP efforts.
  - *Reforecasts are needed to understand performance.*
- Uncertainty estimates are of most value at the extremes where they are the least reliable.
- Customer education and assistance with decision support integration is key.


Thank You