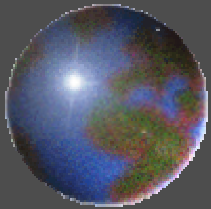
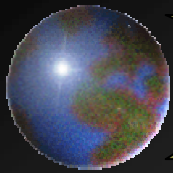


GAPP Ensemble Experiments (GE²) Initiative



Allen Bradley
University of Iowa
&
John Schaake
NWS/OHD

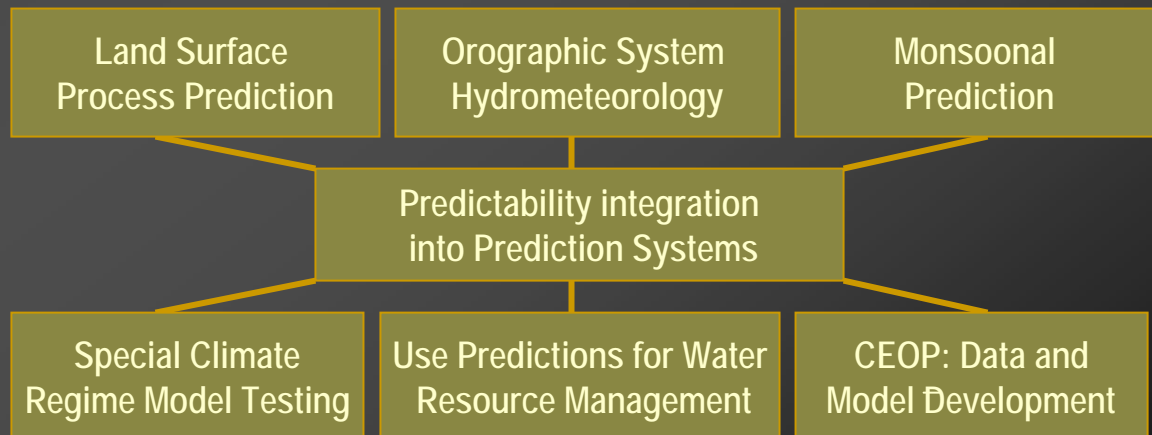




GEWEX Americas Prediction Project (GAPP)

- The **mission** of GAPP is to demonstrate skill in predicting changes in **water resources** over **intraseasonal-to-interannual time scales**, as an integral part of the climate system

GAPP Components



GAPP Background:

GAPP has a successful history rooted in *international* and *interagency* cooperation, scientific advisement, and operational relevance.

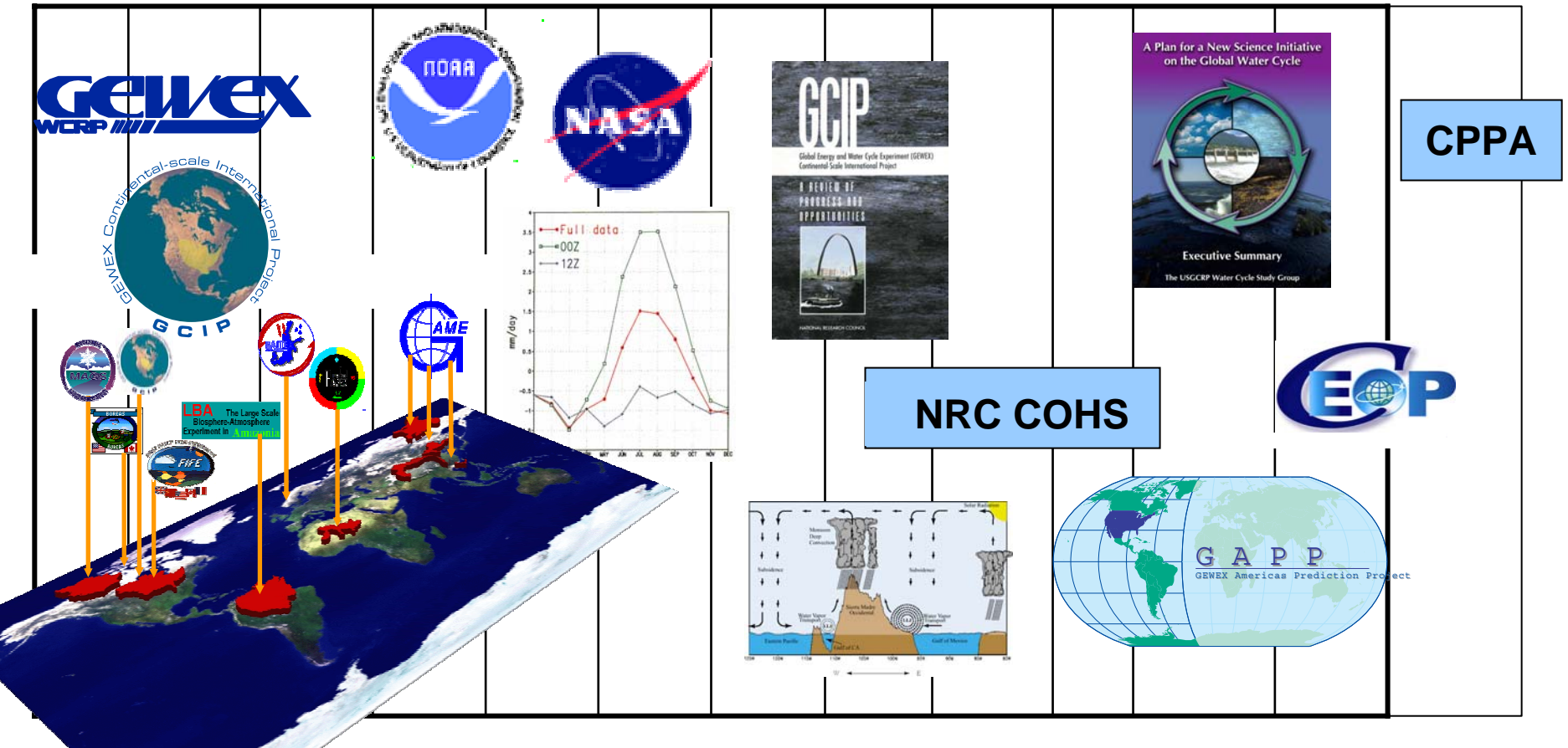
International: WCRP-UNESCO-IGOS-IAHS-IGBP

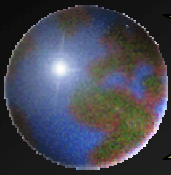
Interagency: NOAA-NASA-BoR-USGS-USDA-DOE-USACE

Research Community: ~50 university, federal, state, and private researchers

YEAR →

'91 '92 '93 '94 '95 '96 '97 '98 '99 '00 '01 '02 '03 & Beyond





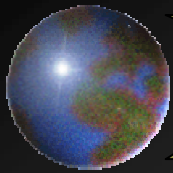
GAPP Objectives

⊕ One of the primary objectives is to:

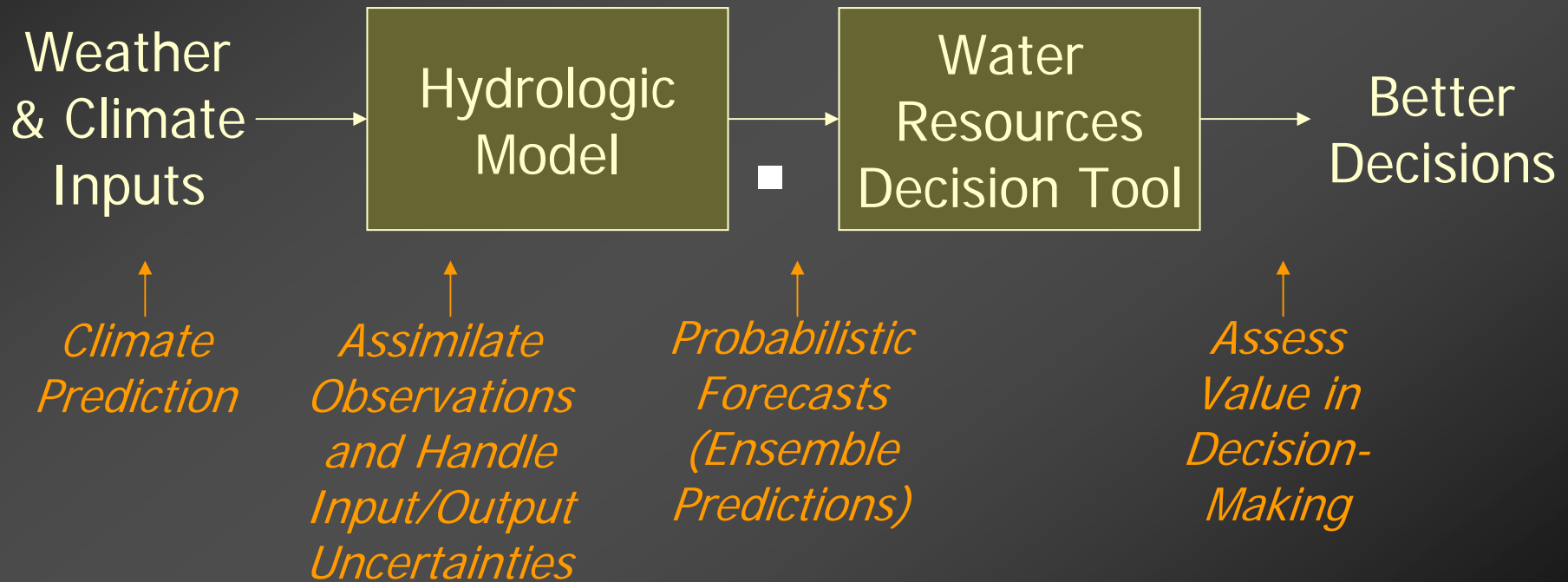
“Interpret and transfer the results of improved seasonal predictions for the optimal management of water resources”

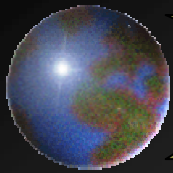
⊕ Elements:

- ⊕ Hydrologic prediction & predictability
- ⊕ Hydroclimatic forecasting technologies
- ⊕ Water resources decision-making



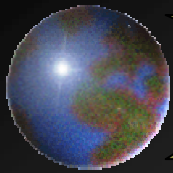
GAPP Strategy for Water Resources





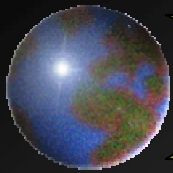
WR Applications Group (2004)

- ❖ Critical needs for GAPP WRA research:
 - ❖ Need to facilitate the research of investigators on hydrological ensemble prediction, by providing community data and forecast technology components to enable their investigations
 - ❖ Need to provide an experimental framework that allows for scientific comparison of forecast technologies and transfer to the operational forecasting community

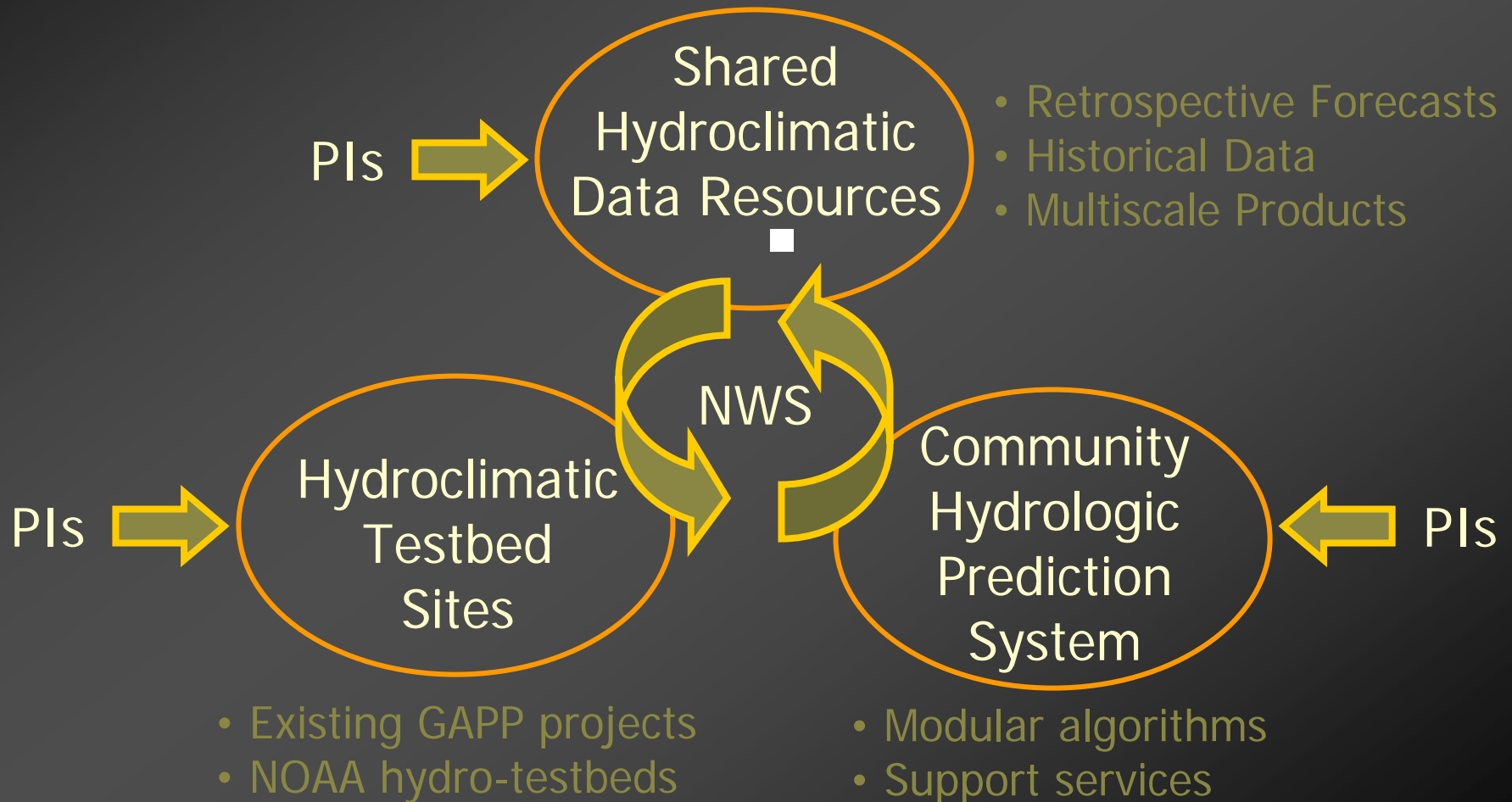


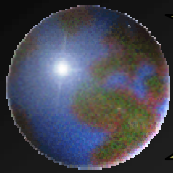
GAPP Ensemble Experiments (GE^2)

- ⊗ An initiative to develop **community-based** ensemble prediction experiments as part of GAPP
-
- ⊗ The objective would be to **formulate** and carry out **experiments** that advance and demonstrate techniques for **hydrologic ensemble prediction**
- ⊗ **U.S. contribution** to HEPEX at **seasonal climate** time scales



GAPP Ensemble Experiments (GE²)





Science Priorities for GE² Initiative

● Interpreting Climate Predictions

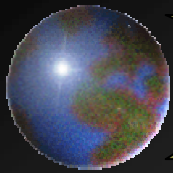
- How can the full information content from skillful climate forecasts be reflected as weather inputs to hydrologic forecast models?

● Initialization of the Hydrologic Forecast Models

- What is the role of initialization (versus climate forcing) on hydrologic predictability at seasonal climate time scales?

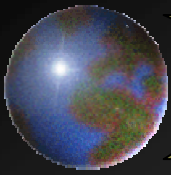
● Producing Accurate/Reliable Hydrologic Ensembles

- What steps are needed to generate useful forecast products that fully account for the uncertainty in hydrologic forecasting?



Prediction Project Experiments

- Focus on development and side-by-side testing of forecasting technologies:
 - Comparison of approaches for generating ensemble weather inputs from climate model outputs
 - Assessment of the impacts of hydrologic model initialization and land data assimilation on forecast quality
 - Comparison of techniques for adjusting hydrologic ensembles to remove biases and enhance predictive skill



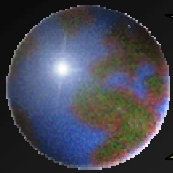
Cross-Cutting Activities

● Data Resources

- Development of retrospective climate forecasts across the US and at project sites
- Creation of hydrologic ensemble forecast data sets for use in testing and comparing methods for adjusting traces to remove biases and enhance skill

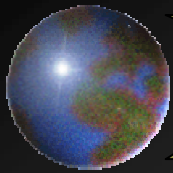
● Scientific Framework

- Establishment of metrics and verification tools for intercomparisons
- Benchmarking ensemble (probabilistic) forecasts with those based on statistical modeling approaches (rather than climatology)



Where Does GE2 Stand Today?

- Still a concept – not a program
 - Not far ahead (or behind) HEPEX itself
- Funding opportunities for elements through NOAA and NASA (GAPP/CPPA)
- Commitment from NWS/OHD for specific activities/products and collaboration
- Existing community of GAPP investigators and established interactions with operational agencies to build on



GE² Initiative

- ❖ Major focus of GAPP research in hydrology and water resources
- ❖ Experiments will be driven by scientific issues in hydrologic prediction over climate time scales
- ❖ Strong collaboration with the operational hydrologic forecasting community at NWS
- ❖ Contribution to international research efforts through the Hydrological Ensemble Prediction Experiment (HEPEX)