

HAP
CEOP

Hydrologic
Application
Project

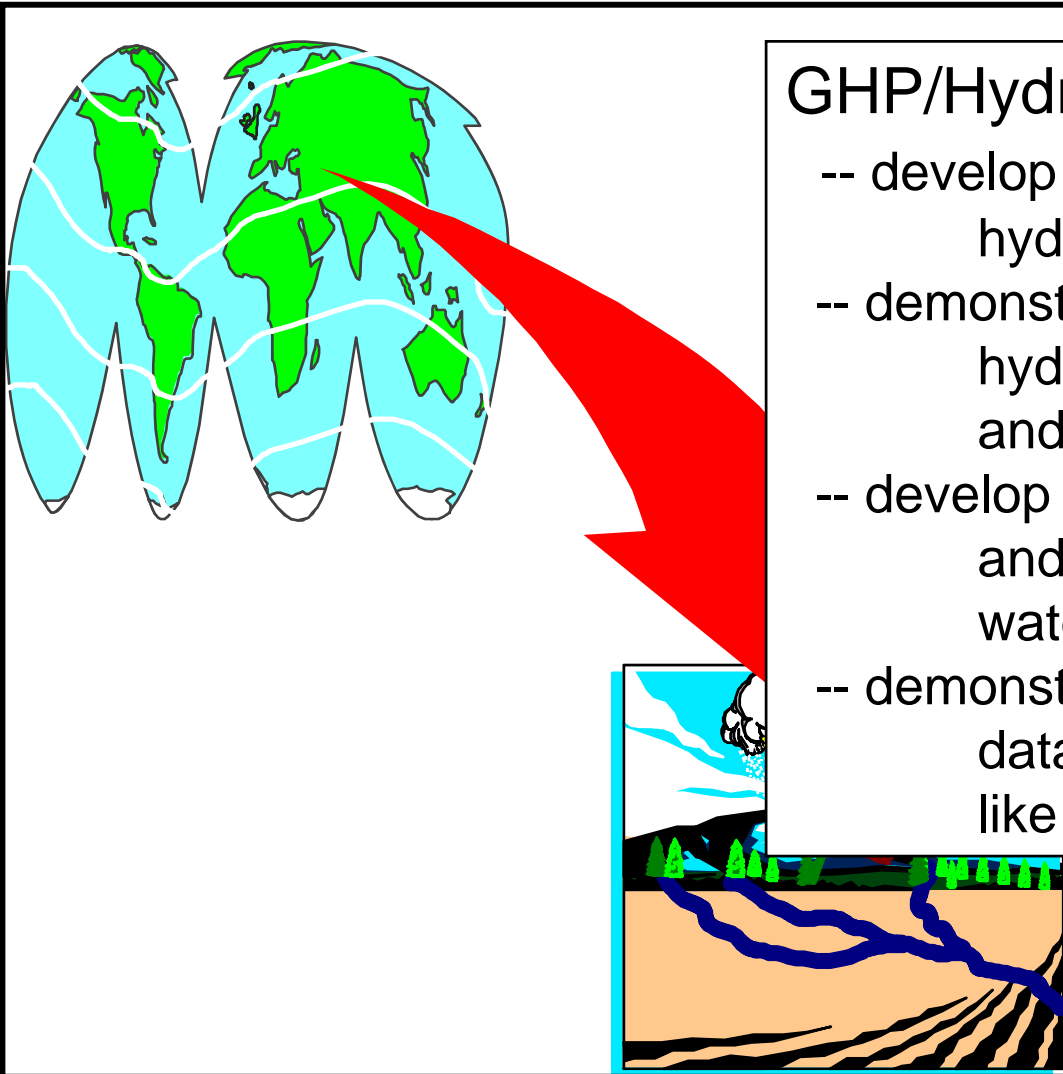
Hydrologic Application Project (HAP)

Report on 2008 Activities

Eric F Wood, Chair
(Princeton University)

Presented at the CEOP
International Implementation Planning Meeting,

September 15-17, 2008
Geneva, Switzerland



GHP/Hydrologic Application Project

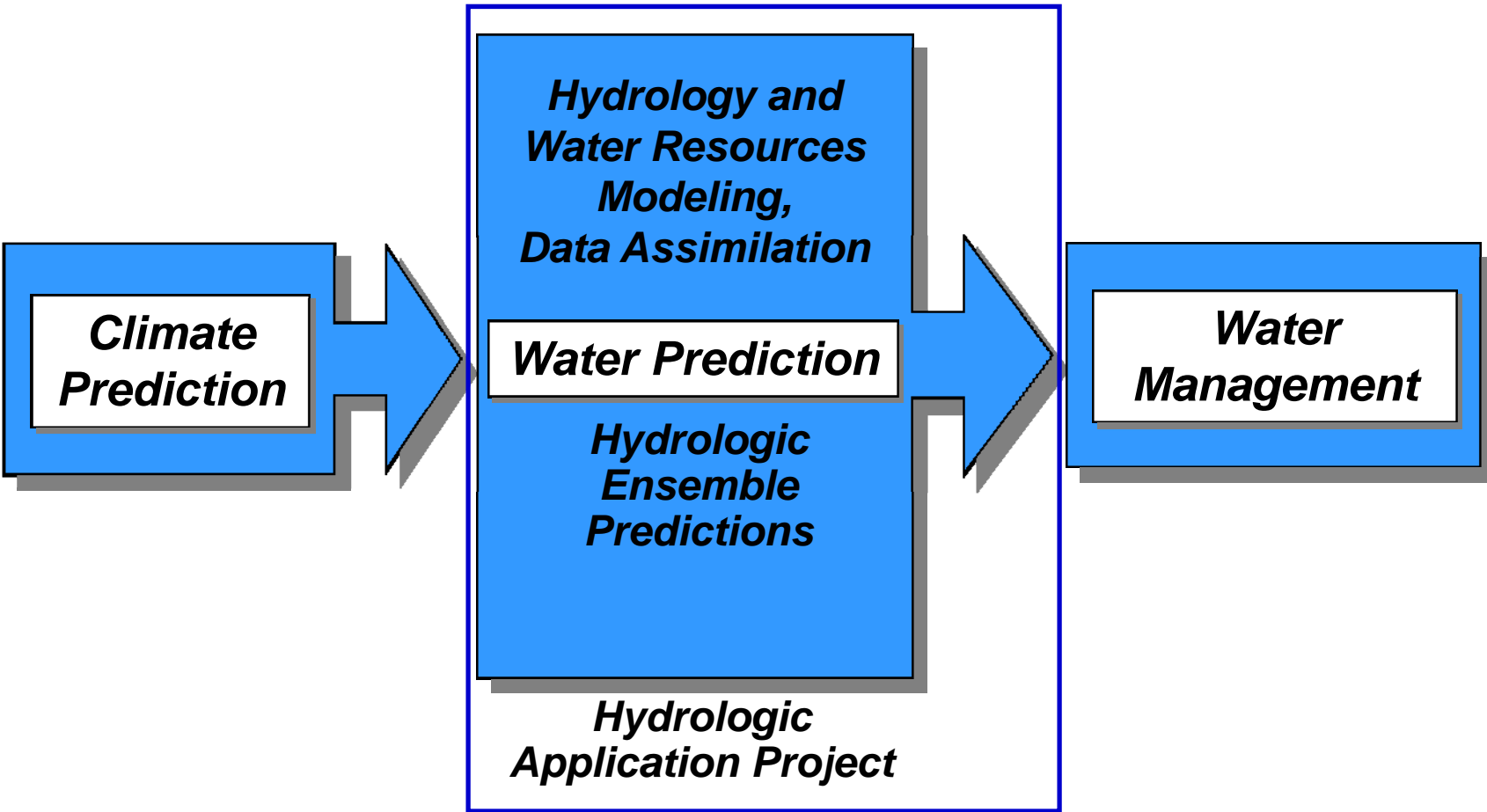
- develop and test probabilistic hydrologic forecasts procedures
- demonstrate how to produce reliable hydrologic ensemble predictions and their use for water resources
- develop and test hydrologic nowcasting and monitoring systems useful for water resources.
- demonstrate the usefulness of GEWEX data products for related activities like WISE, HEPEX, PUB, (etc.)

Developing the science behind skillful ensemble hydrologic seasonal forecasts, and demonstrating their usefulness.

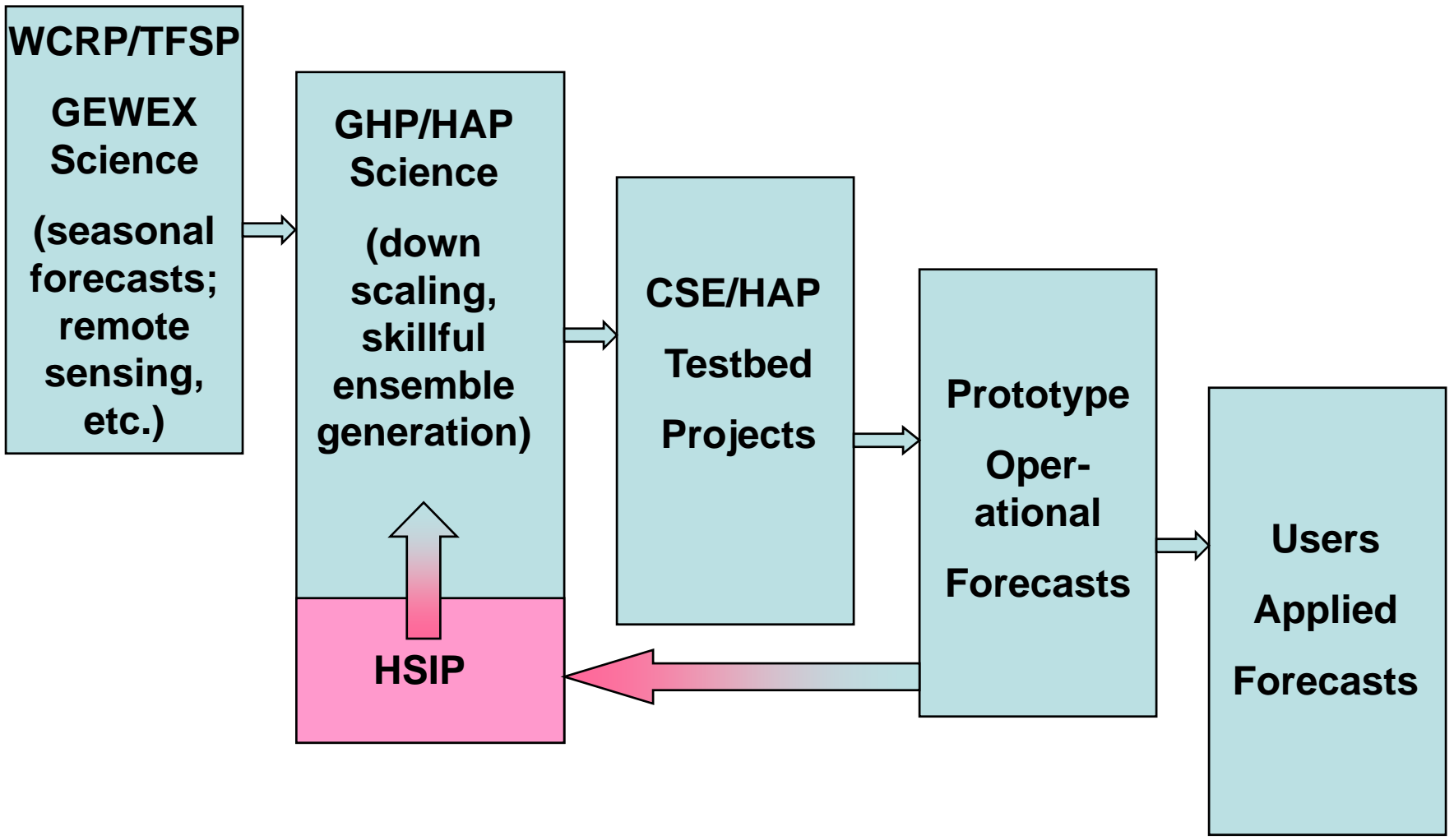
GHP Hydrologic Application Project (HAP) goals:

1. Developing procedures for assessing current hydrologic conditions through application of GEWEX supported data products, including remotely sensing;
2. Developing and testing of reliable, skillful hydrologic ensemble forecast procedures based on seasonal climate model forecasts;
3. Demonstrating that the procedures can be applied at scales useful for water resources through test-bed sites and demonstration projects;
4. Working with related projects, like GHP/WISE, HEPEX, Project for Ungauged Basins (PUB).

From Climate Prediction to Water Management



HAP Science Infusion Process (HSIP)





HEPEX Test-bed Projects

Applications Science	Bangladesh	Brazil	Po River	MAP D-Phase	France	Rhine	E. US	W. US/Ca	Great Lakes	Hydrocomp
Atmospheric downscaling								<input checked="" type="checkbox"/>		
Ensemble QPE										
Parameter estimation										
Hydrologic uncertainty										
Post processing										
Product generation										

Current HAP Activities

New HAP test-beds projects.

Uruguay River basin (Brazil) (with HEPEX)

Collaborator: Prof. Carlos Tucci.

Research goal: Evaluation of seasonal forecasts for agriculture and water management

HAP data products: Downscaled and bias corrected seasonal temperature and precipitation forecasts from NOAA/NCEP Climate Forecast System (CFS) for the period 1995-2006, and with each forecast having 20 ensemble members, for the selected 20 precipitation stations. These will be used with the local hydrological model, calibrated to the specific meteorological stations.

HEPEX Downscaling test bed in the United Kingdom (with HEPEX)

Collaborator: Dr. Christel Prudhomme (CEH), Mr. David Lavers (PhD student)

Research goal: Evaluation of statistical and dynamical downscaling approaches for seasonal forecasts. Initial focus is the River Dyfi basin in central West Wales.

HAP data products: HAP has provided Bayesian downscaling software that the test-bed will use and evaluate. NCEP's GEFS and CFS forecasts for Europe provided via HEPEX ftp site.

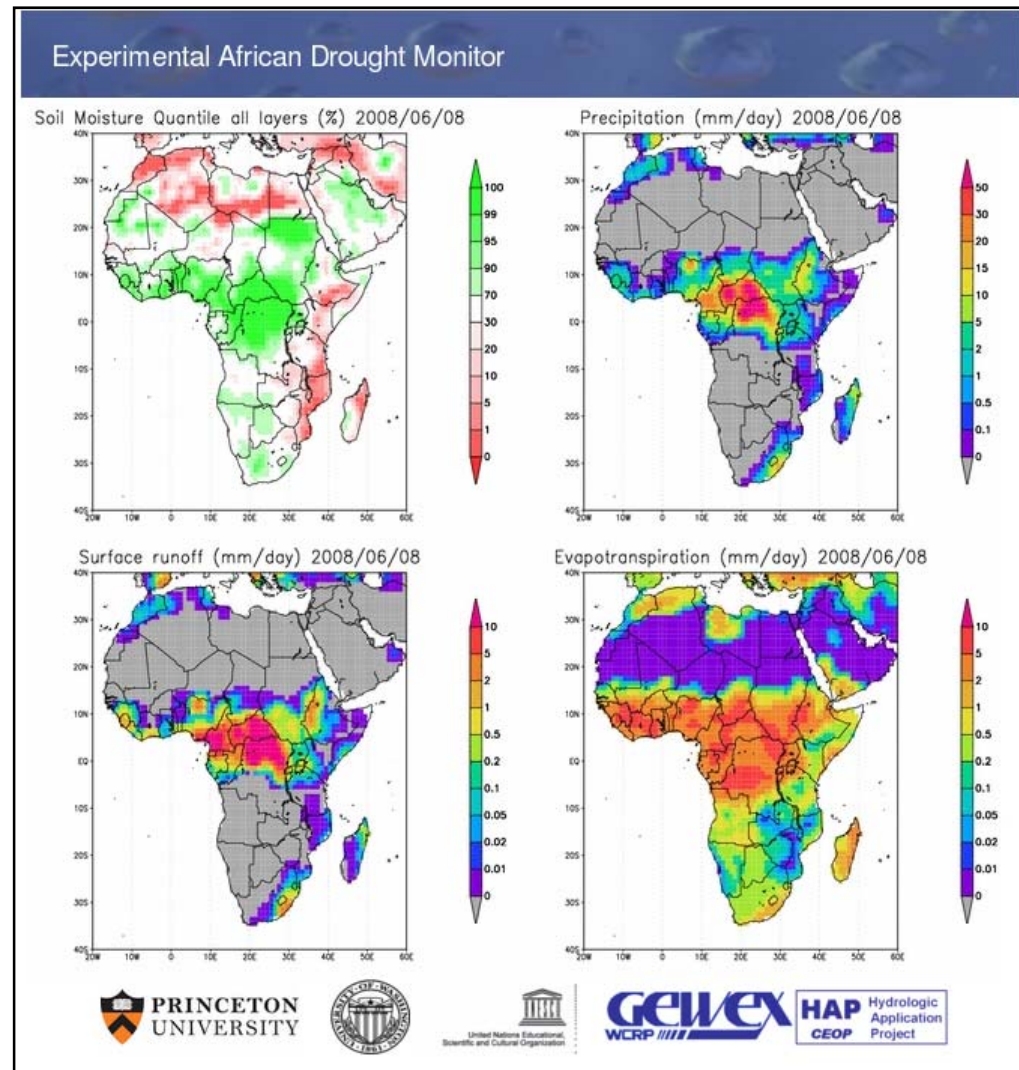
Current HAP Activities

Hydrologic nowcasting and drought monitoring.

Goal: To develop an integrated Drought Monitoring and Prediction System (DMAPS) that utilizes NASA-supported science and satellite data products that are central to GEWEX and to HAP's goal of providing GEWEX data and science products to water resources managers and related users.

Collaborators: UNESCO's International Hydrology Programme (IHP)

Data Product: Developed "Africa Drought Monitoring" (ADM) system, which runs in real-time at Princeton University.



Current HAP Activities

Seasonal Hydrologic Predictions.

HAP is generating a global (land) hydrologic re-forecasts (hindcasts) based on NOAA and DEMETER seasonal forecasts and a 50-year surface meteorological data set that will serve as the basis for bias correction and downscaling. There is close collaboration with HEPEX with this activity.

Collaboration with HEPEX.

HAP and HEPEX co-sponsored a workshop on Hydrologic Ensemble Post-Processing that was hosted by Deltares (formerly Delft Hydraulics) in Delft June 23-25, 2008. The workshop goal was evaluate approaches to improve hydrologic ensemble forecasts through statistical post-processing of the output from hydrologic ensemble forecast models.

Development of a “science plan” for a Post-Processing and Hydrologic Uncertainty test-bed project to be established in the near future.

Future HAP Activities

Collaboration with HEPEX.

(2008) HAP and HEPEX will co-sponsor (with several other organizations) a workshop on Post-Processing and Downscaling of Atmospheric Ensemble Forecasts for Hydrologic Applications. This will be hosted by Meteo-France in Toulouse, June 15-19, 2009.

(2008-2009) HAP and HEPEX will develop a test-bed project on Ensemble Representations of Rainfall Observation and Analysis Uncertainty, with a related workshop in the 2009 timeframe.

HAP and HEPEX expect to sponsor a Hydrologic Ensemble Forecast User's workshop in 2010 where example hydrologic ensemble forecast applications and potential applications can be discussed with the user community

Future HAP Activities

Collaboration with IAHS (Working Group on Hydrometeorologic Projects)

Complete plans to collaborate with WGHP on applying GEWEX science and data sets to the international Prediction of Ungauged Basins (PUB) and hydrologic model calibration under MOPEX.

Collaboration with GMMP on GLACE-2

HAP seasonal forecasting working group members will continue to participate in the GMPP GLACE-2 experiment whose goal is to assess the role of using soil moisture initial conditions to improve seasonal forecasting.

Develop new HAP test-beds in the RHP regions.

HAP will continue to try and establish test-beds in the RHP regions, but needs the RHP coordinators to help identify collaborators. CEOP management needs top help encourage the RHP coordinators to identify these testbeds so the goals of GEWEX can be met.

Future HAP Activities

Seasonal Hydrologic Predictions.

HAP will continue its activity to generate a global (land) hydrologic re-forecasts (hindcasts) based on NOAA and DEMETER/EuroSIP seasonal forecasts. CSEs should identify testbed activities, and groups to evaluate the hydrologic ensemble forecasts. HAP will expand its collaboration with HEPEX.

Estimation of current hydrologic conditions (snow, soil wetness)

HAP will try to work with other GEWEX activities and weather centers to obtain real-time data that will allow for such estimation. GEWEX needs to help to facilitate this.

Future HAP Activities

Contributions to the GEWEX Milestones.

Will contribute to GEWEX objectives through “Improve the predictive capability for key water and energy cycle variables....and determine the geographical and seasonal characteristics over land areas” and “...demonstrating the value of GEWEX research” to operational hydrometeorological services.

HAP Linkages

Within CEOP

GLDAS can provide input data needed by HAP.

RHPs need to be involved in establishing RHP HAP testbeds, and in testing the HAP forecast products (Linkages with AWCI?)

Within GEWEX

GEWEX Modeling and Prediction Panel (GMPP). Given the modeling focus of HAP, does it fit better in GMPP?

Within WCRP

WCRP Working Group on Seasonal Prediction . Overarching goal of WGSP is “to determine the extent to which seasonal prediction is possible and useful in all regions of the globe with currently available models and data”, which is synergistic with HAP.

Outside of WCRP

GEOSS HAP can offer products directly relevant to GEOSS (e.g. hydrologic monitoring, hydrologic seasonal forecasts)

HEPEX (Hydrologic Ensemble Prediction Experiment. Very synergistic.

UNESCO. HAP is working with UNESCO’s IHP on drought monitoring.

ESSP. HAP can contribute to Global Water System Project (GWSP)

Thank You

Precipitation Forecasts are Temporally Scale Dependent

GFS Precipitation Forecast Correlation vs Lead Time NFDC1HUF - January 15 Forecast Creation Time

