

HAP, HEPEX and IAHS

John Schaake

GEWEX/CEOP Workshop

Bali, September 6-9, 2007

Recent HAP Activities

1. HAP working group scientists participated in a workshop organized by the Hydrological Ensemble Prediction Experiment (HEPEX) in June 2007. The workshop focused on methodological issues related to seasonal hydrological forecasts as well as testbed activities where the science was being evaluated.
2. The HAP strategic plan has an element related to joint scientific activities between GEWEX and IAHS, which included a joint working group. These activities include applying GEWEX science and data sets to the international Prediction of Ungauged Basins (PUB) and hydrologic model calibration under MOPEX. At the recent IUGG meeting (July 2007), the scope of activities under the working group, and its structure, was updated.
3. Progress has been made in forming the HAP seasonal forecasting working group. This working group consists of one group whose focus is on the methodological development of hydrological seasonal forecasting (downscaling, bias corrections, evaluation of hindcasts and proper inclusion of forecast uncertainty.) The second group, whose membership is incomplete, will focus on specific 'test-beds' where the seasonal hydrologic forecasts will be evaluated for usefulness in water resources decision making. Comments regarding populating this part is below.
4. The CEOP coordinators from the Regional Hydrometeorological Projects (RHP), previously the Continental Scale Experiments, have a responsibility to identify RHP investigators interested in establishing HAP testbeds sites. It is these local researchers who can best evaluate the usefulness of the seasonal forecasts and work with local water resources decision makers. It is the goal of HAP to have one test-bed in each RHP. HAP requests that over the next six months the RHP coordinators identify one test-bed and test-bed scientist for their RHP.
5. Progress is being made on generating hydrologic hindcasts
6. Possibility of having some of the GWSP testbeds collaborate with HAP will be explored.
7. Report to CEOP in preparation

IAHS - PUB



The screenshot shows the PUB website interface. At the top, there is a header with the IAHS logo on the left, the text 'PUB: PREDICTIONS IN UNGAUGED BASINS' and 'SECRETARIAT AT THE INTERNATIONAL WATER MANAGEMENT INSTITUTE' in the center, and the IWM logo on the right. Below the header is a navigation bar with links for 'PUB Home', 'IAHS', 'IWM', and 'Joining PUB'. A vertical sidebar on the left contains a menu with items: ABOUT PUB, THEMES, WORKING GROUPS, AFFILIATED PROJECTS, EXPRESSIONS OF INTER..., EVENTS, NEWSLETTERS, PUBLICATIONS, VACANCIES IN PUBs, LINKS, HYDRO SOFTWARE, STUDENT CORNER, SECRETARIAT, PUB LOGO, and CONTACTS. The main content area is titled 'WORKING GROUPS' and contains the following text:

Working Groups (WGs) are the main engines for PUB activities and achievements. The PUB Science Themes serve as the organizational basis for PUB and for WGs. There are two types of WGs in PUB:

International Thematic Working Groups (TWGs): For dealing with specific PUB issues, (e.g. access to modelling, process field studies, biomes, hydroclimatic regimes, etc.). From April 2005, each TWG is linked with an appropriate Theme. For within PUB communication purposes a TWG will usually be associated with a single Theme but it might contribute to more than one Theme.

National / regional Working Groups (NWGs): For the promotion, steering, coordination and reporting of PUB business related to a given country or region. NWGs are internal customers of PUB, reaching out to the user community.

List of Working Groups:

- [WG1 - Top-Down Modelling Working Group](#)
- [WG2 - MOPEX Working Group](#)
- [WG3 - Orographic Precipitation, Surface & Ground Water Interactions and their Impact on Water Resources](#)
- [WG4 - Japan Working Group - Suimon Adventure for Knowledge Evolution \(SAKE\)](#)

4-1 and 4-2: Relating hydrologic diversity to landscape elements
4-3: Establishment of assessing methods for hydrologic model performance

IAHS

- IAHS/WMO working group on GEWEX has been replaced by the IAHS working group on hydrometeorological projects:
 - Scope expanded beyond GEWEX to include other projects (e.g. CLIC, HEPEX, USWRP, etc.)
 - Co-chairs are Alain Pietroniro (CA) and Eleanor Blythe (UK)
 - Members from IAHS Commissions and PUB Working Groups
 - IAHS interest in collaboration with GEWEX includes CEOP, HAP, RHPs and GMPP

HEPEX Participation – 3rd Workshop

- *HEPEX is an independent, cooperative international scientific activity comprised primarily of researchers, forecasters, water managers and users. Participation is HEPEX is open to the community and anyone wishing to contribute to its objectives.*



<http://hyd8.eng.uci.edu/hepex/>

HEPEX Core Activities

- Test bed projects
- Supporting data sets
- Components of a Community Hydrologic Prediction System (CHPS)
- Workshops, special sessions, publications

HEPEX 3rd WS Summary

- 65 participants from 19 countries
- 9 new testbed projects proposed (+8 existing)
- Proposed focus-area workshops
 - Users
 - Hydrometeorological forcing
 - Post-processing and hydrological uncertainty
- Proposed new working group
 - Verification procedures
- Presentations
 - On HEPEX web site
 - Research Letters publication of the Royal Meteorological Society.

Proposed New Testbed Projects

- User application in CA & WA (Hydrocomp)
- MAP D-Phase
- Rhine basin
- France
- Parameter uncertainty (MOPEX, DMIP PUB)
- Ensemble QPE
- Hydrologic post-processing
- Product generation
- BPA?

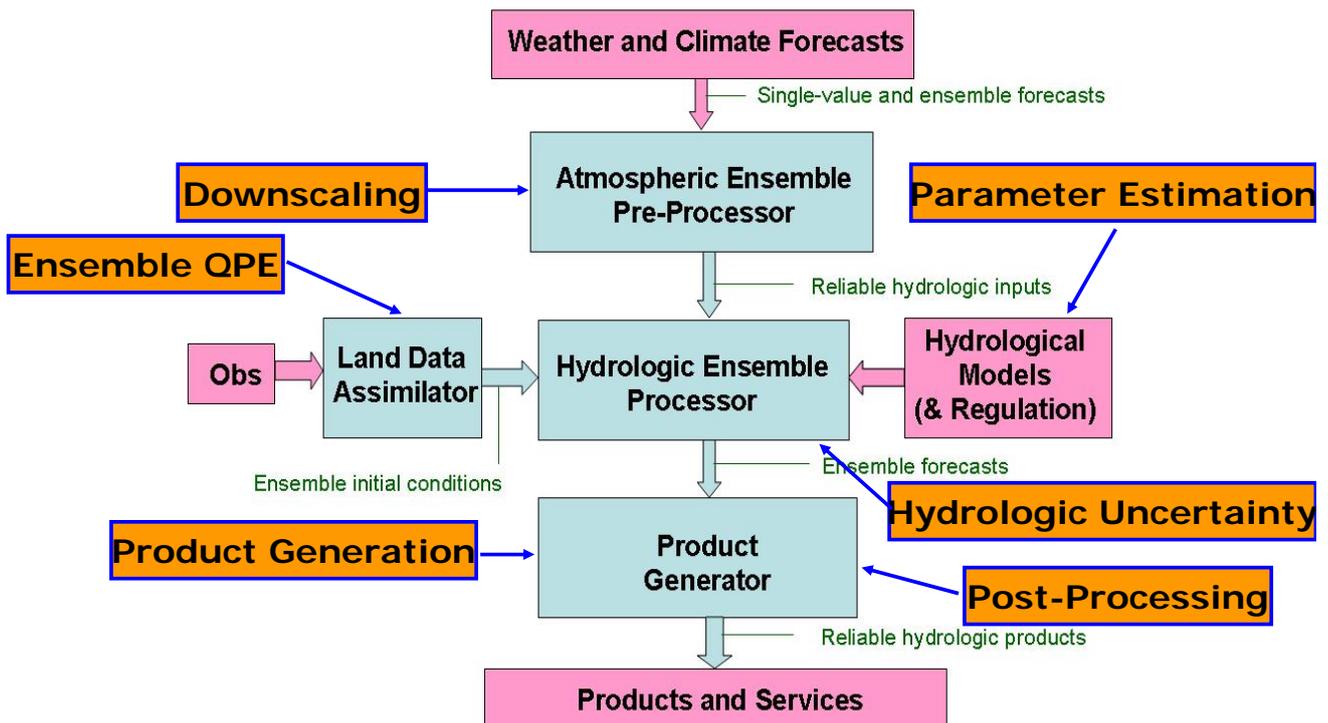


HEPEX Test-bed Projects

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



HEPEX Science Test-beds

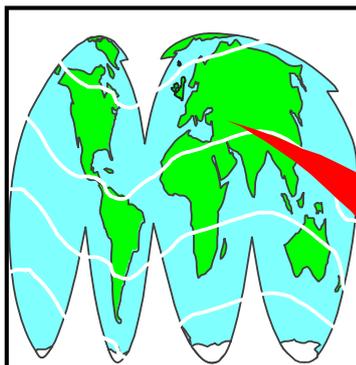


Future HEPEX Plans

- Future workshops proposed:
 - Downscaling (2008/2009)
 - Post-Processing (2008/2009)
 - User Applications (2008/2009)
 - 4th HEPEX Workshop (2009/2010)
- Possible Intercomparison Studies
 - Downscaling (TBD)
 - Post-Processing (TBD)
- Data Sets
- Ensemble Verification/Diagnostic Tools
- Document hydrologic applications requirement for weather and climate hindcasts (re-forecasts for ~1980 to present)

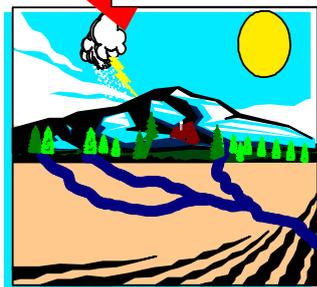


Implementation Strategy



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
- Demonstrate the usefulness of GEWEX data products for related activities like WISE, HEPEX, PUB, (etc.)



WRAP



HAP

The Water Resource Applications Project (WRAP) goals:

1. Dialogue with hydrological modeling community in operational environmental services;
2. Demonstrate skill in predicting change in water resources and soil moisture on time scales up to seasonal and annual;
3. Collaborate with water resources agencies to develop better hydrometeorological predictions

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

GHP Hydrologic Application Project (HAP) (draft) 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, 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).

Current (Initial) HAP Activities

Development of a HAP Draft Strategic Plan.

Completed and distributed at this meeting. After approval, HAP will establish Working Groups and a more detailed schedule of activities.

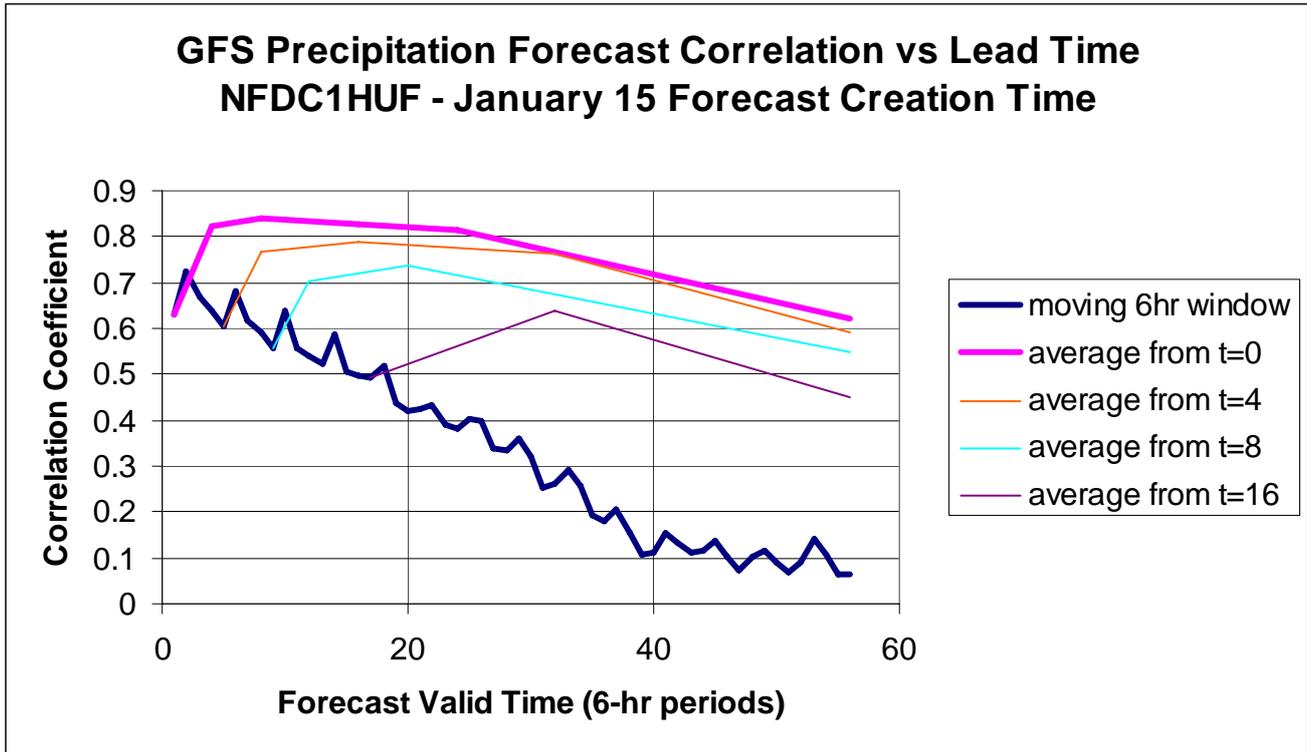
Seasonal Hydrologic Predictions.

HAP will generate 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.

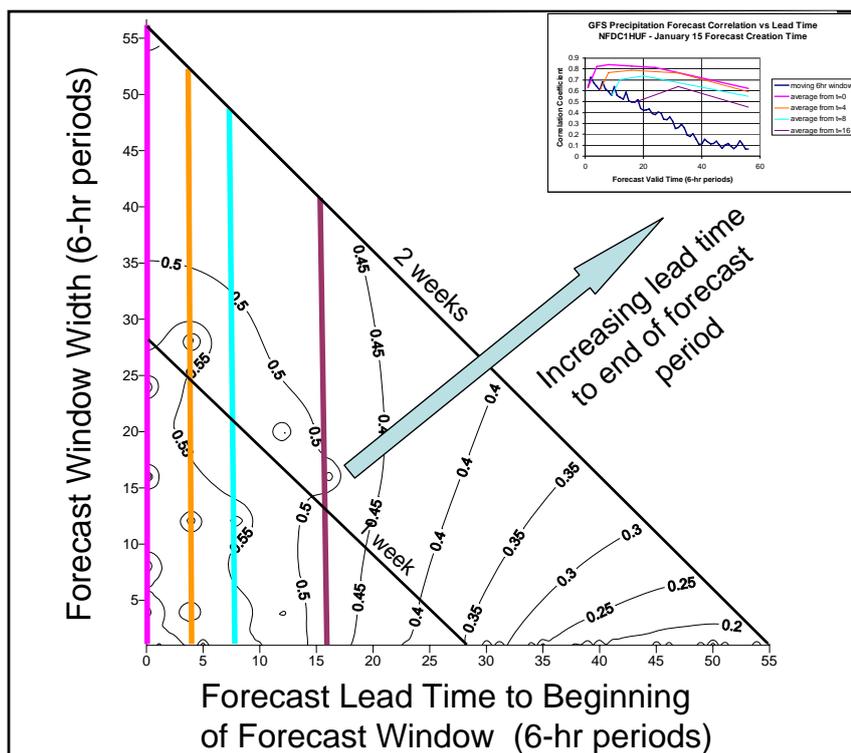
Estimation of current hydrologic conditions (snow, soil wetness)

HAP is partnering with groups to estimate such current conditions but needs a strategy to expand this globally. (Requires real-time surface meteorology.)

Precipitation Forecasts are Temporally Scale Dependent



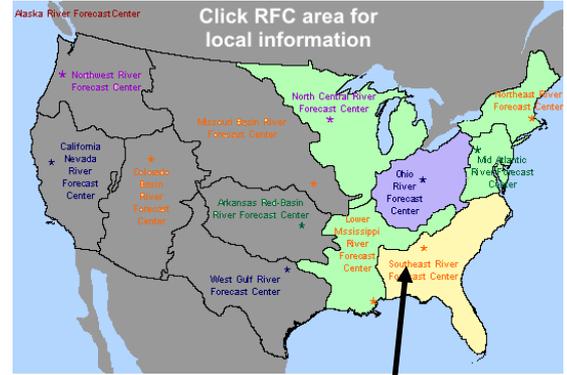
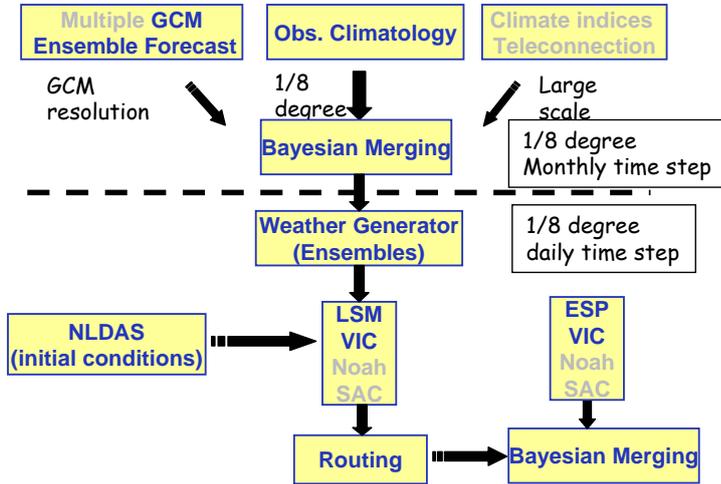
GFS Precipitation Forecast Correlation Coefficient: Temporal Scale-Dependency NFDC1HUP – January 15 Forecasts



Experimental Seasonal Hydrologic Forecast System over the Eastern US

Project objectives:

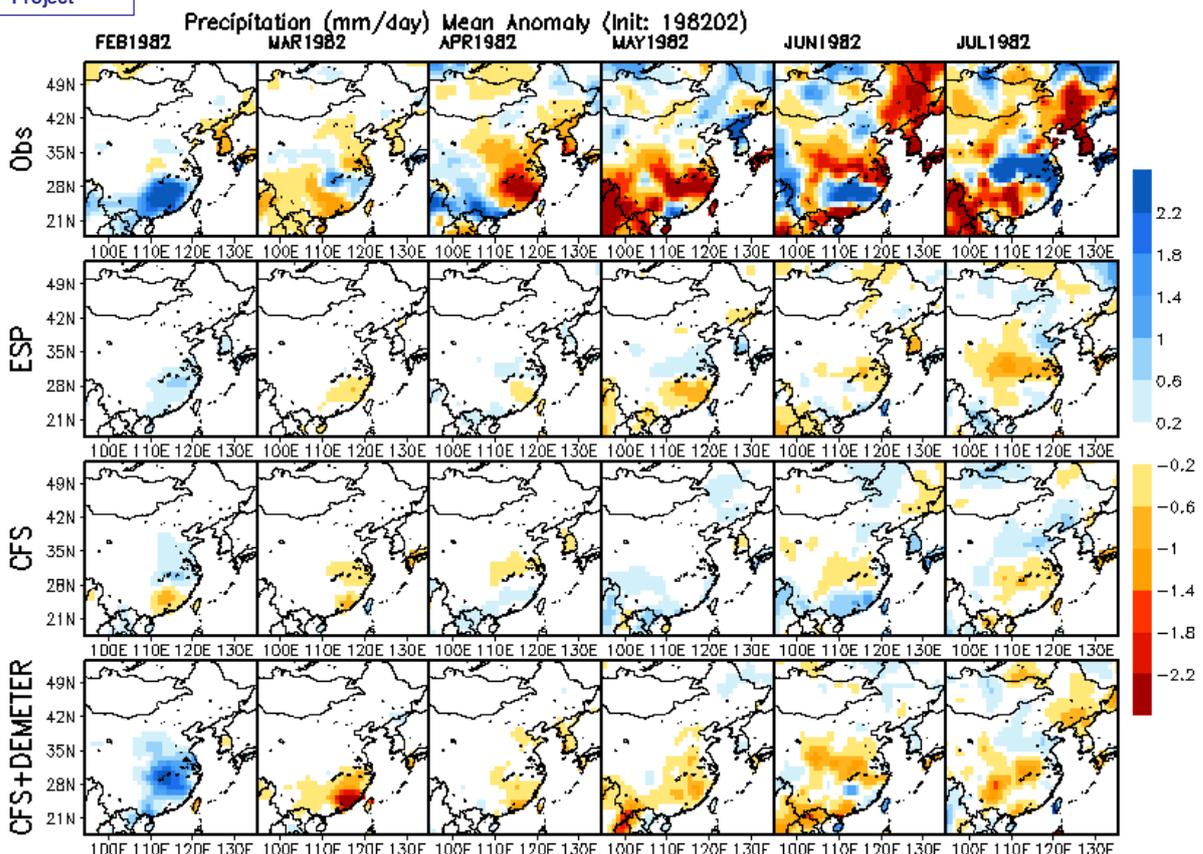
- (i) develop a seasonal hydrologic forecasting system that utilizes NCEP dynamical Climate Forecast System (CFS),
- (ii) evaluate the hydrologic forecast uncertainty and skill over a range of basins and
- (iii) develop verification approaches for the generated hydrologic ensembles.



Forecast region. 2005 focus on SE



Princeton University



Hydrologic Uncertainty

- MOPEX, DMIP, PUB
 - Data sets / reference sites / flux data
 - Parameter estimation / uncertainty / regionalization
- Role of analysis error
 - Ensemble QPE
 - Effect on parameter estimates
 - Effect on hydrologic model outputs
- Initial condition uncertainty
 - Ensemble initial conditions are needed
 - Role of satellite data?
- Representation of hydrologic model error
- Multi-model approaches
- In some cases hydrologic uncertainty is much greater than effect of forcing uncertainty



Future HAP Activities

Development of a HAP Science Implementation Plan.

The establishment of HAP Working Groups, finalizing the HAP terms of reference, and writing a science plan needs to be completed over the next 12 months.

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”
(Role of river basins)
- “...demonstrating the value of GEWEX research” to operational hydrometeorological services.

And....

Future HAP Activities

Seasonal Hydrologic Predictions.

HAP will generate a global (land) hydrologic re-forecasts (hindcasts) based on NOAA and DEMETER 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.

Thank You

HAP Linkages

Within GHP

GLDAS can provide input data needed by HAP.

CSEs need to be involved in establishing CSE HAP testbeds, and in testing the HAP forecast products

Within GEWEX

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

Within WCRP

WCRP Task Force on Seasonal Prediction . Overarching goal of TFSP 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. It is recommended that GEWEX nominate a HAP person to participate on TFSP.

Outside of WCRP

GEOSS HAP would offer products directly relevant to GEOSS.

HEPEX (Hydrologic Ensemble Prediction Experiment. Very synergistic.

UNESCO. HAP needs to get the attention of UNESCO’s IHP.

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

HEPEX Affiliations

- GEWEX/HAP
- IAHS (new WG)
- GEO/GEOSS & IGWCO
 - Project WA-06-02
- WWRP/THORPEX
- WMO/HWR?
- UNESCO?