Planning for GEWEX Post 2013

The following will be discussed at the Second Pan-GEWEX Science Meeting in Seattle on August 23–27.

Draft Mission Statement

Develop improved observational, diagnostic, and modelling capabilities for measuring and predicting global and regional energy and water variations, trends, and extremes, such as heat waves, floods, and droughts, and provide the science underpinning climate services.

Draft Imperatives:

Data

Develop climate data records of atmospheric and land variables, complete with metadata and error bars.

Lead: GRP, CEOP; Partners: SCOPE-CM, CEOS, WOAP

Actions:

- Reprocess GEWEX data sets, provide advice on other efforts and lead evaluations.
- Continue evaluation and refinement of sensor algorithms, influencing next generation space-born platforms and reprocessing.
- Development of appropriate calibration/validation/evaluation datasets to confront models.
- Devise robust ways of dealing with the more diverse, complex, higher spatial and temporal resolution, and much greater volumes of data.
- Build on CEOP experience in data management, archival and access.

Provide descriptions and analyses of observed variations, trends and extremes in hydrological and energy-related quantities.

Partners: Rest of WCRP

Actions:

- Analyze, evaluate and compare observations, and document results.
- Work to close moisture and energy budgets, regionally and globally.
- Determine the geographical and seasonal characteristics of key water and energy cycle variables especially over land areas.
- Close catchment water budgets.
- Integrated product assessment, data assimilation into hydrological models.

Analysis

Develop advanced diagnostic tools and identify pathways for model improvement.

Lead: GRP, GMPP, CEOP; Partners: WGNE, CAS

Actions:

- Spin up a new joint GRP-GMPP-CEOP effort in advanced diagnostics.
- Build on GEWEX's combination of observations and modelling capabilities.
- Identify and entrain collaborators from other WCRP and CAS groups.

Increase understanding of energy and water cycle processes, quantify their contribution to climate feedbacks, and develop improved hydrometeorological parameterizations.

Lead: GMPP, CEOP; Partners: CLIVAR, CliC, SPARC, WGCM, WGNE

Actions:

- Observations, process studies, field programs.
- Investigate alternative representations of sub-grid processes in Land Surface Schemes.
- Develop improved understanding of climate variability and change on land surface properties, including soils, vegetation, and hydrological processes, and an associated modelling capability.
- Investigate the scope for development of next generation land surface models with improved representation of subsurface hydrology, including groundwater processes; identify suitable areas for their evaluation.
- Develop more modular Land Surface Models and components for use in Earth system models.

Develop and exploit methods of dealing with non-stationarity of hydrological variables, and especially extremes of floods and droughts, associated with climate and global change.

Partners: CLIVAR, IHDP (Global Water System Project, GWSP), UNESCO (International Hydrological Programme, IHP), Hydrological community

Actions:

- Define requirements for data types, sampling, and resolution.
- Develop new statistical methods for planning for extremes.
- Develop new generation methodologies for quantification and prediction of extremes.

Contribute to building a comprehensive end-to-end pan-WCRP initiative on climate extremes such as heat waves, floods, and droughts, addressing the compound nature of extreme events, their ubiquity, and risk-coping issues.

Partners: WCRP (CLIVAR, CliC), Hydrological community, IRDR (Integrated Research on Disaster Risk)

Actions:

- Define requirements for data types, sampling, and resolution.
- Model development, focused on extremes, and definitions consistent with observations (upscaling and downscaling).
- Characterize the entire pdf and especially the characteristics of precipitation (frequency, intensity, amount, type, duration).
- Assist in reducing vulnerability and planning for adaptation to and coping with changes.

Modelling

Attribute causes of trends, and determine the predictability of energy and water cycles on a global and regional basis in collaboration with the wider WCRP community.

Partners: WCRP projects and WGs, IPCC

Actions:

- Develop links between global, regional, and local scales.
- Model detection and attribution studies.
- Coordinate data set generation, process studies, and modelling.

Accelerate developments in models of the land, atmosphere, and entire climate system.

Lead: GMPP, CEOP; Partners: WGNE, WGCM

Actions:

- Strengthen the model improvement activities within GMPP.
- Strengthen collaboration with the modelling centers.
- Consider how the components interact and makeup a complete system through improved understanding of coupling and feedbacks.
- Continue evaluation of developing earth system model products.
- Develop archives to support model development and intercomparison.
- Develop forecasting algorithms including ensemble techniques.
- Promote regional application and evaluation studies.
- Improve representation of hydrological processes – lakes, wetlands, groundwater, river routing.
- Improve the representation of the atmospheric energy and water cycle, in particular clouds and precipitation.
- Improve representation of non-stationarity in land surface properties under global change.

Improve capabilities predictions of water and energy cycle variability on all time scales.

Partners: CLIVAR, CLiC, WGSIP, WGCM, UNESCO (IHP), IAH

Actions:

- Diagnose model errors and exploit GEWEX datasets and focused process studies.

Applications

Develop observational sites, data processing tools, data management and archival systems, model initialization and synthesis capabilities, and other research outcomes for transition to operations.

Partners: Pan-WCRP, IGBP, hydro-meteorological and climate services

Actions:

- CEOP reference sites heritage.
- Undertake joint activities with operational hydro-meteorological and climate services, and hydrological research programs to demonstrate the value of the capabilities, data sets, technology, tools, and information products that address societal needs.
- Promote collaboration among climate system science, engineering hydrology and socio-economic sciences.
- Demonstrate a prototype of an end-to-end fully collaborative study.
- Work with operational agencies to transition new capabilities.

Promote and foster capacity building through training of scientists and the user community.

Partners: ESSP, START

Actions:

- Publish results and lessons learned.
- Collaborate on observations.
- Participate in outreach and workshops.
- Provide tools for diagnoses and analysis.