5.3 Crosscutting studies contribution to GEWEX objectives

WEBS/WISE/SWING/Aerosols
Semi-arid region/Cold region/High elevation

Aerosols and SWING:

- No representatives presented, and thus no research plan inside
- Data are going to be collected by semi-arid and high elevation WGs

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GEWEX Objective 1:
Produce consistent research quality data sets complete with error descriptions of the Earth's energy budget and water cycle and their variability and trends on interannual to decadal time scales, for use in climate system analysis and model development and evaluation.

- Convergence of observation and data integration in cold regions (cold region)
- Derive long-term SWE and soil moisture by satellite (SSM/I) and/or ground based measurement (cold region).
- Develop long-term measurements of water, energy, aerosols in mountainous areas (high elevation)
- Develop high resolution datasets to create state-of-the-art precipitation forecasting (high elevation)
- Evaluate satellite products of precipitation and surface radiation and energy budget with reference data (WEBS)
- 2008: develop an inventory of floods and droughts and the role of land-atmosphere feedbacks in causing those events (WISE)

**Planned milestones during 2007 to 2012
by SHARE (Stations at High Altitude for Research
on the Environment) Project**

Ev-K²-CNR

2007	Improve Nepal and Pakistan AWSs in the direction of reference stations. New studies on atmospheic depositions, nitrogen cycle, and micropollutants in lake sediments records. Glaciers studies in Mt Everest region
2008	Glaciers studies and possibly hydrological studies in Mt Everest region. Improve Africa site on Ruwenzori with news and possibly in Buthan or Caucasus.
2009	Install a new ABC Complementary Station in Pakistan to study the aerosols and air composition. Paleolimnology in Africa site on Ruwenzori
2010	Enlarge the High Altitude Network
2011	Maintain High Altitude Networks
2012	…

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Mountain/High Altitude Initiative (MHAI)

GEWEX Objective 2:
Enhance the understanding of and quantify how energy and water cycle processes contribute to climate feedbacks.

- Evaluate global water cycle using model intercomparison and parameterization sensitivity experiments (WEBS)
    - Land-surface, convective, and boundary layer schemes
    - Diurnal → Interannual variability
- Identify and focus on regions where water cycle simulation has trouble (WEBS)
    - Overlap with semi-arid and cold region studies
    - Identify remotely-sensed datasets that will be useful
- Examine the vertical profiles of water cycle exchanges throughout column and their temporal variability (WEBS);
- 2008-2010: Regional hydroclimate hotspot studies in Tibet, including surface and atmospheric water and energy budget, its relation with extreme events in East Asia (WEBS)

- 2010: Provide an assessment of the role of land –atmosphere interactions during extremely wet and dry (drought) period (WISE);
- Understanding the water and energy cycles of semi-arid regions and their role in climate system by globally integrated analysis of CEOP reference sites data, satellite observations and model outputs (semi-arid);
- Impacts of dust aerosols on hydrological cycle and climate at regional and global scales (semi-arid; aerosols);
- Inter-comparison of cold region large rivers (Lena, Obi, Yenisey, Mackenzie), their temporal changes, and possible relation with regional warming (cold region);
- Glacial process studies (cold region; high elevation).

GEWEX Objective 3:
Improve the predictive capability for key water and energy cycle variables and feedbacks through improved parameterizations to better represent hydrometeorological processes, and determine the geographical and seasonal characteristics of their predictability over land areas

- 2007-2008: Apply CEOP-based inter-comparison study and identify model deficiencies in simulating diurnal, seasonal, and annual precipitation pattern and water and energy budget using CEOP phase 1 (WEBS);
- Evaluate LSMs' ability in semi-arid and cold regions and improve their performances (semi-arid; cold region);
- Improvement of parameterization of land surface process for semi-arid region to be coupled in climate models, with particularly a new scheme of eco-hydrological process (semi-arid);
- Apply current existed RCMs for semi-arid region simulation and identify their problems. Assist in better prediction of climate and water resources and their management in semi-arid regions where the shortage of water supply is crucial (semi-arid);

- High mountain hydrology including glaciers, interactions between vegetation and frozen ground and snow process (cold region);
- High resolution precipitation modelling in complex topography (high elevation).

GEWEX Objective 4:
Undertake joint activities with operational hydrometeorological services, related ESSP projects like the GWSP, and hydrological research programs to demonstrate the value of GEWEX research, data sets and tools for assessing the consequences of climate predictions and global change for water resources.

- Assess the ability of models to simulate the impacts of heavy rain events and droughts on water resources (WISE)
- Provide high-resolution precipitation forecast for hydrological extreme studies (High elevation).
- Based on data inter-comparisons, recommend model and satellite data for hydro-meteorological applications (WEBS)