THE 2018 GEWEX SCIENCE CONFERENCE: Extremes and Water on the Edge

The world community increasingly recognizes that changes in climate, extreme events, and shifting freshwater distribution around the globe could lead to severe environmental degradation and intense conflicts in the years ahead. Increasing greenhouse gas concentrations can affect the occurrence of weather and climate extremes in many regions, including heatwaves, droughts, and floods. In the case of freshwater availability, an increasing population and decline in water quality further exacerbate the problem by threatening the world's freshwater supply and complicating our ability to manage this precious resource. The abundance of water—such as flooding in Texas caused by Hurricane Harvey or the widespread flooding across South Asia in 2017—as well as the lack of water—such as droughts in Somalia or drought and high temperatures leading to wildfires across the North American West—causes substantial economic loss and human casualties. The loss of snow and ice in river headwaters is also causing endemic water shortages in much of the world. It is a societal imperative to i) *determine how climate extremes and water availability are currently shifting and how they are expected to alter under the forces of changing climate and human management practices*, and ii) *project how these changes are in turn likely to impact the global security of human livelihood, food, and energy production*, among other obligations. From a climate perspective, it is crucially important to understand the processes affecting climate extremes and water availability, including atmospheric and land surface processes, their interactions, and their susceptibility to change by external forcings such as human interference.

This complex interplay between the natural system and human interference represents a set of significant and vital challenges for both understanding and predicting the changes in weather and climate extremes and to the Earth's hydrological cycle. GEWEX, the Global Energy and Water EXchanges activity, is a core project of the World Climate Research Programme (WCRP) positioned to confront these challenges. The mission of GEWEX is to measure and predict global and regional energy and water variations, trends, and extremes (such as heat waves, floods, and droughts) through improved observations and modeling of the land, the atmosphere, and their interactions, thereby providing the scientific underpinnings of climate, hydrometeorological and weather services. In addition, the WCRP Grand Challenges on "Weather and Climate Extremes" and "Water for the Food Baskets of the World," which are both led by GEWEX, foster leading-edge research on assessing changes in extremes in a warming climate and on the interactions within the water-food-energy nexus.

The 2018 GEWEX Science Conference is structured around the topic of challenges confronting our ability to understand and predict changes in climate extremes and the availability of freshwater under the complex factors of natural variability, forced climate change due to human activities, and human management practices such as dams, reservoirs, land cover changes, and agricultural management. The Conference will reflect research activities that advance the main themes of the GEWEX project and of the two above-mentioned WCRP Grand Challenges.

GEWEX activities are grouped into four main panels.

- The **GEWEX Global Atmospheric System Studies (GASS) Panel** facilitates and supports the international community that carries out and uses observations, process studies, and numerical model experiments with the goal of developing and improving the representation of the atmosphere in weather and climate models. Primarily, GASS coordinates scientific projects that bring together experts to contribute to the development of atmospheric models (http://www.gewex.org/panels/global-atmospheric-system-studies-panel/).
- The **GEWEX Data and Assessments Panel (GDAP)** seeks to describe the complete water and energy budgets using consistent, long term, global data sets of radiative fluxes and surface energy exchanges, as well as the atmospheric parameters affecting the energy balance (http://www.gewex.org/panels/gewex-data-and-assessments-panel/).
- The **GEWEX Hydroclimatology Panel (GHP)** aims to understand and predict continental to local-scale hydroclimates for hydrologic applications. It concentrates on improving our understanding of environmental water and energy exchanges at the regional scale and from an integrated perspective (http://www.gewex.org/panels/gewex-hydroclimatology-panel/).
- The **Global Land/Atmosphere System Study (GLASS) Panel** coordinates the evaluation and intercomparison of the new generation of Land Surface Schemes (LSSs) and their applications, as well as further model development and evaluation on both local and global scales (http://www.gewex.org/panels/global-landatmosphere-system-study-panel/).

The 2018 GEWEX Conference welcomes abstracts that are related to the themes mentioned, particularly on the following topics:

- Nexus of water, energy, and food
  - Water for agriculture
  - Water for cities
  - Water for the environment
  - Convective permitting modeling (including human management and structures)
  - Applications of high resolution satellite data
  - Use of big data techniques and large computers and models
  - Application of hybrid downscaling techniques
  - Results from recently completed field efforts

- Climate extremes
  - Processes inducing the occurrence of heatwaves, droughts, heavy precipitation and storms in a changing climate
  - Documenting extremes through data collection and rescue, ground observations, and satellite remote sensing
  - Modeling the effects of land-atmosphere interactions on climate extremes
  - Examining climate extremes through decadal long convective permitting modeling
  - Detection and attribution of trends in extreme events and of single extreme events

- Use of big data techniques and large computers and models
- Examining climate extremes through hybrid and other downscaling techniques
- Feedbacks between climate extremes, ecosystems, and societal dynamics

- Extreme weather
  - High-resolution satellite data examination of extreme weather
  - Convective permitting modeling of extreme events including hurricanes and heavy precipitation
  - Extreme weather prediction at subseasonal to seasonal time scales, in particular for droughts and heatwaves
  - Use of big data techniques and large computers and models to examine extreme weather
  - Surrogate climate scenario techniques to examine specific extreme weather cases in the future
  - Extreme weather observed in recently completed field efforts

- Atmospheric modeling: atmospheric model parameterizations, physics-dynamics coupling, coupling of physical processes
  - Atmospheric modeling through convective permitting modeling
  - Use of high resolution satellite data to verify atmospheric modeling
  - Advanced modeling and observations of the coupling of land and atmosphere
  - Use of big data techniques and large computers and models
  - Aerosol-cloud-radiation interaction
  - Precipitation diurnal cycle in different climate regimes
  - Precipitation frequency, duration, intensity, and phase in models and observations
  - Results from recently completed field efforts

- Land modeling: Land parameterizations, model representation of land-climate interactions in present and future, coupling of physical processes
  - Benchmarking of land model parameterizations
  - Representation of evapotranspiration
  - Integrating human water management in land and hydrological models
  - Land use and land cover management
  - Soil moisture-climate feedbacks in present and future
  - Carbon cycle-water interactions
  - Soil processes and soil modeling

- Mountain and high latitude hydrology
  - Convective permitting modeling of winter weather and hydrology
  - Use of high resolution satellite data to observe and verify mountain hydrology models
  - Application of hybrid downscaling techniques to mountain hydrology including snowfall, precipitation phase, and snowpack evolution
  - Examination of mountain hydrology through other observational datasets
  - Results from recently completed field efforts (such as the WMO SPICE project on measurement of snow and long term basin scale measurements of mountain hydrology)

- Global energy and water cycles
  - Evapotranspiration determination
  - Advances in irrigation hydrology and irrigation impact on water cycle
  - Energy and water budget closure and advances in assessment techniques
  - Global energy and water cycles, clouds, and radiation
  - Water cycle over breadbaskets–cities, agriculture & environment
  - Satellite observations for climate extremes, water cycle processes, and land-climate interactions
  - Droughts in present and future climate
  - High-resolution modeling and resolved/permitted convection

Abstracts for both of the themes of weather and climate extremes and water availability, as well as the themes of the GEWEX Panels described above, are welcome. Poster submissions are encouraged. In conjunction with the conference, special Early Career Scientists events will be organized in collaboration with the Young Earth System Scientists (YESS) and Young Hydrological Society (YHS).

The 2018 GEWEX Conference is hosted by the Global Institute for Water Security at the University of Saskatchewan and will be held at the Coast Canmore Hotel and Conference Centre in Canmore, Alberta, Canada from May 6-11, 2018.

Important Dates:
October 15, 2017: Registration and abstract submission opens
December 18, 2017: Abstract and travel support requests due
January 15, 2018: Abstract acceptance notification
January 22, 2018: Travel support notification
February 1, 2018: Early bird registration closes

Registration and Abstract Submission Fees:

Full week registration:	500 CAD (~405 USD)
Full week early bird registration:	450 CAD (~365 USD)
Full week for students:	400 CAD (~325 USD)
Abstract submission fee (non-refundable):	80 CAD (~65 USD)
Attendance for guest accompanying a registered participant at banquet and reception:	100 CAD (~80 USD)

Note that one-day registrations are not possible.

Please join us in using this conference to advance these important scientific and societal topics.

Sincerely,
The 2018 GEWEX Conference Committee

Save the data and bookmark the conference URL:
http://www.gewexevents.org/events/2018conference/