Geophysical Research Abstracts
Vol. 12, EGU2010-14103-1, 2010
EGU General Assembly 2010

Solicited abstract: Global hydrological modeling and models

Chong-Yu Xu
Dept of Geosciences, University of Oslo, Oslo, Norway (chongyu.xu@geo.uio.no)

The origins of rainfall-runoff modeling in the broad sense can be found in the middle of the 19th century arising in response to three types of engineering problems: (1) urban sewer design, (2) land reclamation drainage systems design, and (3) reservoir spillway design. Since then numerous empirical, conceptual and physically-based models are developed including event based models using unit hydrograph concept, Nash's linear reservoir models, HBV model, TOPMODEL, SHE model, etc. From the late 1980s, the evolution of global and continental-scale hydrology has placed new demands on hydrologic modellers. The macro-scale hydrological (global and regional scale) models were developed on the basis of the following motivations (Arenll, 1999). First, for a variety of operational and planning purposes, water resource managers responsible for large regions need to estimate the spatial variability of resources over large areas, at a spatial resolution finer than can be provided by observed data alone. Second, hydrologists and water managers are interested in the effects of land-use and climate variability and change over a large geographic domain. Third, there is an increasing need of using hydrologic models as a base to estimate point and non-point sources of pollution loading to streams. Fourth, hydrologists and atmospheric modellers have perceived weaknesses in the representation of hydrological processes in regional and global climate models, and developed global hydrological models to overcome the weaknesses of global climate models. Considerable progress in the development and application of global hydrological models has been achieved to date, however, large uncertainties still exist considering the model structure including large scale flow routing, parameterization, input data, etc. This presentation will focus on the global hydrological models, and the discussion includes (1) types of global hydrological models, (2) procedure of global hydrological model development, (3) state-of-the-art of existing global hydrological models, and (4) challenges.

Acknowledgment: Thanks to Lebing Gong, Elin Widén-Nilsson, and Sven Halldin of Uppsala University for the team work in global hydrological models.