Session: B10 Oral presentation

Advantages of vector-based river networks for river flow modeling

Ahmad Tavakoly [†]; Cedric David; Xitian Cai; Zong-Liang Yang; David Maidment
[†] The University of Texas at Austin, USA
Leading author: tavakoly@mail.utexas.edu

Rivers play an important role in the Earth's hydrological cycle and most climate system models nowadays include continental scale river transport models (RTMs) to complete the global water balance. Despite the increasing availability of hydrographic datasets providing a "blue-line" (vector-based) definition of river networks, most of the current continental-scale river routing models are grid-based. The present study evaluates how the type of river network used impacts the flow rates produced by RTMs. For this purpose, RAPID (Routing Application for Parallel computation of Discharge) is run with grid-based and vector-based river networks using surface and subsurface runoff obtained from NLDAS2 (North American Land Data Assimilation System, version 2). The gridded river network is determined based on 1/8 degree topography using an eight-direction model, and the vector network is based on the enhanced version of the National Hydrography Dataset (NHDPlus). The modeling is conducted over the entire Mississippi River Basin for a period of 10 years (2000-2009) and model outputs are compared to observed daily flow from the National Water Information System (NWIS). The results demonstrate the ability of the RAPID model to simulate a river flow on a very large scale. More importantly, the simulation of river flow based on blue lines (vector base) has higher accuracy than grid based river network.