

Improving Flash Flood Prediction in Multiple Environments

Patrick D. Broxton, Peter A. Troch, Michael Schaffner, Carl Unkrich, David Goodrich, Hoshin Gupta, Thorsten Wagener, Soni Yatheendradas

Flash flooding is a major concern in many fast responding headwater catchments. Adequate flood prediction depends on both finely tuned hydrologic models as well as a good understanding of meteorological inputs. Flood prediction is often limited in areas where there is poor estimation of precipitation inputs or where the ‘wetness’ of a catchment is not known. Furthermore, many flood models do not even consider snow, which can, by itself, or in combination with rainfall, cause destructive floods. The current research is aimed at broadening the applicability of flash flood modeling. Specifically, this study seeks to improve upon an event-based flash flood model, the KINematic runoff and EROSION model (KINEROS2), by better constraining initial hydrologic conditions and hydrometeorologic forcing in both semiarid and humid watersheds using national gridded data that would be available in near-real time. We will 1) use an energy-balance snow model to predict snowmelt, 2) assess antecedent hydrologic conditions using a continuous hydrologic model, and 3) improve upon KINEROS itself by adding subsurface flow dynamics. This should improve its predictive ability at times when flood characteristics are significantly influenced by antecedent hydrologic conditions, and it will make possible the prediction of flood events that involve rain-on-snow or rapid snowmelt.