XVIII International Conference on Water Resources
CMWR 2010
J. Carrera (Ed)
CIMNE, Barcelona 2010

QUANTIFYING AND REDUCING HYDROGEOLOGIC UNCERTAINTY IN A FULLY-COUPLED LAND-ATMOSPHERE MODEL

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Summary. Using ParFlow-WRF, a fully-coupled land-atmosphere model incorporating a variably saturated subsurface flow model, we evaluate responses in land-atmosphere feedbacks to heterogeneity in subsurface properties. To accomplish this, we first generate an idealized domain with heterogeneous, subsurface properties using correlated, Gaussian random fields. We then induce heavy rainfall using a moisture tendency over a straight line in the center of a fifteen by fifteen kilometer model grid within the atmospheric portion of the fully-coupled PF.WRF model grid domain to create changes in subsurface moisture and overland flow. We complete ensembles of model runs, each with different random seeds, and monitor the of surface runoff, saturation, and land-atmosphere feedbacks at and near the ground surface. Finally, using conditional Monte Carlo simulations, we also incorporate subsurface data to evaluate the reduction of uncertainty in soil moisture and subsequent impacts on land-atmosphere feedbacks.