Geophysical Research Abstracts, Vol. 9, 08291, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08291

Using sub-grid-scale topographic information to parameterise a probability-distributed runoff-production scheme for regional climate modelling

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Fully-coupled regional climate models require the representation of hydrological processes at spatial scales coarser than the scale over which topographic variability influences water fluxes. It is possible to retain sub-grid-scale information by constructing a parameterised representation of fine resolution topography.

Here we describe a procedure that can be used to infer catchment and grid-pixel hydrological properties from existing topographic and geomorphic datasets. This procedure permits the calculation of the probability distribution of soil moisture stores within a grid pixel or a catchment. The new scheme is demonstrated in use as a hydrological sub-component of a regional climate/land-surface model.

As well as improving the representation of hydrological processes in coarse resolution gridded flow models, the work may provide a physically-based method of providing enhanced calibration of hydrological models in ungauged basins using readily available geomorphic data.