



High-resolution global topographic index values for use in large-scale hydrological modelling

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Modelling land surface water flow is of critical importance for simulating land-surface fluxes, predicting runoff and water table dynamics and for many other applications of Land Surface Models. Many approaches are based on the popular hydrology model TOPMODEL, and the most important parameter of this model is the well-known topographic index. Here we present new, high-resolution parameter maps of the topographic index for all ice-free land pixels calculated from hydrologically-conditioned HydroSHEDS data using the GA2 algorithm ('GRIDATB 2'). At 15 arc-sec resolution, these layers are four times finer than the resolution of the previously best-available topographic index layers, the Compound Topographic Index of HYDRO1k (CTI). For the largest river catchments occurring on each continent we found that, in comparison with CTI our revised values were up to 20% lower in, e.g., the Amazon. We found the highest catchment means were for the Murray-Darling and Nelson-Saskatchewan rather than for the Amazon and St. Lawrence as found from the CTI. For the majority of large catchments, however, the spread of our new GA2 index values is very similar to those of CTI, yet with more spatial variability apparent at fine scale. We believe these new index layers represent greatly-improved global-scale topographic index values and hope that they will be widely used in land surface modelling applications in the future.