



A hydrological model of New Zealand – version 2

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We report recent progress on a long-term hydrological modelling project whose goal is to make reliable estimates of all water fluxes and storages of New Zealand, and reliable estimates of potential changes in those water resources. This is an ambitious scientific project, with many practical implications for water use and water planning. The model assumes a single model structure (TopNet, see Clark et al 2008), and uses a priori parameter estimation, based on national datasets, without calibration. The model uses an hourly timestep and was run for 40 years. New Zealand's 260,000 sq km area is subdivided into 35,000 subcatchments of about 7 sq km each. Experience with practical applications of a priori parameter estimation have shown that the two parameters of TopNet which lead to the greatest source of uncertainty in river flows are TOPMODF and HYDCON0. These describe the rate of change of saturated soil hydraulic conductivity with depth, and the saturated soil hydraulic conductivity at the ground surface, respectively.

We will show results for selected regions and river basins, and assess the model performance against measured soil moisture and snow storage, as well as measured streamflow. As well as being useful as regional and national models, the results provide a sound start for model calibration, if needed.

There are opportunities to improve on these results through improved mapping of recession characteristics, improved use of recording raingauge data, and selection of model structure to match the spatial variations in hydrological processes which are not captured by a fixed model structure. This model underpins new regional and national forecasts and climate change assessments which are now in development.