

Takata, K., and N. Hanasaki, 2021: Investigating runoff sensitivity in the land-surface model MATSIRO to reduce low runoff bias. *J. Meteor. Soc. Japan*, **99**, <http://doi.org/10.2151/jmsj.2021-034>.

Plain Language Summary: Runoff calculated with the Minimal Advanced Treatments of Surface Interaction and RunOff (MATSIRO) on the basis of TOPography-base MODEL (TOPMODEL) tends to be too low and its response to precipitation be too low, compared to observation for instance in Thailand. We conjectured that those biases could be attributed to the water table's excessive depth, which was diagnosed from grid-mean soil moisture using a saturation parameter. The results of Sensitivity for the parameter were then investigated aiming to make the response more active at a catchment in Thailand. The results presented marked increases in runoff accompanying reduction in water table depth. The preliminary global sensitivity experiments indicated spatial variations of the sensitivity with climate zones.

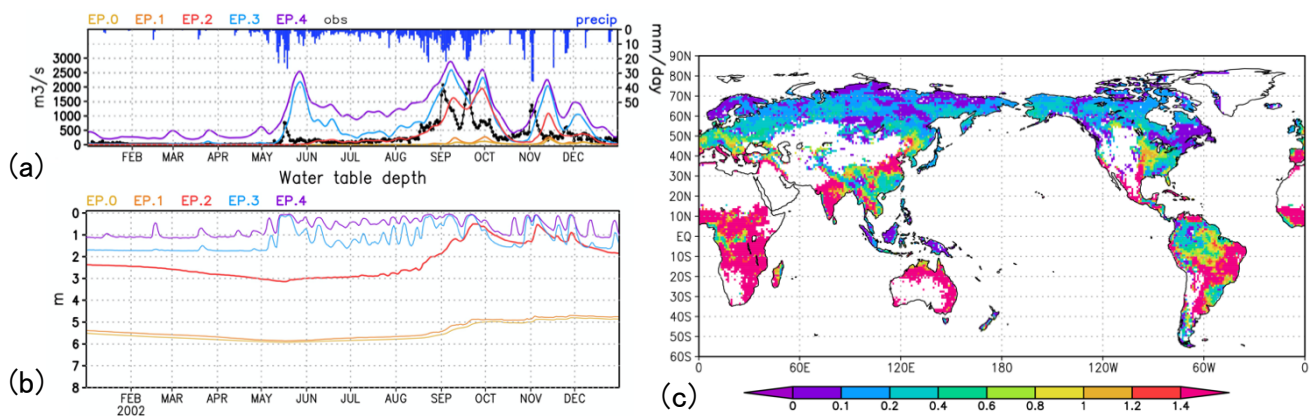


Figure 1. (a) Chronological changes of daily precipitation (blue bars, mm day⁻¹) averaged over the catchment area of the Bhumibol Dam, Thailand, and of daily river flows (lines, m³ s⁻¹) at the outlet of the area in 2002. The dotted black line indicates the observed river flow, and the solid lines indicate calculated ones. (b) As in (a) but for daily water table depth (m). (c) Geographical distribution of change rate in mean annual runoff during 1995–2004 between the original and new parameter settings. The regions with small difference (less than 1 mm year⁻¹) are uncolored.

- Sensitivity of runoff with MATSIRO was investigated with regard to a parameter that relate grid-mean soil moisture with water table depth, aiming to reduce low runoff biases and to enhance its responses to precipitation.
- The parameter was changed from the original value (experiment EP.0), with which saturation judgement in diagnosing water table depth has been strict to grid-mean soil moisture, to the relaxed values (experiments EP.1, EP.2, EP.3 and EP.4).
- The simulation results for the catchment area of the Bhumibol Dam, Thailand, presented marked increase in runoff accompanying reduction in water table depth.
- The preliminary global sensitivity experiments where the parameter values are same as EP.0 and EP.2 indicated spatial variations of the sensitivity with climate zones.