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On the use of evapotranspiration data in hydrologic model calibration/ verification

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One of the fundamental concepts in most hydrologic models is water and mass balance within the water cycle. In other words, hydrologic modellers are trying to represent and maintain the balance of water flux in precipitation, evaporation and other losses, runoff and groundwater. Over the past three decades, as the representation of each component of the water cycle becomes more refined and more physically-based concepts are included, hydrologic models are becoming more complicated in order to reflect physical reality. In this aspect, using measured runoff for calibration is no longer sufficient to verify the accuracy of the model. This is especially relevant for catchments affected by human activities, where the ET processes contribute significantly to the catchment losses. With the development of remote sensing techniques, remote sensing data provides an additional means for calibration and verification of data.

In this study, a novel ET calibration and verification method for hydrologic models is introduced and the application of remote sensing data is elaborated in detail. Combined with the traditional runoff calibration method and the measured groundwater level data, the full water cycle calibration and verification of hydrological model can be implemented, which makes the hydrological model more accurate and more reliable. The proposed method is applied to a catchment in Tianjin, China. Remote sensing data from “ETWatch” was used to calibrate and verify the SWAT hydrological model, and results indicate that good results can be achieved from using a combination of evapo-transpiration and runoff data for model verification.