TB-205L

WEEKLY GROUNDWATER PUMPAGE ESTIMATION IN UPPER CENTRAL PLAIN THAILAND VIA ARTIFICIAL NEURAL TECHNIQUE

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Abstract. Under the water stress in the recent dry years, the farmers in the Upper Central Plain Basin of Thailand have adapted conjunctive water use to meet high demand from rice cultivation. Conjunctive water management is an optimal tool of groundwater pumping guideline under reservoir water release conditions for sustainable development. However, weekly conjunctive water management operation remains difficult due to the difficulties on estimations of groundwater pumpage and reservoir water storage due to the complex modeling techniques, consuming time, and survey data.

Therefore, this study aims to apply an artificial neural network to improve the estimation of weekly groundwater availability under extreme climate scenarios. First, the weekly pumping pattern was calculated via monthly artificial neural networks through groundwater level, reservoir storage, and rainfall. Second, the weekly groundwater pumping of the Younger Terrace Aquifer was validated through groundwater modeling, obtaining the region's piezometric head. The validation shows good performance when the R^2 is over 0.7 and the RMSE is lower than 1m. Second, the potential groundwater was estimated based on three scenarios under sustainable drawdown criteria: wet year, drought year, and normal year scenarios. Finally, the rainfall, groundwater level, and dam storage data from three climate scenarios were re-trained into the artificial neural network for the weekly available groundwater pumping. As a result, the ANN tool could guide properly the region's available groundwater by utilizing the relatively surface water data, less laborious, and cost-effective.

Keywords: Groundwater pumping estimation, ANN, groundwater yields

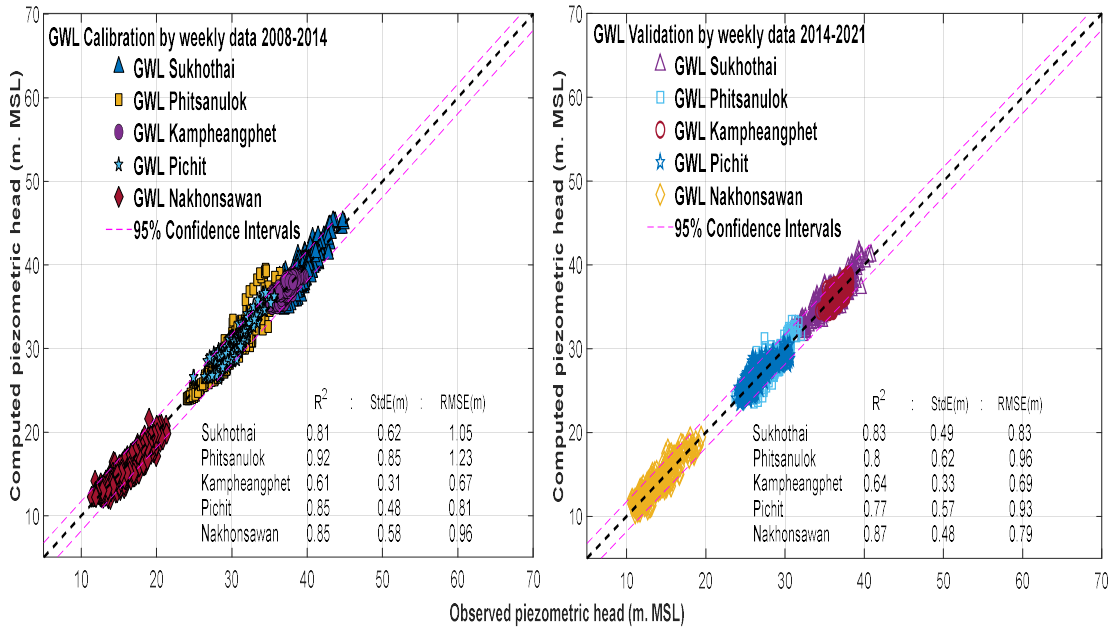

Figure 1. Evalution weekly piezometric head in regional after estiamted weeky groundawter pumping via ANN

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