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Groundwater assessment in the Mediterranean region: Regional modelling and in-situ data across scales

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Groundwater is a valuable resource throughout the world. It supplies the needs of many sectors everywhere. Providing high spatial resolution groundwater data is important for climatic, hydrological and agricultural applications, to ensure sustainable groundwater management. The scarcity of high-resolution groundwater data over large scales at the required accuracy is a significant limitation for such applications. This study was undertaken in the Mediterranean region, which is recognized as one of the world's most sensitive regions to water scarcity due to both climate change and consistently increasing anthropogenic pressures. Groundwater is considered a strategic freshwater reserve in the Mediterranean region; however, its status remains poorly characterized. This study investigates the feasibility of downscaling outputs of three global groundwater models (Reinecke et al. (2019), de Graaf et al. (2017) and Fan et al. (2013)) to higher resolution.

Steady-state results of the three models were compared with in-situ groundwater level observations, and an aggregation method was developed for downscaling. Observations from a long-term groundwater monitoring network over different regional studies around the Mediterranean were employed. Results showed that there is a significant discrepancy between the three compared model outputs. More specifically, the de Graaf et al. (2017) model presents a deeper water table than Reinecke et al. (2019) and Fan et al. (2013), while de Graaf et al. (2017) generally shows more significant variability in simulated water table depth. A detailed comparison between simulated and measured water table depth of different Mediterranean aquifers having different climatic, geologic and anthropogenic conditions will be presented.

The results of this work will contribute to advance the understanding of how to combine large-scale groundwater modelling with local in-situ data as a crucial tool to improve groundwater management in data-scarce regions.

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