

## **Linking variations in large-scale climatic circulation and high groundwater levels in southern England**

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**Abstract** Groundwater is a crucial water resource, sustaining ecosystems and providing an essential water source during droughts. In certain geological settings, prolonged high rainfall can generate groundwater flooding, as elevated water tables can lead to rapid stormflow runoff. Herein, we quantify the links between chalk groundwater levels in the Lambourn River basin (a sub-basin of the River Thames) in southern England, and the large-scale climatic circulation. Precipitation, river discharge and groundwater levels from 1964 to 2010 are analysed together with monthly large-scale climate data from the Twentieth Century Reanalysis Project. Results show reasonably strong climate–groundwater connections with a lag time of several months, associated with rainfall transit time through the basin. The patterns uncovered improve understanding of drivers of groundwater level dynamics and provide a basis for strategic water resource planning.

**Key words** hydroclimatology; groundwater; precipitation; river flow; climate; River Lambourn; southern England; Twentieth Century Reanalysis