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Exploring the effect of extreme hydrometeorologycal events on the groundwater table in the diverted inner delta of the Danube

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The efficient operation of shallow groundwater monitoring networks is crucial to water supply, inland water protection, agriculture and nature conservation. In the present study, the spatial representativity of such a monitoring network is assessed in different discharge scenarios, taking the directional characteristics of this representativity into account, i.e. exploring whether geostatistical anisotropy is present, and investigate how this changes with flooding. The Szigetköz monitoring network adjacent to the River Danube is located in an area that has been thoroughly impacted by anthropogenic activity (river diversion/ damming). The time series of 85 shallow groundwater monitoring wells tracking flood events from 2006, 2009 and 2013 were assessed. After the subtraction of a spatial trend from the data, variography was conducted on the residuals, and the degree of anisotropy was assessed to explore the spatial autocorrelation structure of the network. Since the spatial density of the raw data proved to be insufficient, an interpolated grid was derived, and the final results were scaled to be representative of the original raw data. It was found that during floods the main direction of the spatial variance of the shallow groundwater monitoring wells alters, from perpendicular to the river to parallel with it for over a period of about two week. However, with the passing of the flood, this returns to its original orientation in $\sim$2 months. It is likely that this process is related first to the fast removal of clogged riverbed strata by the flood, then to their slower replacement. In addition, the work highlights the importance of assessing the direction of the spatial autocorrelation structure of shallow groundwater monitoring networks, especially if the aim is to derive interpolated maps for the further investigation or modeling of flow.