



Detecting groundwater anthropogenic extraction with cyclicity results of wavelet models

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Groundwater is the main water source for irrigation in arid and semi-arid areas. Unfortunately, it has been proven very difficult to prevent unauthorized extractions. The present work studies the application of wavelet analysis to detect and quantify the unfavorable effects of these extractions on the piezometry.

Wavelets have been widely applied for hydrologic time series analysis since the 1990s, with increasing popularity in recent years. This method can be applied to hydrologic series to reveal complex hydrological processes and evaluate complex latent factors, such as seasonal crop irrigation, controlling groundwater level fluctuations.

Records of the piezometric level from more than 150 piezometers were studied from 1975 to 2016 in the Almonte-Marismas aquifer (SW Spain). The majority of these time series presented periodicities between 11-12 months, which corresponded to hydrological cycles of recharge and discharge. Nevertheless, in some areas close to crop fields, periodicities of 2-3 and 4-6 months have been detected. In these cases, wavelet analysis could be used as a tool to prevent damage in areas in need of deeper legal control.