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Modeling saltwater intrusion with SUTRA 3.0 in Almonte-Marismas aquifer coast (Doñana Natural Space, Southern Spain).

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The Almonte-Marismas aquifer is a multilayer alluvial groundwater body constituted of silts, sands and gravel of fluvial-deltaic and marine origin. It supports Doñana Natural Space (Southern of Spain). It is in direct hydraulic contact with the Atlantic Ocean to the Southwest. Nowadays, the aquifer is subjected to important losses in terms of regional groundwater resources caused by the excessive groundwater pumping for crop irrigation, as well as for tourism water supply in two coastal resorts. This fact causes a subsequent lowering of the phreatic head, and therefore, the water requirements of the ecosystems in this protected area.

Although up to date there is no evidence of saltwater intrusion in this area, there have been several studies warning that seawater advance through the deep layers would likely happen under the present exploitation pattern (Custodio, 1993). The aim of this study is to analyze the possible destabilization of the dynamic balance between the freshwater and saline water in the aquifer. This goal is assessed through numerical simulations of different seawater intrusion scenarios using a 2D model, where the density flow and solute transport model is considered using the SUTRA 3.0 package (Voss et al., 2002) of Modelmuse (Winston, 2014). This work enables the evaluation of the hydrodynamical conceptual model in the aquifer coast, the potential threat of seawater intrusion caused by coastal resort extractions and the consequences that it entails for the nearby natural environment.

Key issues: saltwater intrusion, 2D model, SUTRA, Doñana, overexploitation.

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