Is sea water intrusion by groundwater over-abstraction even worse than what we expected? - Part 2: Understanding parameter sensitivity in field-scale

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ABSTRACT

Groundwater often offers a continuously available, relatively secluded water source and is therefore widely used for various activities. To the manifold of possible anthropogenic contaminations, the threat of aquifer salinization through sea water intrusion additionally has to be considered in coastal areas. For long-term sustainability and availability of aquifer resources, proper water management is therefore necessary including long-term development of the groundwater quality and quantity under the external stresses.
In continuation of Stoeckl et al. (2016), we investigated the effect of continued sea water intrusion after ceasing groundwater pumping activity. We observed a similar phenomenon as the overshoot effect due to sea level rise described by Morgan et al. (2015). We utilized numerical simulations to identify the sensitivity of relevant parameters that govern key values of this overshoot phenomenon.
To our knowledge, this transient effect is currently not considered as a relevant process in sea water intrusion investigations or coastal water management. Our simulations (together with the previously published results in Stoeckl et al., 2016, and Walther et al., 2014) show, however, that the time scales the overshoot phenomenon continues may very well exceed the preceding aquifer pumping periods, thus causing a lasting state of aquifer salinization.

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