

MAR with salinization through the back door - Salinization of the Castricum coastal dune area by artificial recharge

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ABSTRACT

Groundwater in the coastal dune area of Castricum in the Netherlands is used for drinking water production. To combat salinization, water from the river Rhine and Lake IJssel (IJsselmeer) is pretreated and transported to the dunes for artificial recharge.

Generally the salinity of river water that is used for recharge is at approximately 100 mg Cl/l. As a result of a relatively dry 2017 with low river discharges, chloride concentrations increased to 170 mg Cl/l in June before returning to 100 mg/l in November.

In this article we evaluate how this chloride peak propagates through the MAR system and how the attenuated (smoothed) concentrations in the abstracted water compare to the drinking water standard of 150 mg Cl/l.

We use 3D flow path calculations to evaluate travel times for all three facilities and compare these to measurements of chloride, electrical conductivity and temperature. We will distinguish between three different PWN MAR facilities which all have their own specific distribution of travel times; one with deep well injection and abstraction wells, two with open recharge via canals and abstraction wells of which one is more and one is less compact. Subsequently we consider how climate change may exacerbate salinities when dry spells will grow more extreme. We evaluate this with a simple compartment model for Lake IJssel, using existing scenarios for river discharge based on climate scenarios of the Royal Dutch Meteorological Institute.