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Fate of agrochemicals and plant pathogens during managed aquifer recharge of tile drainage water

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The AGRIMAR project investigates managed aquifer recharge (MAR) technology that collects fresh tile drainage water for storage in brackish aquifers, and retrieves it in summer for crop irrigation. The project aims to enable sustainable agriculture under climate change in saline deltas of the Netherlands and elsewhere, by providing solutions for two major agricultural water problems: (i) surface water carries plant pathogens causing diseases such as brown rot to (seed) potatoes and flower bulbs; its use for irrigation is prohibited or unwanted, and (ii) brackish groundwater in coastal regions and climate change further deteriorate fresh water availability.

This nature based solution secures water availability, recycles water and nutrients, improves surface water quality, and yields economic gain. However, major research gaps are the (predictive) understanding of the conditions and processes improving both chemical and microbiological water quality in MAR; Water and agricultural legislations require this research to minimize risks of groundwater pollution and pathogen outbreaks.

Results are presented of (i) lab batch and column experiments on the fate of plant pathogens; (ii) push-pull tests to obtain insights in intra-aquifer variations in nutrient and pesticide fate processes and removal rates; and (iii) high resolution hydrological-hydrogeochemical monitoring with a.o. an automated sensoring system of a 10ha company scale MAR system realized early 2019. Finally, an outlook is presented to upcoming activities including a quantitative microbial risk analysis to realize the project's goals.

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3. Impact on groundwater quality of non-conventional water (treated wastewater, desalinated water) for (managed) artificial recharge and irrigation practices

Non-conventional waters such as treated waste water, storm water, or desalinated water often contributes to groundwater recharge, either as a direct process, namely managed aquifer recharge, or as a consequence of other uses, for example, in relation to irrigation practices. This session will consider the role of such inputs in the sustainability and management of groundwater resources in different contexts. Particular attention will be given to investigations on aquifer hydrogeochemistry, biogeochemical reactions improving the quality of the recharged water and reactive and mixing processes that occur between groundwater and the recharged water, in regard to the implications for groundwater management and use, including aquifer clogging and other operational problems.