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Management of fresh and salt groundwater on the Dutch Wadden islands in relation to a sustainable water supply

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The Dutch Wadden islands are popular holiday islands. During the summer these islands are ′flooded′ by many tourists. The demand of drinking water is increasing in these months with a factor 3 till 5. Based on the Ghyben-Herzberg principle, a fresh groundwater lens has been established under the Dutch Wadden Islands. This lens is the “beating heart” of the hydro geological cycle. The drinking water supply of the island is depending on this storage of fresh groundwater. For salinization risks, i.e. as an effect of climate change, a better knowledge of the variation (in time and space) of the depth of the salt and fresh water interface is essential. Field data, cone penetration tests (CPT), continuous vertical electrical sounding (CVES), time domain electro magnetic sounding (TDEM) and historic geological data was used together with a high resolution geophysical airborne survey. The airborne survey was flown with the SkyTEM system and results in a complete 3D mapping of the central part of the island. The boundary conditions of a 3D, density driven MODFLOW-SWI model were based on this unique data set. The result was a high detailed and calibrated 3D model of the salinity distribution and hydrological conditions.
All this information is needed to solve a complex question for the water supply company Vitens: is a sustainable self supporting water supply on the islands possible, notwithstanding an increase of the drinking water demand, without salinization risks or ecological or other environmental damage. The presentation will explain which steps were taken to find these answers. The conclusion will be that the SkyTEM survey was very helpful to create a better understanding of the hydrology of the islands This is essential to optimize the drinking water supply for the future in a sustainable way.