CASE STUDY AT A MODEL SITE "GREEN ECONOMY PARK" IN BREMERHAVEN, GERMANY "LUNEPLATE": HIGH-RESOLUTION 3D SUBSURFACE MODELS IN FLOW MODELING WITH A FOCUS ON CLIMATE RESILIENCE"

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The Luneplate in southern Bremerhaven is well known as the most sensitive area of Bremerhaven with respect to saltwater intrusion. In the nature protected area with an organic rich alluvial loam extensive farming takes place. The area is particularly vulnerable to potential heavy rainfalls, which is expected as a result of climate change. In the northern part an area of economic activities is located. Recently this will be expanded by a green business park with a climate-neutral approach "Green Economy". This gives the opportunity to join the challenges of climate change for these both areas. The groundwater levels are located directly below the terrain surface and rainwater cannot seep away without special groundwater management. Another threat is the salinization of groundwater due to rising sea levels. As part of the Interreg project Blue Transition, the question is being investigated how to make our region climate-resilient through ground water management. In this Bremerhaven region once can study different measures due to the focus on climate-friendly water management e.g. the use of excess rainwater. Likewise, in this area compensation areas and basins for the controlled infiltration of rainwater are to be created. Drainage and creation of controlled levelling surfaces can protect against flooding but as well to prevent the dehydration of the organic-rich alluvial clay and thus reduce the risk of a higher CO2 release. As a project partner of the Interreg project Blue Transition, infiltration wells are also tested and the effects of all measures are simulated in a hydraulic 3D groundwater model. The expected rise of sea levels due to climate change, forces a risk of salinization of the groundwater, which infiltration wells can positively influence as well. A high-resolution 3D background model parameterized with hydraulic parameters such as the permeability is the prerequisite for this. The model approach for an area of 4000 m² the cell resolution of 5 m x 5 m x 0.5 m allows us detailed views down to a depth of 10 m in this area, which is geologically well investigated by the upcoming development. Results from geoelectrical resistance measurements provide further information about the subsurface structure and are also included in the model. The aim is to enter into dialogue with investors and project managers and to be able to realistically estimate the effects by simulating possible measures and thus make a meaningful contribution to climate resilience.