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A Single-well push-pull test for flow and mass transfer properties with the depth of 100m at a coastal area

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Hydrogeological Investigations are conducted at the coastal area of Horonobe to realize a long-term deep groundwater flow, especially focusing a movement of saltwater/freshwater interface. The understanding of the groundwater system is crucial for questions that have to be solved, e.g. assumed groundwater velocities at depths of about 1,000 m below ground surface; the "age" of groundwater; and the evolution of these systems depending on different sea levels, etc. Horonobe is located at the northwestern coast of the northern Japanese main island, Hokkaido, and is a part of a sedimentary coastal basin, which is composed of poorly compacted sand-, silt- and mudrocks of Quaternary. In our project, the hydraulic and hydrochemical properties of an aquifer in about 1,000 m depth should be investigated. The final goal of the project is to establish a numerical model to predict the long-term behaviour of groundwater flow and transport. In the first phase a Single-well ("push-pull") test was conducted as a preliminary study in the 100 m deep well. First a tracer-groundwater mix was pumped into the aquifer ("push-phase"), and afterwards the resulting plume was pumped back ("pull-phase"). The retardation of several different ions and their recoveries in relation to conservative tracers were used to characterize the transport characteristics of dissolved substances within a potential sedimentary host rock.

Keywords: geological disposal, saltwater/freshwater interface, groundwater environment, tracer, adsorption, retardation