

Estimation of preferential recharge and saltwater intrusion to a coastal groundwater system in the North Central Coast of Vietnam by means of 3D hydrostratigraphical modeling

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ABSTRACT

Saltwater intrusion is worldwide regarded as a major threat to groundwater resources. Mostly, saltwater intrusion problems are related to sea water level rise or induced intrusion due to excessive groundwater extraction in coastal aquifers. However, the hydrogeological heterogeneity of the subsurface might play an important role in (non-)intrusion as well. This study focuses on local (hydro)geological conditions for preferential recharge as well as saltwater intrusion to a coastal groundwater system in Vietnam where geological formations exhibit highly heterogeneous lithologies. For that purpose, a 3D hydrostratigraphical solid model of the study area is constructed by a recursive and cluster analysis – based process combined with a chronographic marker. The cluster analysis is carried out on lithological composition, distribution depth and thickness of each lithological distinctive drilling interval of 47 boreholes to distinguish and map well-log intervals of similar lithological properties in different geological formations. A 3D hydrostratigraphical fence diagram is then generated from the constructed solid model and is used as a tool to estimate preferential recharge paths and saltwater intrusion to the groundwater system under study. Available data on groundwater level, water sample chemical analysis, and geophysical DC resistivity measurements are also used to support the estimation. Result of this research work contributes to the interpretation of why the aquifer system of the study area is almost uninfluenced by saltwater intrusion which is relatively common in coastal aquifers of Vietnam.

Keywords: stratigraphic modeling, coastal aquifer, cluster analysis, Vietnam.

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