

Dispersion effects on the freshwater-seawater interface in subsea aquifers

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ABSTRACT

The recent acknowledgment of the widespread occurrence of freshwater under the sea has renewed interest in understanding and predicting the extent of this hidden resource. The most easily applied approaches to estimating offshore freshwater limits are based on sharp-interface assumptions, which neglect dispersive mechanisms and offshore circulation of seawater. The difference between sharp-interface and dispersive models has been investigated extensively for onshore coastal aquifers; however, the role of dispersion in controlling offshore freshwater-seawater interactions is not well understood. Our study aims to improve the current understanding of the influence of dispersion on stable offshore interfaces, seawater circulation and freshwater discharge. For this purpose, we undertake dispersive numerical simulations in SEAWAT. Results show that dispersion affects the tip and toe in a different fashion. Increasing dispersion causes the toe to increasingly advance seaward, where the tip shows non-monotonic relationship with dispersion.