Modelling of paleo-saltwater intrusion in the northern part of the Nubian Aquifer System, Northeast Africa

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Abstract:

A numerical groundwater model of the Nubian Aquifer System was established to prove the influence of rising seawater levels on the groundwater salinity in northern Egypt over the last 140,000 years. In addition, the impact of a groundwater recharge scenario for these 140,000 years, involving climatic change, on the saltwater/freshwater interface was investigated. Saltwater intrusion induced by rising water levels of the Mediterranean Sea led to salinisation from the Mediterranean Sea to the Qattara depression. This modelling approach was supported by a density-driven model setup and calculation. The modelled saltwater/freshwater interfaces partially fitted the observed ones, especially in the southern half of the Qattara depression. In other parts of the northern Nubian Aquifer System, the ingression of salt water was modelled adequately, but in the west, small regions of the measured interface were not. The development in the Qattara depression (Egypt) and Sirte basin (Libya) were investigated in more detail. The different behaviour in the Sirte basin may be due to high evapotranspiration rates in some former periods, salt solutions from the pre-Quaternary layers or saltwater infiltration from sabkhalike recent salt-bearing sediments.

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