

Vincent Post: The use of chemical and isotope tracers to study the coastal groundwater system in the greater Adelaide region, South Australia

Groundwater is an important water resource in semi-arid South Australia, and protection of the resource is of critical importance. The management of groundwater in coastal areas requires special consideration, as the vicinity of saline seawater can lead to salinization of fresh groundwater reserves. This contribution will highlight the outcomes of research by the National Centre for Groundwater Research and Flinders University of the sedimentary coastal aquifer system near the city of Adelaide in South Australia. Chemical and isotope data of groundwater samples reveal the presence of a hypersaline water type in the deeper parts of the system. It is inferred that the brine originated by the evaporation of seawater but the timing of this process is difficult to ascertain. Where the brine is migrating upwards, a complex stratification of water types develops in aquifers. These water types can be discerned based on their salinity, stable water isotope values, Sr isotope ratios, as well as their ^{14}C and ^4He content. While in some parts of the system flushing by meteoric recharge is within thousands of years, much older water occurs in the deeper parts of the system, which means that the evolution of the groundwater system has been influenced by the long-term changes in sea level and recharge. The resulting distribution of water types has important implications for the management of the groundwater resources.