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Stable isotope geochemistry of pore waters from the New Jersey shelf - No evidence for Pleistocene melt water

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Scientific drillings in the 1970s revealed the presence of a large fresh water lens below the New Jersey Shelf. The origin and age of this fresh water body is still under debate. Groundwater flow models suggest that the water mainly originates from glacial melt water that entered the ground below large continental ice sheets during the last glacial maximum (LGM), whereas other studies suggest an age up to late Miocene.
In this study, interstitial water was sampled during the Integrated Ocean Drilling Program (IODP) expedition 313 “New Jersey Shallow Shelf” (Mountain et al., 2010) and analyzed for water chemistry and stable isotope ratios (van Geldern et al, 2013). The pore fluid stable isotope values define a mixing line with end members that have oxygen and hydrogen isotope values of -7.0‰ and -41‰ for fresh water, and -0.8‰ and -6‰ for saltwater, respectively. The analyses revealed the following sources of fluids beneath the shelf: (1) modern rainwater, (2) modern seawater, and (3) a brine that ascends from deep sediments. The stable isotope composition of the water samples indicates modern meteoric recharge from New Jersey onshore aquifers as the fresh-water end member. This contradicts earlier views on the formation of the New Jersey fresh water lens, as it does not support the ice-age-origin theory. The salt-water end member is identical to modern New Jersey shelf seawater. Lower core parts of the drilling sites are characterized by mixing with a brine that originates from evaporites in the deep underground and that ascends via faults into the overlying sediments. The geochemical data from this study may provide the basis for an approach to construct a transect across the New Jersey shallow shelf since they fill a missing link in the shelf’s geochemical profile. They also lay foundations for future research on hardly explored near-shore freshwater resources.

References

Mountain, G. and the Expedition 313 Scientists, 2010, Proceedings of the Integrated Ocean Drilling Program, Volume 313, Tokyo, available at: http://publications.iodp.org/proceedings/313/313toc.htm.
van Geldern, R., Hayashi, T., Böttcher, M. E., Mottl, M. J., Barth, J. A. C., and Stadler, S., 2013, Stable isotope geochemistry of pore waters and marine sediments from the New Jersey shelf: Methane formation and fluid origin: Geosphere, v. 9, no. 1, p. in press.