

***Interactive comment on* “Groundwater mean residence time of a sub-tropical barrier sand island” by Harald Hofmann et al.**

Anonymous Referee #2

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General comments The authors describe the mean residence times of groundwater in a fresh-water lens on a barrier island in Australia. The paper is generally well written, easy to follow and the methods and their application is straightforward. In general, it is a contribution worthwhile publishing. There are, however, a few points that need to be addressed:

The authors tend to focus on rather recent literature to introduce concepts (e.g. lines 38-39, 40-41 but also elsewhere). This undervalues the contributions of the people who developed these concepts in the first place. Priority should be given to the older literature.

What is surprisingly almost completely missing is a comparison of the obtained data to other barrier islands, of which there are many worldwide. Several studies have studied

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the MRT (or age patterns) on barrier islands/dune areas in the Netherlands (Stuyfzand 1993) and on the German barrier islands Borkum, Spiekeroog, Langeoog and Baltrum (search for authors Holt, Seibert, Greskowiak, Massmann, Wiederhold, Post, Houben, Stoeckl etc.).

A recommendation would be to try to use the analytical model by Fetter (1972, the one with the impermeable basement) to try to recreate the lens shape depicted in Figure 9 with the parameters the authors propose. The age patterns could also be checked against the analytical models by Vacher (1988) and Chesnaux & Allen (2013).

Screen lengths of the observation wells are not given but may be an important factor. Considering the low tritium concentrations found, results can be easily affected by mixing, if samples are taken from long-screened wells. Please add info!

Specific comments Line 1-2: groundwater use and over-abstraction are related L25: do not agree, the barrier islands along the North Sea shore have no perched aquifers, this might be true for Australia but not necessarily for all barrier islands L46: I would disagree, there was steady stream of publications on the German barrier islands in the last few years, especially on Borkum, Spiekeroog, Langeoog and Baltrum. Hardly any of the publications are cited in this manuscript (except for Röper et al.), therefore, the statement on the poor understanding of such systems is not valid. Several of these studies explicitly address the topic of residence times (and also of groundwater climate archive). L130: what was the screen length? L162ff: I wonder why tritium-helium was not considered, as it frees you from many of the model assumptions of lumped parameter models such as the PFM et al.? L241: maybe better to use dissolved oxygen concentrations instead of ORP L245, 246: two decimal places really needed/valid? L365: please avoid colloquial terms like “coffee rock”

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