

Interactive comment on “Tracing and quantifying groundwater inflow into lakes using radon-222” by T. Kluge et al.

Anonymous Referee #3

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General Comments

Yes, the paper addresses relevant scientific questions within the scope of HESS. Yes, the paper presents novel concepts, ideas, tools, and data. Good instrumental work. Yes, substantial conclusions are reached. Yes, the scientific methods and assumptions are valid and clearly outlined. Yes, the results are sufficient to support the interpretations and conclusions. Yes, the description of experiments and calculations allows their reproduction by fellow scientists. Yes, the authors give proper credit to related work and clearly indicate their own new contribution. Yes, the title reflects the contents of the paper. Yes, the abstract provides a concise and complete summary. Yes, the overall presentation well structured and clear. Yes, the language is fluent and precise. Yes, mathematical formulae, symbols, abbreviations, and units are correctly defined

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and used. The paper is too long. I would remove some of the lengthy discussion of gas exchange rates. Yes, the number and quality of references is appropriate.

Specific Comments

page 1521: Why should hydraulic heads of the groundwater in the lake's surroundings and typical evaporation and precipitation values lead to large uncertainties to determine indirectly the groundwater inflow. Darcy's Law makes hydraulic gradients reflect directly non-constant hydraulic conductivities in the heterogeneous subsurface. In fact, small-scale heterogeneities are often not reflected in maps of groundwater flow paths. See also comment for page 1533.

page 1533: Why did you not use Darcy's Law for an assessment of inflow rates, to compare with the tracer results ? (cross-sectional area of flow x hydraulic gradient x hydraulic conductivity of aquifer material at lake interface). See also comment for page 1521.

Figure 4: Give groundwater flow direction and hydraulic gradients.

page 1522: - No: In the flow situation of groundwater exfiltration from the subsurface to a "groundwater lake", concentration gradients are created between groundwater and surface waters not as a result of the short lifetime, but rather as an effect of outgassing to the atmosphere. - No: Comparable use of radon to assess groundwater exfiltration into lakes has not received less attention, as has erroneously been copied from Corbett et al., (1997), see, e.g., Rogers, A.S., Physical behavior and geologic control of radon in mountain streams, U.S. Geol. Surv. Bull., 1052-4, 187-211, 1958.

Technical Corrections

page 1520: - extraction of gravel and sand. - wells are not used for drinking water - ground water is.

page 1525: - Normally, low-cost plastics are not Rn-in-air tight. Has tightness of polypropylene buckets been tested ? - desiccant, not dessicant - If equilibration of

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the Rad Aqua Plus method also requires several hours, then this is no longer advantageous over the Rad Aqua method, as described by Burnett.

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4, S441–S443, 2007

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