

Response to Anonymous Referee #1:

Comments in black

Responses in blue

General Comments:

This manuscript presents research that was completed to determine the source(s) of recharge to the Adelaide Plains, Australia. The authors were specifically interested in determining whether recharge in the Adelaide Plains was sourced from mountain-block recharge (MBR) or mountain-front recharge (MFR) or a combination of the two in the nearby Mount Lofty Range using a combination of regional hydraulic head data and chloride data. The article is well written and will likely gain broad readership within the hydrogeology and mountain hydrology communities. It has immediate regional implications to the evolving conceptual framework for the Adelaide Plains.

There are a couple of weaknesses in its current form that prevent a recommendation for acceptance.

First, the Abstract, Introduction, and Conclusions do not do the article justice. The Abstract needs data in my opinion, but this is admittedly difficult since most of the results are presented spatially in maps. In any case, the Abstract feels methods-heavy since only the last 6 sentences discuss actual results. This could be remedied with a concise problem statement in the Abstract contrasting the different conceptual models. The Introduction suffers from the same problem. While most readers familiar with mountain hydrological processes will know the typical range for MBR and MFR, it may be useful for the larger HESS community to provide numbers (range of recharge) with geographic setting. This is easy to incorporate into a table and provides the readers with what to expect for MBR and MFR, why it's important, etc. The Conclusions is the weakest section in my opinion and may need a complete overhaul. The article is entertaining and will likely gain appreciation in the communities mentioned above. However, the Conclusions are methods-heavy and do not discuss the regional or broader implications.

Response: We agree that these sections may contain too many technical details, and so we will remove some of these while revising the manuscript, and will put more emphasis on the implications. However, we prefer to keep the focus principally on the methods, as this is what the article is about. Namely, including the typical range for MBR and MFR is deemed out of scope as this would not serve the paper's objective, and considering that the recharge rate would be hugely dependent on regional characteristics (climate, geology, topography).

Second, Figures 6 and 7 are difficult to interpret. Figure 8 is much more informative. Is there a way to show this data more effectively? This is important since so much of the interpretation revolves around these figures.

Response: We understand the concern. To deal with this issue, we will consider producing zoomed-in figures when revising the manuscript.

Third, it may be very useful/informative to have conceptual diagrams for Section 2.1, especially for those readers who have not read Winter's seminal chapter.

Response: Accepted; we will add a figure.

Specific Comments:

P2 L2 (Page 2 Line 2): suggest changing "rainfall" to either "precipitation" or "rainfall and snowfall" for the broader audience. Suggest adding references to Winograd et al. (1998) and Earman et al. (2006).

Response: Accepted (will use "precipitation").

P2 L23: suggest changing "ultimate" to "most robust" or "more robust".

Response: Accepted ("most robust").

P3 L3: it's still uncommon to have many wells in other mountainous regions. Perhaps this statement should be tempered to reflect regional conditions.

Response: Accepted.

P3 L6-9: Can you expand on what is implied in this statement? It assumes that the reader has an intimate knowledge of the references studies.

Response: We will clarify the statement by changing it for: "In particular, the hydraulic role of faults (i.e. acting as barrier or conduit to flow) that run along the mountain front remains unclear."

P3 L23: What is meant by "triangular facets"? Do you mean interfluvial? Please define.

Response: We will add a figure to clarify this concept.

P4 L6: This is not correct. It should be groundwater discharge to streams occurs when groundwater levels are higher than the stream as indicated in Winter's chapter. Correct?

Response: Thank you for pointing out the error; this will be corrected.

P4 L22: delete "as discussed in the following" and elsewhere in the article.

Response: Accepted.

P5 L18-20: This is not always the case, not always true.

Response: Accepted; we will mention this as only one possibility.

P5 L21: This is a sweeping statement. Is it possible that Cl-(MFR) can be higher than Cl-(MBR), especially where streams draining the mountains are accumulating lots of Cl- from groundwater in other regions?

Response: Accepted; we will indicate this possibility.

P6 L11-18: Is there seasonality in precipitation and recharge?

Response: Yes. We will add this information, as in: "The majority (87 %) of the rainfall in the Mount Lofty Ranges occurs during the extended winter season (April–September) (station number 23810, 1970–2013), indicating a strong seasonality in the recharge."

P10 L9-14: please add arrows to show these locations.

Response: We will consider producing zoomed-in figures and adding interpretation information when revising the manuscript.

P11 L2: suggest amending the statement to read, "had the same Cl concentrations or if mineral sources of Cl were non-negligible and/or spatially variable, "

Response (P13 and not P11): We prefer to modify the sentence as: “Cl is potentially a great tool to distinguish between MFR and MBR if the stream water Cl concentration in the mountain front zone is significantly different from the groundwater Cl concentration at the base of the mountain.”. This sentence is more rigorously correct, while the question of mineral sources is addressed later.

P11 L11: should this be "long" instead of "short"?

Response (P13 and not P11): Absolutely; thank you for pointing out the error. This will be corrected.

P13 L27-30: do you have Br data? If so, Cl/Br ratios would provide additional support for this statement.

Response: We will look into that while revising the manuscript.