Hydrol. Earth Syst. Sci. Discuss., 11, C3497–C3499, 2014
www.hydrol-earth-syst-sci-discuss.net/11/C3497/2014/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Identifying flood recharge and inter-aquifer connectivity using multiple isotopes in subtropical Australia" *by* A. C. King et al.

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Received and published: 30 August 2014

Thank you for your comments anonymous Referee #2.

1 ANONYMOUS; REFEREE #2

This is an interesting and well written paper. I am wondering if the paper would benefit from a little more focus: The main conclusion of the paper is that most of the rainfall contributing to the flood event obviously ended up in the Cressbrook dam or recharged the alluvial aquifer in the lower part of the catchment. However, this result can be inferred from Figure 8 alone, which only presents data of stable water isotopes plus

chloride. The paper would also benefit from discussion of some of the uncertainties involved in the interpretation of recharge processes inferred from the environmental tracer data.

Response: Thank you for your comments. More information regarding the uncertainty of interpretations made from the strontium isotope data is presented below. This information includes additional data from another paper (Ullman and Collerson, 1994), as suggested by Referee #1. It should be noted that if the actual strontium concentration of rainfall was greater than the range presented here, it would not affect the interpretation of the data.

Change to: Strontium isotope ratios of surface and groundwaters in the Cressbrook Creek catchment range from 0.7042 to 0.7119 (Fig. 9), although most samples are within a narrower range of 0.7051 to 0.7078. No measurements of the 87Sr/86Sr ratios of rainwater were conducted for the study area, and as a consequence, the 87Sr/86Sr ratios of rainfall used in this study (Fig. 9a) are based on data from elsewhere in Australia. The 87Sr/86Sr ratios of rainfall are typically similar to modern seawater (0.7092; Dia et al., 1992) near the coast, but they become progressively more radiogenic inland due to the addition of atmospheric dust. Strontium isotope measurements of rainfall from Hamilton, Casterton and Willaura in Victoria (south-eastern Australia), which are located approximately 60, 70 and 100 km from the coast respectively, were 0.7094, 0.7097 and 0.7107 (Raiber et al., 2009). In comparison, the rainfall 87Sr/86Sr ratio measured at Woodlawoolana located approximately 500-600 km inland in South Australia is 0.71314 (Ullman and Collerson, 1994). The Cressbrook Creek catchment is approximately 70 km from the eastern coast of Australia (Fig. 1). Assuming a similar increase of the strontium isotope ratios of rainfall with increasing distance from the coast, the 87Sr/86Sr ratios in the Cressbrook Creek catchment may be in a similar range to those reported by Raiber et al. (2009), although it is acknowledged that local factors and temporal variability can have a substantial influence. However, the 87Sr/86Sr isotope ratio of rainfall at Cressbrook Creek should not be significantly different to the

range presented in Fig 9a, and any local variations would not affect the hydrological interpretation.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 3711, 2014.