



Large basins as isotopic monitors of hydrologic response in arid zones

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The initiation of surface runoff, the development of flash floods in ephemeral rivers of arid catchments and the subsequent generation of indirect groundwater recharge are characterized by significant and scale-dependent thresholds. Although, in arid basins there is considerable process variability on the event-scale regarding both rainfall and its isotopic composition (SHARON, 1972; DODY, ADAR & YAKIREVICH, 1995), high thresholds for the connection of hydrological compartments reduce much of the variability for the few events that are effective in terms of runoff generation and indirect groundwater recharge. The concept of how hydrological processes are related to the isotopic composition of water in different landscape units of arid basins was described conceptually for semi-arid and arid zones (GAT, 1994). Recent data from different macro-scale catchments (Kuisseb, 14.700 km²; Kalahari, Omambonde river, 36.400 km²) in Southern Africa sustain this concept and suggest that especially large basins exhibit the benign effects of temporal integration making them suitable for the study and reconstruction of long-term hydrological system characteristics. Based on known isotopic amount effects and regional surveys, regional scale-dependent thresholds for the generation of runoff and indirect recharge could be derived.

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