

Interactive comment on “Recharge estimation and soil moisture dynamics in a Mediterranean karst aquifer” by F. Ries et al.

Anonymous Referee #2

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Review Letter to the paper – hess-2014-304 - “Recharge estimation and soil moisture dynamics in a Mediterranean karst aquifer” by Reis et al.

General This is a very interesting paper which studies the effect of soil moisture on groundwater recharge in the semi-arid Mediterranean region. The data is new and the analysis does good job to the data producing relevant conclusions. I highly recommend to publish the paper in HESS. Methods The study uses an intensive monitoring system including rain-gauges, meteorological stations and soil moisture sensors in 3 different plots along the climatic gradient of the Jordan Valley, east of Jerusalem. Water movement in the unsaturated zone of the soil was simulated using Hydrus-1D model. The soil depth and rainfall input were modified in order to simulate the effect of the climatic gradient and soil depth on water percolation. The calibrated model later applied to a
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series of 62 years of meteorological data. Results 1. Soil moisture measurements showed significant infiltration during heavy rainstorms and the modelling indicated that recharge takes place in relative few rainfall events. 2. Temperature drops in a nearby groundwater verify the recharge fluxes to groundwater. 3. The model runs calculated annual percolation ranging from 0 to 66 % of the rainfall depth during wet years. 4. Recharge is highly correlated the temporal distribution rainfall and to the depth of the soil.

Comments a.The Study area section – mainly climate, deserves more data: 1. Page 4, lines 36-37 - Add that this is a “rain-shadow desert” 2. Page 4, add some data on typical rainfall intensities. 3. Page 4 - The area is affected also by the Red Sea Trough (RST) system from the south during autumn and spring with different characteristics. 4. Page 4 - Data on evaporation? b. Dust and soils 1. Page 4, lines 12-18 - grain-size of the dust? – it is critical to the texture of the soils which is a bit different – clay soil versus loamy-clay - silty-clay. 2. Page 4, lines 12-18 – chemical composition – soil with much dust versus a soil with more weathering products. c. Page 4, lines 21-22 - actually, the mechanism is that the soil develops at the pocket above a fissure which allows a good drainage of the water and to a lesser extent accumulation of eroded particles. d. Page 9, line 13 – where are these stations? e. Page 10, line 27 – how dry (% of average) f. Page 14, line 2 – Show Auja spring on the map. g. Page 16, lines 16,17 – what are these “high” rainfall intensities? For example, “very high” intensities typical of the RST system (see in the literature and cite) are too high for infiltration – most of which turn into runoff. Therefore the “high” intensities have values/thresholds and rainfall depth maybe as important. When these are exceeded rainfall will turn into runoff typical of the desert. h. Page 3, line 20 – Youval Arbel in his Ph.d. monitored soil moisture in few soil sections in Mt. Carmel, using FDR. There are many minor comments of editing and typo in the ms which I attach. Figures are in a good quality.