

Stemflow of desert shrub and its significance in soil moisture replenishment

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General Comment:

Overall, I would say that manuscript it is worthy of publication, but needs a major revision, and I leave the final decision to the editor. I have some doubts about the approach used. The study represents a valuable addition to scientific knowledge. However, there are some points of concern:

- 1) The experiment lasted one year, and in a very short period of time in 2008. On the other hand I think that as preliminary results on which further investigation will be needed, it is valuable and should be published. I believe that the editor will make the final decision about it.
- 2) The experiment seems to have been carried out under rainfall events that fall without turbulence effects. For example no information or concern is taken about the possibility to have a rainfall event under windy condition. Would be the water quantity the same? Would the plant intercept more or less water? Do such conditions apply to some of the events observed during the experiment?
- 3) I have a general doubt about the 8 shrubs plants considered. If we look at Table 1 and take into account the column of canopy projection, we can see that there is a large variation across plants, and this will affect the quantity of water intercepted from the plant. For example projection areas of 80245, 45239, 52778 (cm²) are very different from an other group of plants having values of 28274, 22619, 20028....etc,(cm²). Would these different plants intercept different quantity of water?. I think so, and at least the analysis should have been done on homogeneous plant age and canopy projection, just to reduce variation due to the different plant leafiness. Some comments should be added on this aspect.
- 4) I have some doubts about the equation (1) and the accuracy of the approach, I will leave a decision to the editor. At least the following is requested: use the same units (e.g. cm, cm²; cm³; dm³ and so on) for all variables in Eq. 1.
- 5) I invite the author to be more accurate in the figure captions that should correspond to the main text. Specific comments are reported later
- 6) If possible, improve the figure quality as for example Fig 2 in which a double Y-axis could help to have a clear visibility of rainfall and rainfall intensity.

Specific comments:

Equation (1) and Fig 5 are related: is SF a stemflow water volume given in liter units ? Is F expressed in (%) or as non-dimensional ratio ?

In relation to the Equation (1) if SF is the water volume collected in the bottles at the base of shrubs (stemflow) (e.g. liters) and BA_xP is the volume of water (e.g. liters) that could have be caught under the trunk of the shrubs, I have some problems to believe that F values Higher than 100 are possible, and should be ascribed to the contribution to the leaves to catch the water. My doubts are:

- a) as already noted due to the high plant canopy variation of the 8 shrubs plant you are comparing different situations an you are not making the analysis on homogeneous plant family. So what is the general relevance of your results? How would you extrapolate your results to a larger sample of plants, to a wider area, to a different site?
- b) could you provide some additional information on canopy structure, e.g. Leaf Area Index and Stem Area Index, to support especially the rather large F-values (exceeding 100)? Do you explain such large values with the area of stems and leaves? This information would be most useful to understand how to group data of very different canopies? Some illustrations suggest SF is shown as a %.

Detailed comments:

Page 5215 line 25....."Consequently " sentence nor clear

Page 5216 line 5....."In the following....." redundant sentence, organization of manuscript follows usual practice.

Page 5217 material and methods of TDR probes. I suppose that the TDR probes were installed under shrubs different from the ones where "*Stemflow water was delivered from the collar to a collection bottle via a 1.5 cm aperture plastic hose (Fig. 1). Stemflow was measured by graduated cylinder for each branch after each rainfall event and summarized for a single shrub* ". If the shrub is the same for TDR and collection bottle, did you pour the water collected in the bottle on the soil under the shrubs after the collection and record of volume collected? If the plants were the same for both TDR measurements and bottle collection I believe that all the comments on the wetting front in relation to a small or large rainfall event (fig 6 , 7) are difficult to interpret, since observed soil moisture and wetting front depend on what is done with collected water. I suppose that the plants are different if I am right you should clarify in material and methods that the TDR probes were installed on different plant location. If not explain what how did you account for collected stem water when analyzing data on the wetting front.

Page 5218 line 9. Why did you decide to limit the measurements in the range july-october and not include an earlier starting date?

Equation (2) reads:

$$I = 10(\theta_e - \theta_i)Z_f$$

I think that θ_e should be substituted with θ_f , where f = final volumetric soil water content, otherwise please specify what does "e" stand for.. You indicate later that θ_e is a generic *the volumetric soil water content*. Also you should clarify the dependence on time of variables in eq.2: I suppose cumulative infiltration is a time dependent variable (up to time t..). It is confusing to see Z_f as infiltration depth, while is not clear how θ is obtained from TDR measurements at different depths and intervals. Is it some kind of average across an entire soil layer? Please clarify.

Page 5219 line 24. Rainfall event excluded from the analysis because there was a overflow . Did this water come out from the bottle and go to the soil ? Did you exclude from the analysis of the soil wetting front soil too?

Page 5220 line 10 to 12. Have I understood well that 60 and 120 are averaged F values? If they aren't averaged values the sentence should be rewritten, by clarifying how they were estimated. If I am right and so they are averaged values you should improve the sentence by indicating that 60 and 120 are averaged.

Fig 6 and 7. There is no agreement between the timing of events in the text and in the figure captions. For example: Text "*For a consecutive series of large rainfall events with cumulative rainfall of 42.5mm (from 0:00 LT of 22 September to 21:00 LT of 26 September), the wetting front reached a depth of 90 cm.*" Figure 7 caption: "*Fig. 7. The wetting front advance from 17:00 LT of 22 September to 17:00 LT of 7 October (S) represents the start of rainfall, (E) the end of rainfall.*"