Response 1

I suggest to make the following change (blue color) of the text and to rearrange members of Eq. (3) so that the correspondence between them and the newly inserted text is clearly visible.

Let $\boldsymbol{\xi} = \boldsymbol{\xi}(t)$ be a point upon the evaporation front at time t; $\boldsymbol{\xi} \in \gamma_t$. Let δt be an elementary time step and δS an elementary surface surrounding the point $\boldsymbol{\xi}$, $\delta S \subset \gamma_t$. Denote by $\boldsymbol{\nu}(t, \boldsymbol{\xi})$ the unit normal vector to γ_t at point $\boldsymbol{\xi}$, oriented out of the wet zone, and by δs the distance between the positions γ_t and $\gamma_{t+\delta t}$ at $\boldsymbol{\xi}$. Then the flow and transport of water coming to the elementary surface δS from the wet zone, $\rho\,\boldsymbol{w} + \boldsymbol{b}^w + c^w\,\boldsymbol{v}^v$, pushes the front towards the dry zone, and the transport of water out of δS into the dry zone, $\boldsymbol{b}^d + c^d\,\boldsymbol{v}^d$, pushes the front towards the wet zone. The excess of water coming to δS during the time interval δt, $(\rho\,\boldsymbol{w} + \boldsymbol{b}^w + c^w\,\boldsymbol{v}^w - \boldsymbol{b}^d - c^d\,\boldsymbol{v}^d, \boldsymbol{\nu})$, is compensated by the mass of water $\delta s\,\delta S(\rho\,\theta + c^w(n-\theta) - n\,c^d)$ shifting the surface δS to its new position distant by δs in the direction $\boldsymbol{\nu}$. Here and in the sequel, $(\boldsymbol{u}, \boldsymbol{v})$, where $\boldsymbol{u}, \boldsymbol{v}$ are two vectors, denotes the scalar product. This account gives the balance equation

$$\delta S\,\delta t\big(\rho\,\boldsymbol{w}(t,\boldsymbol{\xi}) + \boldsymbol{b}^w(t,\boldsymbol{\xi}) + c^w(t,\boldsymbol{\xi})\,\boldsymbol{v}^w(t,\boldsymbol{\xi}) - \boldsymbol{b}^d(t,\boldsymbol{\xi}) - c^d(t,\boldsymbol{\xi})\,\boldsymbol{v}^d(t,\boldsymbol{\xi}), \boldsymbol{\nu}(t,\boldsymbol{\xi})\big)$$
$$= \delta S\,\delta s\big(\theta(t,\boldsymbol{\xi})\,\rho + (n - \theta(t,\boldsymbol{\xi}))c^w(t,\boldsymbol{\xi}) - n\,c^d(t,\boldsymbol{\xi})\big) \qquad (3)$$

It is not necessary to make any changes in s Eqs. (4), (5) and (6), I only suggest to remove the superfluous brackets.

I believe that Eq. (5) does not require any further comment, since it was derived from Eq. (3) which is now explained in the blue colored lines.

What do the designations n and _theta mean?

I suggest not to use the symbol _theta (water content) in line 87, and to introduce and define it in line 92.

I suggest to introduce and define the symbol n (porosity) in the sentence "Denote by ...", line 120.

What is in parenthesis? Scalar product with normal?

Yes, it is the scalar product. The notation is now explained in suggested blue colored text above.

Response 2

I understand that this item concerns in particular the step of getting the balance equation, Eq.(3). In order to make the step clear, I suggest to insert the following lines (new text is colored blue) and to rearrange members of Eq. (3) so that the correspondence between them and the newly inserted text is clearly visible.

Denote by $\boldsymbol{\nu}(t, \boldsymbol{\xi})$ the unit normal vector to γ_t at point $\boldsymbol{\xi}$, oriented out of the wet zone, and by δs the distance between the positions γ_t and $\gamma_{t+\delta t}$ at $\boldsymbol{\xi}$. Then the flow and transport of water coming to the elementary surface δS from the wet zone, $\rho\,\boldsymbol{w} + \boldsymbol{b}^w + c^w\,\boldsymbol{v}^v$, pushes the front towards the dry zone, and the transport of water out of δS into the dry zone, $\boldsymbol{b}^d + c^d\,\boldsymbol{v}^d$, pushes the front towards the wet zone. The excess of water coming to δS during the time interval δt, $(\rho\,\boldsymbol{w} + \boldsymbol{b}^w + c^w\,\boldsymbol{v}^w - \boldsymbol{b}^d - c^d\,\boldsymbol{v}^d, \boldsymbol{\nu})$, is compensated by the mass of water $\delta s\,\delta S(\rho\,\theta + c^w(n - \theta) - n\,c^d)$ shifting the surface δS to its new position distant by δs in the direction $\boldsymbol{\nu}$. Here and in the sequel, $(\boldsymbol{u}, \boldsymbol{v})$, where $\boldsymbol{u}, \boldsymbol{v}$ are two vectors, denotes the scalar product. This account gives the balance equation

$$\delta S\,\delta t\big(\rho\,\boldsymbol{w}(t,\boldsymbol{\xi}) + \boldsymbol{b}^w(t,\boldsymbol{\xi}) + c^w(t,\boldsymbol{\xi})\,\boldsymbol{v}^w(t,\boldsymbol{\xi}) - \boldsymbol{b}^d(t,\boldsymbol{\xi}) - c^d(t,\boldsymbol{\xi})\,\boldsymbol{v}^d(t,\boldsymbol{\xi}), \boldsymbol{\nu}(t,\boldsymbol{\xi})\big)$$
$$= \delta S\,\delta s\big(\theta(t,\boldsymbol{\xi})\,\rho + (n - \theta(t,\boldsymbol{\xi}))c^w(t,\boldsymbol{\xi}) - n\,c^d(t,\boldsymbol{\xi})\big) \tag{3}$$

Solving a problem with Eq.(5), the knowledge of its right-hand side is required at any time and position of the macroscale evaporation front. I have not found such a set of data that make it possible. Moreover and perhaps the most important reason for using the "not sufficiently documented" experiment is the measurement of the front motion using the color method. To be utilized as a substitute for in situ measurements, the theory needs a comparison with results obtained by a method applicable under field conditions. The example is provided in order to show that the theoretical problem of evaporation front motion is numerically solvable and that the comparison with the experimentally measured data is possible.

The role of the film flow is of course important in problems of evaporation in porous media. The approach of the present paper takes the film flow into account through its effect upon the flow in the wet zone and neglects its presence out of it. This follows from the definition of the front in lines 73-75.

I made new figures and increased the font size.

density porosity in Eq. 3).

I checked the text once more and suggest to add the missed definition of θ, the water content, to the line 93 and not to use the symbol in line 87. I also suggest to introduce and define the symbol n (porosity) in the sentence "Denote by ...", line 120.

All equations should be numbered consistently (about half of the equations are not numbered).

Though I think that it suffices to number only equations that are referred to, I am ready to give numbers to all equations if required.

In order for someone to be able to reproduce the simulations discussed in the current study, it is essential that all the parameters used in the study should be provided either in the text or preferably collected in a Table (Mualem and van Genuchten parameters, Diffusion coefficients, etc.)

I suggest to insert the values of the parameters between the sentences "Now the problem (13), (12) can be solved numerically." and "Figure (4) shows ...", line 291.

In lines 76-78 the author mentions that "we do not consider the temperature distribution and heat flow balance". Does the author considers completely isothermal conditions? This issue should be stated clearly. Does this particular assumption applies to all experimental conditions and different porous media? If not, which are the restrictions/limitations for using this assumption?

The sentence tries to express the fact that (without any assumptions concerning heat or temperature) sufficient knowledge of water flow and transport (i.e. both liquid phase water and gaseous phase water) defines the position of the evaporation front. Consequently, it even gives the rate of the latent heat of vaporization being spent upon the front, see the lines 306-308. Of course, it cannot give the temperature distribution.

In order to make it clear, I suggest to replace the paragraph "We do not consider ..." lines 76-78, by the paragraph We do not consider the temperature distribution and heat flow and balance, since, in virtue of its definition, the evaporation front results from the water transport data. Though unknown, the heat flow within the profile provides the latent heat of vaporization that is necessary for the evaporation resulting from the actual process of water transport.

In lines 293-295 the author presents 3 cases for c_f and c_e. Additional details should be provided on how these values were selected (temperature, pressure conditions etc.) and what is the source of these values.

The only given values were those presented in lines 271-272. To show that the chosen values satisfy the requirements, I suggest to insert When using the method by Mc Rae (1980) and choosing the relative humidity at the evaporation front and at the sample's surface as 100% and 40%, respectively, we get the following temperatures at the evaporation front and at the sample's surface: (1) 19.5°C and 20.0°C, (2) 20.5°C and 21.0°C, (3) 21.5°C and 22.0°C. between lines 295 and 296.

The doi reported for Sakai et al. (2011) corresponds to a Correction to a previous paper by those authors. The author might want to include the original paper as well in the reference list.

The doi was incorrect. I will change it to 10.1029/2010WR009866.