Erratum to: An Improved Heat Flux Theory and Mathematical Equation to Estimate Water Vapor Advection as an Alternative to Mechanistic Enhancement Factor

Eng Giap Goh^{1,2} · Kosuke Noborio¹

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In our recent paper, cited above, equations from Eqs. 17 to 20 in Sect. 2.7 were in incomplete forms. The water vapor movement should be presented in the form of heat flux equation either as latent heat flux, or as a combination of both latent heat and sensible heat flux by water vapor movement. The expressions for the equations should be written, respectively, as follows:

$$\begin{aligned} \eta D\Omega\theta_a (L_o + c_v\Delta T) \left(\rho_s \frac{\partial h_m}{\partial T} + h_m \frac{\partial \rho_s}{\partial T} \right) \\ = f (L_o + c_v\Delta T) + D\Omega\theta_a (L_o + c_v\Delta T) \left(\rho_s \frac{\partial h_m}{\partial T} + h_m \frac{\partial \rho_s}{\partial T} \right) \end{aligned} \quad (17)$$

$$f (L_o + c_v\Delta T) = (\eta - 1) D\Omega\theta_a (L_o + c_v\Delta T) \left(\rho_s \frac{\partial h_m}{\partial T} + h_m \frac{\partial \rho_s}{\partial T} \right) \quad (18)$$

$$f L_o = (\eta - 1) D\Omega\theta_a L_o h_m \frac{\partial \rho_s}{\partial T} \quad (19)$$

$$f (L_o + c_v\Delta T) = \eta D\Omega\theta_a L_o h_m \frac{\partial \rho_s}{\partial T} - D\Omega\theta_a (L_o + c_v\Delta T) \left(\rho_s \frac{\partial h_m}{\partial T} + h_m \frac{\partial \rho_s}{\partial T} \right) \quad (20)$$

In Sect. 3, Eq. 20 was used in the study to estimate the $(k_p k_r)/k_o$ and k_r . This resulted in new values as presented in Figs. 2, 3 and 4. In Fig. 2, Portneuf silt loam remained the higher

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✉ Eng Giap Goh
sunnygoh@gmail.com

¹ School of Agriculture, Meiji University, 1-1-1 Higashimita, Tamaku, Kawasaki 214-8571, Japan

² School of Ocean Engineering, Universiti Malaysia Terengganu, 21030 Kuala Terengganu, Terengganu, Malaysia

Fig. 2 The curve-fitting results of permeability variables as a function of the soil volumetric water content and the pressure ratio. The permeability variables based on the adapted-improved heat flux theory for **a** the lysimeter sand and **b** the Portneuf silt loam. The graphs **a** and **b** were subjected to Eq. 20, before curve fitting using Eq. 22 to determine the permeability variables. *Note:* zero permeability variables values were added as supposed zero water vapor advection at fully saturated soil moisture content to improve the curve-fitting results

Fig. 3 The comparison of the experimental and predicted permeability variables based on the adapted-improved heat flux theory for **a** the lysimeter sand and **b** the Portneuf silt loam. The graphs **a** and **b** were subjected to Eq. 20, before curve fitting using Eq. 22 to determine the permeability variables. *Note:* care should be placed on the fully saturated soil moisture content condition because the permeability variables estimated by Eq. 22 could result in negative values

permeability variables than the lysimeter sand, as in previous findings. The new lowest R-squared value obtained was 0.93, which approximates the previous value as in Fig. 3. In Fig. 4, the relative permeability maintained the previously observed curvature that concaves downward with the increasing water saturation. The value of the water saturation at which the relative permeability peaked remained the same.

Fig. 4 **a** The relative permeability (k_r) of lysimeter sand versus water saturation estimated using Eq. 24 and **b** enlarged graph on relative permeability value ranged 0–0.3. The other relative permeability models were van Genuchten–Mualem, van Genuchten–Burdine, Corey, and Falta referring to Eqs. 25–28, respectively

From the values in graphs given here, all the results and discussion remained valid, and all the observation and percentages stated in the paper remained the same. The inconvenience caused is highly regretted.