

# Corrigendum

The ISBA land surface parametrisation scheme

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This paper published in 1996 in the journal *Global and Planetary Change* provides a revised version of the original scheme (Noilhan and Planton, 1989). It includes all the necessary equations to code this land surface model. However, it contains a number of errors and ambiguous statements that are described and corrected hereafter.

## 2. Prognostic equations and surface fluxes

The quantity  $w_2$  is defined as the "deep soil water reservoir" whereas it should be named the "total depth of soil water reservoir" since it includes the water managed by the superficial reservoir  $w_g$ .

Similarly, in Table 1 the line:

"Depths of the top and deep soil  $d_1, d_2$ "

should be replaced by:

"Arbitrary depth of 1 cm for the superficial water exchanges  $d_1$ "

Additional explanation is given further down regarding the definition of  $d_1$ .

The depth of total soil column  $d_2$  is correctly defined further in Table 1.

a) Equation (4) should be written :

$$\frac{\partial w_2}{\partial t} = \frac{1}{\rho_w d_2} (P_g - E_g - E_{tr}) - \frac{C_3}{\tau} \max[0., (w_2 - w_{fc})]; \quad 0 \leq w_2 \leq w_{sat}$$

instead of:

$$\frac{\partial w_2}{\partial t} = \frac{1}{\rho_w d_2} (P_g - E_g - E_{tr}) - \frac{C_3}{d_2 \tau} \max[0., (w_2 - w_{fc})]; \quad 0 \leq w_2 \leq w_{sat}$$

b) Equation (7) should be written:

$$H = \rho_a C_p C_H V_a (T_s - T_a - g z_a / C_p)$$

where  $z_a$  is the altitude (above ground level) of the lowest atmospheric level and  $g$  the acceleration due to gravity, instead of:

$$H = \rho_a C_p C_H V_a (T_s - T_a)$$

c) Equation (13) should be written:

$$h_v = (1 - \delta) R_a / (R_a + R_s) + \delta$$

instead of:

$$h_v = (1 - \delta) R_s / (R_a + R_s) + \delta$$

In Table 3, the numbering of soil types refers to the Clapp and Hornberger (1978) classification : (3) is sandy loam; (4) is silt loam and (5) is loam.

The notation of roughness lengths is not consistent throughout the paper. For momentum transfers, it can be:  $z_0$ ,  $Z_0$  or  $z_{0m}$ . For heat transfers, it can be  $z_{0h}$  or  $Z_{0h}$ .

## Appendix A. Important coefficients

### A.3 Force-restore coefficients

a) Equation (22) should be written:

$$C_1 = C_{1max} \exp \left[ -\frac{(w - w_{max})^2}{2\sigma^2} \right]$$

instead of:

$$C_1 = C_{1max} \exp \left[ -\frac{w - w_{max}}{2\sigma^2} \right]$$

b) Equation (23) should be written:

$$C_{1max} = (1.19w_{wilt} - 5.09) \times 10^{-2}T_s + (-1.464w_{wilt} + 17.86)$$

instead of:

$$C_{1max} = (1.19w_{wilt} - 5.09) \times 10^{-2}T_s + (1.464w_{wilt} + 17.86)$$

#### **A.4 Continuous formulation of the soil secondary parameters**

a) Equation (31) should be written:

$$C_{Gsat} = (-1.557 \times SAND - 1.441 \times CLAY + 470.21) \times 10^{-8}$$

instead of

$$C_{Gsat} = -1.557 \times 10^{-2}SAND - 1.441 \times 10^{-2}CLAY + 4.7021$$

b) Equation (32) should be written:

$$C_{1sat} = (5.58 \times CLAY + 84.88) \times 10^{-4}$$

instead of:

$$C_{1sat} = (5.58 \times CLAY + 84.88) \times 10^{-2}$$

The revised equations (22) and (32) are compatible with a definition of the superficial soil layer  $d_1$  used in the prognostic equation of  $w_g$  (Eq. (3)) that is 1 cm but not explicitly mentioned in the paper. This knowledge is rather important because the definition of  $C_1$  has to be consistent with this specified (and arbitrary) value. This has led to some confusion in various papers describing the ISBA scheme, the most striking one being in Noilhan and Lacarrère (1995) where the authors indicate in the Appendix that the superficial depth  $d_1$  is 1 cm whereas the discrete values of  $C_{1sat}$  (see Table 2) and the continuous ones (see Figure 1) are consistent with a superficial soil depth of 10 cm as in the initial version of the ISBA scheme (Noilhan and Planton, 1989).

## **Appendix B. Surface resistance**

Equation (38) should be written:

$$F_1 = \frac{1 + f}{f + R_{smin}/R_{smax}}$$

where  $R_{smax}$  is an arbitrary high value of the stomatal resistance set to 5000 s/m.

instead of:

$$F_1 = \frac{1 + f}{f + R_{smin}/5000}$$

The coefficient  $f$  should be written:

$$f = 0.55 \frac{R_G}{R_{GL}} \frac{2}{LAI}$$

for a more explicit contribution of the photosynthetically active radiation (defined as  $0.55R_G$ )

instead of:

$$f = 1.1R_G/(R_{GL}LAI)$$

## Appendix C. Drag surface coefficients

The coefficients defined in formulae (45), (46), (47) and (48) are written according to the formulation of Louis et al. (1982) instead of Louis (1979).

## References

- Clapp, R. B. and Hornberger, G. M. (1978). Empirical equations for some soil hydraulic properties. *Water resources research*, 14(4):601–604.
- Louis, J.-F. (1979). A parametric model of vertical eddy fluxes in the atmosphere. *Bound. Layer Meteorol.*, 17:201–222.
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