



*Supplement of*

## **Weak sensitivity of the terrestrial water budget to global soil texture maps in the ORCHIDEE land surface model**

**Salma Tafasca et al.**

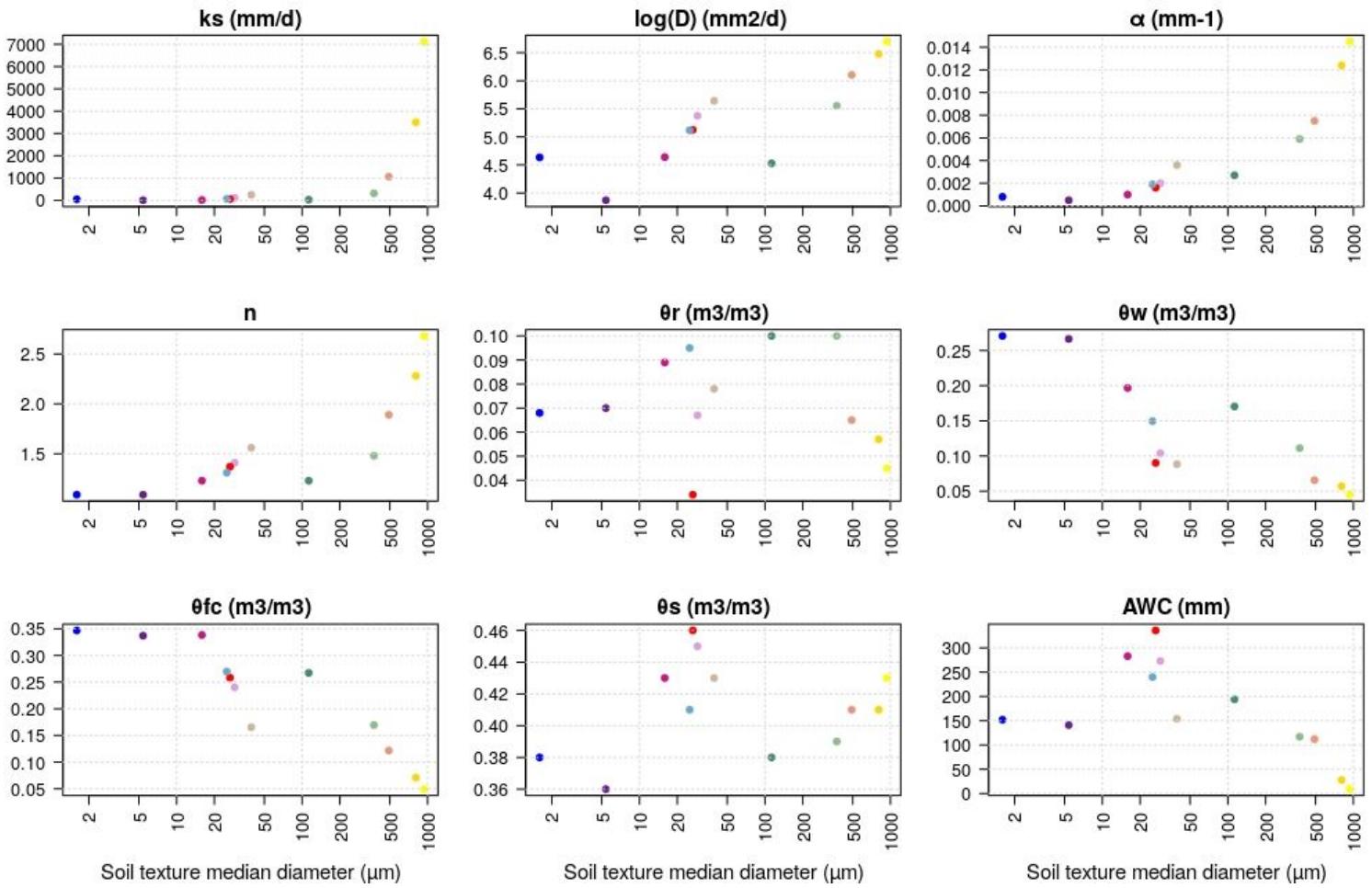
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## Supplement

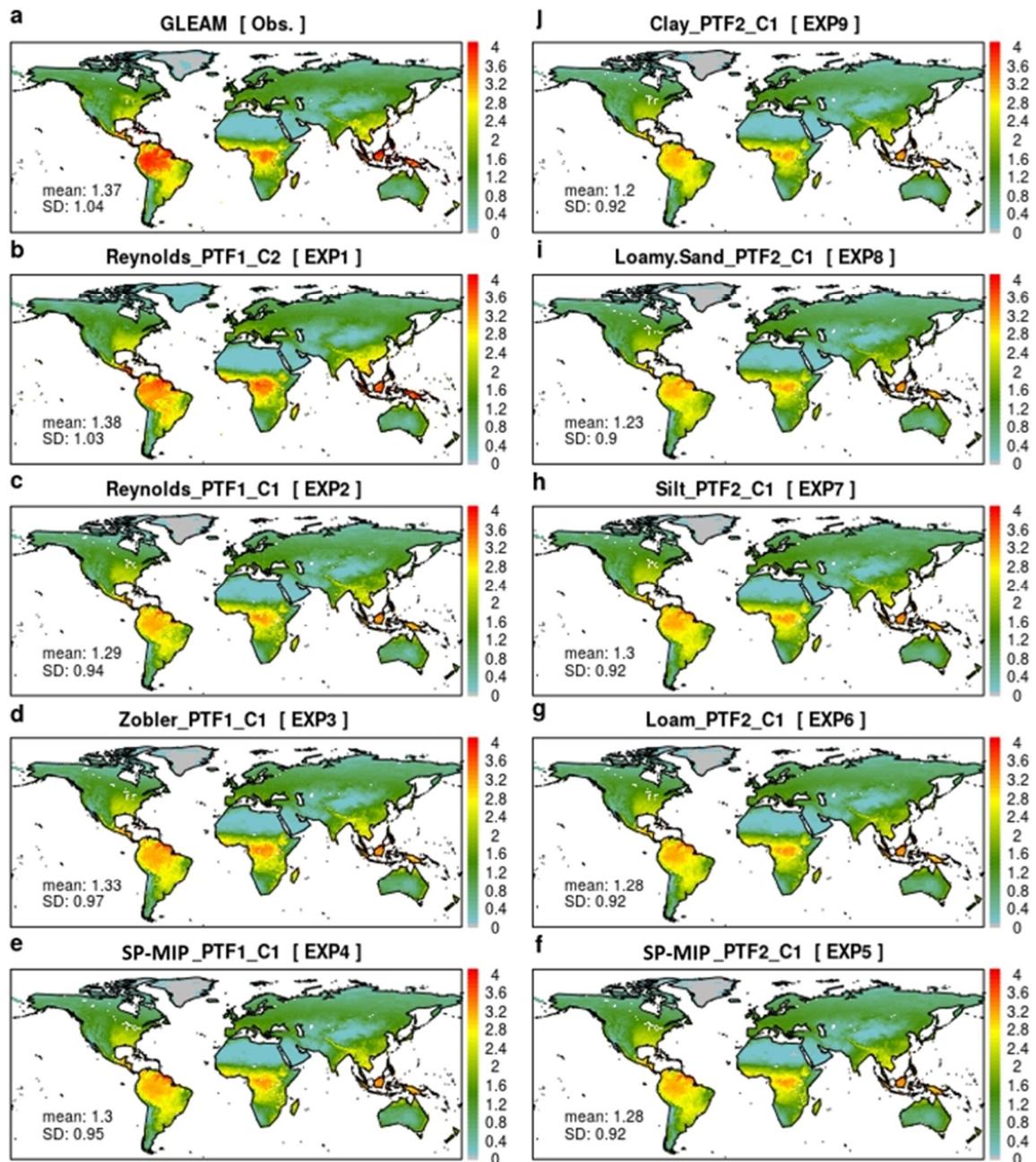
### Text S1: Soil texture classes characteristics

Figure S1 presents the soil hydraulic parameters used in ORCHIDEE LSM:  $K_s$ ,  $\alpha$  (inverse of air entry suction, corresponding to the capillary forces close to saturation, at the top of the capillary fringe),  $n$  (Van Genuchten scale parameter),  $\theta_r$  and  $\theta_s$ . Their values for each USDA texture class are taken in Carsel and Parrish (1988). Water contents corresponding to the wilting point and the field capacity, noted  $\theta_w$  and  $\theta_{fc}$ , are derived from the Van Genuchten water retention curve:  $\theta_w$  is the water content corresponding to a water potential of -150m, and  $\theta_{fc}$  corresponds to a potential of -3.3 m except for the texture sand which corresponds to -1m.  $AWC$  is the available water capacity of the 2-meter soil column, it is calculated in mm as  $AWC(2m) = 2000(\theta_{fc} - \theta_w)$ .

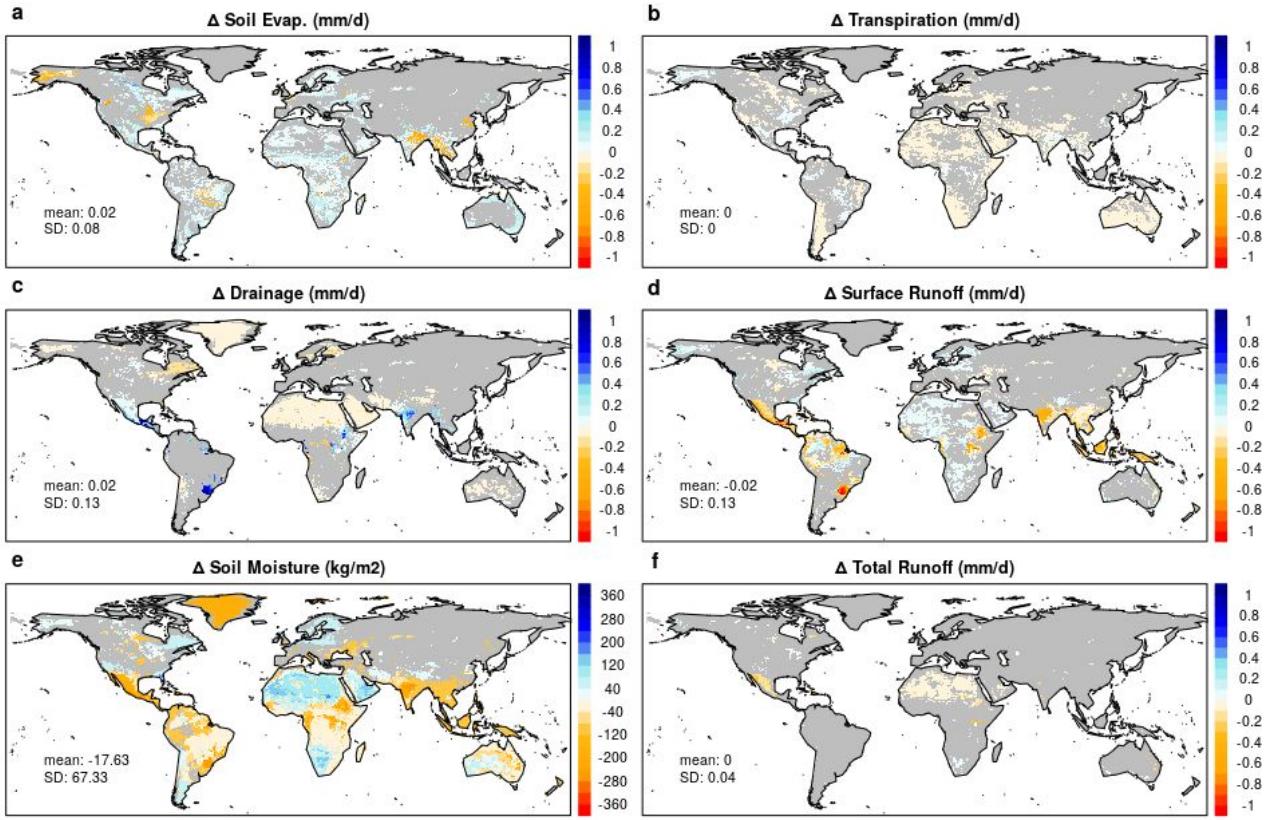


**Figure S1.** Soil parameters of the 12 USDA texture classes, for color codes see Figure 1.

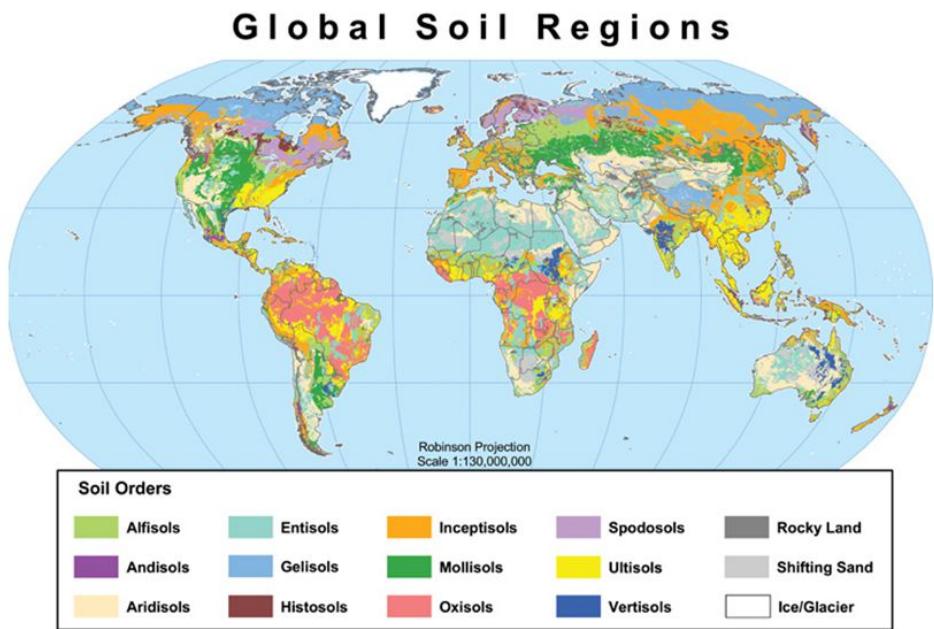
D: maximum hydraulic diffusivity,  $\alpha$ : inverse of air entry suction, n: Van Genuchten parameter,  $\theta_r$ : residual water content,  $\theta_w$ : wilting point,  $\theta_{fc}$ : field capacity,  $\theta_s$ : saturated water content, AWC: available water content.



**Figure S2.** Maps of evapotranspiration averaged over 1980-2010 (a) estimated by Martens et al. (2017) and (b-j) for the nine experiments. **PTF1** is the default PTF in ORCHIDEE found in Carsel and Parrish (1988), **PTF2** is the PTF of Schaap et al. (2001), **C1** is the climate forcing GSWP3, **C2** is the climate forcing CRU-NCEP.



**Figure S3.** Difference in simulated variables when the SP-MIP map is replaced by a uniform Loamy map (EXP6 - EXP5), averaged over the period 1980-2010. The corresponding difference for evapotranspiration is shown in Fig. 5a. Grey color indicates that the difference is not statistically significant based on Student's t-test (with a p-value  $< 0.05\%$ ). Mean and standard deviation are averaged over the globe excluding Antarctica.



**Figure S4.** FAO Soil Order Map. This map is a simplification of the FAO/UNESCO Soil Map of the World (Eswaran et al., 2012), accessible on [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/?cid=nrcs142p2\\_054013](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/use/?cid=nrcs142p2_054013).