This short note describes the steps required to calibrate the new developed model in Norouzi et al. (2022). Two main MATLAB codes as well as two “.mat” file containing the soil retention measurements and spectral reflectance are available in the folder.

1. Run the code named “Main\_Lebeau\_Konrad\_Model.m”. This code fits the Lebeau and Konrad (2010) model to the measured soil water retention curve (SWRC). The code saves the optimized parameters in a .mat file. You can set the variable “flag\_optimization” equal to 0 if you do not need to repeat the optimization process each time you run the code. It will automatically load the previously saved results.
2. Run the code “Main\_Radiative\_Transfer\_Model.m”. This code loads the SWRC parameters and water components from the previous code as well as the hyperspectral reflectance measurements and calibrates the new radiative transfer mode [Eq. (8)] in the shortwave infrared range (i.e., 1300-2500 nm) via optimization of optical properties (). You can set the variable “flag\_opt” equal to 0 if you do not need to repeat the optimization process each time you run the code. The code will automatically load the previously saved results.
3. If a linear mixing model (i.e., ) is required, set the variable “linear\_model\_flag” equal to 1. For any value other than 1, the code fits the general nonlinear mixing model.
4. In line 17 and 18 you can specify the wavelengths and degree of saturations () at which model predictions are plotted.