Fig. S1 Soil properties (clay and sand content, organic carbon content and porosity) of three soil layers (Layer1: plough layer; Layer 2: black soil layer; Layer3: lime concretion layer) HRB at different stations.
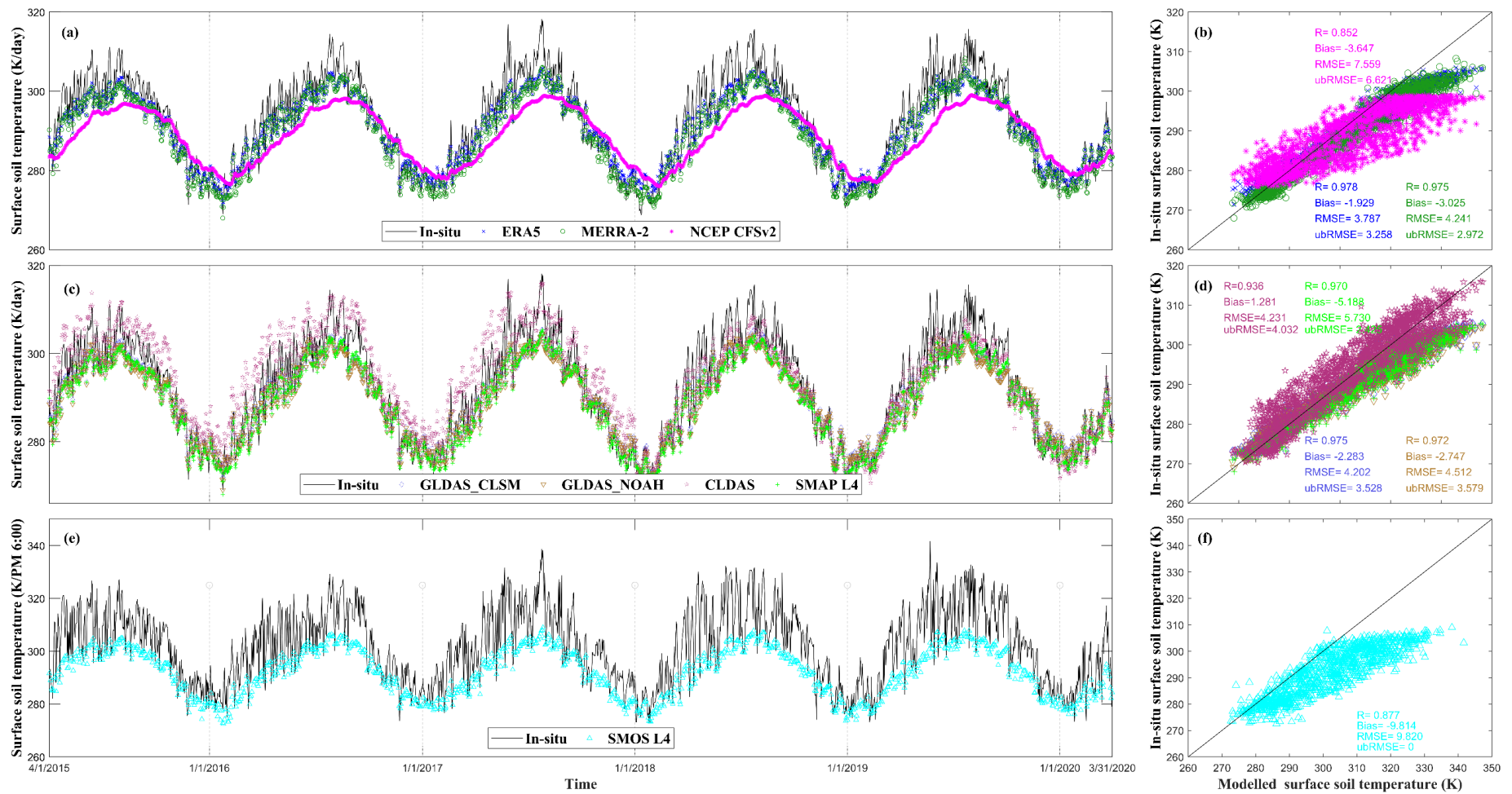
Fig. S2 Comparison between model-derived surface soil temperature and in-situ observations.
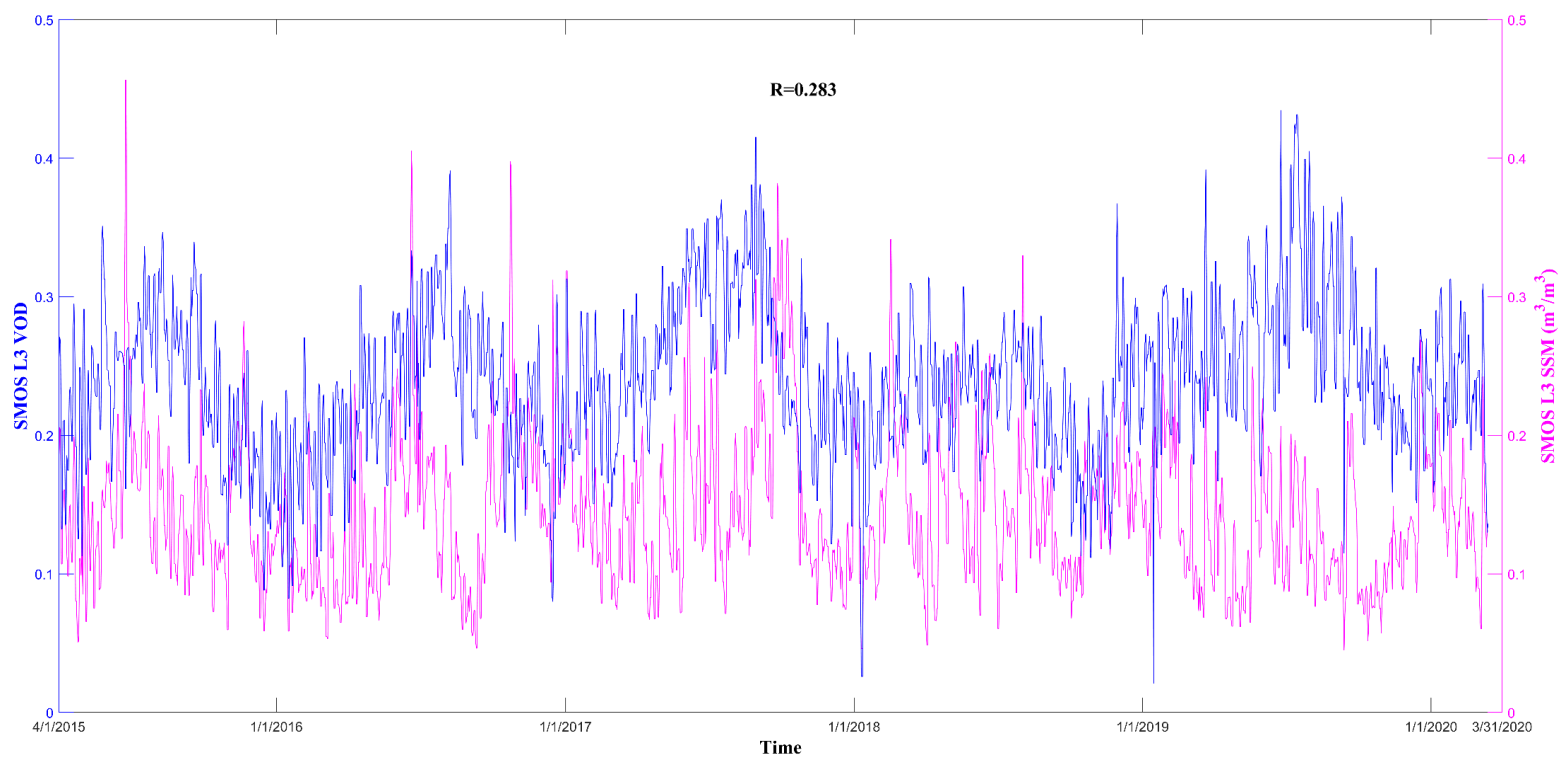
Fig. S3 Time series of SMOS L3 VOD and SMOS L3 soil moisture.