Author's response to the comments

Response: Thank you for the remarks. The relevant discussion is now added.

Page 31: Line 636-650:

"6.4 Other SMAP soil moisture products

In this study, only the SMAP enhanced L3 radiometer 9 km EASE-grid SM (SPL3SMP_E) product (O'Neill et al., 2021) was used. The SMAP/Sentinel-1 L2 Radiometer/Radar SM product (Das et al., 2019; 2020), which can provide higher spatial resolution (3 km and 1 km) SSM, was not used here because the temporal resolution of the product (~ 12 days) is not appropriate for detecting the time lags between the variations of SSM and subsurface SM. Further, although the SMAP Level-4 (L4) product can provide the surface (0-5 cm) and root-zone (0-100 cm) SM data at 3-h intervals over 9-km EASE-grid (Reichle, et al., 2022), the product is also not suitable for the approaches utilized in this study since the L4 root-zone SM variability is not independent of the SMAP L3/L4 SSM variability. The links between the SMAP SSM and L4 root -zone SM variations are controlled by the Catchment land surface model and the assimilation system of SMAP brightness temperatures that were used for producing the L4 product. However, note that the SMAP L4 product is in very good agreement with the HGS model simulations, which were used for representing the subsurface water dynamics in this work, in terms of the root zone SM variability (Figure 14A; the absolute bias between them has no impact on the approaches used in this work, which considering only the temporal variations of SM). This further supports the HGS model's application towards representing the dynamic behavior of subsurface water in this work."