Supplemental Material

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Assimilation of Sentinel-1 Backscatter into a Land Surface Model with River Routing and Its
Impact on Streamflow Simulations in Two Belgian Catchments
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Supplemental material

of the manuscript

Improving streamflow simulation by assimilating Sentinel-1 backscatter into a land surface model with river routing

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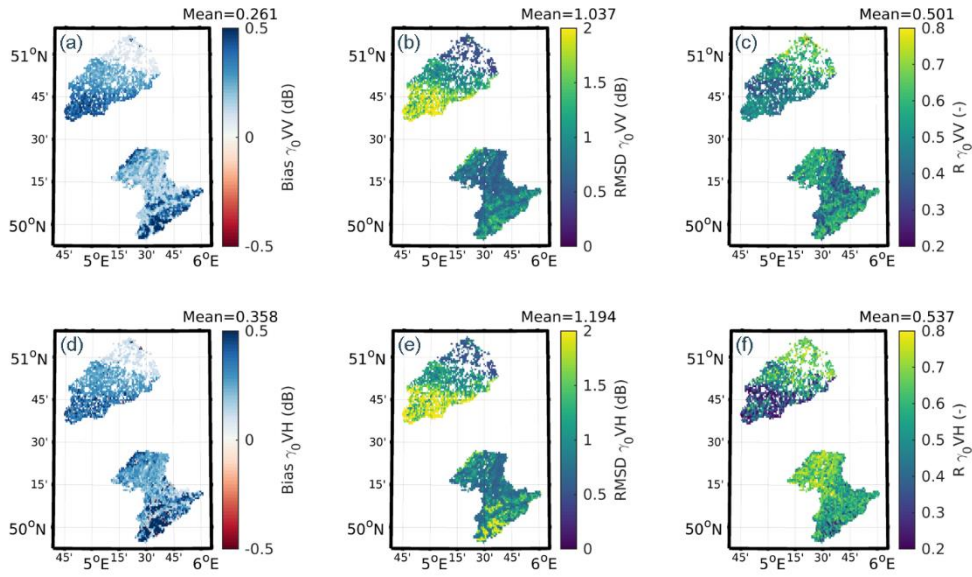
Fig. S1. Performance metrics of the water cloud model over the full study period for (a, b, c) VV and (d, e, f) VH polarization and the absolute orbit number 037 in descending track.
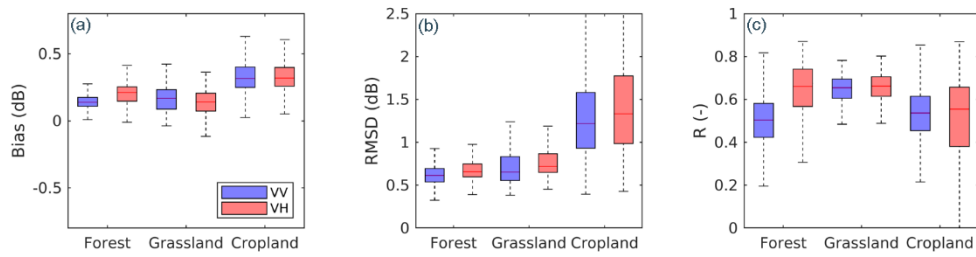

Fig. S2. Performance metrics of the water cloud model by land cover for the absolute orbit number 037 in descending track.
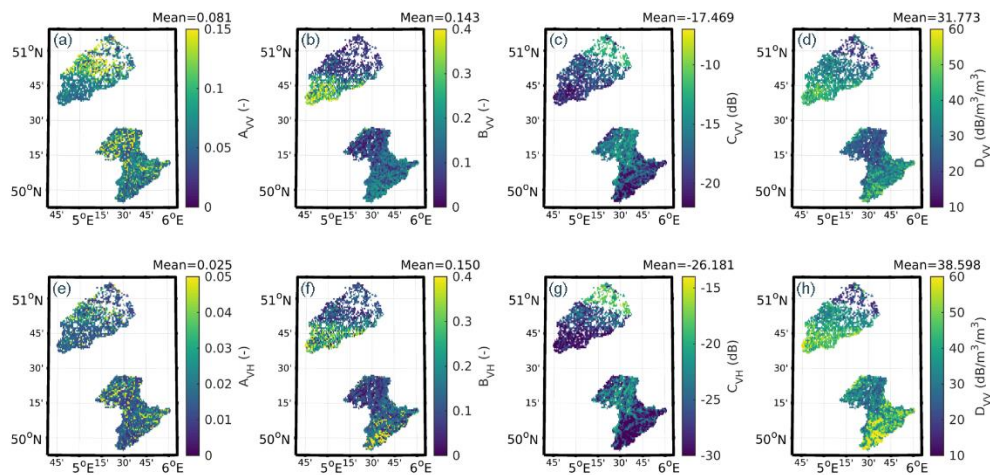

Fig. S3. The WCM parameters A, B, C, and D for (a,b,c,d) VV and (e,f,g,h) VH polarization for the absolute orbit number 037 in descending track.
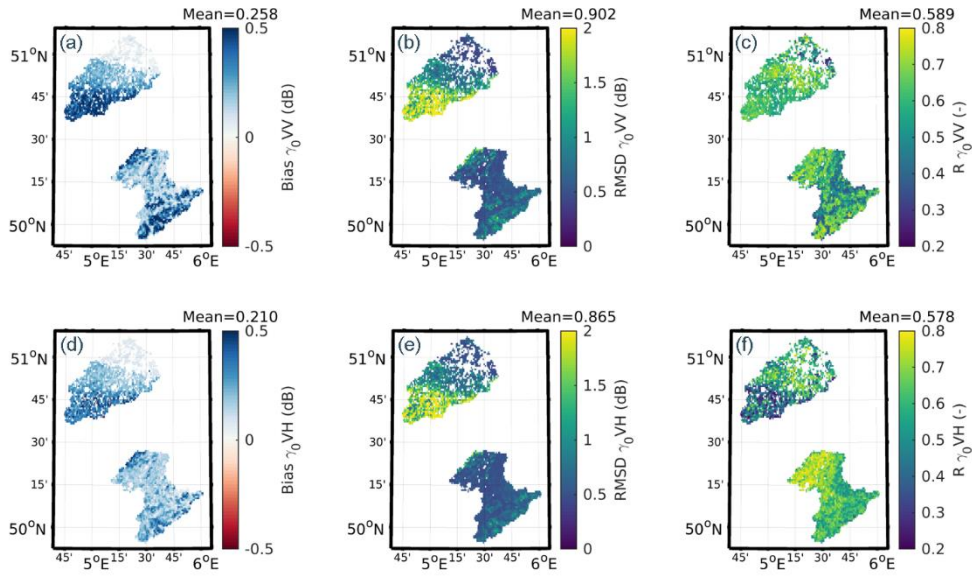
Fig. S4. Performance metrics of the water cloud model over the full study period for (a, b, c) VV and (d, e, f) VH polarization and the absolute orbit number 088 in ascending track.
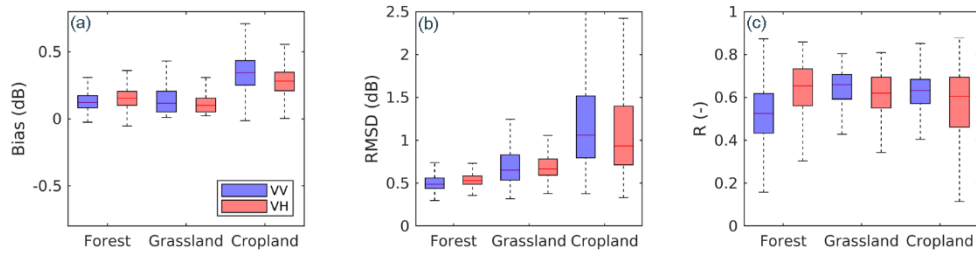

Fig. S5. Performance metrics of the water cloud model by land cover for the absolute orbit number 088 in ascending track.
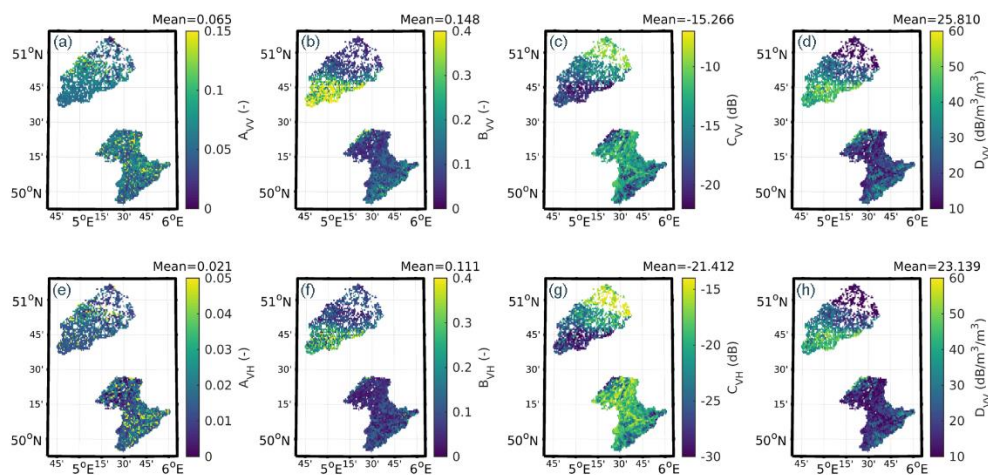

Fig. S6. The WCM parameters A, B, C, and D for (a,b,c,d) VV and (e,f,g,h) VH polarization for the absolute orbit number 088 in ascending track.
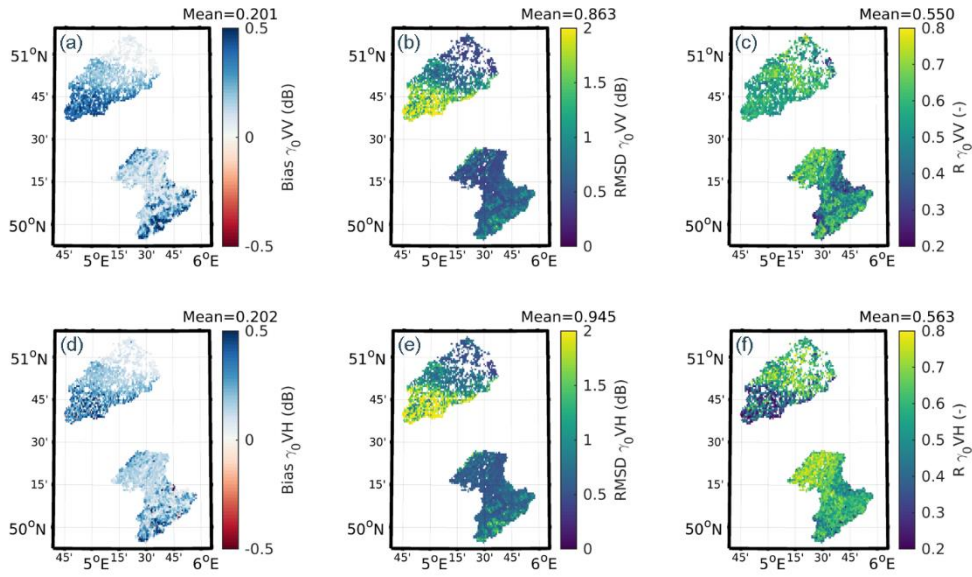
Fig. S7. Performance metrics of the water cloud model over the full study period for (a, b, c) VV and (d, e, f) VH polarization and the absolute orbit number 161 in ascending track.
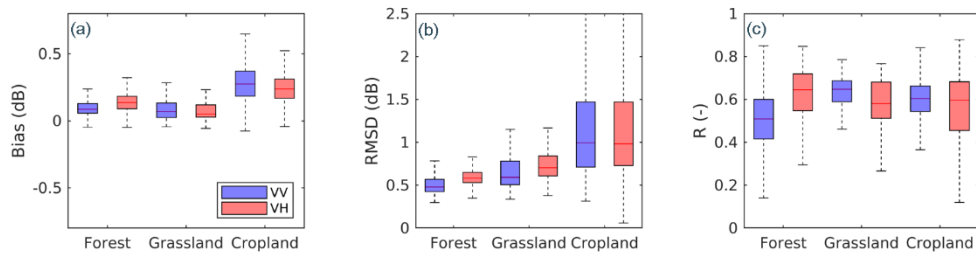

Fig. S8. Performance metrics of the water cloud model by land cover for the absolute orbit number 161 in ascending track.
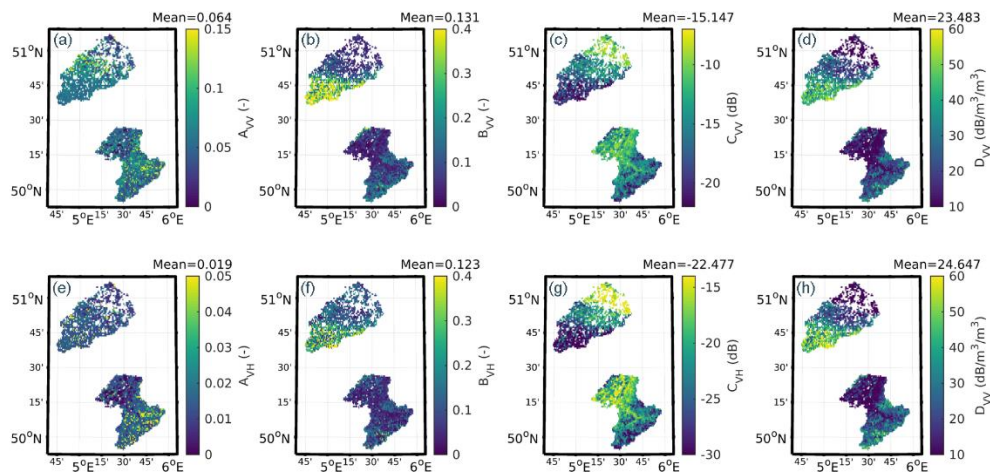

Fig. S9. The WCM parameters A, B, C, and D for (a,b,c,d) VV and (e,f,g,h) VH polarization for the absolute orbit number 161 in ascending track.
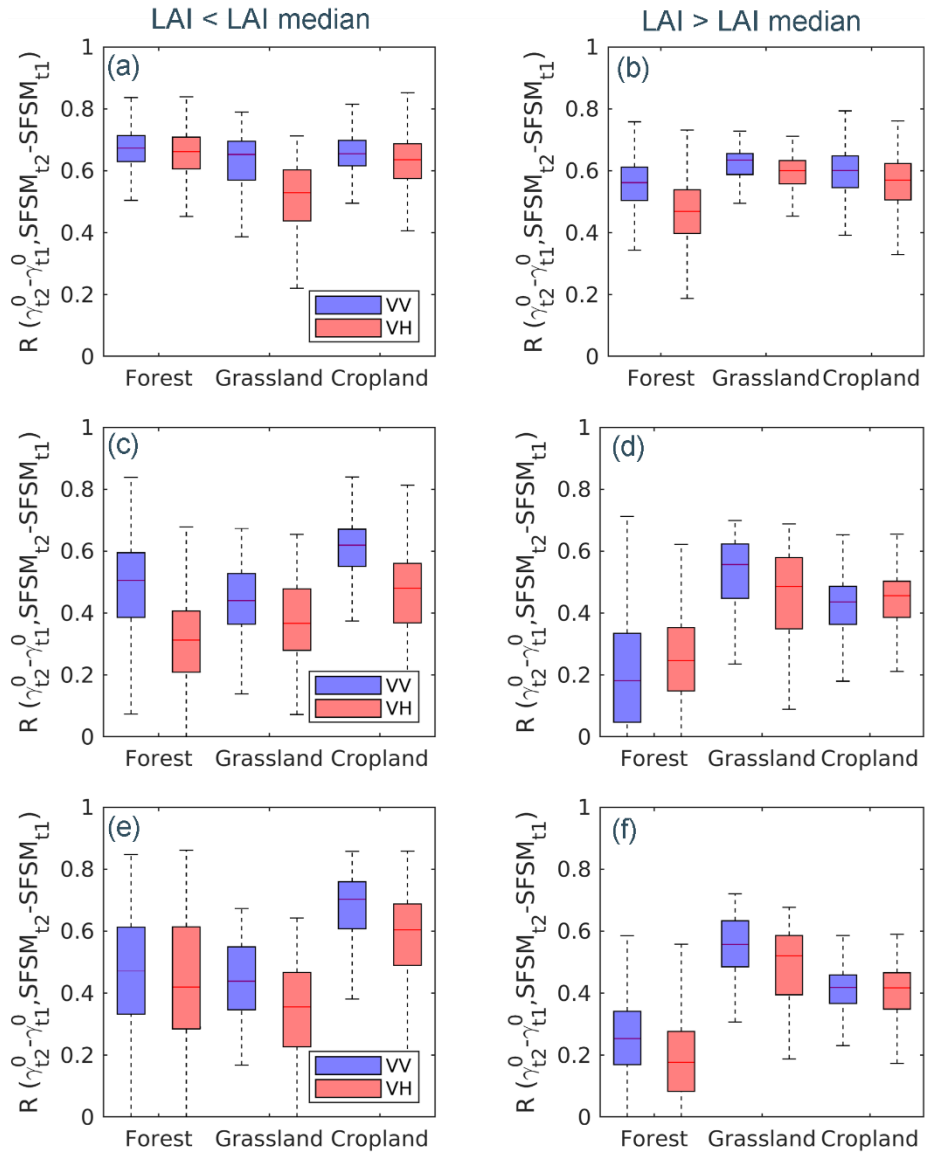
Fig. S10. Pearson correlation R between the change in backscatter ($\gamma^0_{t2}-\gamma^0_{t1}$) and surface soil moisture ($SFSM_{t2}-SFSM_{t1}$) between two consecutive time steps of the same orbit (a,b: 037 descending, c,d: 088 ascending, e,f: 161 ascending) for the low (LAI < LAI median) and the high (LAI > LAI median) vegetation season per pixel. Boxplots capture the spatial distribution of R within the three dominant land cover classes.
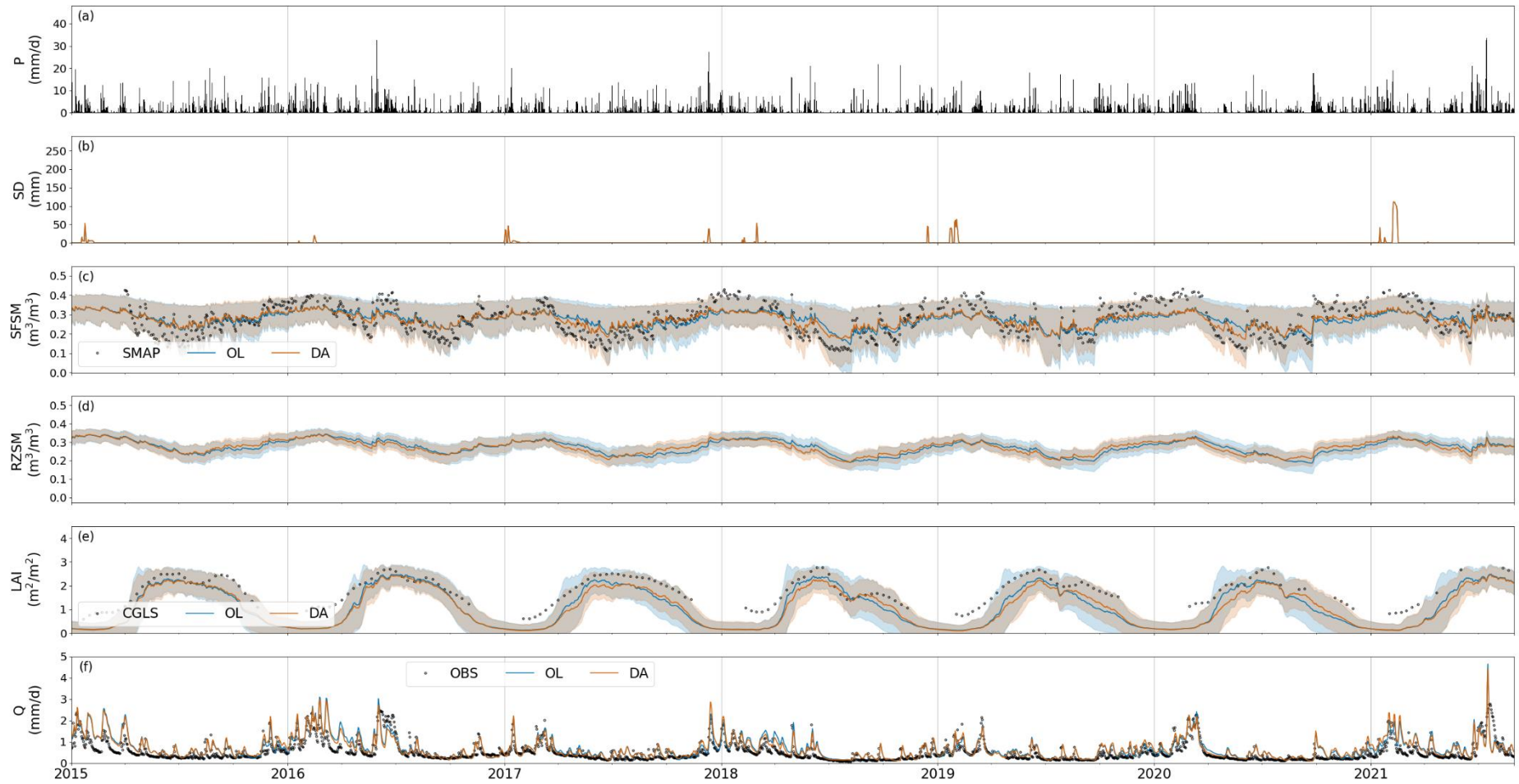
Fig. S11. Time series of the DASM experiment for the Demer catchment of catchment-averaged (a) Precipitation; P, (b) Snow Depth; SD, (c) Surface Soil Moisture (SFSM), (d) Root-Zone Soil Moisture (RZSM), (e) Leaf Area Index (LAI), and (f) Streamflow (Q). Light colored shading in (c), (d) and (e) indicates the ensemble spread.
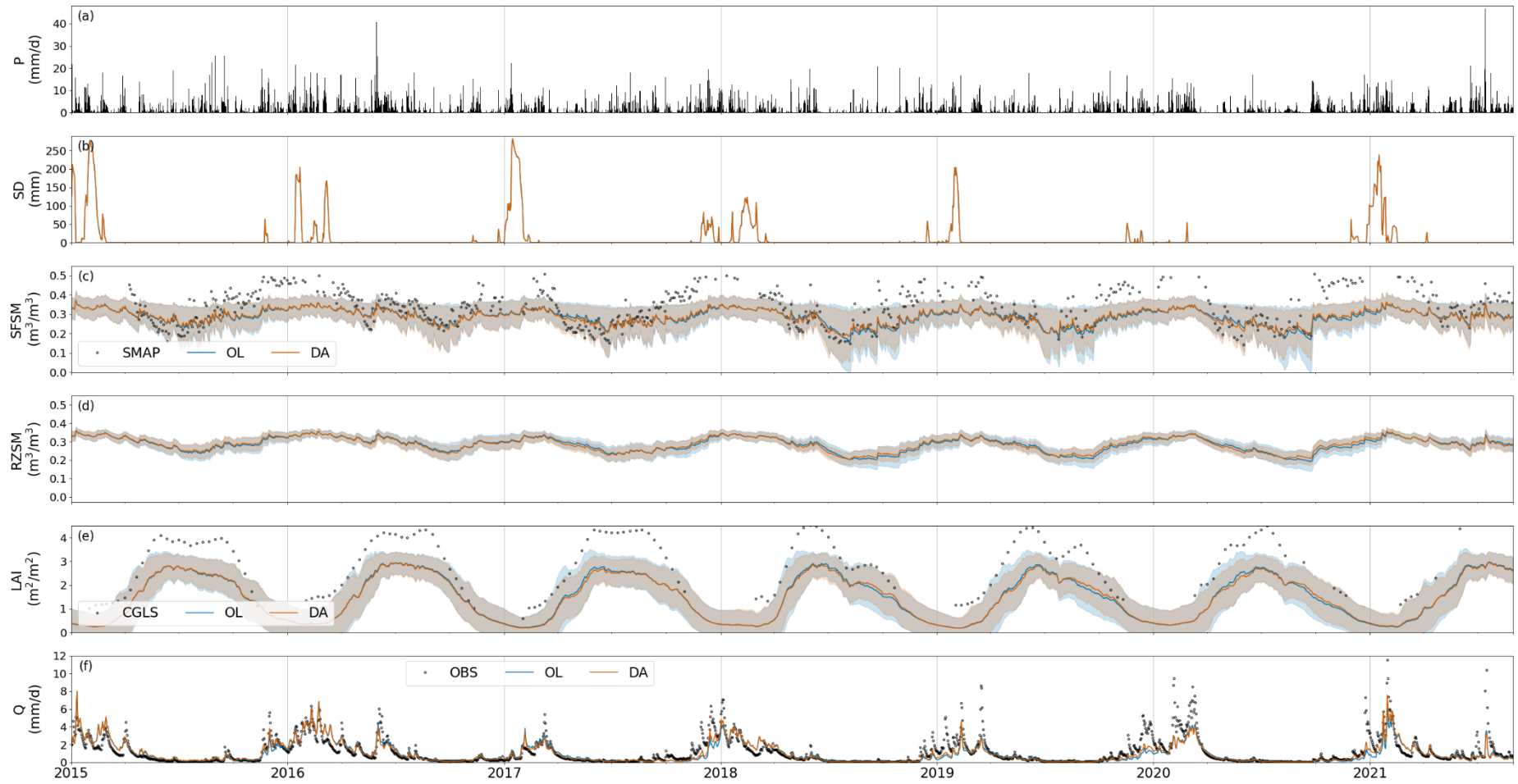
Fig. S12. Same as in Fig. S1 but for the Ourthe catchment. Note that observed Q on 15th and 16th of July 2021 was 24 mm/d and 21 mm/d, respectively (not shown).