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Water ages in the critical zone of long-term experimental sites in northern latitudes

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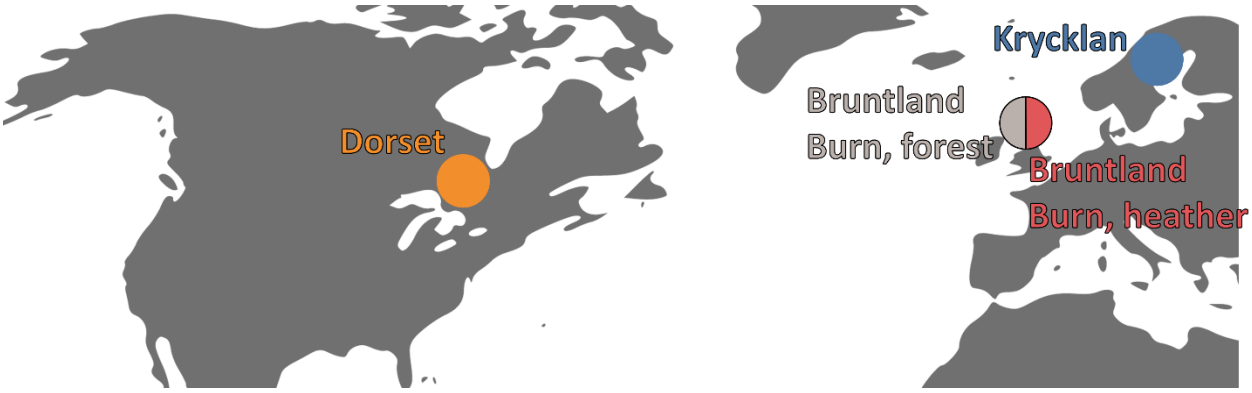

Figure S 1 Location of the four study sites.

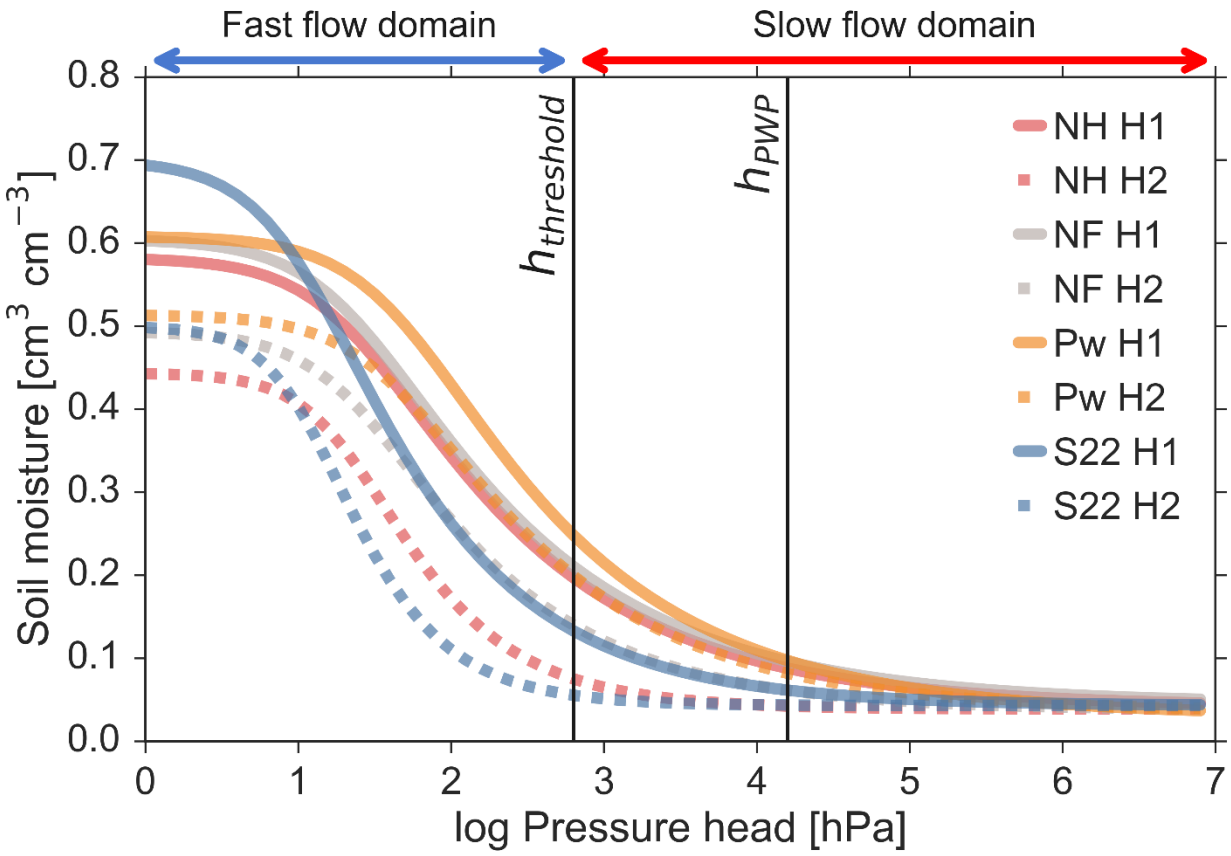

Figure S 2 Water retention curve for the four study sites and each of their two horizons (H1 and H2) in the 50 cm soil profile (graphic based on data presented in Sprenger et al., 2018). The threshold between the fast flow domain and the slow flow domain was defined as $h_{threshold}$ = 600 hPa. The permanent wilting point was defined as h_{PWP} = 15000 hPa. NH: Bruntland Burn, heather, NF: Bruntland Burn, forest, Pw: Dorset, S22: Krycklan.

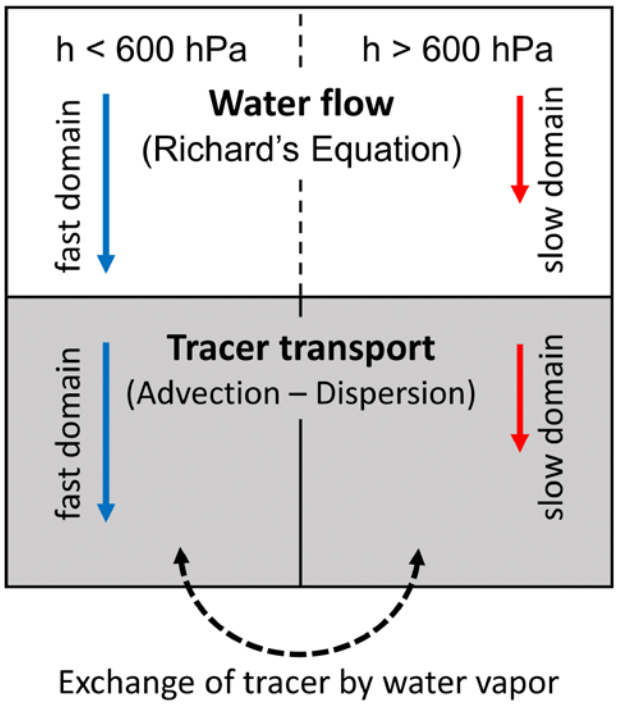

Figure S 3 Conceptualization of the division of the pore space into a fast and slow flow pore domain as done in the SWIS model. The fast and slow pore domains are divided according to the pressure head (see Figure S 2). The water flow and tracer transport of both domains is described by the same set of water flow and transport parameters. The exchange of tracer mass between the fast and slow domain takes place via water vapor.

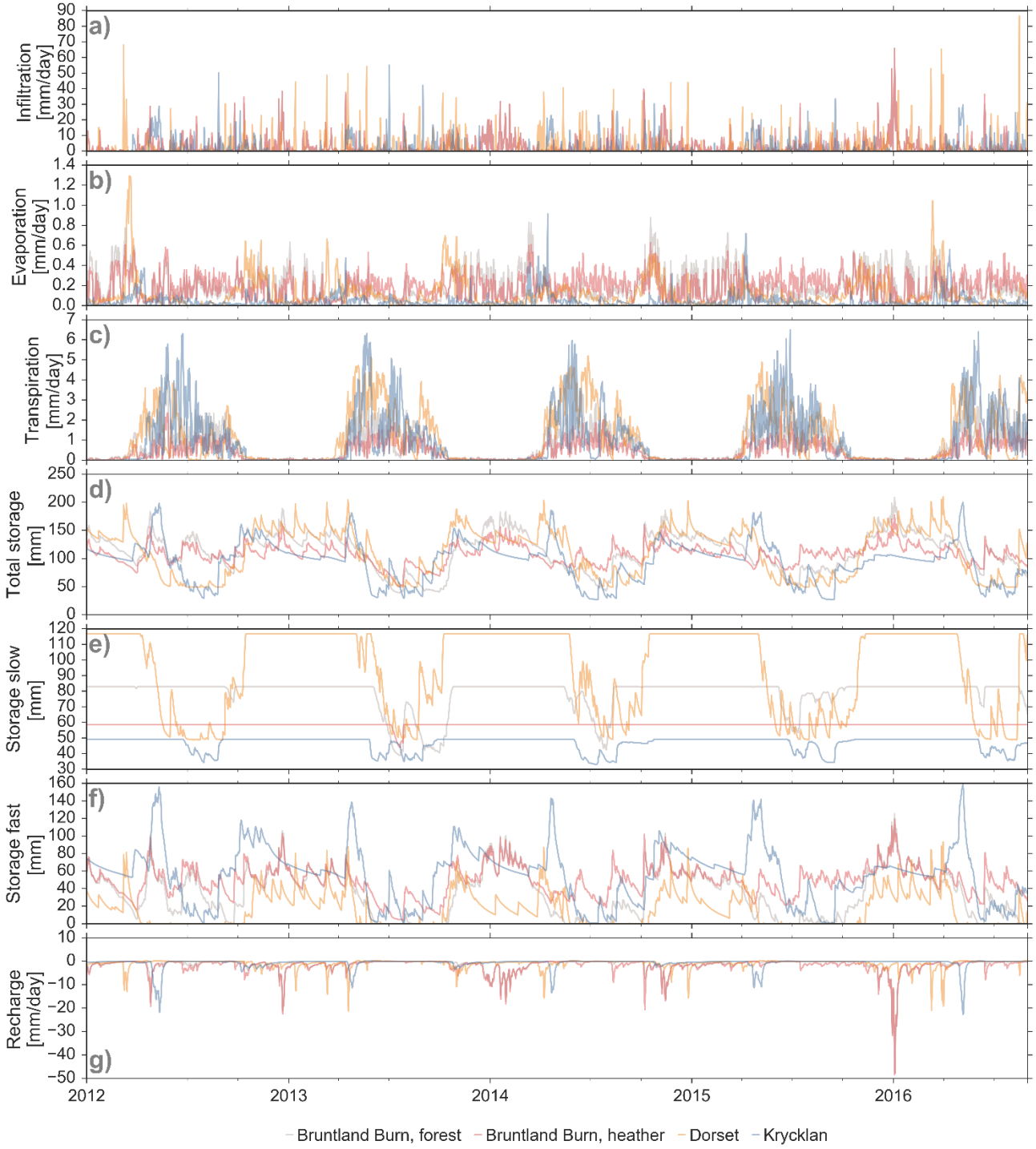

Figure S 4: Simulated hydrometric dynamics for the four study sites: Infiltration (a), evaporation (b) and transpiration (c), storage in the 50 cm soil profile (d), storage in fast flow domain (e), and fast flow domain (f), and recharge (g) for the simulation period from June 2012 to September 2016. Colour code indicates the study sites.

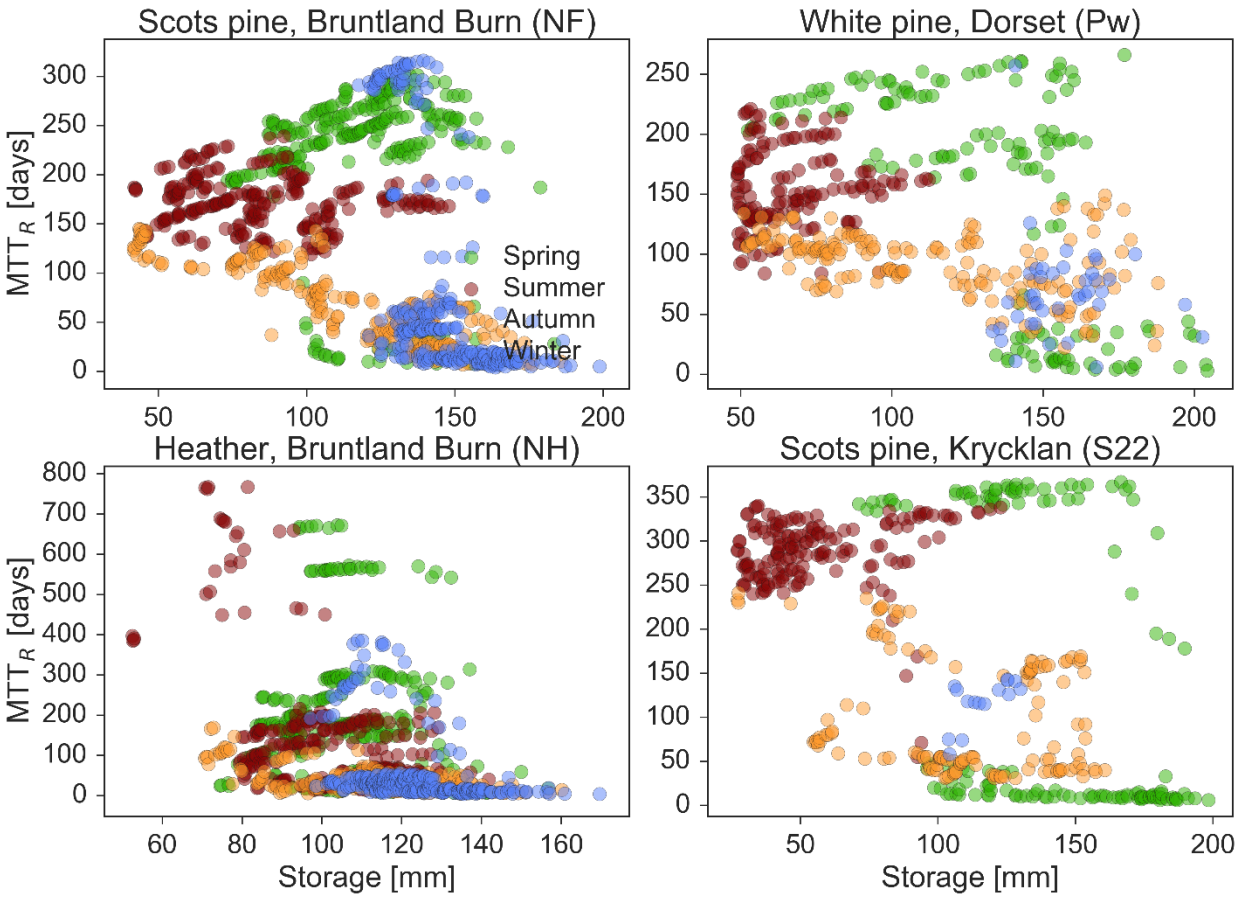

Figure S 5 Median travel times in recharge flux for each study site as a function of storage at day of tracked infiltration.

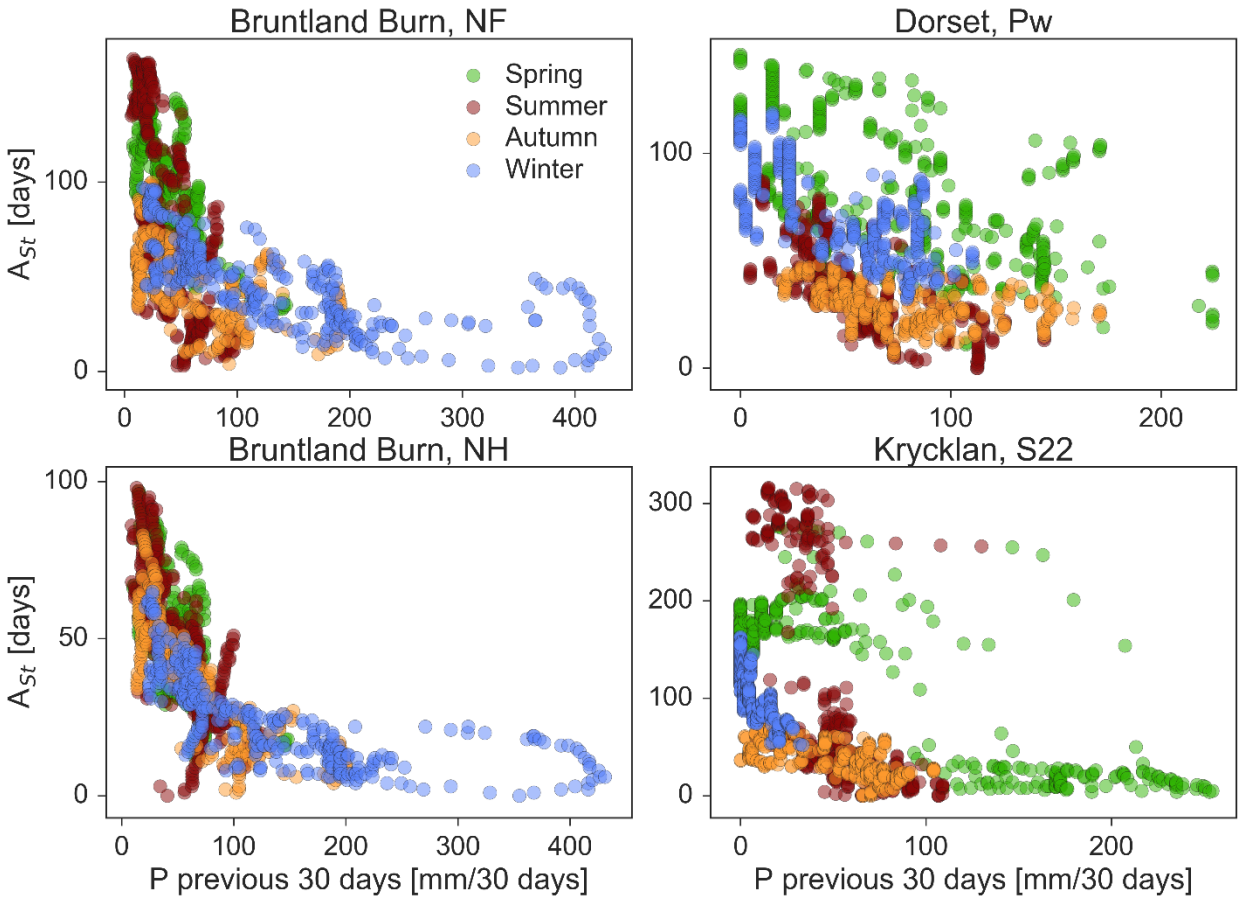

Figure S 6 Median water age of total soil water storage (A_{St}) at the four studied sites as a function of infiltration sums over 30 days prior to the considered day for A_{St}. Color code represents the season of the considered evaporation flux.

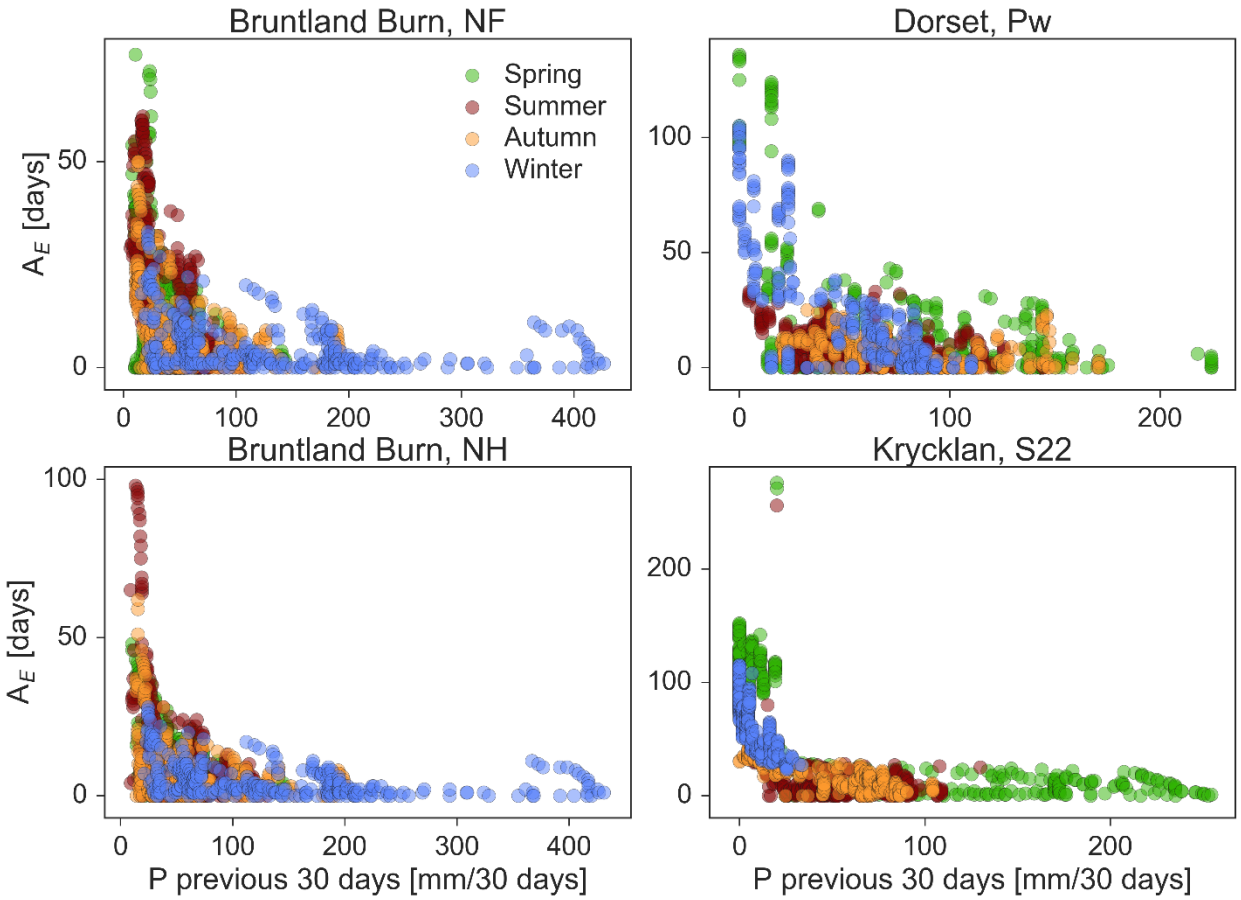

Figure S 7 Median water age of evaporation (A_E) at the four studied sites as a function of infiltration rates over 30 days prior to the considered day for A_E. Colour code represents the season of the considered evaporation flux.