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Interannual variability in evapotranspiration and water yield from a temperate Scots pine forest (Brasschaat, Belgium).

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By evaporating more than vegetation of different structure and height, forests play an import role in the water and energy balance of the land surface. Consequently, forests influence rainfall patterns and magnitude at regional and global scale by influencing the low level moisture convergence, and determine the amount of water that yield towards the river basin. This study focuses on the drivers of interannual variability of total stand scale evapotranspiration (AET) and water yield for a Scots pine (Pinus sylvestris L.) forest.
The study site is located 20 km NE of Antwerp, near Brasschaat (Belgium) and consists of an 80-year-old even aged Scots pine stand, which belongs to a larger mixed coniferous/deciduous forest and is part of the ICP-II and Fluxnet/CarboEurope-IP networks since 1997. To calculate the water balance, five different approaches are used, ranging from eddy covariance (EC) and conservative ions measurements over an empirical model (WATBAL) to two ecosystem Carbon/Water process based models (SECRETS and ORCHIDEE). Model results are evaluated with sapflow, troughfall and EC measurements that were available during the study period.
Tree transpiration and AET of both process based models fit well to the EC measurements. In contrast, compared to EC measurements, WATBAL tends to overestimate AET for the seasonal course as well as the yearly totals. No clear driver is found variability in the annual total AET. Furthermore, interannual variability in water yield is clearly determined by total precipitation. Future climate scenarios predict drier summer periods and more precipitation during the winter for the north Belgian region. To study the future trends in both AET and water yield, future climate scenarios will be used as model inputs to simulate the water balance. These data will be presented in this paper.