

Evaluating the effect of the 2018 drought on the NEE in the Sorø beech forest by means of time-series analysis.

Kim Pilegaard & Andreas Ibrom

Department of Environmental Engineering, Technical University of Denmark
Bygningstorvet 115, 2800 Kgs. Lyngby, Denmark

Denmark experienced a severe drought in 2018 lasting from the beginning of May to the end of August with very little rain during this period. The influence of drought on the net ecosystem exchange (NEE) was analysed at the ICOS DK-Soroe site (a mature beech forest). The site has a very long continuous flux data set starting in June 1996. The annual NEE of the site has been increasing over the years, mainly due to a prolonged growing season in the autumn (Pilegaard et al., 2011).

The effect of the summer drought in 2018 was analysed by means of time series analysis based on monthly trends during 1996-2017. The observed monthly NEE in 2018 was compared to the predicted values from the monthly time series.

The analysis showed an increased NEE in May and June and a strongly reduced NEE in July and August. Overall, the NEE was reduced 25% compared to the predicted value.

The increased NEE in May and June can be explained by the benefit for the photosynthesis of the trees of the increased light and temperature, while there was still a sufficient water content in the soil. By the end of June, the low water content in the soil affected the NEE, and despite some heavy rain in the beginning of August, the NEE only recovered by September.

Kim Pilegaard, Andreas Ibrom, Michael S. Courtney, Poul Hummelshøj, Niels Otto Jensen.
Increasing net CO₂ uptake by a Danish beech forest during the period from 1996 to 2009.
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