

We simulated the effect of prolonged summer drought by lowering the water table on three manipulation plots (D1-3) in a minerotrophic fen in South-eastern Germany in three subsequent years (2006-2008). Water table was lowered below natural levels by drainage and by excluding precipitation. Soil respiration (R<sub>Soil</sub>) measurements predominantly revealed no differences between the D1-3 plots and three control plots (C1-3). Gross primary production (GPP) and aboveground respiration (RAG) also were not affected by lowered water tables, indicating the lack of stress due to drought or anoxia for aboveground biomass. The water tables on the control plots were naturally low most of the time and especially during the manipulation periods. The median water table for 2006-2008 was 8 cm beneath the surface on the control plots. During summer, when respiratory activity was highest, it was even lower, with median values on the control plots between 11 and 19 cm beneath the surface during the manipulation periods. We therefore assume that oxygen availability in the uppermost at least 10 cm was not limited by water table. Thus, manipulative lowering of the water table most likely increased oxygen availability only in deeper peat layers, where we expect R<sub>Soil</sub> to be limited by poor substrate quality rather than anoxia. In case that naturally low water tables on the C1-3 plots masked manipulation effects, we analyzed all available data in a second approach (irrespective of treatment) to estimate the influence of water table on R<sub>Soil</sub>. We found a significant correlation between R<sub>Soil</sub> and water table, with R<sub>Soil</sub> decreasing at lower water tables rather than increasing. Summarizing, we conclude that R<sub>Soil</sub> is dominated by decomposition in the litter layer and the uppermost peat layers. Deeper peat layers bear no significant decomposition potential. We do not expect enhanced C losses from this site due to increasing frequency of summer droughts. Aboveground vegetation seems to be unaffected by water table fluctuations beneath 10 cm.