The CO_2 balance of a boreal fen is more sensitive to drought than surrounding forests

Mats Nilsson, **Joshua (Joss) Ratcliffe**, Anne Klosterhalfen, Peng Zhao, Jinchu Chi, and Matthias Peichl

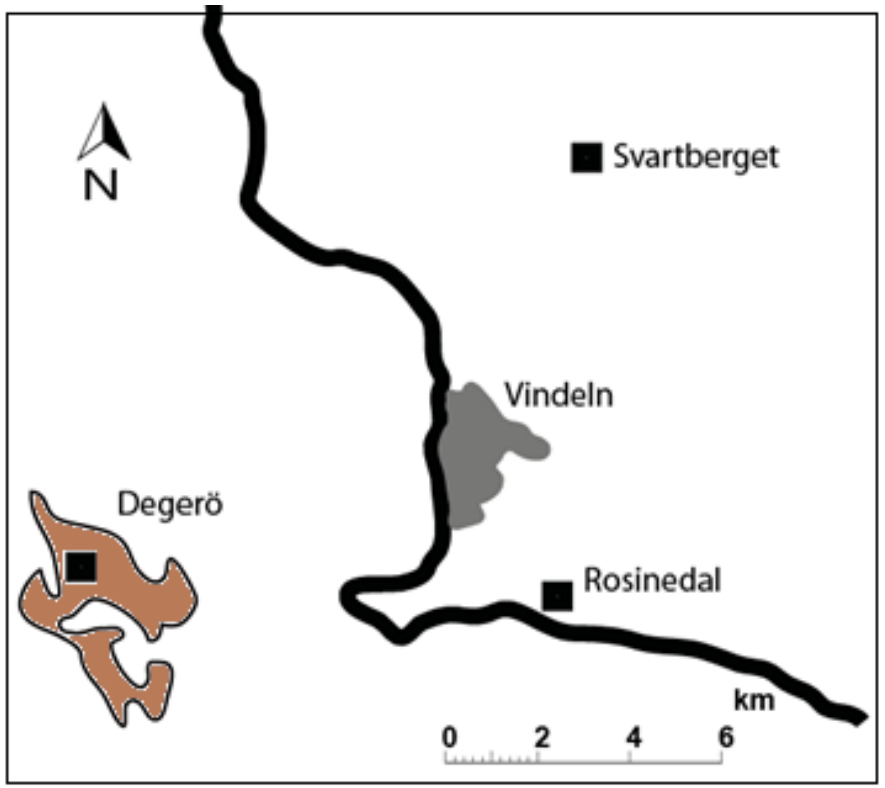
Display structure and research summary

This display describes an ongoing project on the impact of the 2018 European drought on boreal forest and peatland ecosystems in the North of Sweden. While the impact of drought on individual ecosystems has been well studied, the relative drought sensitivity of these two boreal ecosystem types has not been explored before*

- CO_2 exchange was measured at the ecosystem scale using Eddy Covariance at one mire and two forests for 2018 and a reference period from 2014-2017†
- The mire was a source for CO_2 for the first time in 17 years
- The CO_2 sink was reduced at Svartberget forest, but not enough to cause the site to be an annual source for CO_2
- Provisional data for another forest, Rosinedal, indicates the CO_2 sink was reduced but within the 95% confidence interval of the reference period.
- The impact of the drought occurred earlier in the mire and the recovery later than in the forests

*as far as we are aware †2014-2016 for Svartberget

Study sites



All sites are located in the north of Sweden at 64° north, near the town on Vindeln and within 20 km of each other

Degerö is a poor fen dominated by *Sphagnum* mosses

Svartberget is an old mixed *Pinus sylvestris* and *Picea abies* forest on glacial till

Rosinedal is a single stand *Pinus sylvestris* forest ~90 years old situated on sandy soil

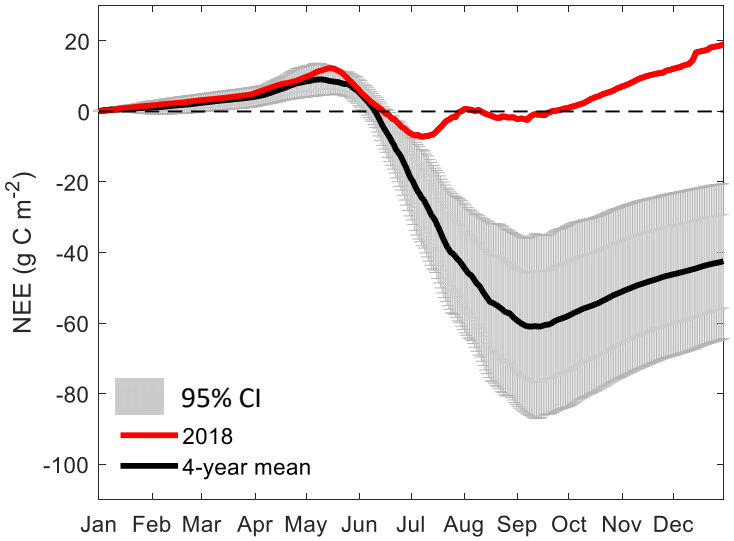
Both forests are ‘open’ and have an understory mostly comprised of *Vaccinium myrtillus* and *Vaccinium vitis-idaea*


Degerö peatland
Photocredit: Andreas Palmén

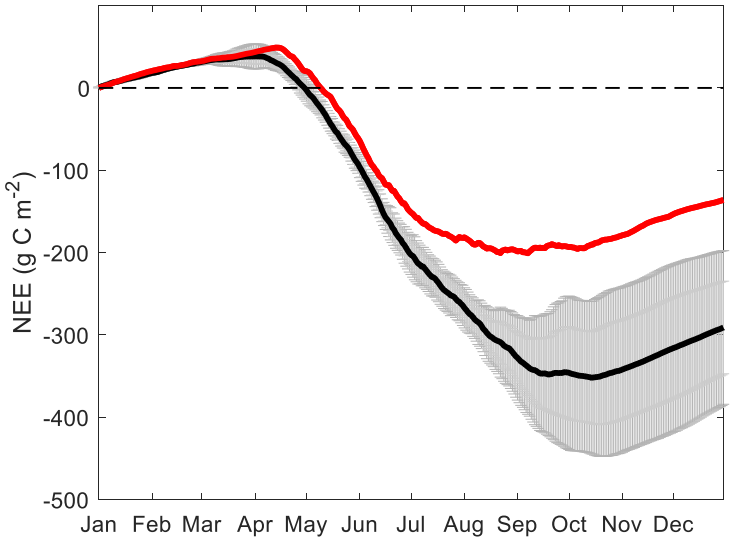

Svartberget forest
Photocredit: Andreas Palmén


Rosinedal forest
Photocredit: Andreas Palmén

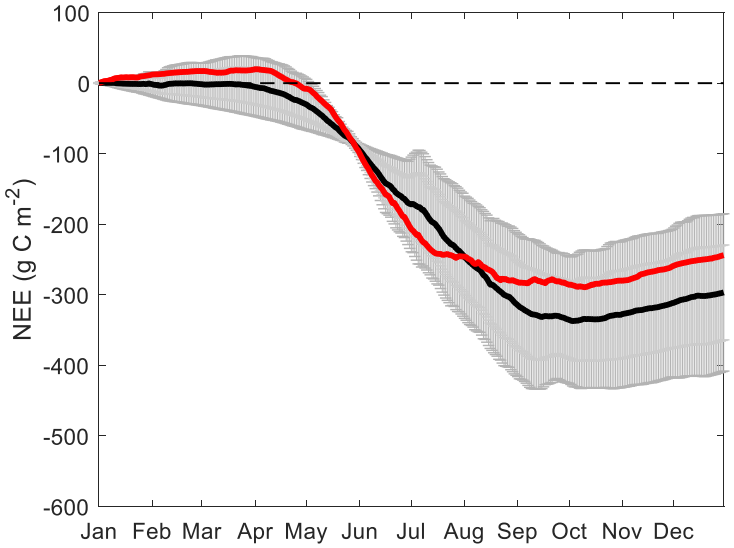
Degerö

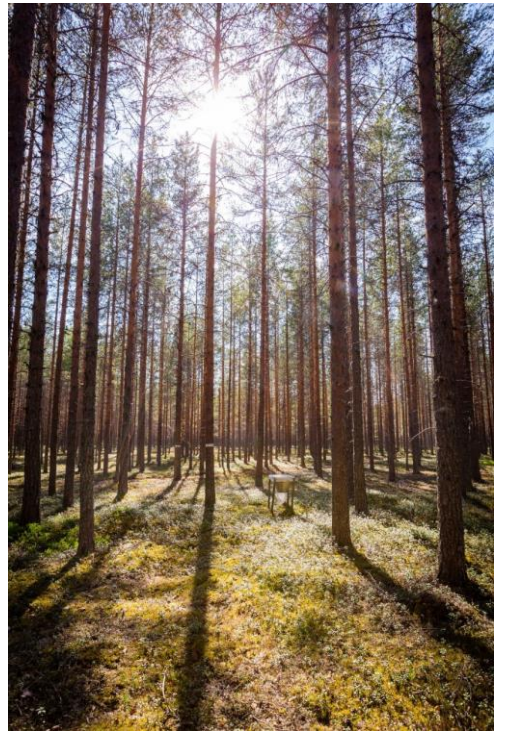


Svartberget



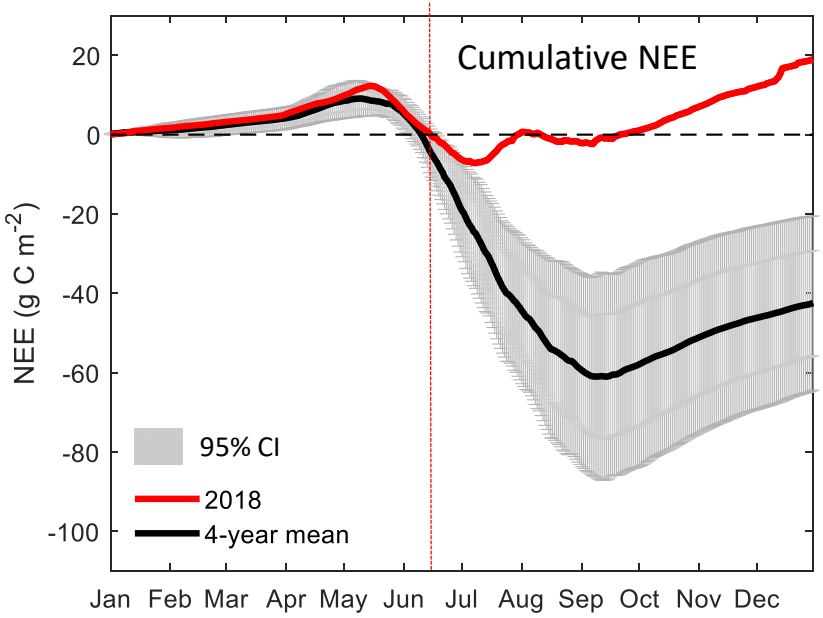
Rosinedal*

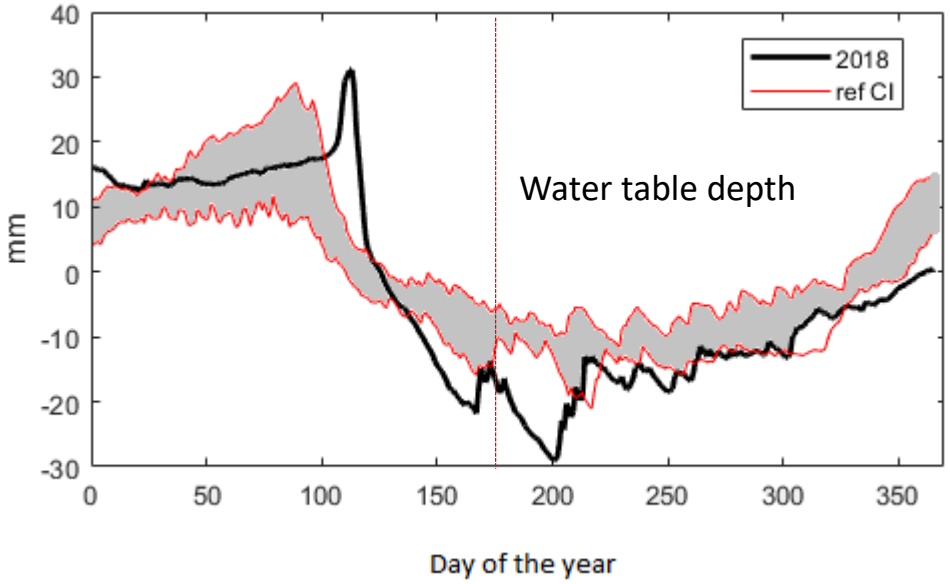


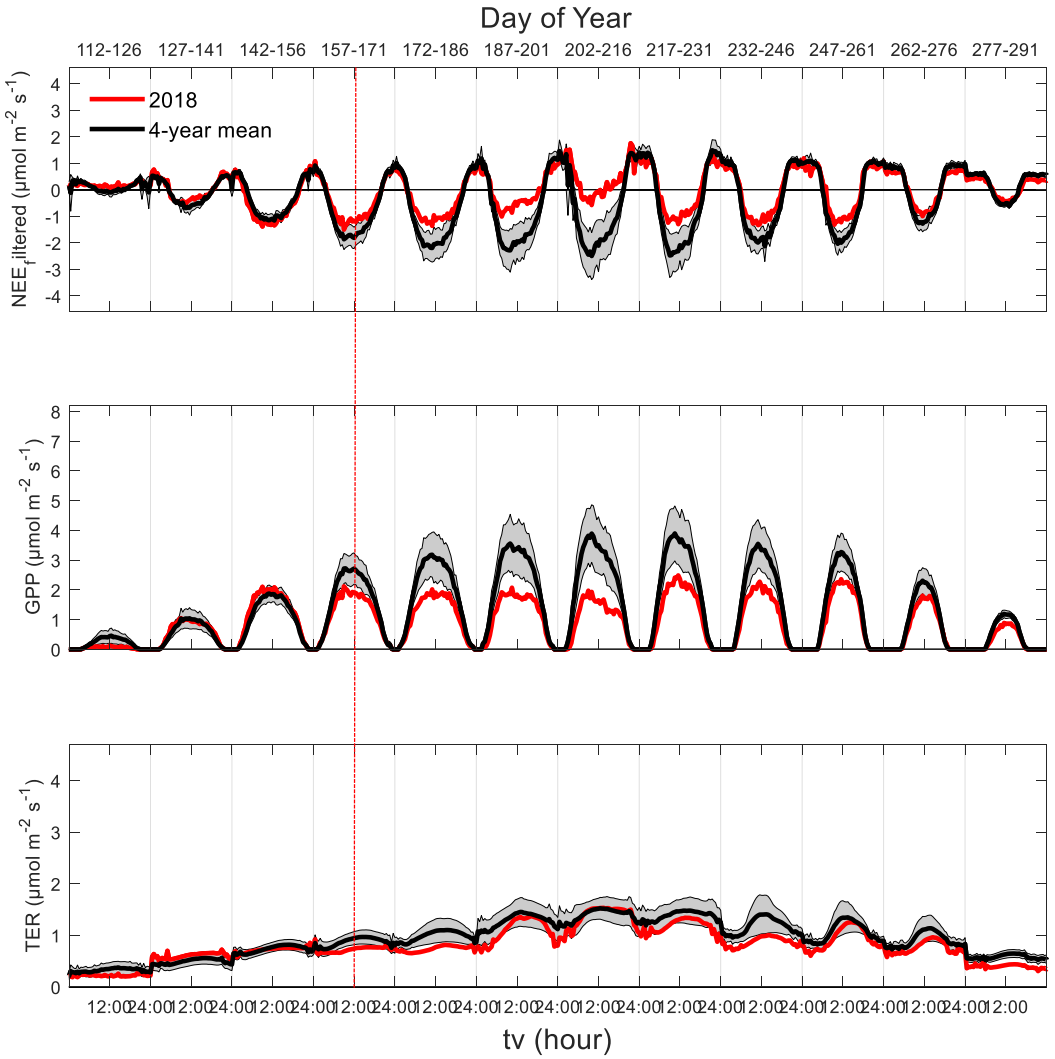


*Data is provisional and likely to change

Degerö

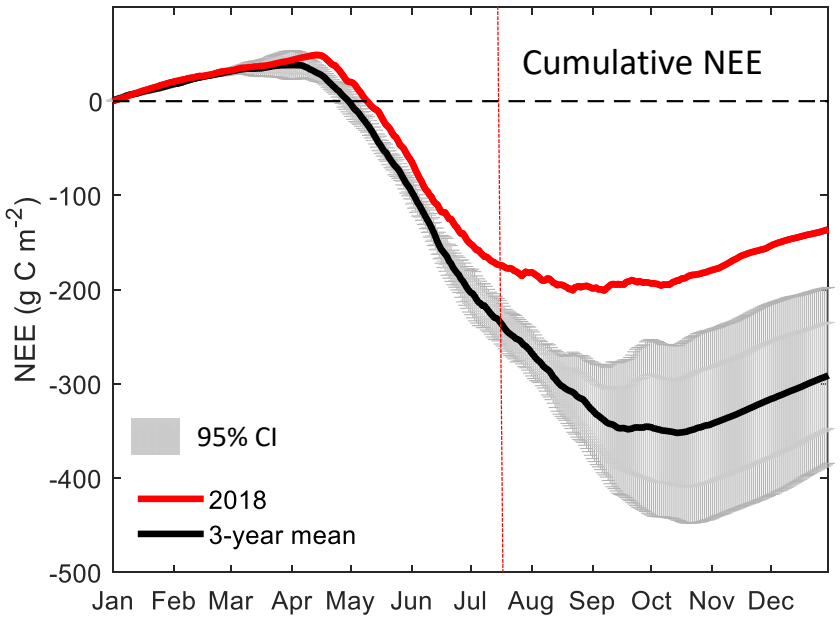


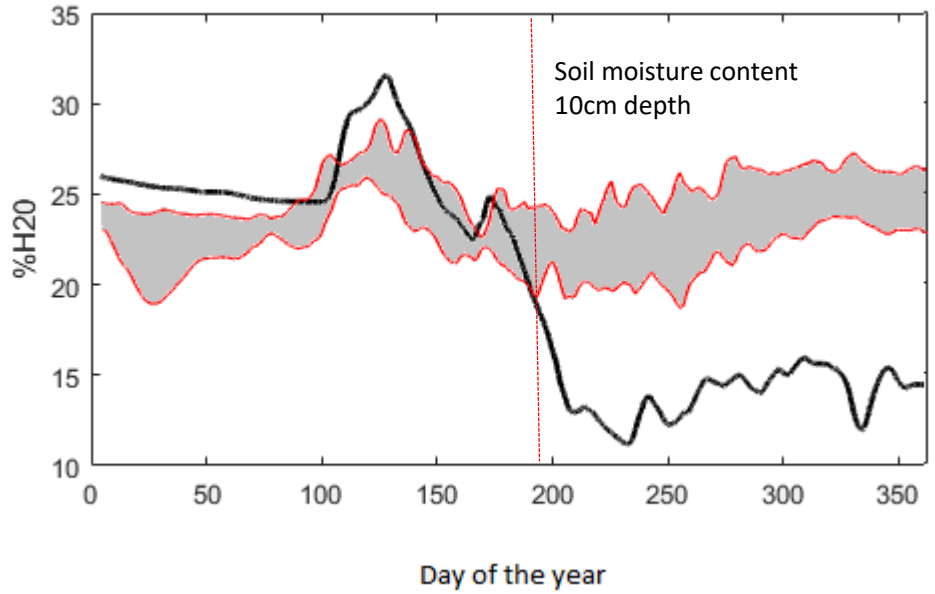


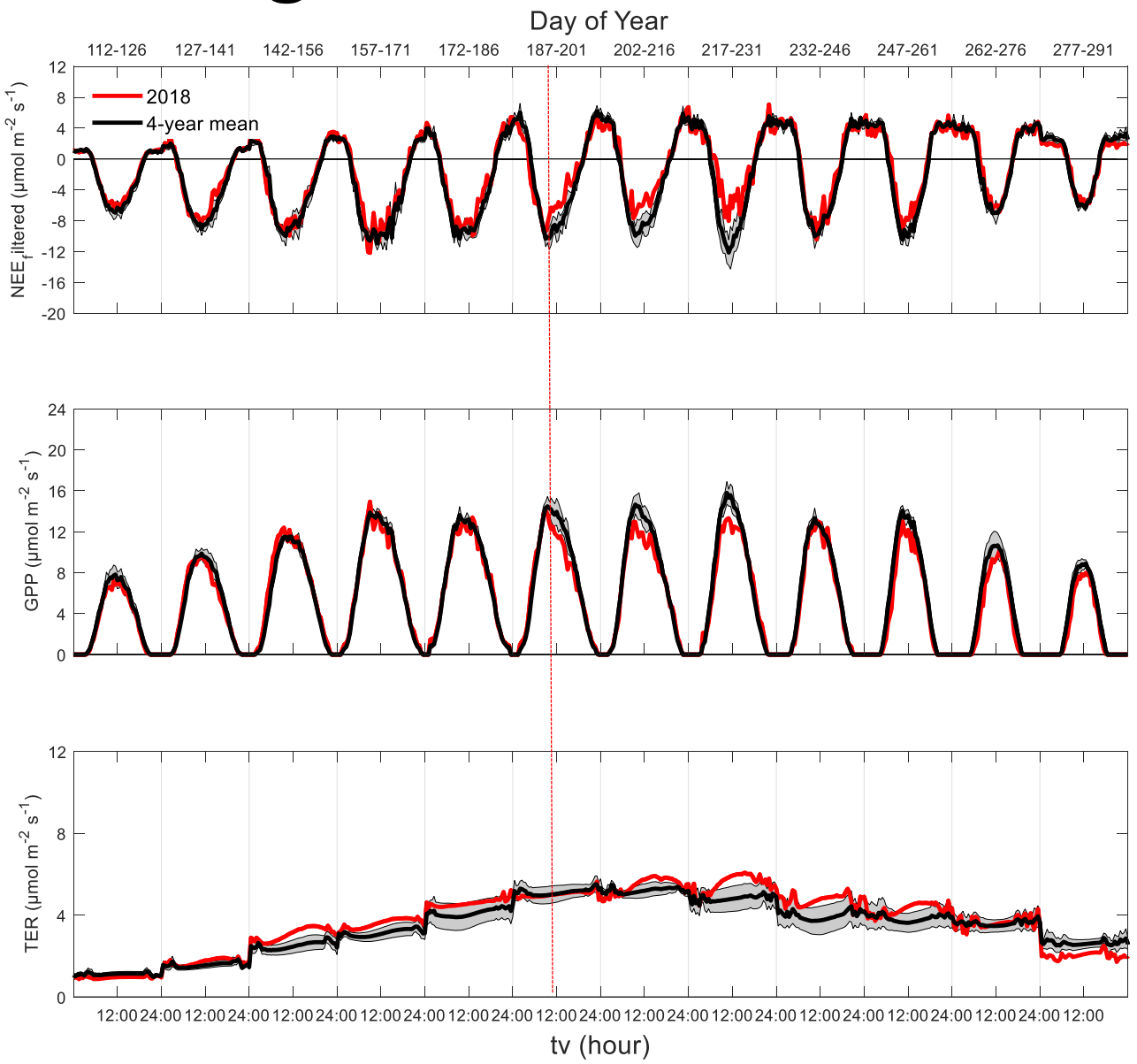


Dashed red line indicates the point fluxes deviated from the reference period

Svartberget







Dashed red line indicates the point fluxes deviated from the reference period

Discussion and some preliminary conclusions

- The drought effects were more severe in the peatland, with changes in the CO_2 flux occurring earlier and lasting longer
- Unlike earlier droughts, the 2018 drought came at the most critical time for CO_2 uptake during the relatively light and warm conditions in June and July
- GPP was the more sensitive of the two fluxes in both ecosystems
- The Sphagnum mosses at Degerö, lacking roots, are poorly adapted to dry conditions and GPP is more sensitive to drought than in the forest ecosystems