Simulating dissolved organic carbon in the Baltic Sea catchment area

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Introduction

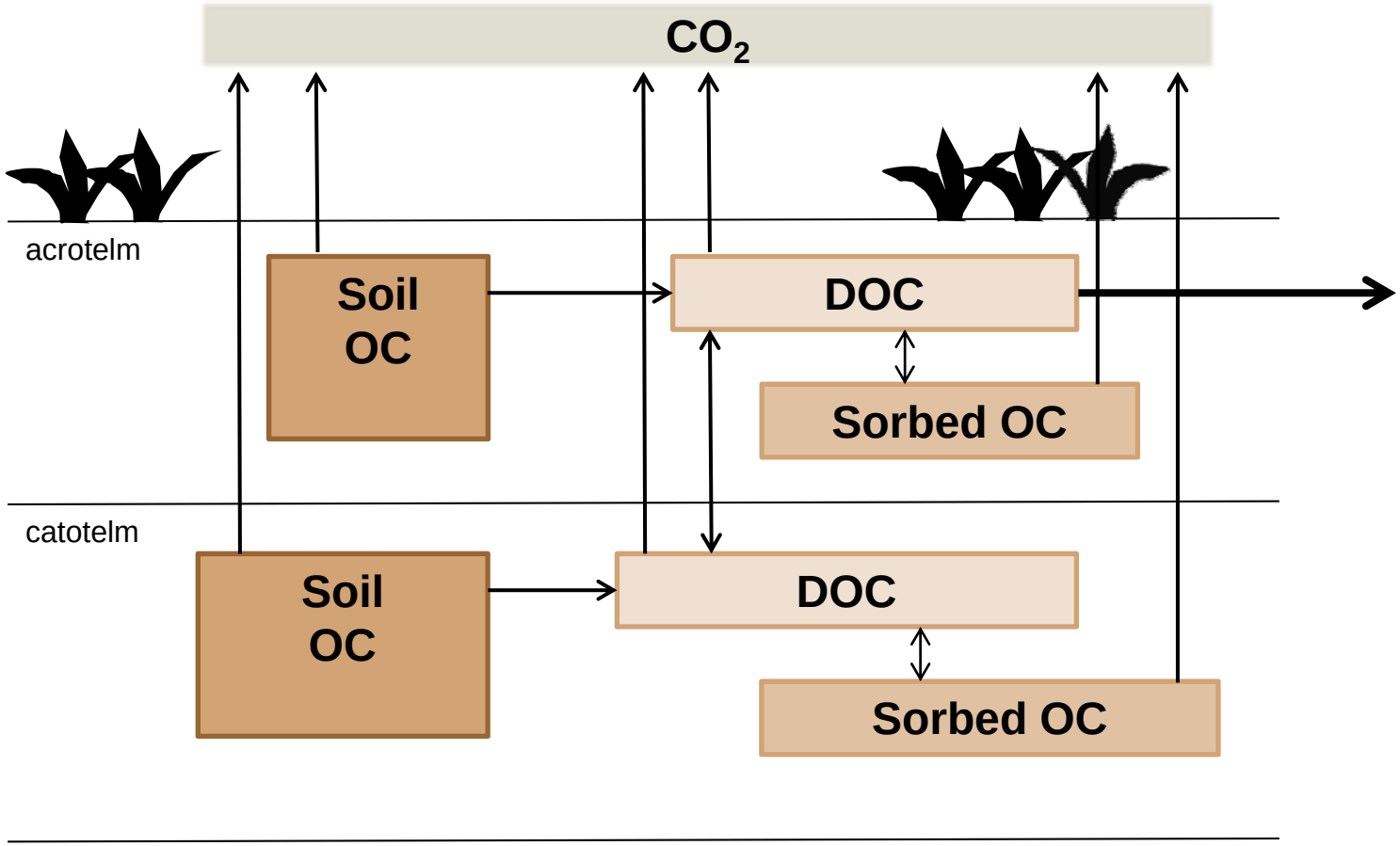
- Dissolved organic carbon (DOC) comprises a significant part of the carbon transported into the Baltic Sea
- Main source: wetlands (peat accumulation)
- DOC is generated by microbial decay of soil organic matter and transported by runoff and rivers to the Baltic Sea

Model and simulation setup

- LPJ-GUESS dynamic global vegetation model
- Wetland hydrology incorporated
- DOC model

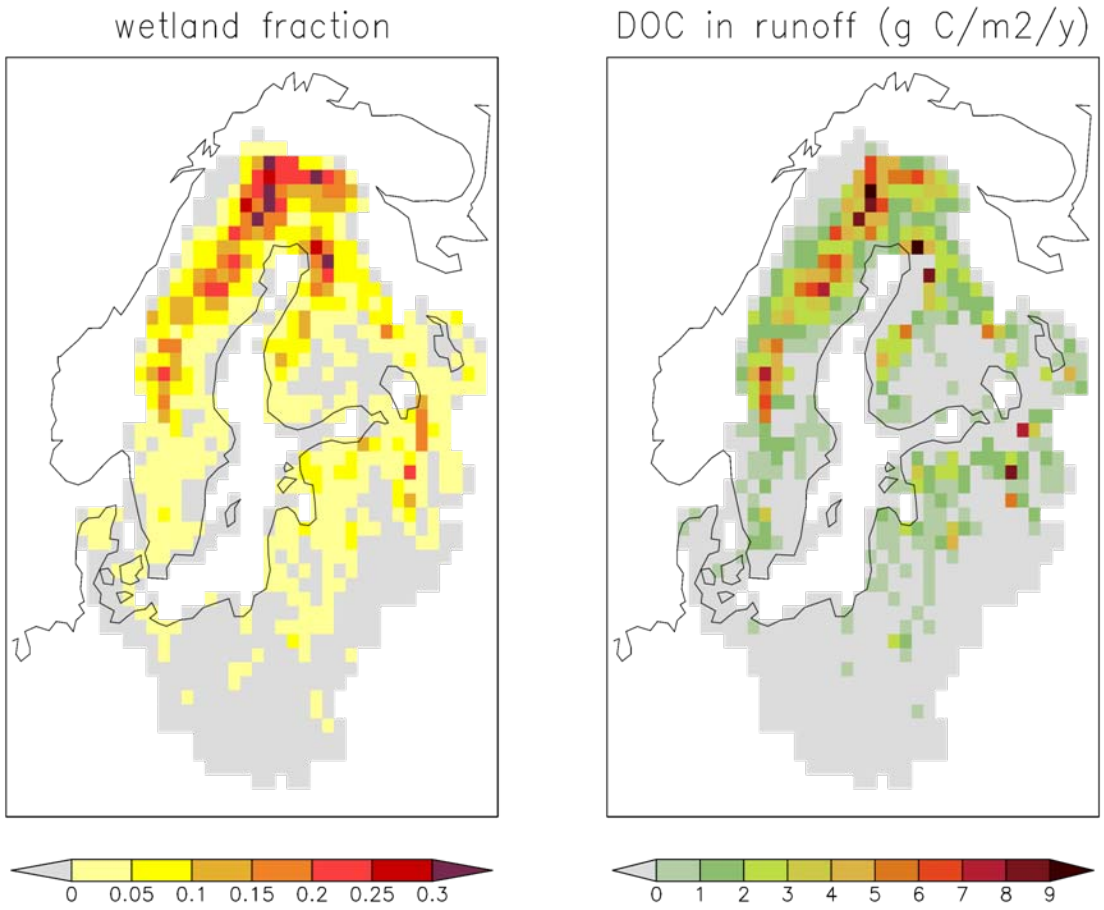
- Monthly climate forcing CRU (corrected) 1901-1960
- Daily climate forcing RCA-ERA40 1961-2005
- Land cover prescribed

Wetland DOC scheme

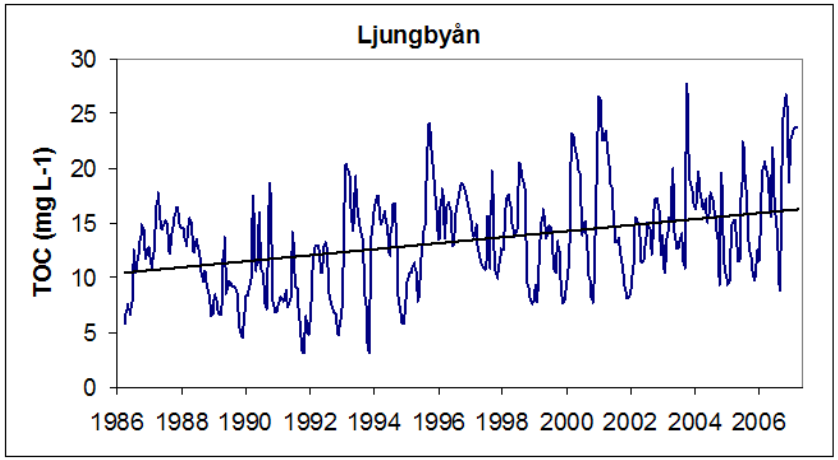


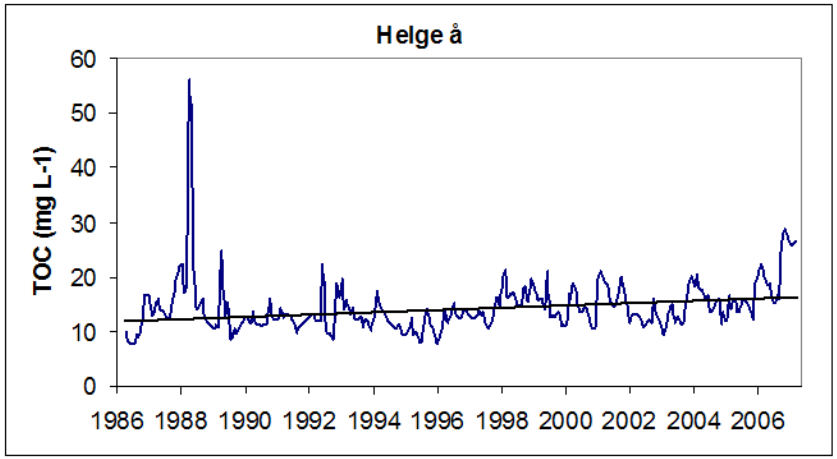
20th century trends in DOC

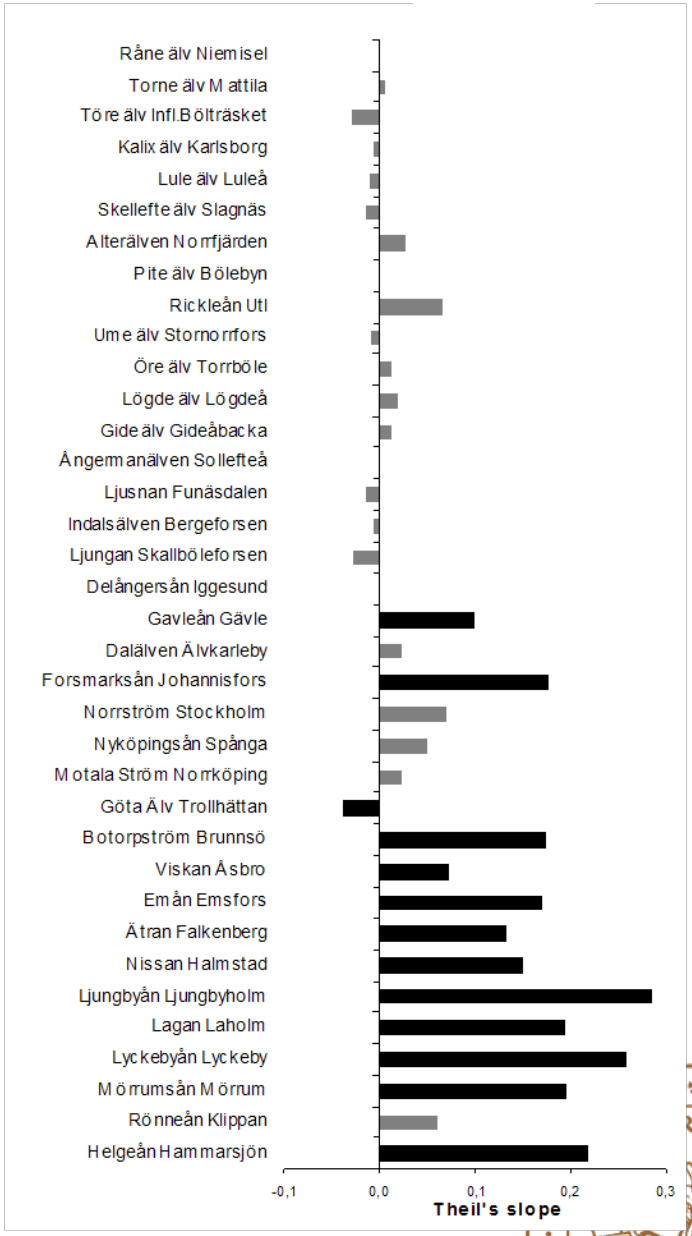
DOC production
(averaged for 1961-2005)



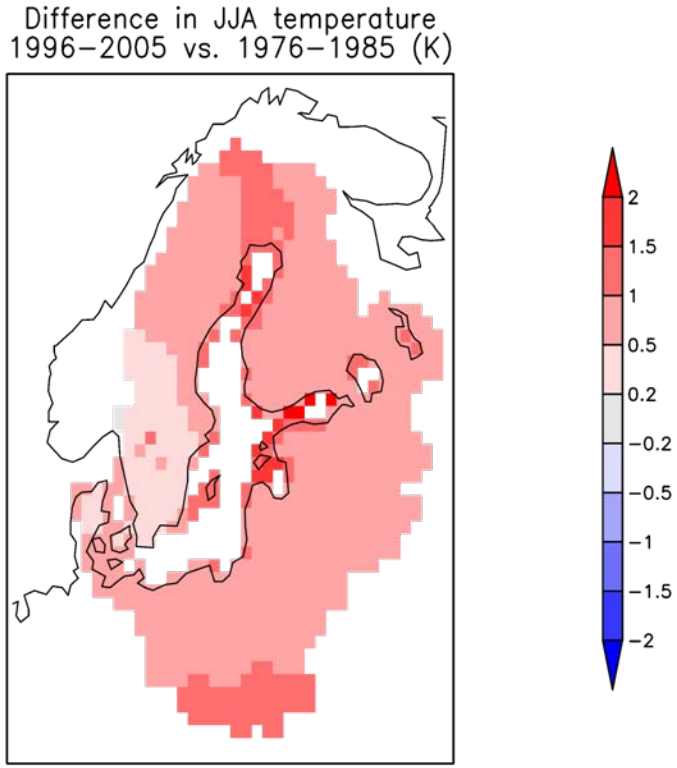
TOC concentration

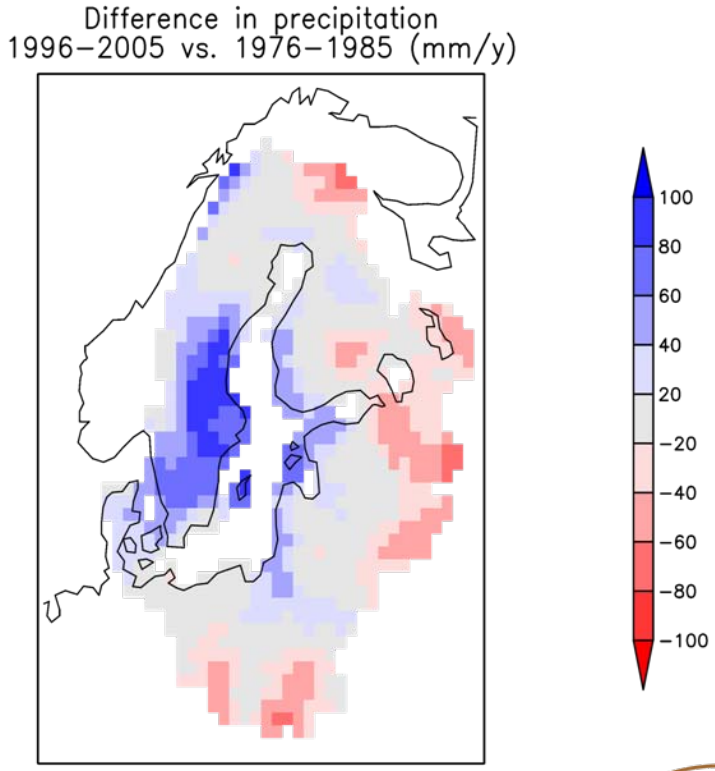




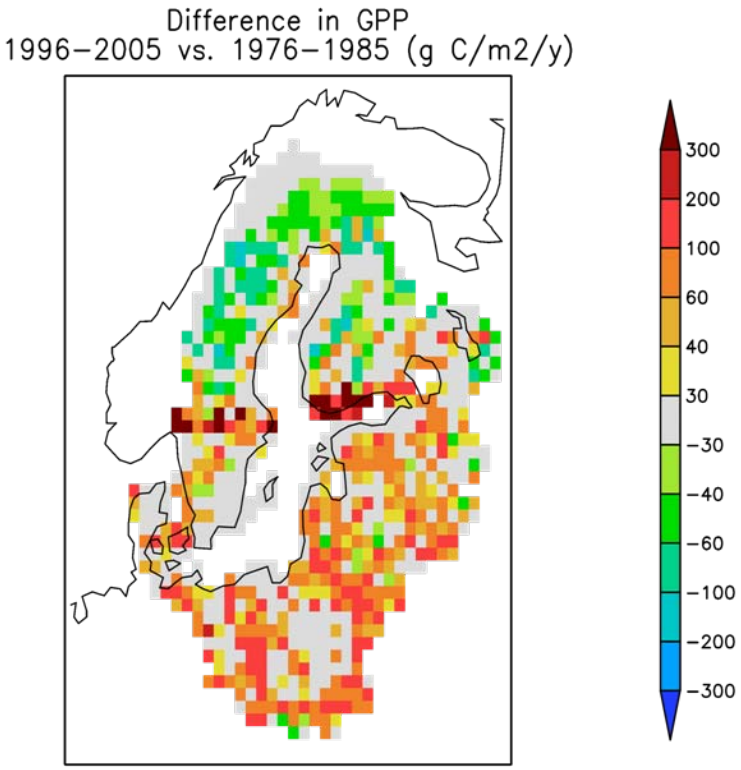


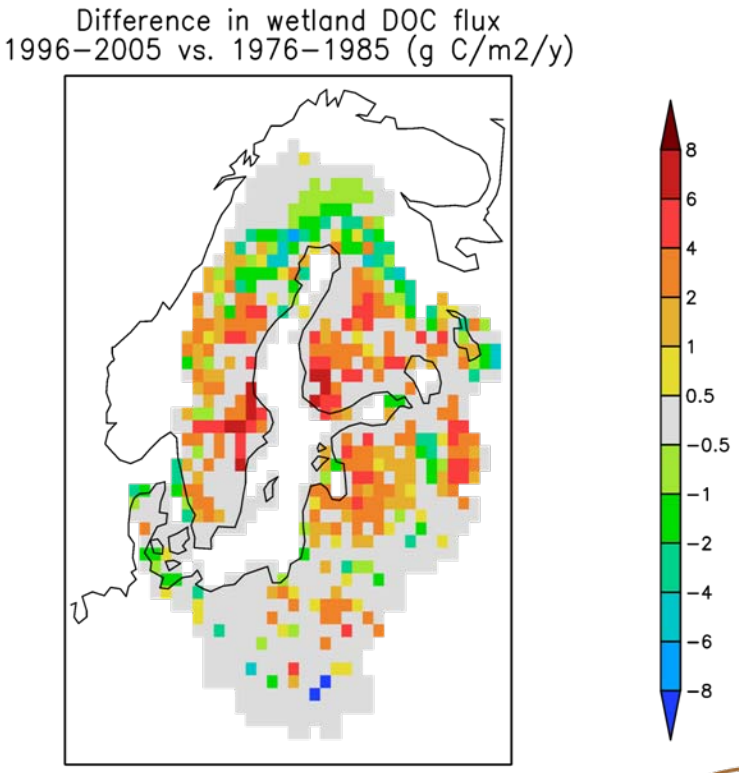
Changes in climatic conditions
(for 1996-2005 compared with 1976-1985)



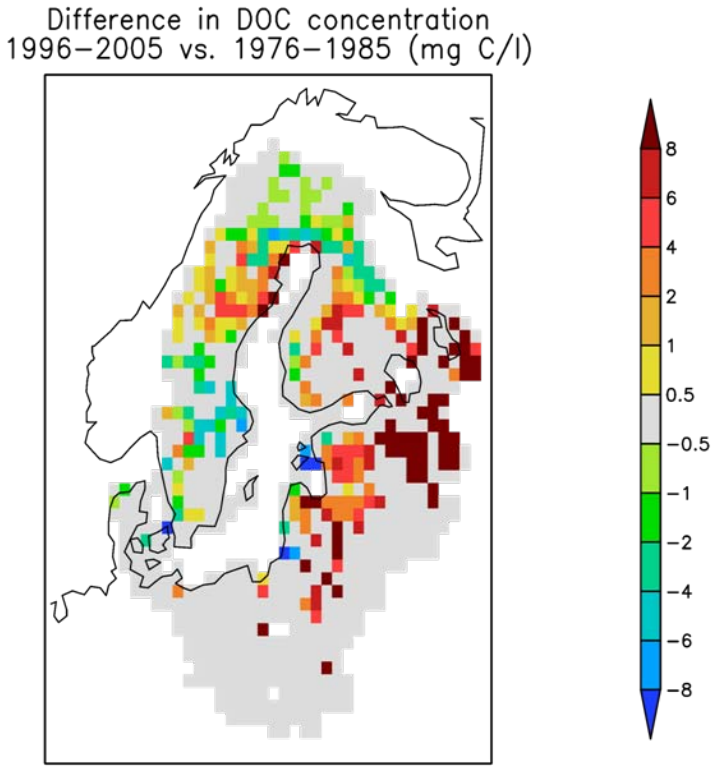


Changes in GPP and wetland DOC production
(for 1996-2005 compared with 1976-1985)

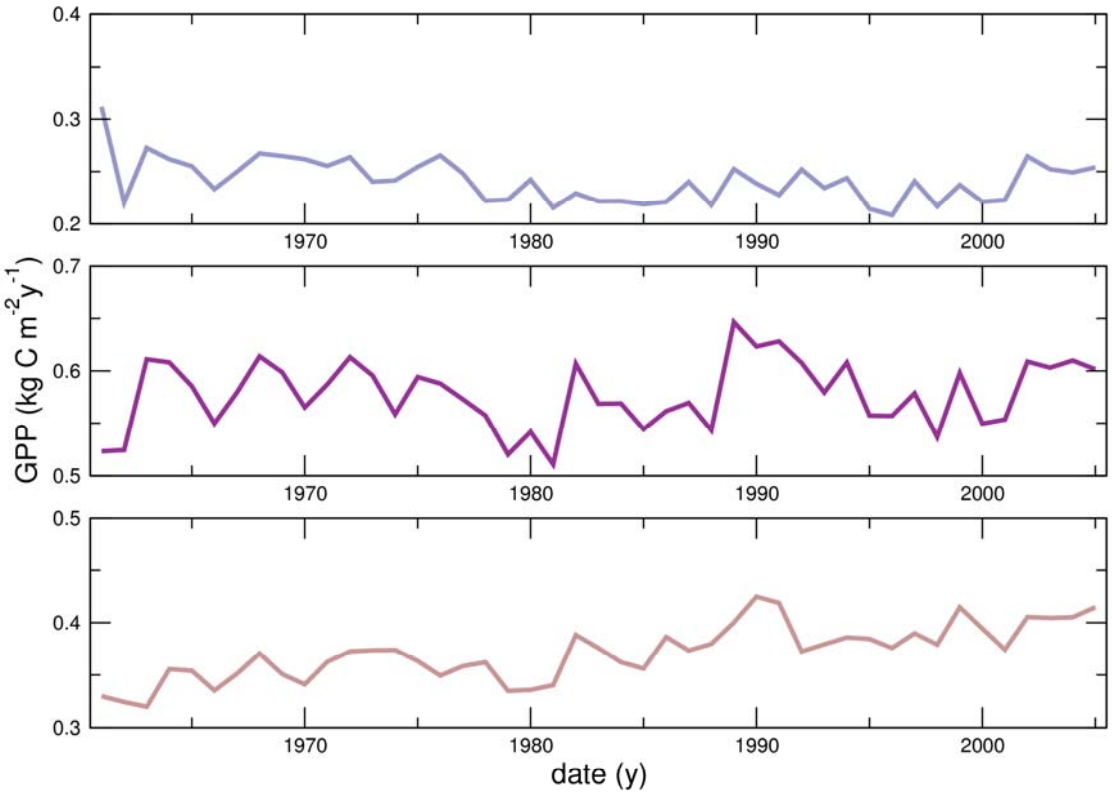


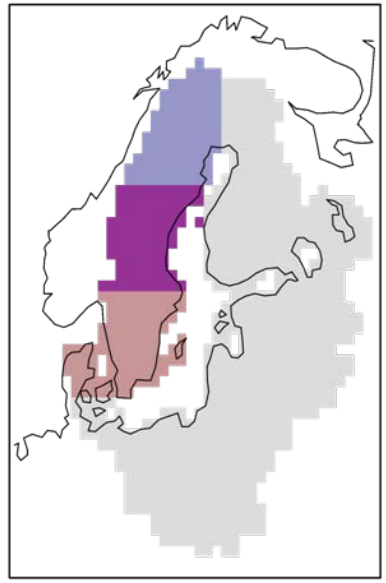


Changes in DOC concentration
(for 1996-2005 compared with 1976-1985)

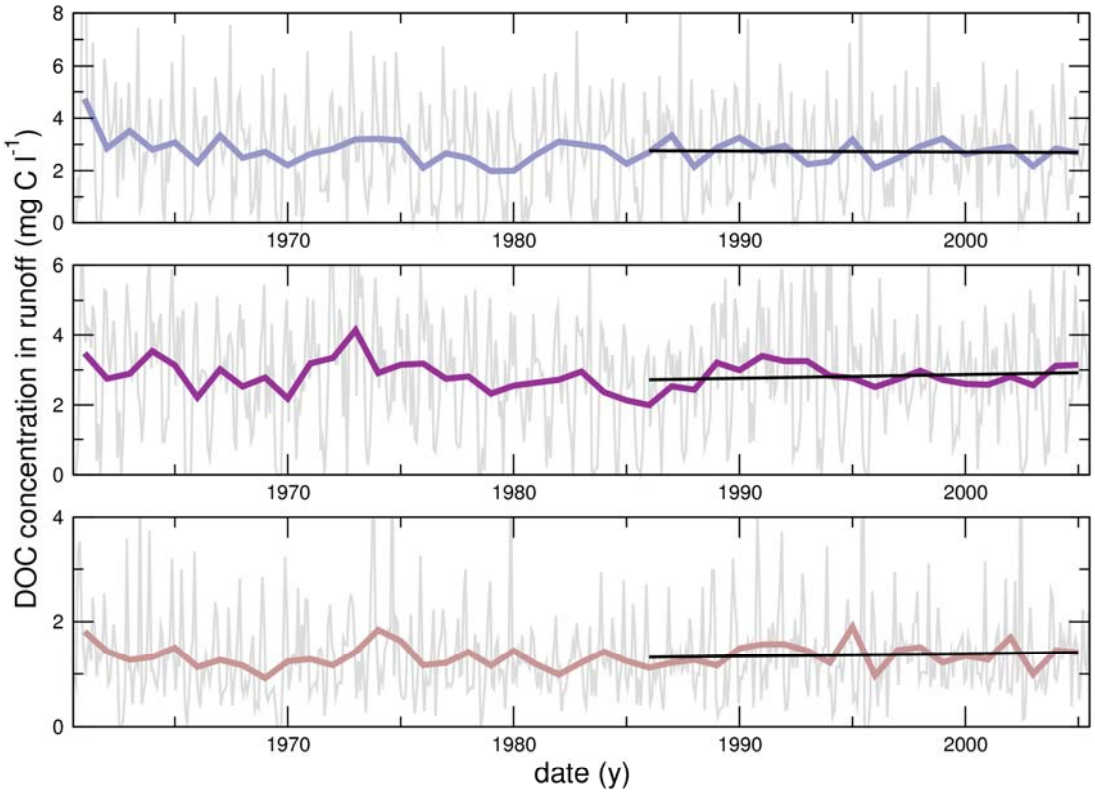


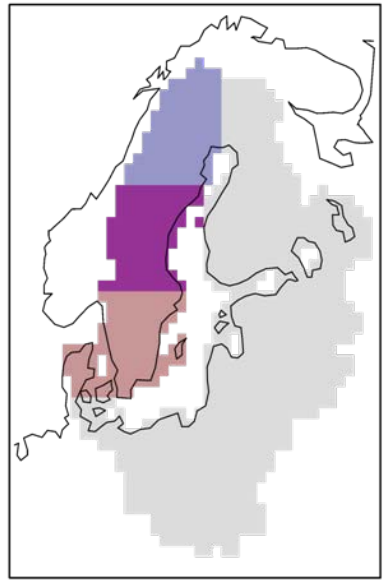
Changes in GPP
for selected regions





Changes in DOC concentration
for selected regions





Conclusions

- Dynamic simulation of DOC fluxes can help to understand the changes in past and future
- The observed changes in TOC concentration match the pattern in GPP and DOC production, but not that in DOC concentration
- Processes during river transport and changes in land use and forestry management have not been accounted for in these simulations and could play a role in past and future DOC changes