Baltic-C Workshop 24-26/5-2011

Vegetation modelling, future scenarios and results

Model and simulation setup

Setup for 21st century simulations

Monthly climate forcing CRU (corrected) 1901-1960 & E-obs

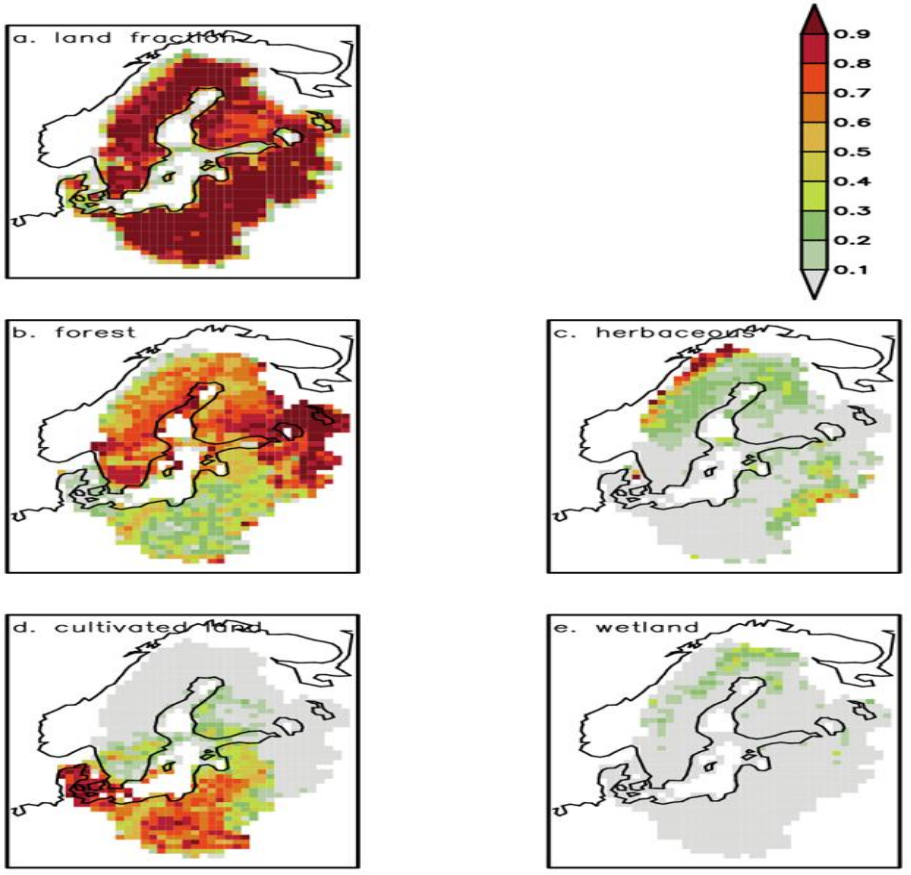
Daily climate forcing from dynamical downscaling with RCA for 1961-2100 (various scenarios)

Land cover varying (various scenarios)

The DOC model

- Wetland model working and deliver results
- Terrestrial, non wetland part of model
  - No dynamical calculation
  - Data from litterature
    - Approximated DOC values with litterature data
    - Included are:
      - Forests - average 40 mg/m-2/day-1
      - Grassland/cultivated - average 10 mg/m-2/day-1
    - Land use changes included
    - Decreasing, only (randomly decrease DOC production in a cell in the region)

Landcover fractions



Scenarios for the future

- Landuse scenarios, (ALARM)
  - Different assumptions concerning socioeconomic and climatic development, 3-different socio-economic lines: (GRAS, SEDGE, BAMBU)
  - Impact of CO2 and climate
    - GRAS - Coupling of the ecosystem LPJ-Guess, with the ALARM model LU, climate scenario AB1F1, Hadcm3
    - SEDGE - Coupling of the ecosystem LPJ-Guess, with the ALARM model LU, climate scenario A2, Hadcm3
    - BAMBU - Coupling of the ecosystem LPJ-Guess, with the ALARM model LU, climate scenario B1, Hadcm3

Scenarios used

DOC production, average Totals

DOC and DOC concentration

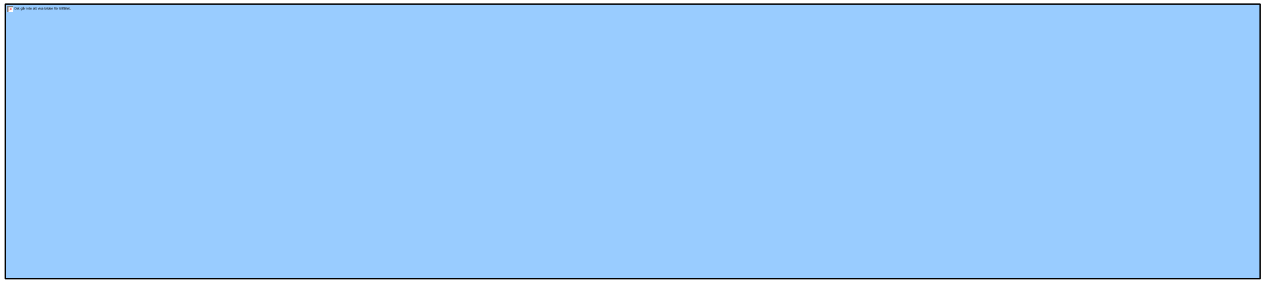
- DOC production (g C/m-2/yr)
  - A2 > A1B > B1
- Concentrationod DOC (mg/L), all decreased
- Correlations DOC production with climatic factors
  - Wetland DOC weak with both temp and precipitation.
  - Non-Wetland, not tested, DOC are constant.

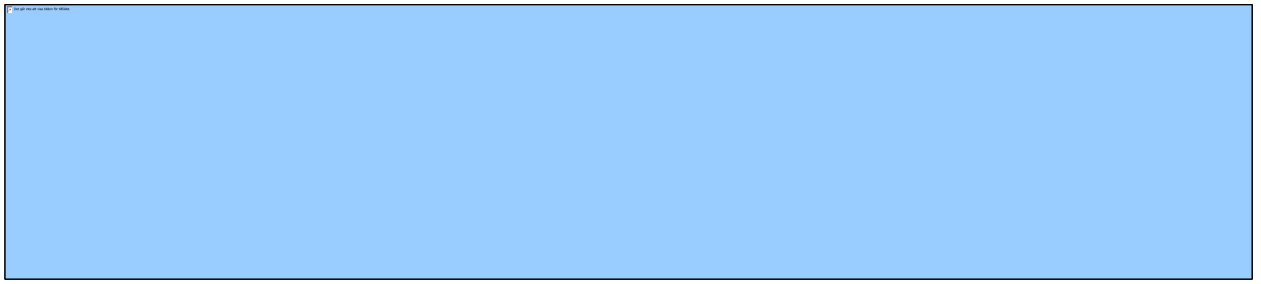
GCM comparison 1961-1990(1), 2071-2100(2)

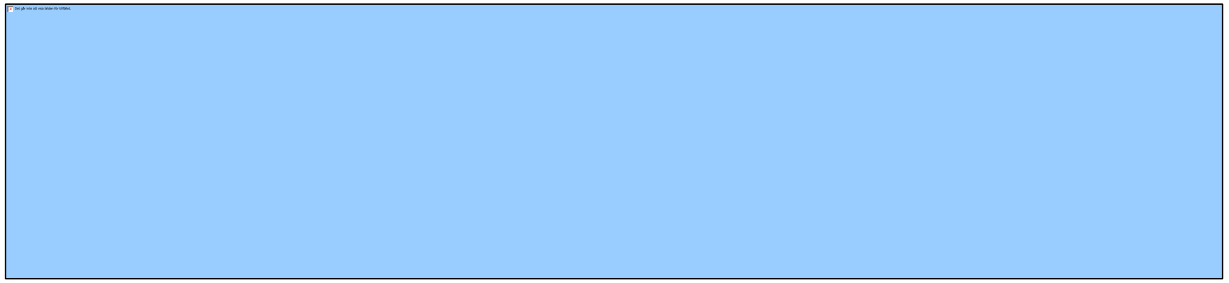
GCM comparison

- DOC production
  - CCSM3 >HADCM3>Echam5
- DOC concentration
  - CCSM3 > Echam5 > HADCM3
- All increas in production
- Only CCSM3 has a increas in concentration of DOC

Land use

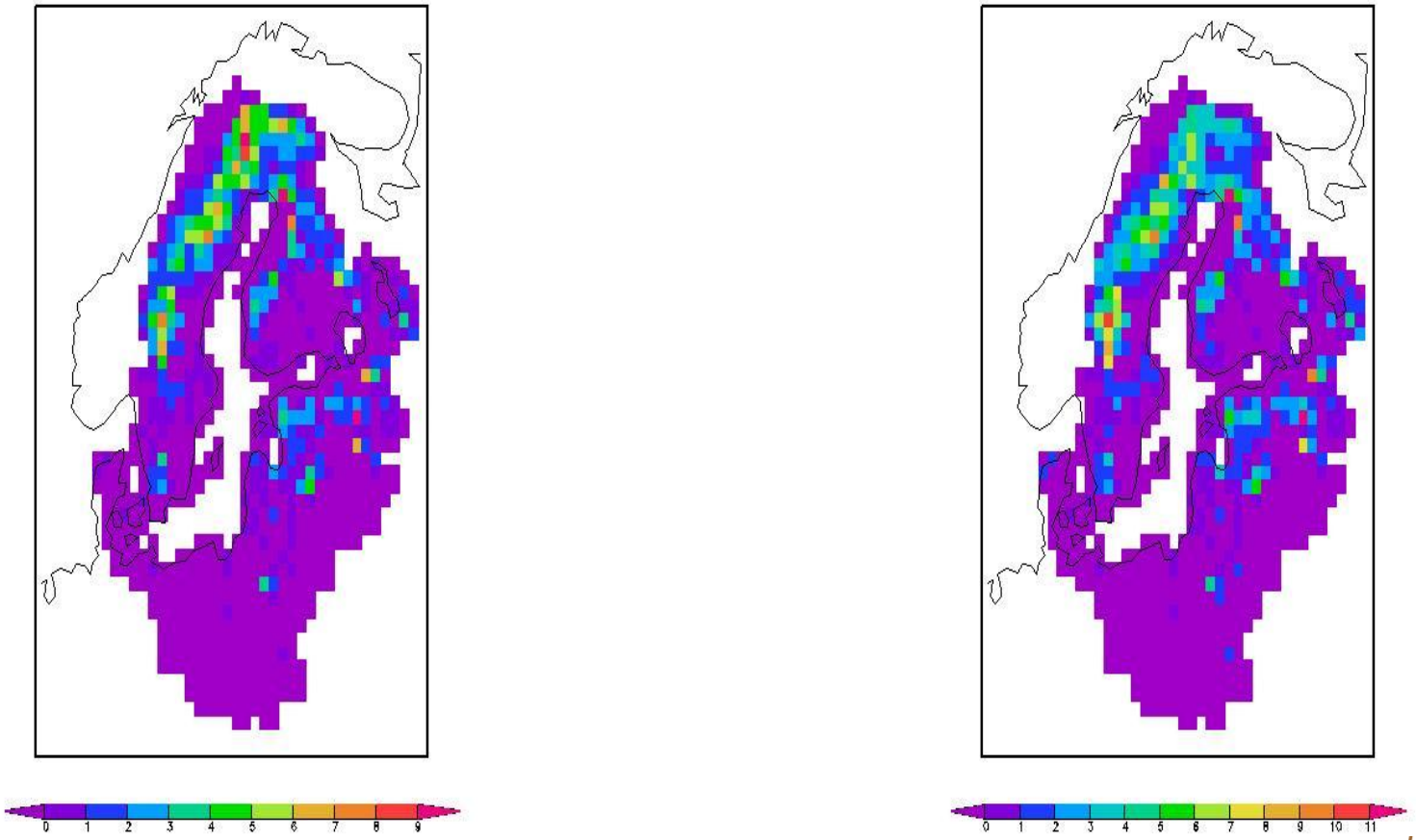




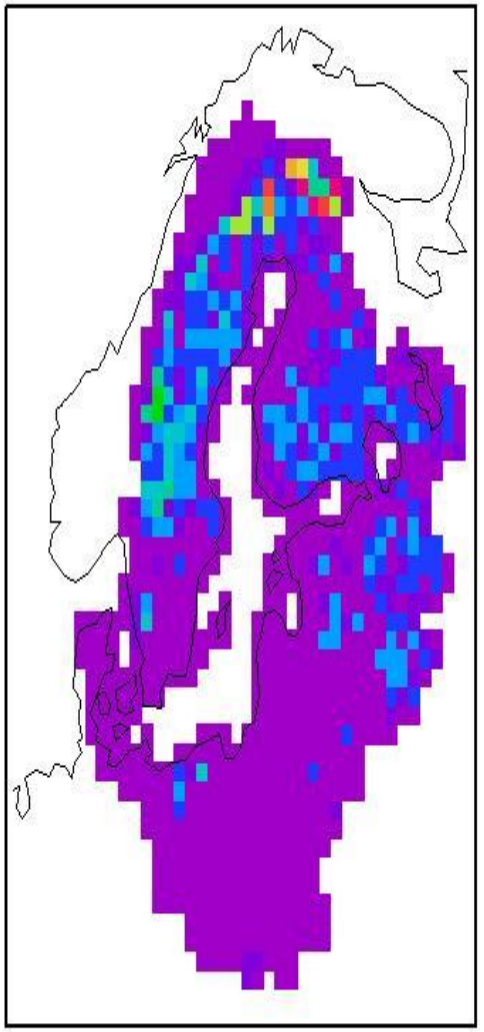


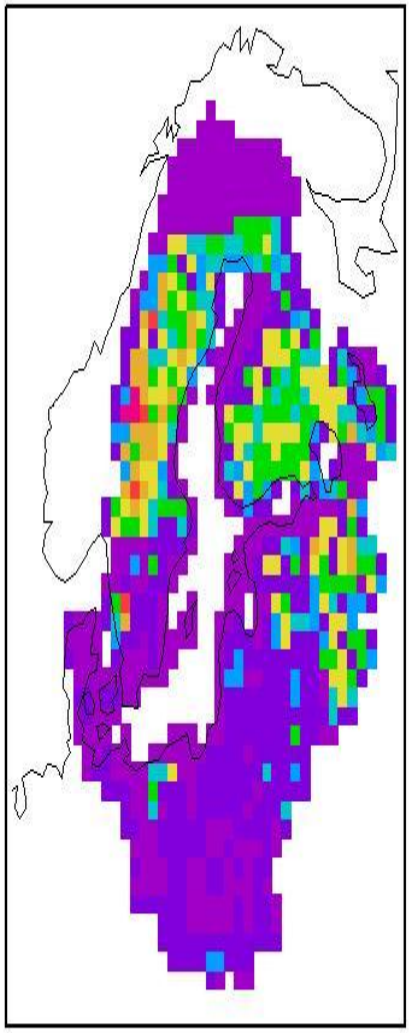
DOC production(wetlands)

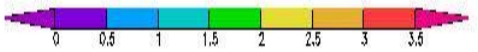
DOC production in runoff, average 1996-2005 and 2085-2095, g C/m2/yr (B1)



DOC in runoff (g C/m-2/yr) non-wetland 61-90 vs 71-00







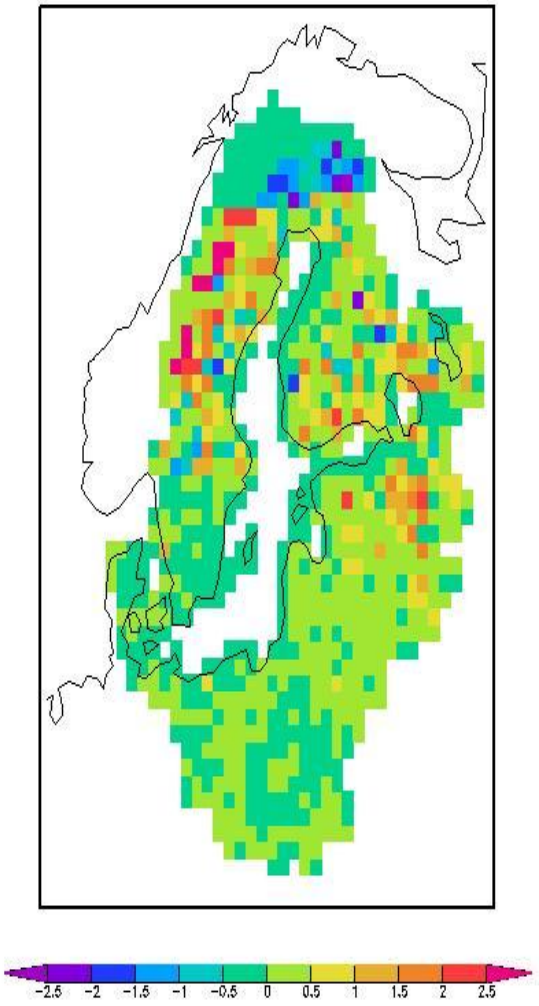
Conclusions

- DOC production in wetlands sets the limits.
  - DOC in Forest,
    - DOC in croplands, graslands least influense
- DOC prod in Forest and Grasland/cultivated
  - About 1/5 – 1/10 of Wetlands, approximately
- Weak correlations of DOC to single climat factors. If any

The future

- Improve plan B! Build a complete dynamic model of DOC production for both Wetlands and non-wetlands
- Try more correlations
- Analyse each DOC producer(Forest, cultivated, graslands) separately.

DOC production



Difference on DOC production in runoff between average periods, 1961-1990 and 2071-2100 (HADCM3 A1B)