

Sensitivitätsstudien mit dem gekoppelten Klimamodell ECHAM-FESOM zu Modellparametern

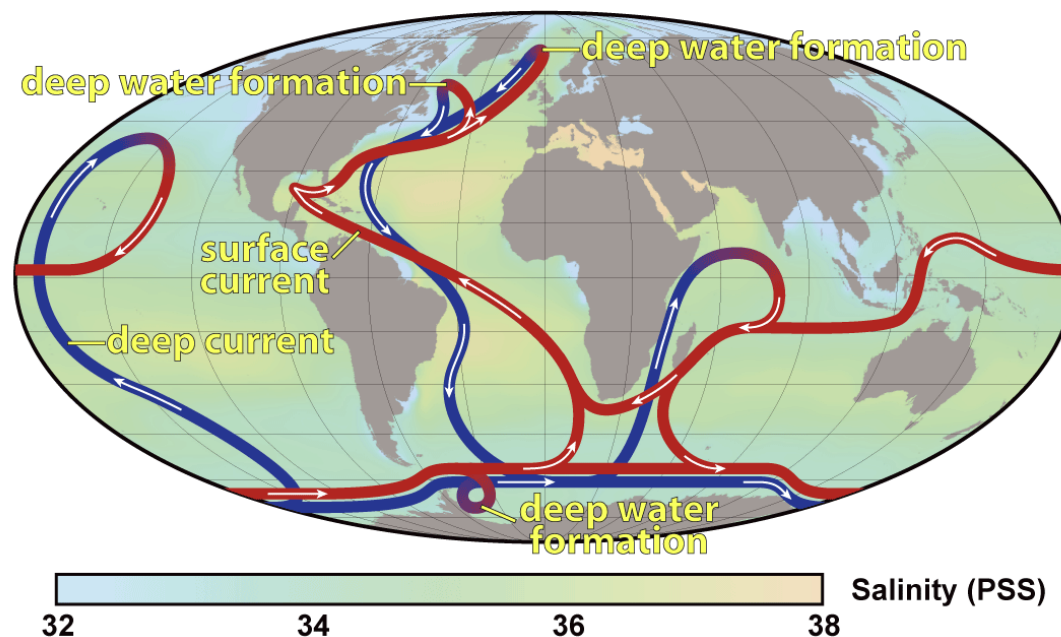
Dmitry Sidorenko, Tido Semmler, Thomas Jung

Alfred-Wegener-Institut für Polar- und Meeresforschung

1. Einleitung
2. Modellkonfiguration und Experimente
3. Ergebnisse
4. Zusammenfassung und Ausblick

Sehr unterschiedliche Ergebnisse für die meridionale Umwälzzirkulation in idealisierten Sensitivitätsexperimenten
Wie findet der Einschwingvorgang statt, wenn man eine plötzliche Veränderung der Treibhausgaskonzentrationen oder der Eisalbedo einführt?

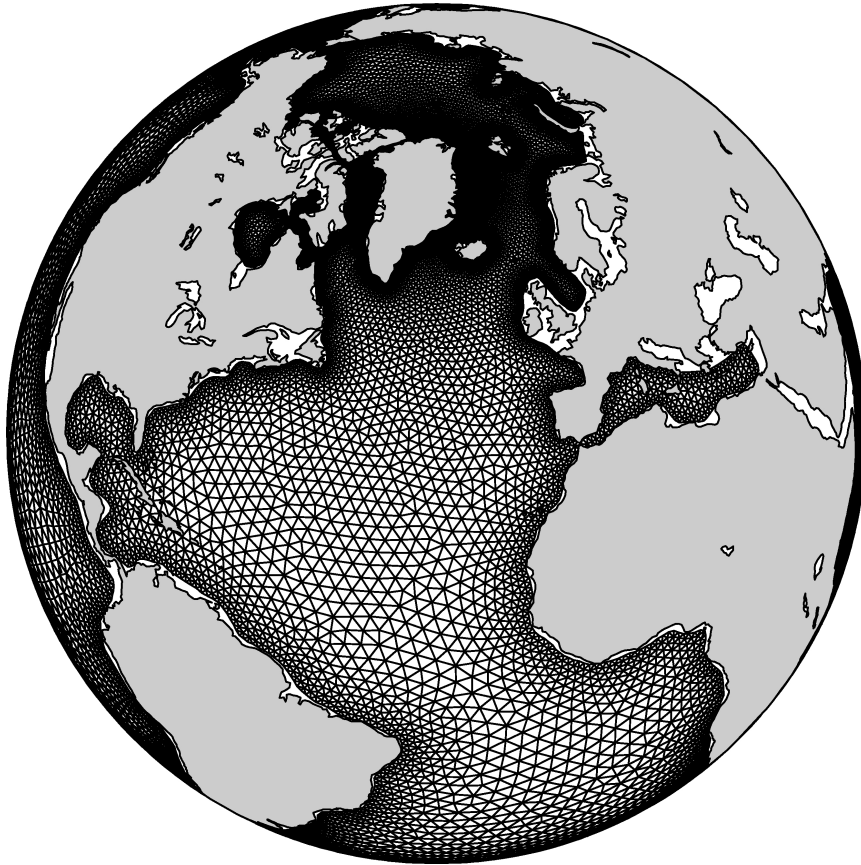
Thermohaline Circulation



Wo treten die ersten Veränderungen nach Einführung der Störung auf?

2. Modellkonfiguration und Experimente AWI

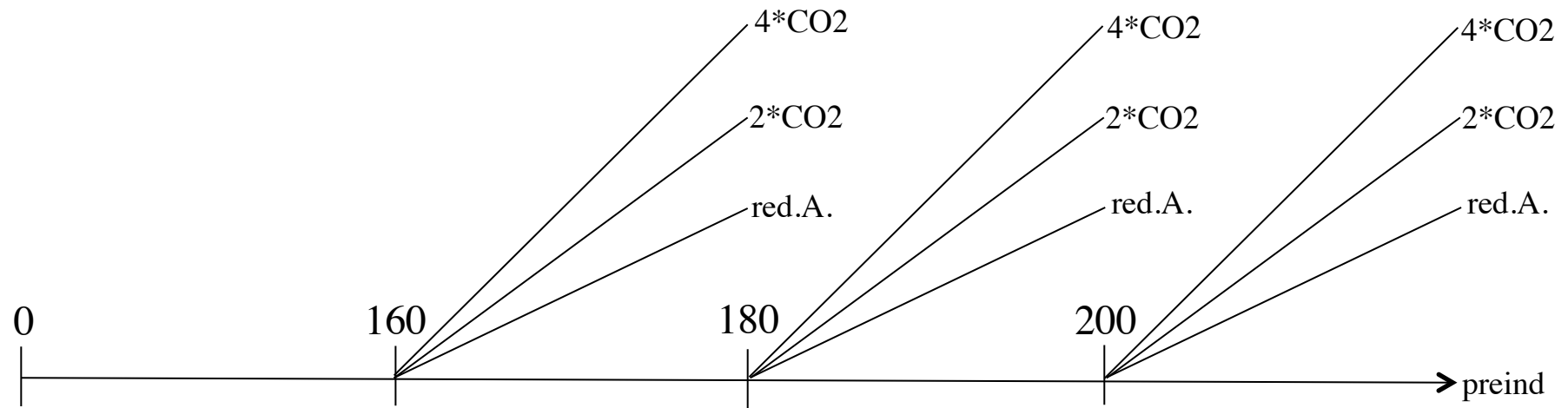
50,000 2D nodes



T63

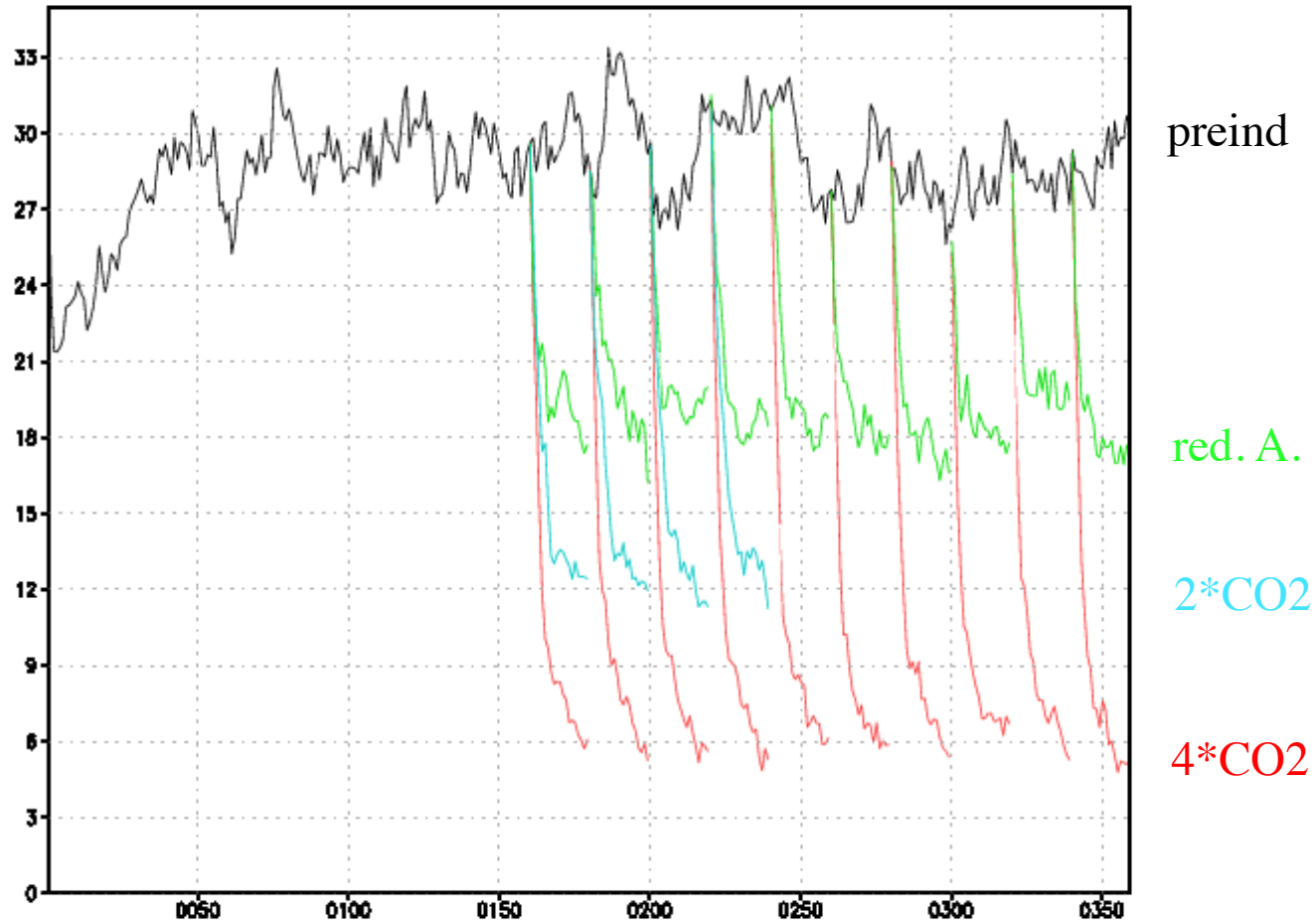


2. Modellkonfiguration und Experimente AWI



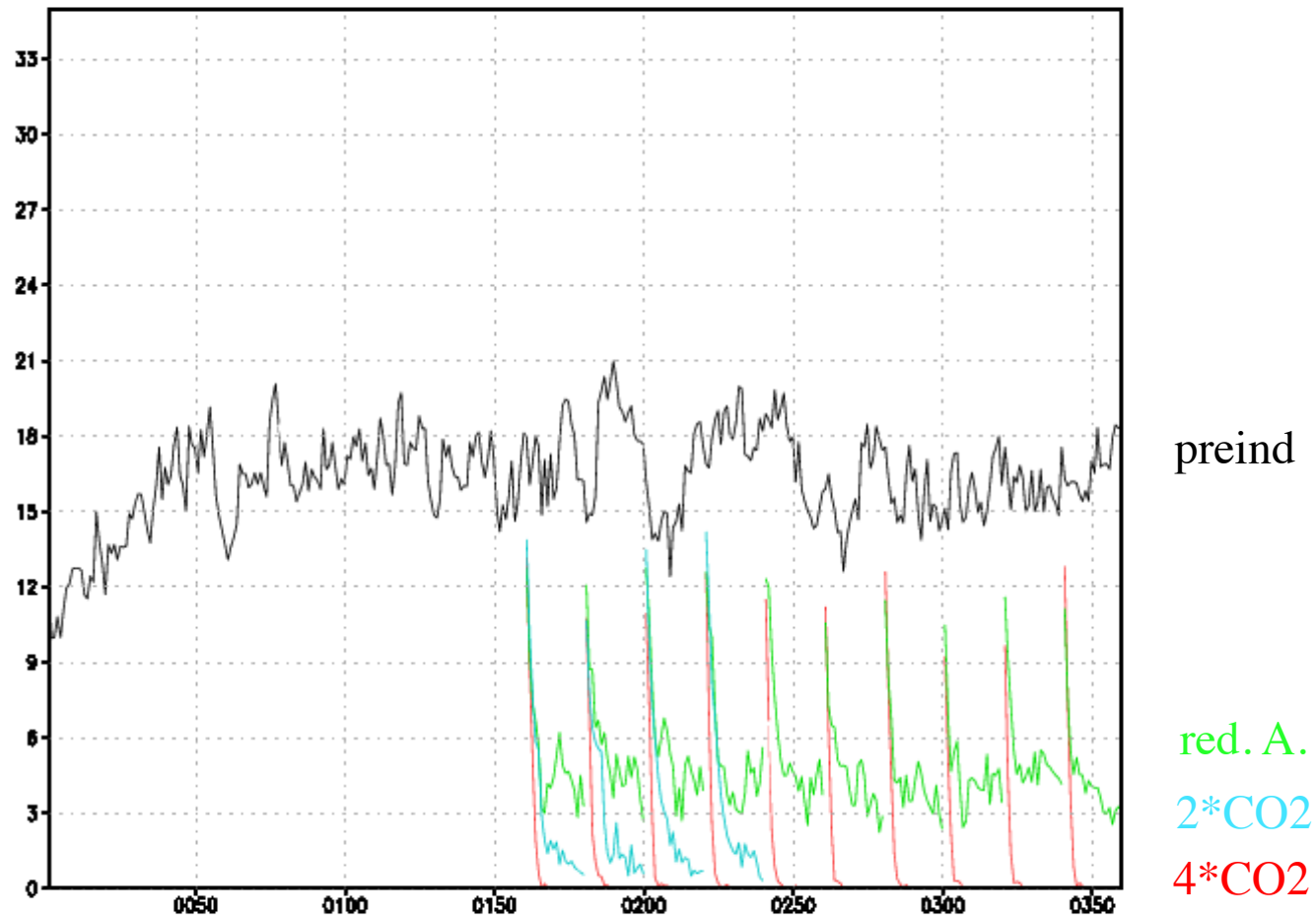
3. Ergebnisse

Arctic sea ice volume FMA [10E+03 km³]



3. Ergebnisse

Arctic sea ice volume ASO [10E+03 km³]

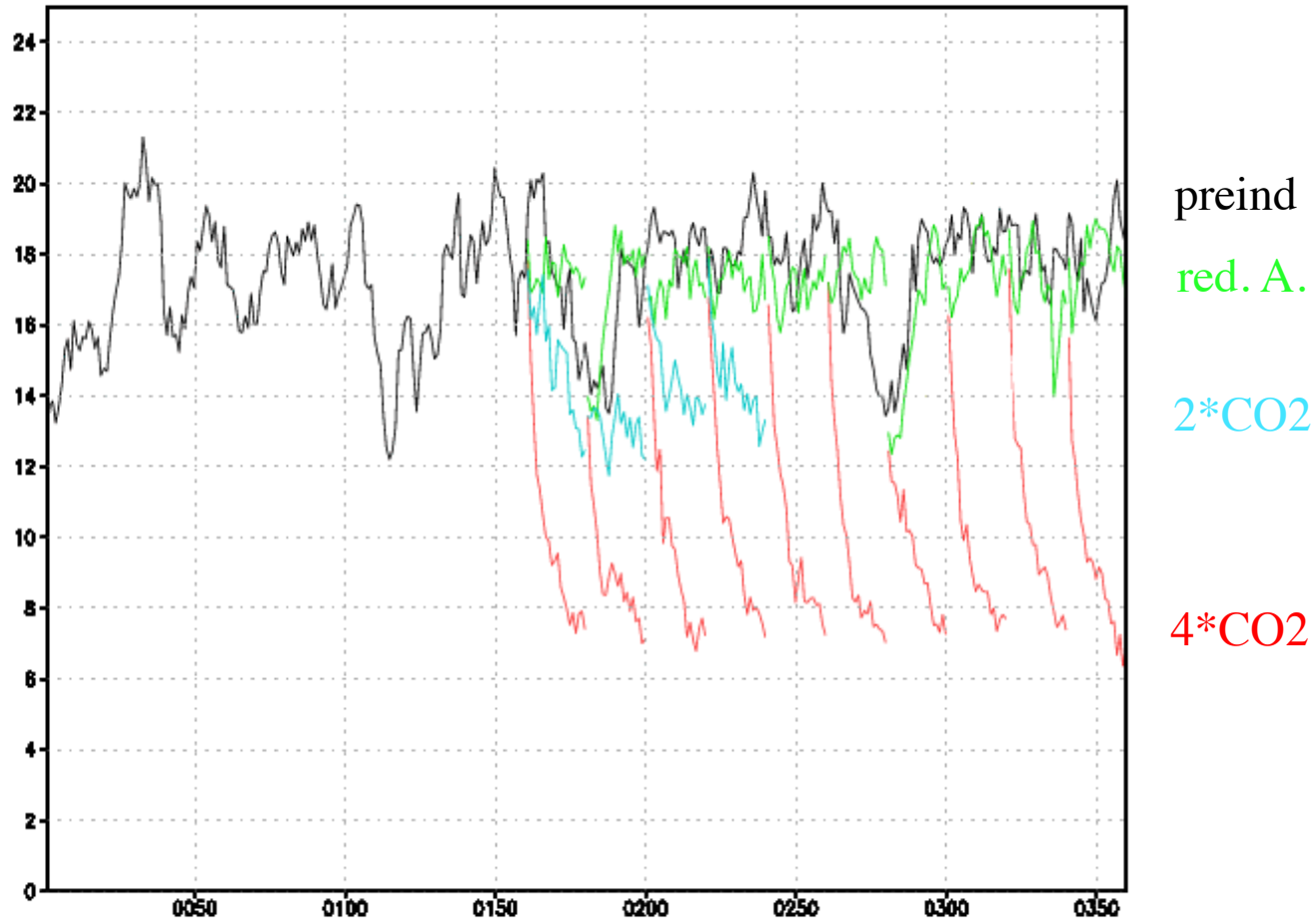


GrADS: COLA/IGES

2012-10-05-11:34

3. Ergebnisse

Antarctic sea ice volume ASO [10E+03 km³]

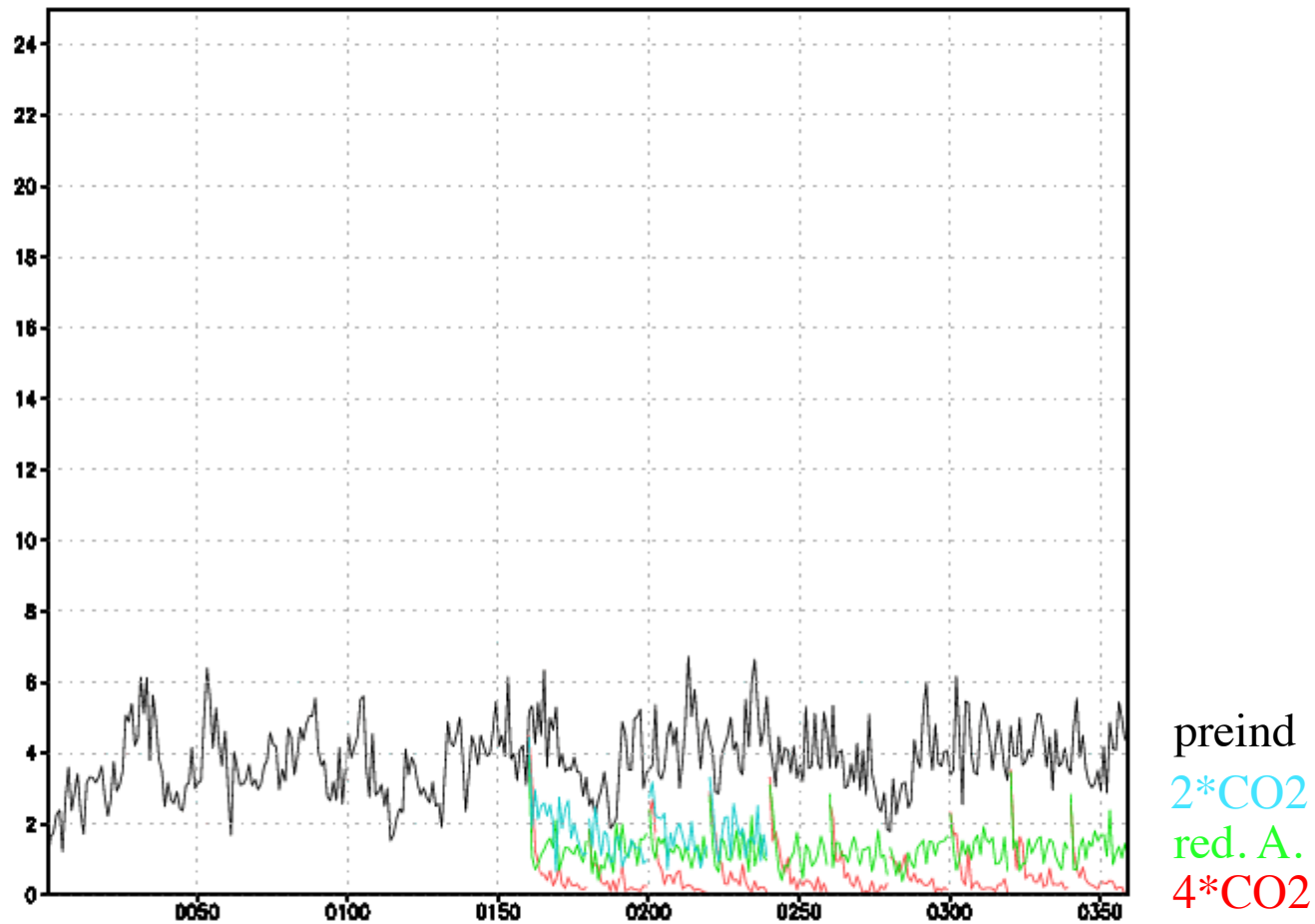


GrADS: COLA/IGES

2012-10-05-11:40

3. Ergebnisse

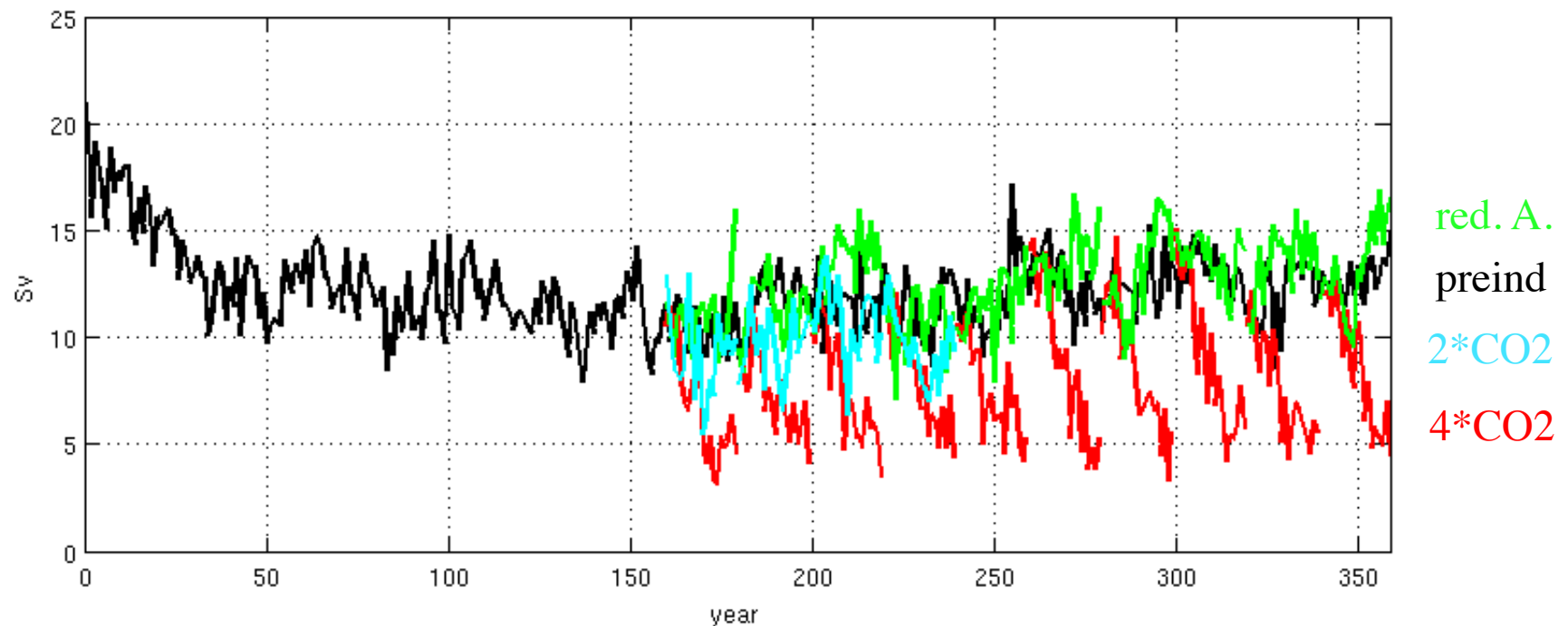
Antarctic sea ice volume FMA [$10E+03 \text{ km}^3$]



GrADS: COLA/IGES

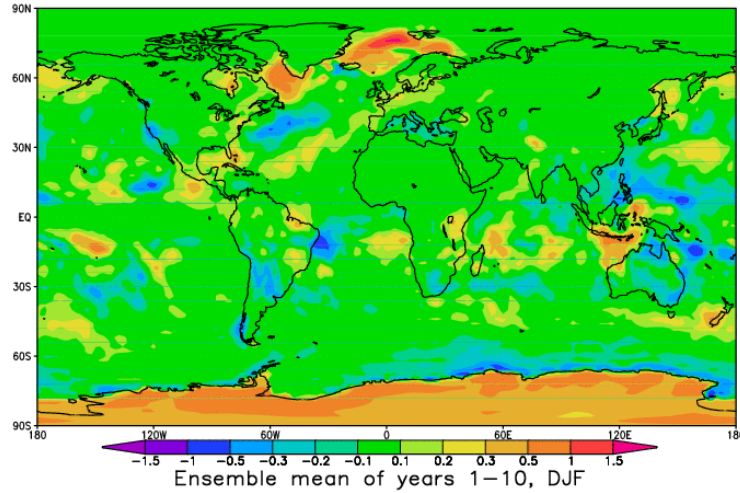
2012-10-05-11:42

Maximum Atlantic Meridional Overturning Circulation 43 N to 46 N

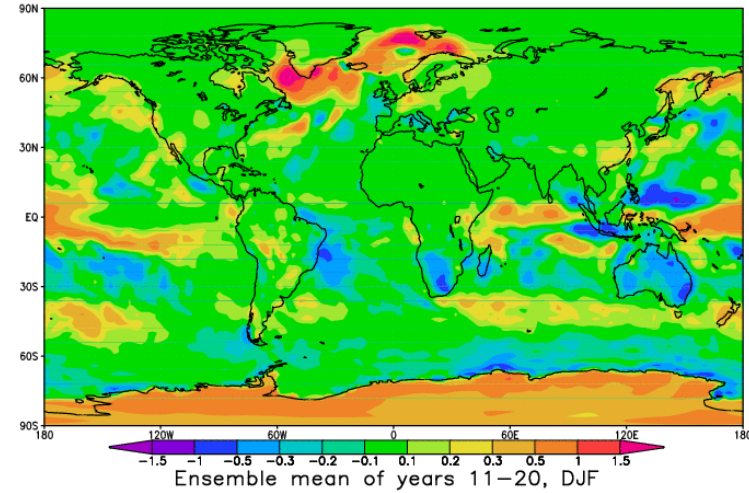


3. Ergebnisse

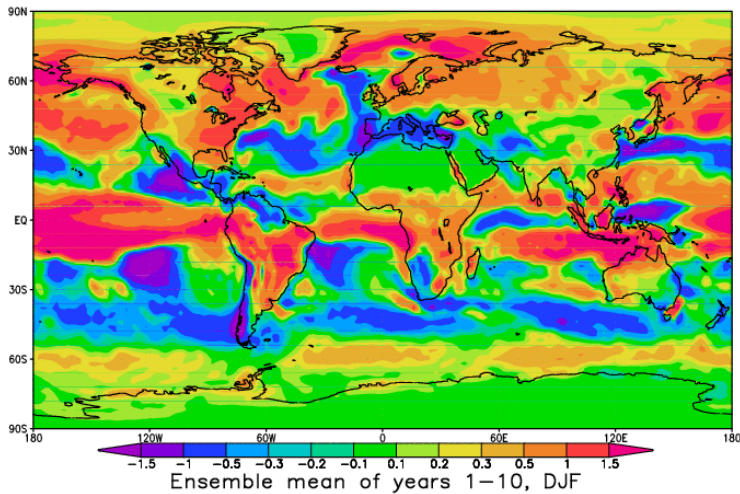
ECHAM5-FESOM P-E [mm/day]
Sudden reda minus preind



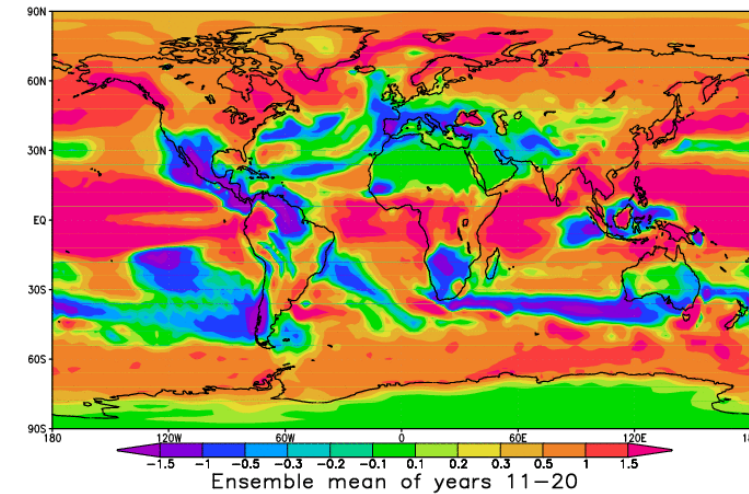
ECHAM5-FESOM P-E [mm/day]
Sudden reda minus preind



ECHAM5-FESOM P-E [mm/day]
Sudden 4co2 minus preind

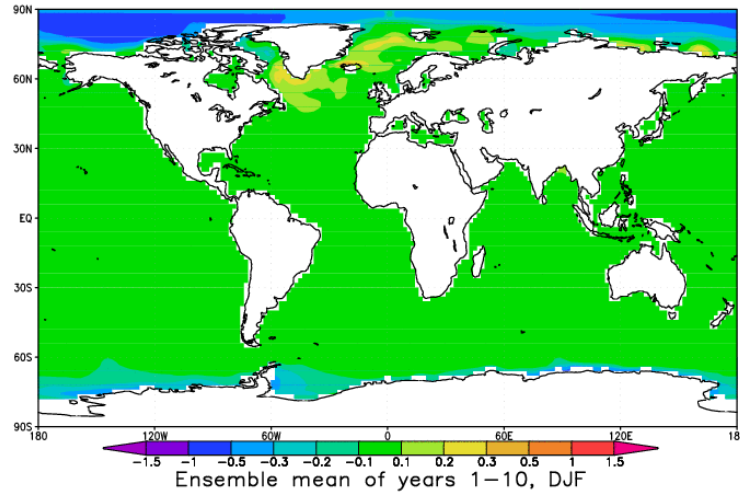


ECHAM5-FESOM P-E [mm/day]
Sudden 4co2 minus preind

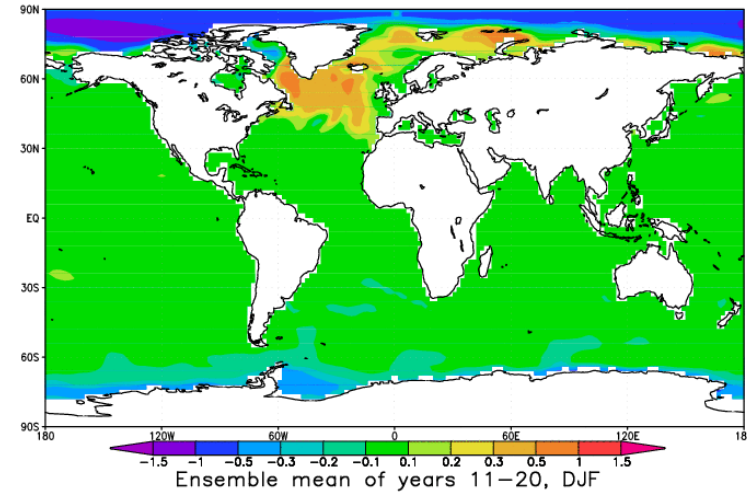


3. Ergebnisse

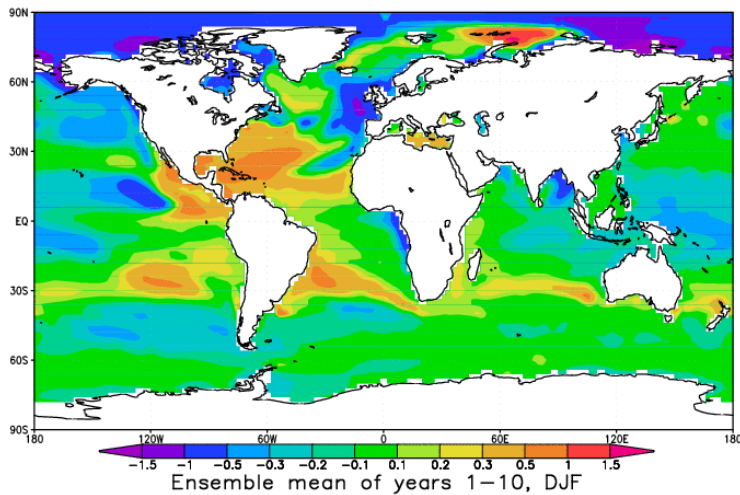
ECHAM5-FESOM SSS [psu]
Sudden reda minus preind



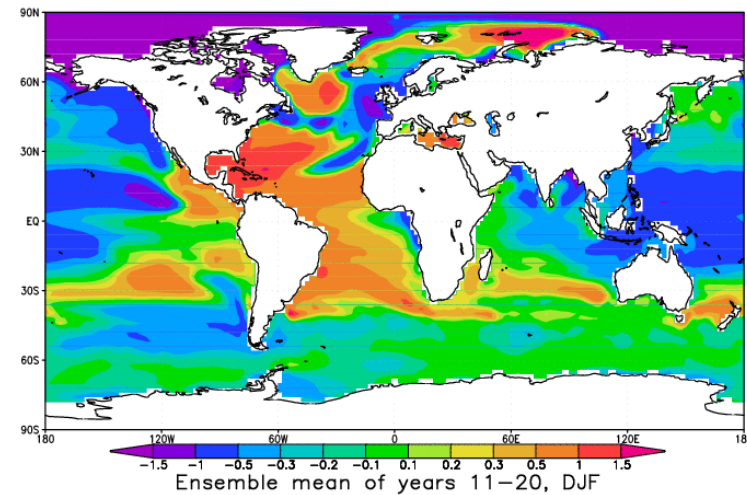
ECHAM5-FESOM SSS [psu]
Sudden reda minus preind



ECHAM5-FESOM SSS [psu]
Sudden 4co2 minus preind

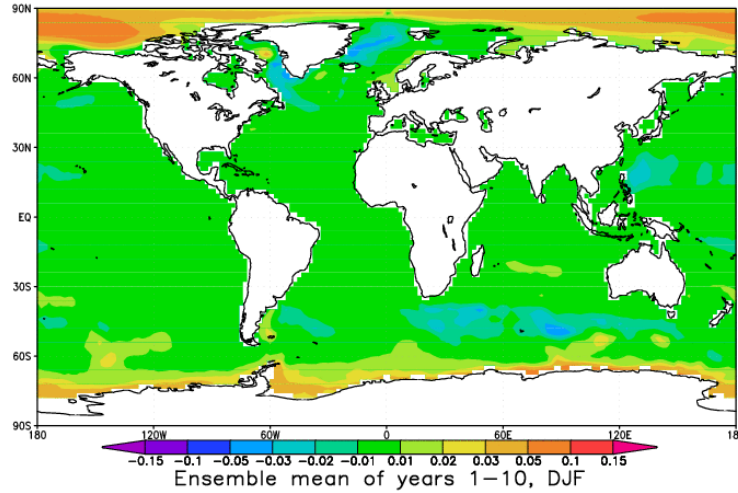


ECHAM5-FESOM SSS [psu]
Sudden 4co2 minus preind

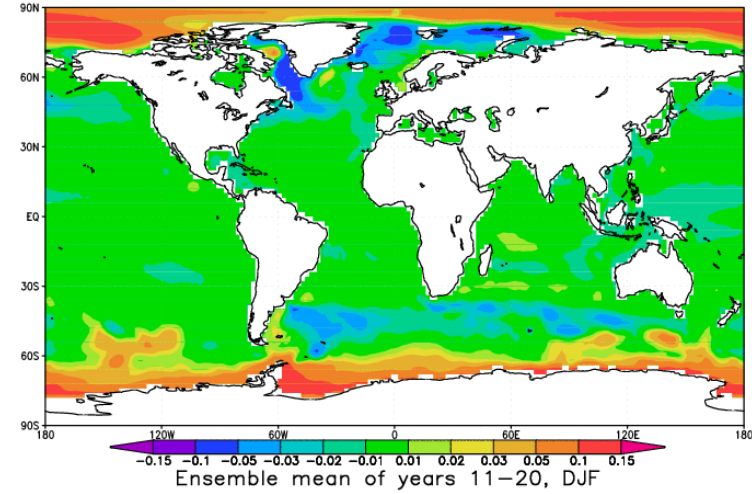


3. Ergebnisse

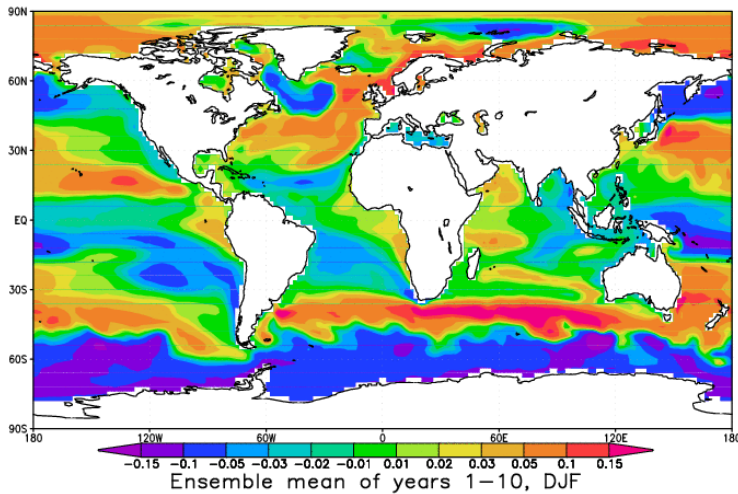
ECHAM5-FESOM SSH [m]
Sudden reda minus preind



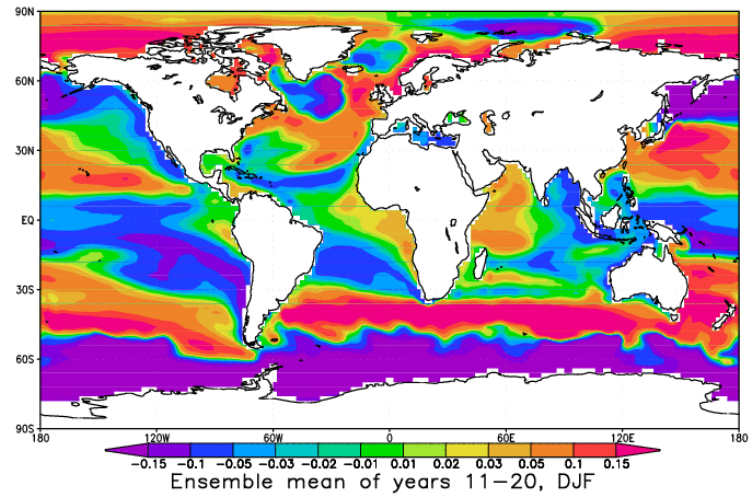
ECHAM5-FESOM SSH [m]
Sudden reda minus preind



ECHAM5-FESOM SSH [m]
Sudden 4co2 minus preind

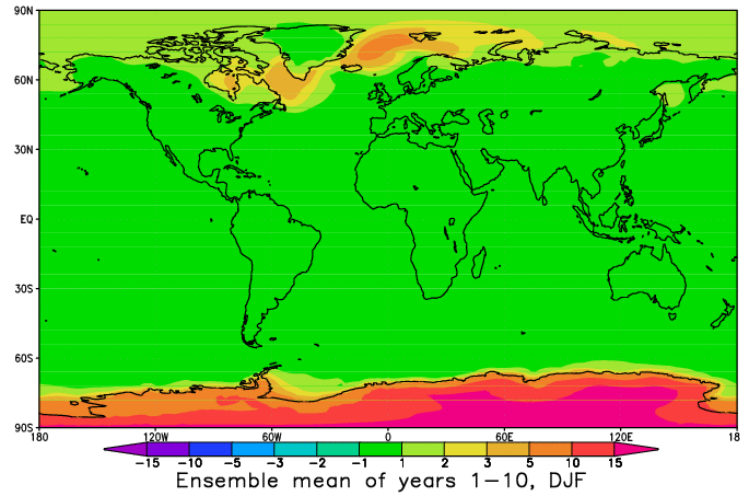


ECHAM5-FESOM SSH [m]
Sudden 4co2 minus preind

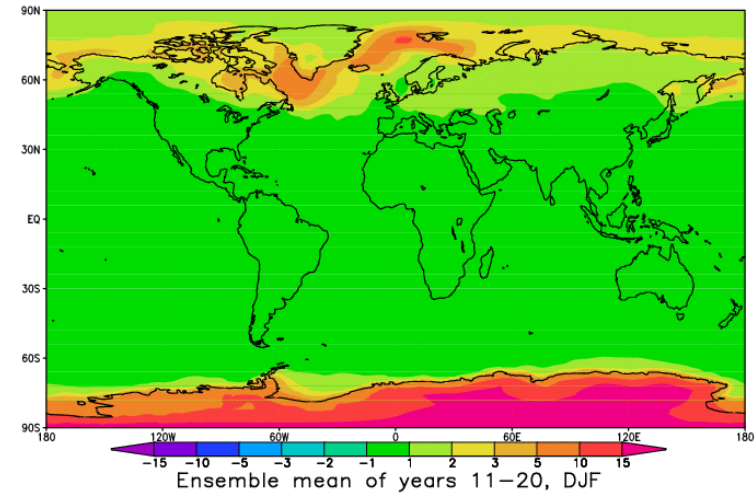


3. Ergebnisse

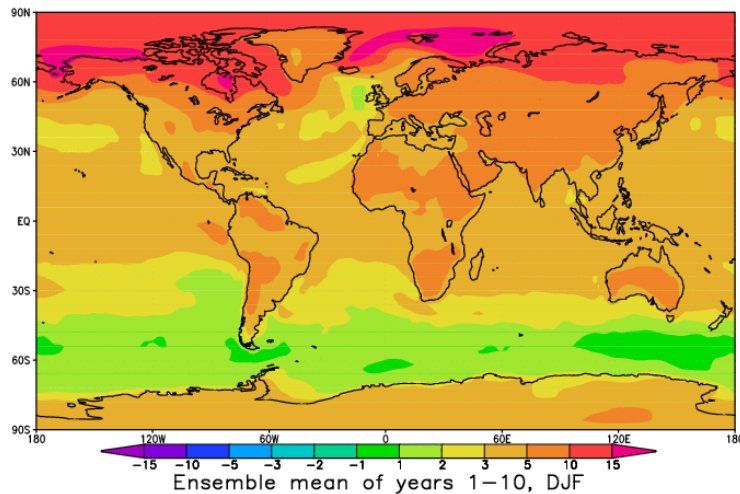
ECHAM5-FESOM 2 m temperature [C]
Sudden reda minus preind



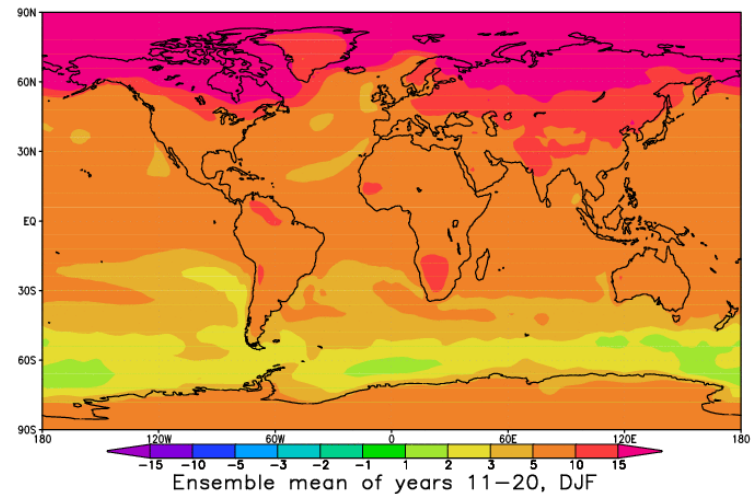
ECHAM5-FESOM 2 m temperature [C]
Sudden reda minus preind



ECHAM5-FESOM 2 m temperature [C]
Sudden 4co2 minus preind

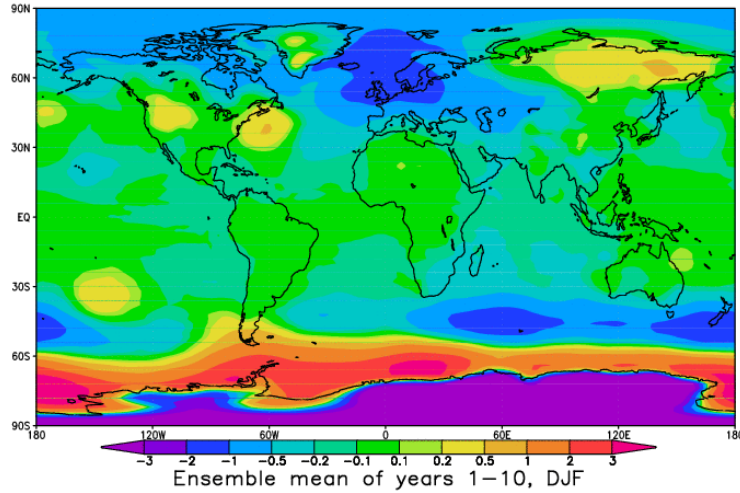


ECHAM5-FESOM 2 m temperature [C]
Sudden 4co2 minus preind

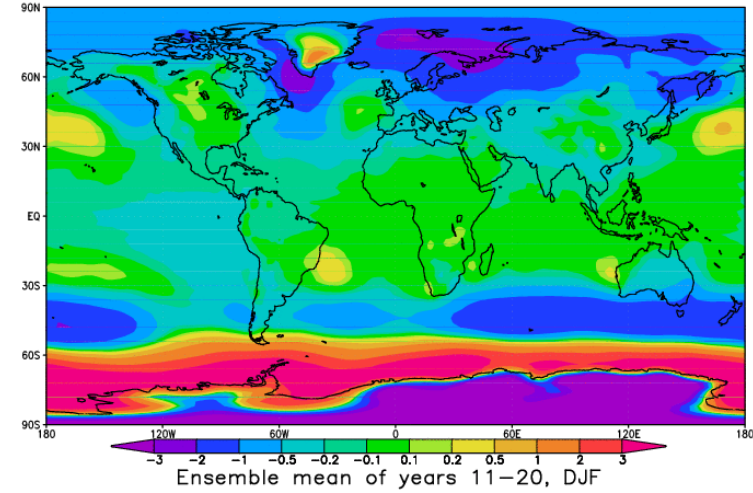


3. Ergebnisse

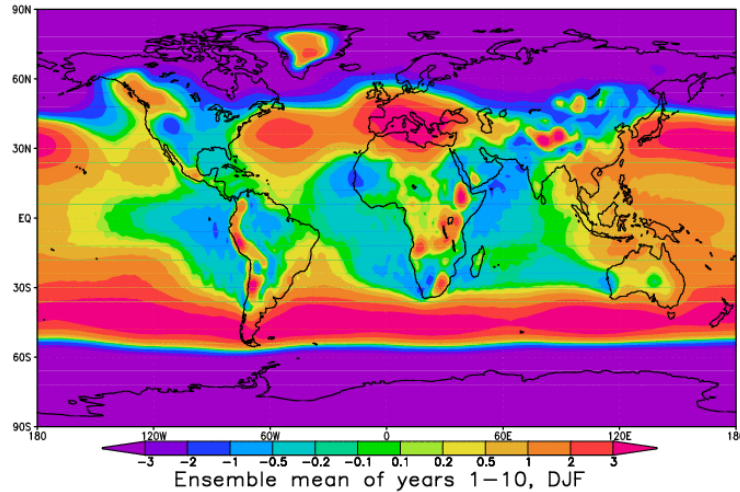
ECHAM5-FESOM mean sea level pressure [hPa]
Sudden reda minus preind



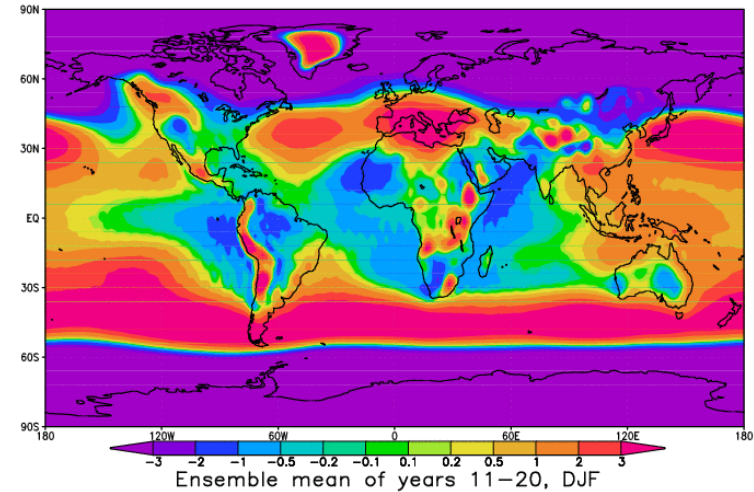
ECHAM5-FESOM mean sea level pressure [hPa]
Sudden reda minus preind



ECHAM5-FESOM mean sea level pressure [hPa]
Sudden 4co2 minus preind

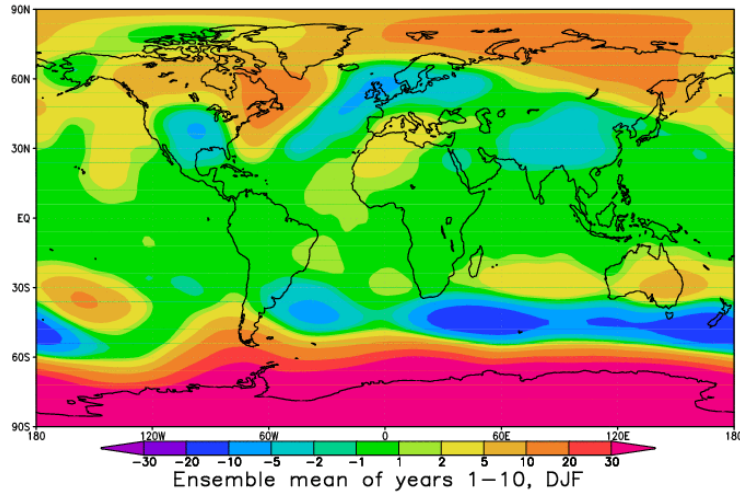


ECHAM5-FESOM mean sea level pressure [hPa]
Sudden 4co2 minus preind

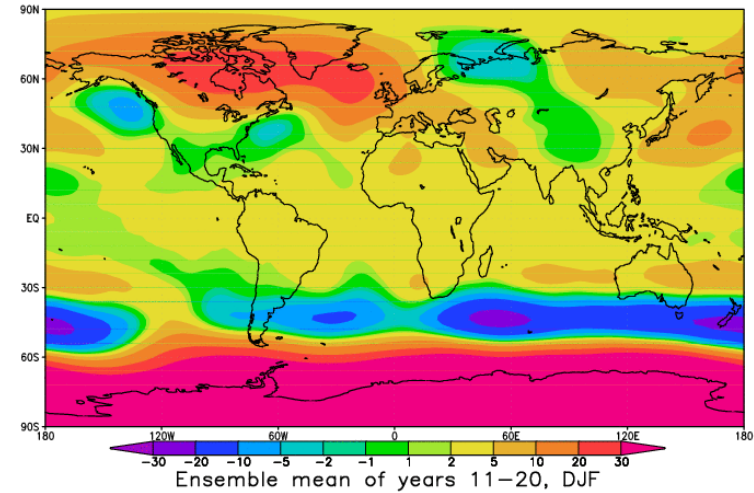


3. Ergebnisse

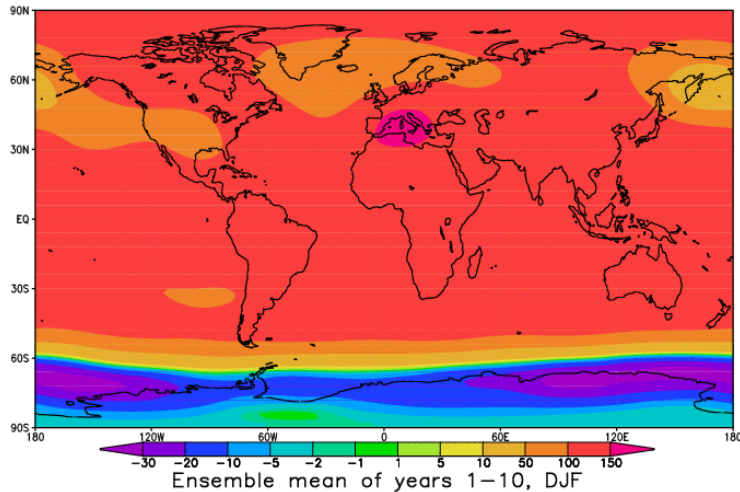
ECHAM5-FESOM 500 hPa Geopotential height [m]
Sudden reda minus preind



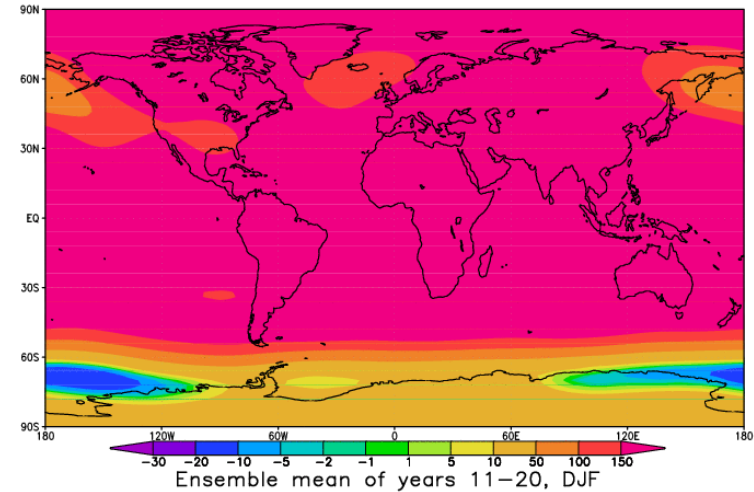
ECHAM5-FESOM 500 hPa Geopotential height [m]
Sudden reda minus preind



ECHAM5-FESOM 500 hPa Geopotential height [m]
Sudden 4co2 minus preind



ECHAM5-FESOM 500 hPa Geopotential height [m]
Sudden 4co2 minus preind



4. Zusammenfassung und Ausblick

- Neues, gekoppeltes globales Atmosphären-Ozean-Meereis-Modell ECHAM-FESOM
- Experimente zur plötzlichen Erhöhung der Treibhausgaskonzentrationen und zur plötzlichen Erniedrigung der Eisalbedo
- Trotz deutlicher Erhöhung des Frischwassereintrages über dem nördlichen Nordatlantik in allen 20-Jahres-Abzweigsimulationen nur in 4*CO₂-Experimenten deutlich schwächere meridionale Umwälzzirkulation
- In den Tropen und Subtropen kaum Änderung in den reduzierten Albedosimulationen, aber deutliche Änderung in den 4*CO₂-Simulationen in diesen Gebieten
- Abschwächung des Westwindes in den südlichen mittleren Breiten sowie des antarktischen Zirkumpolarstromes in reduzierten Albedo-Experimenten, Verstärkung in 4*CO₂-Experimenten
- Weitere Experimente geplant: Stärkere Erniedrigung der Albedo sowie Vervollständigung der 2*CO₂-Experimente