Module 2
Internal and externally forced climate variability

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Specific Objectives

Quantify present day and future atmospheric and oceanic poleward energy transports and the existence of a possible Bjerknes compensation mechanism

Quantification of how circulation variability related to internal climate variability will influence mid and high latitude precipitation.

Quantification of how changes in the hydrological cycle may feed back on extratropical cyclone intensification

WPs

WP2.1 - Quantify change in energy transport (Kvamstø). Estimate simulated response in atmospheric and oceanic energy transport to anthropogenic forcing across the AR5 ensemble. Anthropogenically induced changes in transport properties will be estimated based on control vs forced integrations.

Status: *Postdoc announced, starts Jan. 2012*

WPs

WP2.2–Mechanisms (Kvamstø, Czaja, Furevik).

Estimate the degree of atmosphere-ocean energy transport compensation in NH and NA .

Evaluate if the spread can be reconciled by simple considerations (the Bjerknes compensation hypothesis).

Testing the following hypotheses:

1) Models with low degree of compensation contain the largest sensitivity of dry static energy transport to anthropogenic forcing.
2) In models with significant ocean compensation, the main mechanism is a weakening of the AMOC.

Status: *Postdoc announced, starts Jan. 2012*

WPs

WP2.3 – Analysis of regional flow regimes (Seierstad, Kristiansen, Bentsen, Iversen).
Established flow indices and empirical orthogonal functions will be used to diagnose flow regimes in the NorESM control run.

These will be compared to similar analyses from re-analysed and hindcast data. Links to WP1.3.1 and WP4.3.

Status: *work on the way (Maria's talk later)*

WPs

WP2.4–Quantification of internal precipitation variability (Sorteberg, Seierstad).

The new multi-century control runs with constant external forcing performed within CMIP5 will be used to investigate the range of unforced variability in mid and high latitude precipitation.

Special emphasis placed on relationships to atmospheric circulation variability by calculation of extratropical cyclone tracks and links to moisture and heat transport (calculated in WP2.1).

Status: *not started*

WPs

WP2.5–Quantification of feedbacks from changes in moisture on cyclone intensification (Sorteberg).

Use reanalysis and CMIP5 simulations to perform cyclone tracking and diagnoses of the vorticity budget along the cyclone tracks to quantify the contribution from the different forcing terms to cyclone intensification.

Analyzing the different forcing terms will quantify how the different physical mechanisms that intensify the cyclones may change during climate change scenarios.

Status: *theoretical framework and code implementation finished, analysis of reanalysis on the way (Asgeir's talk later). Postdoc starts Feb. 2012*