Geophysical Research Abstracts
Vol. 16, EGU2014-6605, 2014
EGU General Assembly 2014

Weakening of AMOC is main driver for future West European summer circulation changes

Reindert Haarsma, Frank Selten, and Sybren Drijfhout
KNMI, Research, De Bilt, Netherlands (haarsma@knmi.nl)

The atmospheric summer circulation in CMIP5 models over Europe in response to greenhouse warming is characterized by an anticylcone whose center is located west of the United Kingdom (UK). Its main impact for Western Europe is reduced rainfall, increase of easterly winds, higher summer temperatures and more incoming solar radiaton. Although the anticyclone is prominent in the CMIP5 model mean there is large spread between the different models. We show that a weakening of the Atlantic meridional over turning circulation (AMOC) not only causes the model mean response, but it also explains most inter-model differences. As a result, the uncertainty in the projected decline of the AMOC is the main source of uncertainty in regional climate change for Western Europe. The weakening of the AMOC reduces the north ward heat transport in the North Atlantic and causes a reduced increase in sea surface temperatures in the subpolar gyre. The reduction in the net surface heat flux associated with this warming hole in the north Atlantic, causes a downstream anomalous high west of the UK. Sensitivity experiments with a climate model support this mechanism.