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WATER MASS TRANSFORMATION AND THE NORTH ATLANTIC CURRENT IN THREE MULTI-CENTURY CLIMATE MODEL SIMULATIONS

Subtropical Water carried by the North Atlantic Current undergoes substantial transformation on its way to higher latitudes. The geographical distribution of the surface-forced transformation is assessed in three different multi-century climate simulations and compared with observation-based estimates, with a particular focus on the eastern subpolar North Atlantic Ocean. The diagnosis estimates the transformation in water mass outcrop areas from heat and freshwater fluxes. The integrated heat flux in the eastern subpolar region has a larger contribution than the freshwater flux to the transformation in all three models. While the pattern of the Atlantic Meridional Overturning Circulation is similar in all models, the geographical distribution of the fluxes is very different. The different pathways of the North Atlantic Current, and upper ocean low salinity water, as well as sea ice cover have strong influence on water mass transformation. The water mass transformation in the eastern subpolar region shows pronounced variability on decadal time scale in all models, and is found to reflect the variability in the overturning circulation in two of the models with a time lag of 7-8 years.

Session #:032
Date: 2/21/2012
Time: 11:45
Location: Room 150

Presentation is given by student: No

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