

CMIP Sub-project: Arctic Ice Cover Simulation Experiment (AICSEX)

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Recent analysis of the ice cover in the Arctic Ocean has established that significant changes have occurred in the latter part of the last century (e.g., Bjørgo *et al.*, 1997 & Johannessen *et al.*, 1999). It is therefore of fundamental importance to assess the threat of an abrupt change of the Arctic Ocean ice cover in this century. This is the question which is being addressed in an EC-funded project with seven partners MPG-IMET (Germany), FIMR (Finland), UCL & SPRI (UK), CESBIO (France), and SNF & NERSC (Norway), coordinated by Prof. Ola M. Johannessen. Using the ECHAM4 (Max-Planck GCM), we have predicted that 80% of the ice cover will melt during the summer season at the end of this century.

The objectives for this project are: (i) to assess and compare the natural variability and trends, during the 20th century, for selected climate sensitive variables, (ii) to analyse both model control runs and different greenhouse/aerosol scenario simulations for the 21st century, (iii) to assess, by model simulations, the impact a melting ice cover in the Arctic Ocean will have on the carbon uptake and the ocean circulation at high latitudes, and (iv) to assess the economic impact a melting ice cover in the Arctic Ocean will have.

The scientific program consists of two major parts: (i) observations, and (ii) coupled climate model simulations and performance characteristics. We think that a comparison with the CMIP results will be useful, both with respect to the observations and model results.

The CMIP model output of interest for us, are:

I. CMIP1 atmosphere:

a. Seasonal means:

i. geographical distributions: ice/snow cover and temperature

ii. zonal mean cross-sections: temperature

b. Variability, geographical: time series of monthly mean surface air temperatures

c. Variability, cross sections: standard deviation of annual zonal mean temperature

II. CMIP1 ocean:

b. Seasonal:

i. zonal mean cross sections: temperature and salinity

ii. geographic distribution: SST and surface salinity

I. CMIP2 atmosphere:

a. Time averaged fields:

i. geographical distributions: snow cover

ii. zonal mean cross-sections: temperature

b. Time series of monthly means: temperature and precipitation

II. CMIP2 ocean:

- ii. 3-D global fields: temperature and salinity
- iv. sea ice thickness and concentration