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Influences of the sea ice concentration and sea surface temperature to the atmosphere

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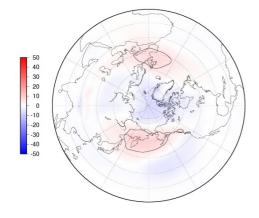
Since 1980s the sea ice extent in the Arctic Ocean has been decreasing. It is important for the climatology in the Arctic whether the sea ice exists or not. The purpose of this study is to investigate the differences of the influences to the atmosphere due to the different conditions in sea ice concentration and sea surface temperature with global atmospheric model NICAM (Nonhydrostatic ICosahedral Atmospheric Model).

Two experiments will be carried out. One is that the monthly climatology of the sea ice concentration and sea surface temperature is used as the boundary condition (normal year), and the other is that the monthly data of them in 2007 is used (less sea ice year). The time integration will be conducted for 50 years for each experiment. The sea ice concentration, sea ice mass and sea surface temperature are fixed within each month during the integration. The horizontal resolution is 112 km (glevel-6) and 40 points are taken for the vertical grid. The experiment is now in progress.

Surface air temperature over the Arctic Ocean on 2007 Experiment is much higher than that on climatological experiment especially in winter. The difference in horizontal distribution of the surface air temperature in summer season is very small compared to in winter season. The maximum difference locates where the sea ice does not exist on September but on January. The strong warming over the Arctic Ocean occurs, the difference is more than 10 degree Celsius. It is found that differences of the sea level pressure in September and January between 2007 experiment and climatological experiment shows positive AO (Arctic Oscillation) distribution, which indicates positive anomaly in mid-latitudes and negative anomaly in Arctic region.

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