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Theme -Theme 5: Arctic Observations in the context of Global Observing initiatives

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Poster title (brief) Changes of the sea ice area in the Arctic seas and their relation to surface air temperature in the Northern Hemisphere

Abstract - text box

The Arctic is the region showing the strongest warming trend on Earth in the last century. Sea ice is one of the most important parameters of the polar climate system. It is suggested that sea ice is an important factor influencing surface air temperatures in the Arctic and through to several feedback mechanisms those two parameters are strongly interconnected. To reveal and assess the strength and extent of these relationships we used observational monthly mean sea ice extent and land surface air temperature anomaly data from Met Office Hadley Centre. The relations between regional sea ice extent of different Arctic marginal seas and surface air temperatures over the northern continents were analyzed using correlation analysis.

Linear relationships between the monthly mean anomalies of the sea ice area in the Arctic seas and the surface air temperature over the land in the Northern Hemisphere in March and September are analyzed in order to identify regions with statistically significant correlations. In addition to a significant negative correlation with a surface temperature in the land regions adjacent to the corresponding seas, a number of remote teleconnections have been revealed. In particular, statistically significant relationships between the anomalies of the ice cover in the Laptev Sea in September and the anomalies of temperature in the Mediterranean region, between the ice cover of the Greenland Sea in March, and the anomalies of temperature in Central Asia were indicated. In most cases, such relationships can be explained by the influence of atmospheric circulation, including the North Atlantic Oscillation, the Arctic Oscillation, the Pacific Decadal Oscillation, variations in the intensity of the centers of action of the atmosphere. Furthermore, the seasonal cycle of the sea ice cover, its climatic trend, variability and autocorrelation of the Arctic seas were considered. The strongest shrinking of the Arctic sea ice cover is observed in the Barents Sea in winter, in the Kara, Laptev, and East Siberian seas in summer.