POSITIONS OF EXTREME ATMOSPHERIC PRESSURE AND THEIR LINK TO THE ARCTIC CLIMATE DURING THE PERIOD 1898-1999

V.K. Pavlov (1), T.B. Loyning (1)

(1) Norwegian Polar Institute, Tromso (terje.loyning@npolar.no/Fax: +47 77 75 05 01)

An analysis of a hundred-year record (1898-1999) of monthly mean sea level atmospheric pressure (SLP) on the northern hemisphere reveals new features of geographical distribution and variability. The results of this analysis show that the extreme low and high values of the monthly mean SLP on the northern hemisphere occurs in three narrow meridional bands, located in the Atlantic, the Pacific and over the Eurasian continent. We also find that the annually averaged extremes of SLP have been relocated in all three regions in the period between 1898-1999. The consequences of these relocations are that the distance between the latitudes of extreme low and extreme high values of SLP have decreased over the period in the Atlantic and Pacific regions, and became zero or close to zero in the 1990s. Over the Eurasian continent the difference was zero around 1920, and has become increasingly larger since then, with the extreme low values of the SLP at the northernmost positions. Based on these findings and the fact that low and high pressure systems are mesoscale features (vorticities) in the large scale atmospheric circulation on the northern hemisphere we have constructed one statistical index in each region, based on the difference in latitude between extreme high and low pressure systems. We find that 50-60% of the variations of northern hemisphere mean temperature, sea water level, and sea ice extent are explained by our indices than the NAO index for the winter months December to March. This means that the variations in climate parameters of the Arctic may be better explained by variations in location of the atmospheric pressure systems, than the difference between the SLP values at two fixed locations south of the Arctic region.