# Statistical Analysis of Interannual Arctic Sea Ice Modeling.

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The application of AGCM, ocean hydrothermodynamical model and sea ice evolution model to Arctic region is discussed.

The sea ice model is based on Semptner and Hibler model. Ice compactness, presence of thick and thin ice in a cell, snow mass in ice cell, specific ice melting and producing processes are taken into account. The purpose of the work is analysis of seasonal and annual evolution of sea ice, long-term variability of a model ice cover, and also its sensitivity to some model characteristics.

The numerous experiments according to influence of some model parameters on results are carried out. Ice and snow albedo and ocean heat flux in ice are most important in this connection.

Results of 70 years simulation of Arctic basin sea ice evolution are analyzed. The average ocean currents data are taken from observations. Ice thickness for a cell with coordinates 170W, 86N depending on time are submitted in Fig. 1. The separate points define daily average meanings. 365 days moving average is shown by a thick line. The significant (about 0.5 м) interannual fluctuations of an ice cover exist. The spectral analysis of results allows to make exacter conclusions about the ice cover change in time. Periodogram, determining amplitudes of spectral decomposition harmonics of ice thickness in the specified cell, is shown in a Fig. 2. The basic peak, naturally, corresponds to a one year (365 days) period. There are also rather appreciable fluctuations with a 5 years period and further continuous wide spectrum with periods more than 10 years. The Fig. 3 shows periodogram for the same variable, but when annual and seasonal components are excluded. The diagram shows, that there are only synoptical fluctuations with a 3 - 10 days period and of rather small amplitude. The auto correlation function with the excluded annual and seasonal components (Fig. 4) shows data dependence with 3 days time lag. The similar results are received for other points, and also for average ice thickness in Arctic Region. There are significant interannual fluctuations of sea ice cover with periods in 4 - 5 years.
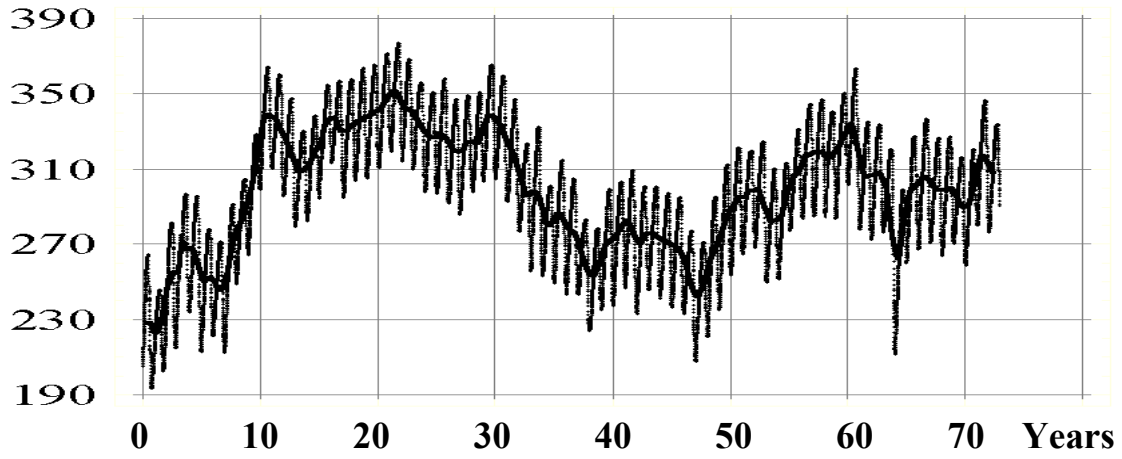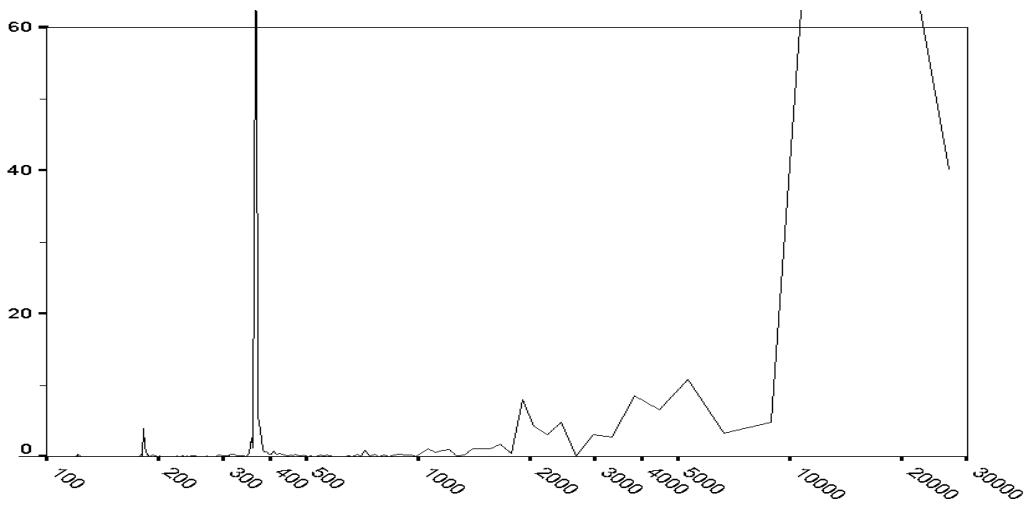
Fig. 1. Sea ice thickness (m).



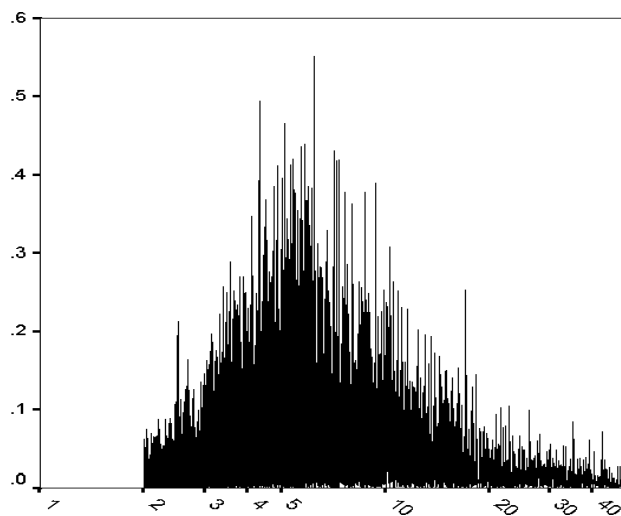Fig. 2. Periodogram for sea ice thickness. Period in days.



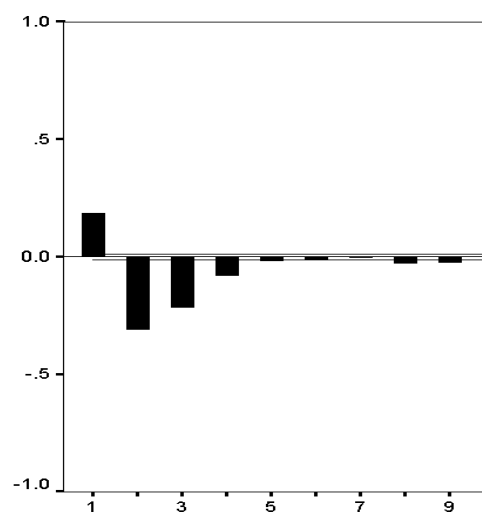Fig. 3. Periodogram for sea ice thickness.
Period in days. Excluded seasonal cycle.

Fig. 4. Autocorrelation.
Time lag – days.