Investigation of Arctic ice cover variance using XX-century historical ice charts information and last decades' microwave data

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Arctic ice cover along with the other natural phenomena simultaneously undergoes both short-term and long-term decadal and centennial variability, assessments of its scale and spectrum being dependant on the data involved into the statistical analysis. A significant and vast collection of mostly airborne expert-controlled ice charts from international ice services (Canada, USA and Russia) for second half of the XX century, prepared in digital formats under the WMO auspices (within the "Global Digital Sea Ice Data Bank" project), provides an opportunity to construct blended (multi-agency) datasets. Blending technique provides incorporation of the "best guess" information from each agency into the final dataset and in many cases makes it possible to eliminate numerous temporal and spatial gaps in individual datasets. That subsequently provides opportunity to describe Arctic ice cover as a two-dimensional stochastic process, assess corresponding statistics and to introduce various time scale (monthly, annual, decadal) WMO sea ice norms for 1950-2000.

The same analysis but for a shorter period of the last two and a half decades (1978-2003) may be done on a basis of modern daily SSMR/SSMI ice extent dataset, statistically independent from the first one. Given dataset is constantly expanding and presently is the prime source of search for a signal of modern climate change in sea ice. Investigation of the Arctic ice extent variances assessed separately on a basis of ice charts and Bootstrap version of SSMR/SSMI ice extent dataset reveals congruency in most cases. However as usually the case for statistical analysis, a number of differences was also observed for areas with predominance of certain structural elements of ice cover, such as fast ice and flaw polynyas of Siberian shelf seas. It is evident that such statistical cross-investigation would reduce uncertainties in dealing with DMSP SSMI data in seasonal cycle and improve quality of sea ice data for numerical modeling.