

Climate Variability in the Region of Future Tiksi Hydrometeorological Observatory from a New Digital Archive of Meteorological Data - Sakha Republic, Russia

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Roshydromet and NOAA have developed a formal collaborative project entitled “Establishing a Modern Weather Station and Research Observatory in Tiksi, Russia”. This joint project exists under the framework of the NOAA-Roshydromet Memorandum of Understanding for Cooperation in the Areas of Meteorology, Hydrology and Oceanography. A significant contribution to this project has been a Roshydromet project to create an electronic archive of standard meteorological observations from 1932 to 2007 from the original, non-digital records. Presented here are preliminary results of statistics calculated for air surface temperature, surface pressure, wind velocity, and cloudiness. The preliminary analysis indicates that the distribution of probabilities for all months is single modal, and seasonal variability is captured in the evaluations of not only mean values, but also in dispersions and extremes. Quantile analysis allows the specification of synoptic influences on the distribution characteristics and the variability of climatic characteristics in the area under study. It is shown for instance, that asymmetry in air temperature distribution in summer is determined substantially by large positive temperature anomalies. The analysis of wind velocity has shown anisotropy of the distribution by wind direction with strongest winds from the South-West. Strongest winds (up to 35 m/s) as well as the highest frequency of calm conditions are observed in winter. Both winter and summer seasons have small positive trends in surface air temperature, and winter has a pronounced increase in maximum and decrease in minimum surface air temperatures. One of the most interesting features is the strong decrease (from nine to six tenths) of total cloudiness and an increase of specific humidity in summer. The new Tiksi data has also been used to specify the dates of fast ice formation (in fall) and breakup (in spring) in the AARI thermodynamic sea ice model. This in combination with local climatic information regarding temporal variability of snow thickness on sea ice in has resulted in significant improvements in the ability of the model to adequately reproduce the time evolution of fast ice thickness. This new digital archive of meteorological data for Tiksi will provide a historical foundation for analysis of measurements in the new Tiksi Observatory. In addition, it will be an important resource in determining an operations plan for new monitoring efforts at the new Tiksi Hydrometeorological observatory as it evolves into a climate observatory to support circum-Arctic observations.

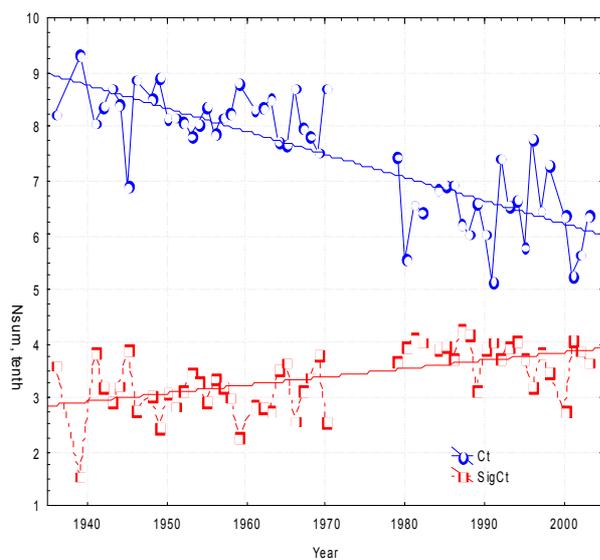


Figure 1. Total Cloudiness in summer.

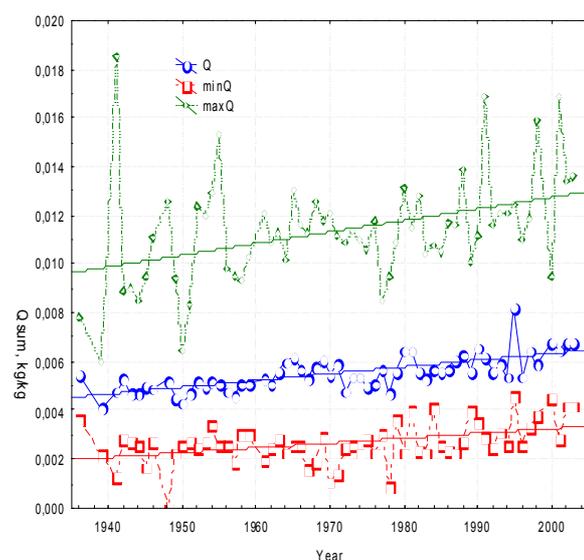


Figure 2. Specific Humidity in summer.