VALIDATION OF ATI SAR OCEAN AND SEA ICE SURFACE VELOCITY DERIVED FROM TANDEM-X AND COASTAL RADAR DATA, NEAR BARROW, ALASKA

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Considerable changes of sea ice cover that have occurred in the new millennium, inspired scientists to invent new algorithms for classification of ice formations and analysis of sea ice drift. The reliable measurement of sea ice drift became possible in the late 1970s in consequence of satellite appearance and since that moment scientists have been inventing higher-end technologies and methods to measure sea ice characteristics.

Interferometry SAR method which was used in this work differs from other methods of sea ice drift calculation and fast ice detection. In addition, up until this work, this method has been used for other purposes, including topographic measurements and calculation of ocean currents. But in our work, it was used to measure the velocity and direction of sea ice drift and the separation of fast ice from drift ice zones. Applications of InSAR techniques for the drift ice are possible only in a single-pass mode because of temporal decorrelation. An important factor of the InSAR method is that the interferometric phase difference, which is readily provided in the data as an interferogram, is linearly related to the radial velocity. However, this method can not be called accurate in terms of sea ice velocity calculation, because the interferometric phase difference contains several types of information, such as topographic, motion of surface and noise, which could produce some errors in the interferogram. On the other hand, if to compare the InSAR method with other automatic methods of sea ice drift calculation, it can be said that the main difference and at the same time the primary advantage is that a pair of images is obtained almost simultaneously (less than a second), this in turn allows to conduct the operational sea ice monitoring. The results demonstrate the possibility of fast ice detection, which would be incredibly useful for the scientific and commercial purposes.

For the data analysis in this work, several datasets from different satellite systems and coastal radar were used. The main satellite images were obtained from the TanDEM-X mission, which provides high resolution images. For this study was selected the test site area near Barrow, Alaska, which is the northernmost point of the United States of America. This work will show how suitable this method is in comparison with other automatic methods of fast ice detection and sea ice drift calculation.