

ERS SAR retrieval of ice cover parameters for some oil and gas fields at the Russian Arctic shelf

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Abstract

The paper describes the results on the thematic decoding of ERS-1/2 SAR images, to provide satellite monitoring of ice cover parameters in five selected regions of Kara and Pechora Seas, and two separate regions of Ob and Taz Guba. The usefulness of satellite radar derived sea ice information is demonstrated in order to improve the hydro-meteorological support of oil and gas operations on the Arctic shelf. The studies were accomplished under a commercial contract between "Eko-Systema Ltd Co", Moscow, Russia and NERSC/NIERSC.

In the frame of this work the radar signatures of sea ice, and also fresh and brackish water ice were studied. The knowledge of the ice regime of the shallow waters of Kara and Pechora Seas are at present limited. Use of the NERSC1993-96 ERS-1/2 SAR data permits us to describe the ice features and the ice behaviour near areas of oil and gas fields at the Russian Arctic shelf.

Low and full resolution SAR images were used for the study of the following pack ice and fast ice parameters: ice development and arrangement, ice concentration (including ice edge), hummocking and grounded hummocks, fractures and polynyas, features of ice massifs and ice breccia displacement. Ice melting processes of sea ice and river ice and dangerous ice phenomena are also studied.

Ice maps on base of ERS-1/2 SAR images will be presented according to international sea ice classification nomenclature. Such maps can be used for the evaluation of ice cover influence on the engineering construction and for the selection of optimal location and position for oil and gas platforms, tanker terminals and pipelines on the Arctic shelf.

Keywords: sea ice, monitoring, microwave sensors, oil exploration, shelf area