

DYNAMICS PROCESS OF SEA ICE IN ANTARCTICA EAST COAST-A CASE STUDY USING SPACEBORNE SAR TERRASAR-X

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THEME: MARI- Marine and coastal environment, resources and dynamics & POLA-Polar and Cold Regions;

KEY WORDS: Synthetic Aperture Radar, X-band, sea ice, classification, dynamics process

ABSTRACT:

In the beginning of January, 2014, the Chinese icebreaker XueLong was stopped by thick ice on its passage to rescue the trapped Russian vessel Akademik Shokalskiy in the Antarctica east coast, between the Commonwealth Bay and the Mertz Glacier. During the event, the X-band spaceborne Synthetic Aperture Radar (SAR) TerraSAR-X (TS-X) data were acquired continuously to monitor the sea ice state to help the both vessels. Our emphasis of the case study is not on how the vessels got out of the danger, whereas we would like to investigate how and why the sea ice breaks in the region, i.e., the dynamic process of the sea ice during the event, through the analysis of the TS-X data, the sea ice classification results, and the reanalysis modeling results. In the paper, we present six scenes of TS-X ScanSAR and the new operational mode Wide ScanSAR, which provide abundant content of sea ice state. Both the ScanSAR and Wide ScanSAR images in HH polarization are used for classifying the sea ice in the region, which tells how the different sea ices vary and finally break during the event. The further analysis of surface wind and sea current model data partially explain why the sea ice could break under such weather situations. It is hoped that the case study would contribute to better and deeper understanding of the sea ice dynamics in regional and local scale.

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