Comparison L-band ALOS-2/PALSAR signature with Helicopter-borne measurements of sea ice condition at Lützow-Holm Bay, Antarctica

Shungo Yaguchi[1], Yuto Takahashi[1],Shuichi Fushimi[1], Hajime Yamaguchi[1] and Shuki Ushio[2]

[1]*Graduate School of Frontier Sciences, The University of Tokyo*

[2]*National Institute of Polar Research*

Sea ice thickness distribution is one of the important factors to understand the impacts on the climate and environment, and for safe ship navigation. The estimation technique of the sea ice thickness is developed by using satellite. Spaceborne synthetic aperture radars (SAR) provide earth surface information at high spatial resolution. Therefore, they can detect dynamic properties of sea ice, such as pressure ridges. The usefulness of L-band SAR on discriminating ridges from undeformed ice and measuring sea ice thickness is confirmed in the Arctic Ocean and the Sea of Okhotsk.[1][2] But there are few studies at Lützow-Holm Bay, which is mainly covered with landfast ice.

Helicopter-borne electromagnetic induction (EMbird) measures snow-plus-sea ice thickness using electromagnetic sensor and a laser profiler. The footprint of EM sensors has a radius of about 40-50m when the EMbird is at an altitude of 15m to 20m. Thus the pressure ridge distribution and lateral extent can be determined by EMbird. And a laser profiler can provide information about sea surface roughness. In 59th Japan Antarctic Research Expedition (JARE59), we have observed sea ice thickness at LHB widely with the EMbird(Fig.1). In this study, we attempt to verify the usefulness of L-band data to detect the deformed ice in LHB, comparing sea ice condition from EMbird (Fig.2(a)) with backscatter coefficient from ALOS-2/ PALSAR (L-band) (Fig.2(b)).

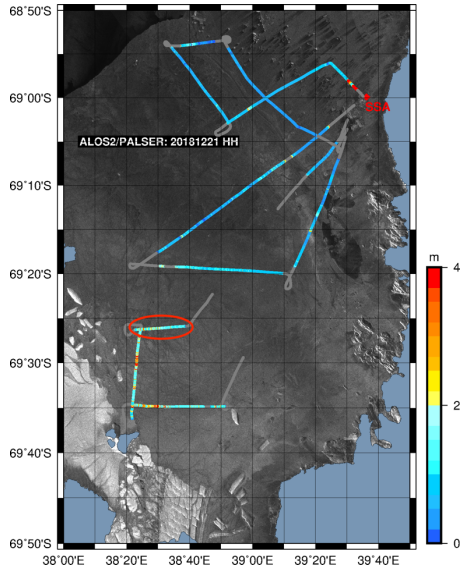

Figure 1Sea ice thickness observations with EMbird

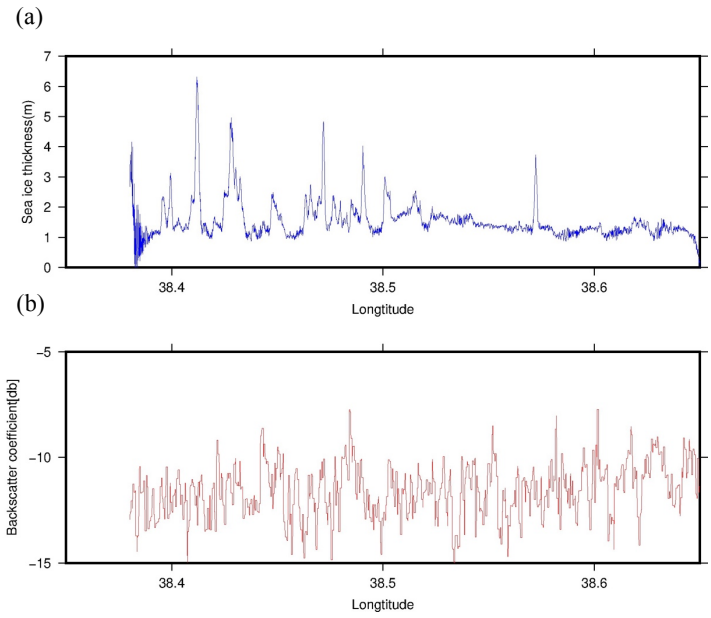

Figure 2 (a)Sea ice thickness profile at line surrounded by a red circle (b)backscatter coefficient along the line.

References

[1] W. Dierking and T. Busche, Sea ice monitoring by L-band SAR: an assessment based on literature and comparisons of JERS-1 and ERS-1 imagery, IEEE Transactions on Geoscience and Remote Sensing, Vol. 44, No. 2, 957-970, 2006

[2] Toyota, T, Ono, S Cho, K and Ohshima, KI(2011) Retrieval of sea-ice thickness distribution in the sea of Okhotsk from ALOS/PALSER backscatter data. Ann. Glacio., 52(57),177-184