

Validation of geophysical model function to retrieve oceanwinds using airborne synthetic aperture radar

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The National Institute of Information and Communications Technology (NICT) has been developing airborne synthetic aperture radars (SARs) in X-band. The first generation system Pi-SAR was operated between 1997 and 2007, and the second generation system Pi-SAR2 has been operated since 2008. Both systems can make polarimetric and interferometric SAR observation, simultaneously. Moreover, Pi-SAR was operated with L-band SAR system developed by JAXA.

The value of sigma zero measured by SAR depends on the wind speed, the relative wind direction and the incidence angle. The relation is described by geophysical model function (GMF). Because much number of pairs of sigma zero measured by SAR and oceanwinds information is needed to determine the GMF, usually the pair of satellite SAR measurement and oceanwinds information measured/estimated by other methods (ex: scatterometers, numerical models).

The airborne SAR is able to measure sigma zero in the same ocean area with many illumination angles in short time enough to assume as under same wind conditions. Moreover, the airborne SAR can measure sigma zero in wide range of incidence angle due to its limited altitude. As a result, the dependency of sigma zero measured by SAR on relative wind direction and incidence angle can be analyzed directly by using airborne SAR. In this paper, the calculated sigma zero using the GMF for X-band SAR (XMOD2) is compared with the measured sigma zero by airborne SAR.

Keywords: oceanwinds, synthetic aperture radar, geophysical model function