

Study of high-definition SAR imaging product(InSAR /CCD) using Ku-band Airborne SAR

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To obtain detailed terrain/target information for disaster monitoring in all-weather all-day condition, high resolution SAR system is very essential. We have developed a very high resolution SAR system with a resolution of 10cm. In this presentation, we show results of two different SAR high-level signal processing; SAR interferometry and airborne Coherent Change Detection (CCD).

First part of this presentation is a field test experiment of a highly accurate Digital Surface Model (DSM).The SAR sensor system, with a spatial resolution of 30 cm, is carried on an airborne platform which has 2 antennas placed in a baseline length of 1 m. We have established a novel DSM reconstruction processing technique, called ICM-MCF phase-unwrapping algorithm, and applied it to the observation data. The SAR-DSM was evaluated by comparing with laser profiler data. For 50 cm × 50 cm mesh, an accuracy of better than 50 cm in height was confirmed.

In the second part of this presentation is a result of CCD experiments. Coherent change detection (CCD) technique is a very important technique to extract the very slight change using radar phase information. Since a sensitivity of the target change depends on wavelength of radar system, higher frequency Synthetic Aperture Radar (SAR) is useful to detect a very slight change. On the other hand, detection of very slight change such as car track and collapse of resident area by using airborne high resolution SAR platform is very challenging due to very accurate flight pass control between before and after the change observation. We have hence developed a Ku-band airborne SAR system, with a spatial resolution of 10cm, and have developed high accuracy navigation system and installed them on the airborne platform. We have conducted the experiments for 2 days and obtained 14 pass SAR images in total. We have obtained with an average coherence of 0.6-0.9 in all images. As a result, a very slight change such as car track and trace of human activity can be detected.