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Inventory and Monitoring of Waste Disposal by ALOS and Quickbird Imagery

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Waste management is one of the expected applications for satellite imagery. Probability of waste monitoring on land area for currently-operated earth observation satellites are investigated in this study. ALOS (Advanced Land Observing Satellite) and Quickbird data are examined, respectively. Japanese ALOS has two optical imagers, PRISM and AVNIR-2, and an L-band Synthetic Aperture (PALSAR). Quickbird is a commercial high resolution satellite which is able to observe sub-meter resolution imagery.

Availability for detecting of surface change on legal or illegal waste disposal site using ALOS imageries is examined. Nominal ground resolution of PRISM (Panchromatic Remote-sensing Instrument for Stereo Mapping) imagery is 2.5 m. AVNIR-2 (Advanced Visible and Near Infrared Radiometer type 2) has 10 m spatial resolution in nadir viewing. Targets are waste disposal sites in Miyagi prefecture, Japan. A landfill block (ca. 30 x 100 m) can be recognized and temporal changes of a disposal site clearly appear on PRISM imagery. Pan-sharpen image by PRISM and AVNIR-2 is useful for image interpretation. Overlay of road vector data is helpful for interpretation of PALSAR (Phased Array L-band Synthetic Aperture Radar) intensity imagery. It has the potential to detect obvious change by movement of large block that causes double-bounce scattering.

Quickbird is a high resolution satellite of which nominal ground resolution is 0.6 m for panchromatic imagery and it is 2.4 m for multispectral imagery. Its possibility to recognize several size of rubbish is examined. A scrap yard of which size is approximately 6 x 4 m clearly appears on the pan-sharpen imagery obtained on June 2003. The same place is recognized by the image obtained on September 2006 and it had expanded to ca. 10 x 4 m. A target in the vegetation is recognizable, but almost same size target in the bare soil is difficult to find.

Spatial resolution improvement, decrease of observation intervals, and reducing the price of data are prospected for practical use of satellite imagery to waste monitoring.

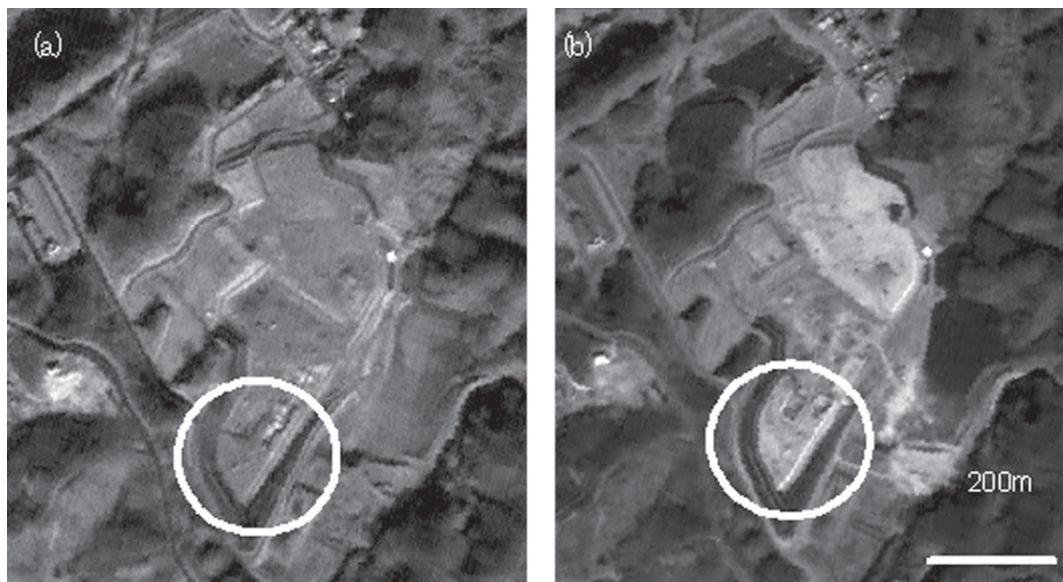


Fig.1. ALOS PRISM imagery for Ishidumori waste disposal facility in Miyagi prefecture acquired on (a) 28 December 2006 and (b) 1 March 2007. White circles show the area where temporal change is recognized.