Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SSS025-08 Room: 301A Time: May 25 14:00-14:15

Detection of Land Surface Deformations Related to Wenchuan Earthquake Using Microwave Radiometer

Takashi Maeda[1*], Tadashi Takano[2]

[1]JAXA, EORC, [2]Nihon University

Interferograms formed by the data of a satellite-borne synthetic aperture radar enables us to detect faint land-surface deformations in connection with volcanic eruptions or earthquakes. However, since the time lag between two scenes of a synthetic aperture radar used to form interferograms becomes longer than the recurrent period of a satellite aboard it, it is not clear enough when land-surface deformations occur in volcanic eruptions or earthquakes.
In order to redeem the disadvantage of an interferogram by SAR data, we have investigated another approach to detect land-surface deformations with higher time resolution from the data of satellite-borne sensors. It was recently confirmed that microwave energy is emitted when rocks are fractured in laboratory experiments. Land-surface deformations are likely to be accompanied by rock failures. Therefore, if rocks are crushed by land-surface deformations, microwave energy generated by rock failures is likely to be detected by a satellite-borne microwave radiometer. Based on this concept, we analyzed the data of the Advanced Microwave Scanning Radiometer for Earth-Observation System (AMSR-E) aboard the Aqua satellite and developed an algorithm to evaluate microwave energy generated by rock failures on the land surface.
For Wenchuan Earthquake that occurred on May 12, 2008, land surface deformations around the epicenter were detected by the Phased-Array L-band Synthetic-Aperture Radar (PALSAR) aboard the ALOS satellite. Therefore, we applied our algorithm to the area where these land surface deformations were detected. As a result, it was confirmed that strongest microwave signals in the entire observation period of six years (from 2002 to 2008) were emitted from the land surface along the Longmenshan Fault Zone one day after the main shock. This paper presents the detail of our algorithm and the analysis results for Wenchuan Earthquake. Additionally, this paper presents the analysis results for other recent earthquakes as well.

Keywords: Microwave radiometer, Remote sensing, Data processing, Earthquake detection, Natural disaster monitoring