InSAR 解析によるトゥングラワ火山噴火に伴う地殻変動

The Ground Deformation associated with the Eruption of Tungurahua Volcano, Ecuador detected by InSAR analysis

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Mt. Tungurahua is one of the most active volcanoes in South America Ecuador. There has been big and small eruptions recorded since 7750 B.C. and it has had at least 13 eruptions since 1700 A.C. The volcanic activity that began on October 1999 is still going on (Global Volcanism Program). The volcanic activity that became more active again from December 2007 reached the peak during the 7th-11th of February, 2008. On the 7th of February, ash plumes rose to altitudes of 7-10 km (23,000-32,800 ft) a.s.l. The pyroclastic flows and incandescent materials were propelled from the summit and fell on the flanks at about the 3.5 km elevation, below the crater. According to news articles, many residents were evacuated (Smithsonian weekly reports). After that, the eruption activity became settled, but there has been an upswing in its activities since April 2009.

ALOS (Daichi), launched in February 2006, has L-band SAR (PALSAR) and the sensor has many advantages for analyzing the crustal deformation around volcano areas using InSAR. In this study, we analyzed PALSAR data from before and after the eruption on February 2008. We were able to get a good interference result between Dec. 26, 2007 and Mar. 27, 2008 for the ascending orbit (Fig.1), and about 12cm deformation on the western side of the summit was clearly detected. This deformation rose toward the satellite in the radar line-of-sight direction. In addition, according to the 2.5-dimensional analysis (Fujiwara et. al, 2000) using both ascending (Fig.1) and descending (between Dec. 10, 2007 and Mar. 11, 2008) orbits, this ground deformation was found to have shifted west, but mostly at a quasi-upward direction (Fig.2).

In general, when volcanoes erupt, an uplift of the ground deformation is observed just before eruption. On the other hand, it subsides after the eruption. In this case, however, it is interesting because the ground deformation uplifted before and after the eruption. Accordingly, this deformation may have been caused by the lava flow which occurred on Feb. 7, 2008.

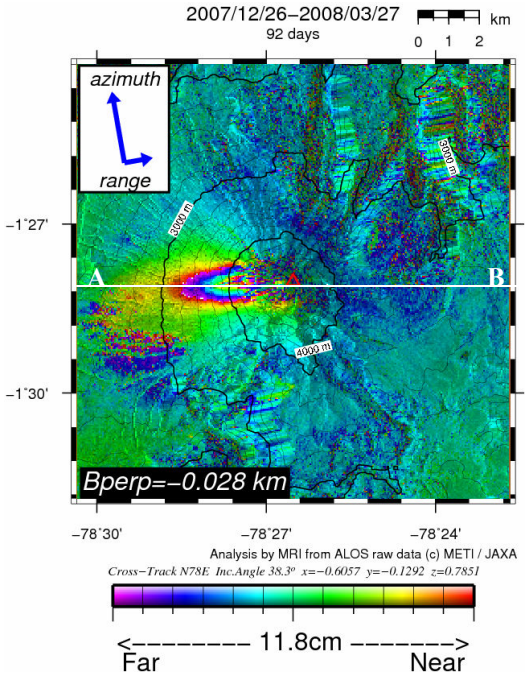

Fig.1 Interferogram in Mt. Thungurahua generated from ascending ALOS/PALSAR data.

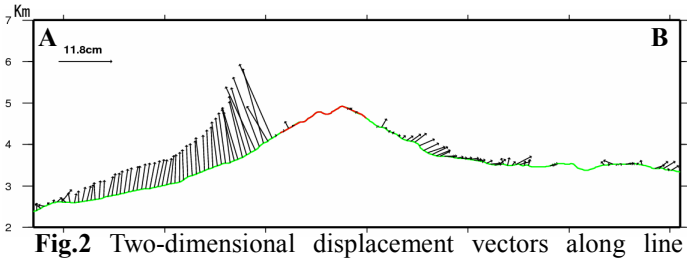

Fig.2 Two-dimensional displacement vectors along line shown in Fig.1. Red line is part of bad coherence. The use data are the ascending (2007.12.26-2008.3.27) and the descending (2007.12.10-2008.3.11) orbits.

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