



SAKURAJIMA VOLCANO ERUPTION DETECTED GEOMAGNETIC VARIATION ANALYSIS

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Geomagnetic field has been researched by geophysical scientist that related to earthquakes by means of precursors (Hayakawa et al., 1996, 2000, 2007; Hattori et al., 2002; Kawate et al., 1998). Geomagnetic analysis has recently been studied in order to find out the phenomena of nature based on data of Cheongyang geomagnetic observation (Oh, 2012; Ji et al., 2012). Several results of geomagnetic variation have the possibility not only earthquake event but also volcanic activities (Johnston et al., 1981; Zlotnicki and Bof, 1998; Utada et al., 2000; Del Negro et al., 2004). This research is a case to analysis geomagnetic variation related with eruption of Sakurajima volcano in Japan erupted on a relatively large-scale, on Aug 18, 2013. The geomagnetic variation has been analyzed using geomagnetic data from Cheongyang observatory in Korea and several geomagnetic observatories in Japan (Figure 1).

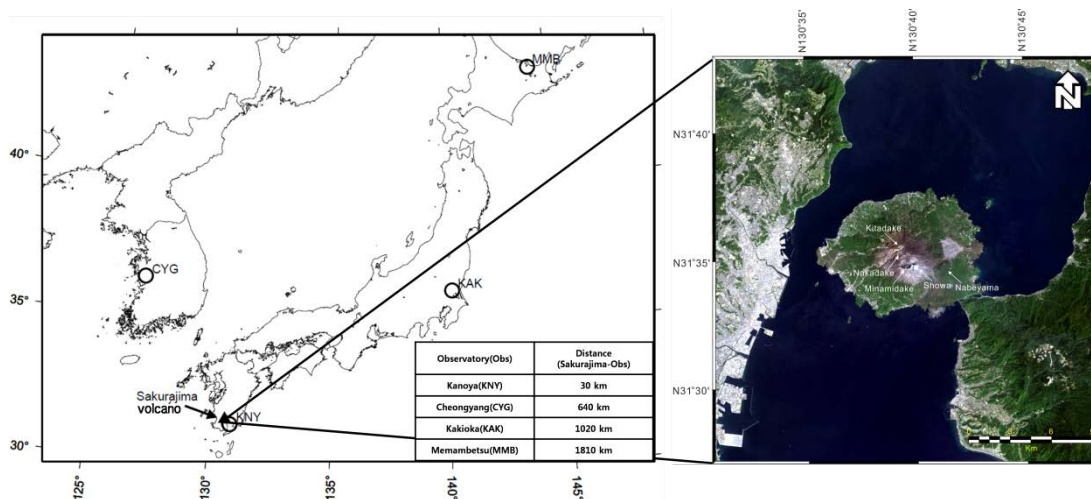


Figure 1. The satellite image and location map of Sakurajima volcano and geomagnetic observatories.

First, we reconstructed data by generating from geomagnetic data by principal component analysis and conducted semblance analysis by wavelet transform (Figure 2). Figure 2(e) shows event related to volcanic activity around volcano eruption.

Secondly, we carried out eigenvalue analysis what known to association for geomagnetic third components and minimized the error of solar effect by using wavelet based semblance filtering with Kp index (Figure 3). Figure 3(c) also shows event after volcano eruption what related to volcano activity estimated

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As a result of this study, we could confirm that the geomagnetic variation usually occurred at the moment of Sakurajima volcano eruption. However, we cannot rule out the possibilities that it could have been impacted by other factors besides volcanic eruption in other variation's cases.

This research is an exceptional study to analyze geomagnetic variation related with abroad volcanic eruption uncommonly in Korea. Moreover, we expect that it can help to develop further study of geomagnetic variation involved in earthquake and volcanic eruption.

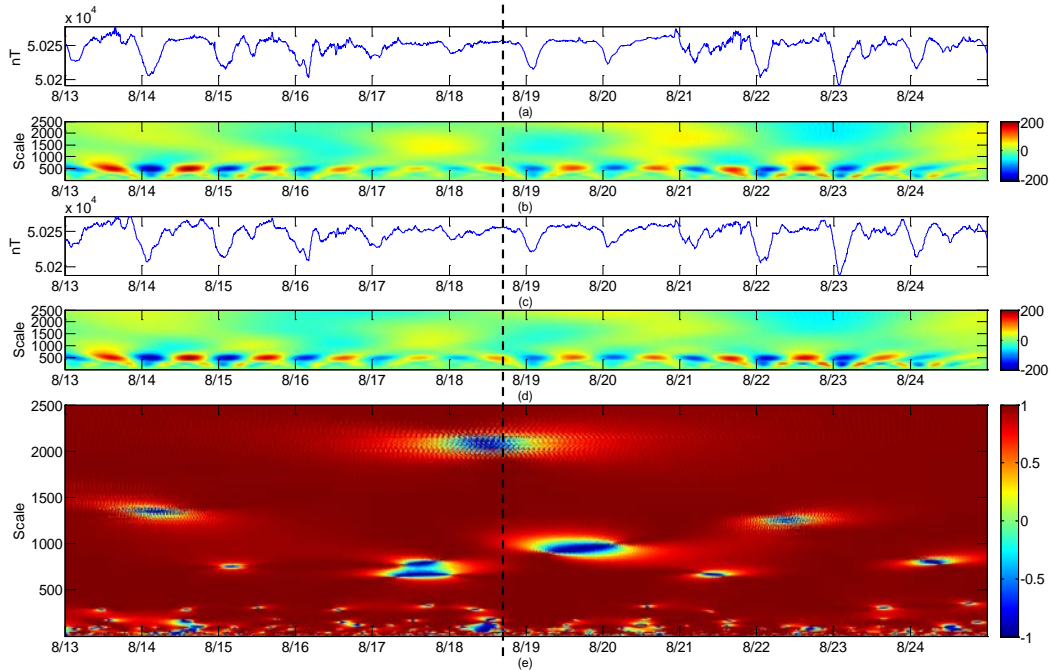


Figure 2. Result of wavelet based semblance using Cheongyang geomagnetic observatory data. (a) observed geomagnetic data. (b) real part of continuous wavelet transform in (a). (c) reconstructed data from principal component analysis. (d) real part of continuous wavelet transform in (c). (e) analysis of semblance between (b) and (d). The dotted line indicates the event time of Sakurajima volcano eruption.

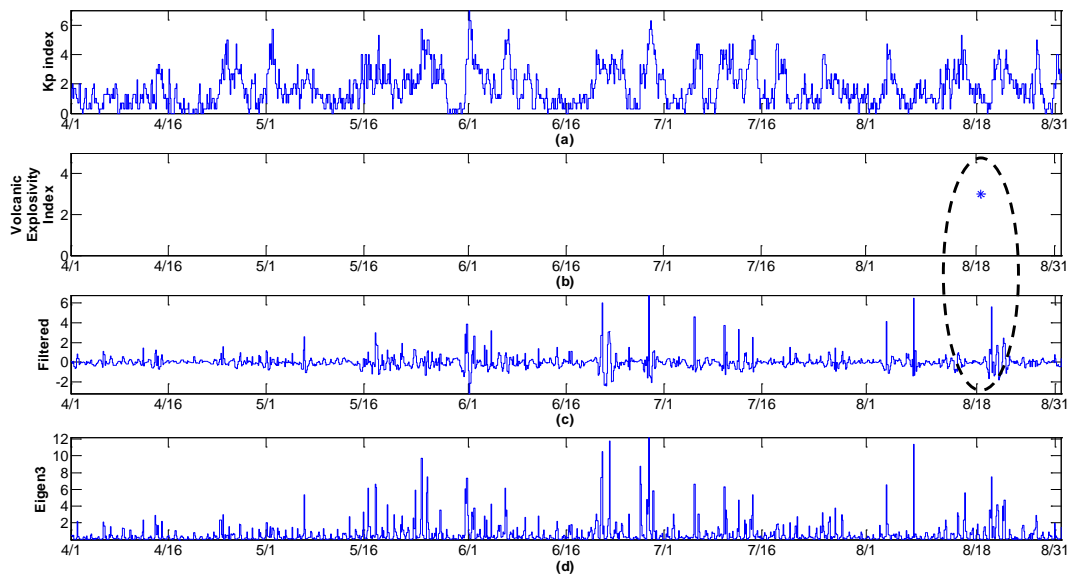


Figure 3. Result of wavelet based semblance filtering between Kp index and eigenvalues of third components from cheongyang geomagnetic observatory data, Apr 1 ~ Aug 31, 2013. (a) Kp index. (b) Volcanic event. (c) third components of eigenvalue after filtering. (d) third components of eigenvalue.