



Investigation of early warning method for volcanic activity by microwave radiometer data through case study of Chaiten volcano

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We have investigated an analysis method to detect local and faint changes from the data of microwave radiometer. Our investigation stemmed from laboratory experiments which confirmed that rocks emit microwave energy when fractured. This analysis method was originally developed to detect microwave signals generated by rock failures in association with an earthquake. Using our analysis method, we have already detected characteristic microwave signals emitted from the land surface in association with some large earthquakes. We believe that these detection cases strongly indicate that our analysis method has the capability to detect local and faint microwave signals emitted from the land surface.

We expect that our analysis method can detect volcanic thermal anomalies as well because thermal anomalies on volcanoes should be reflected in microwave signals. Additionally, considering the advantage that microwave radiometer is less affected by clouds, anomalies of land surface temperatures (LST) around a volcano before eruption is likely to be detected. Therefore, we modified our analysis method for volcanic surveillance, and applied it to a volcanic eruption case of Chaiten volcano in the south of Chile.

As a result, it was detected that microwave energy was emitted from the ground surface around the volcano from several months before the eruption. We consider that these microwave signals was caused by the increase of LST due to the volcanic activity. This paper presents the details of the analysis method and results.