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Detection of the earthquake-origin microwave emission in the passive sensor data of a remotesensing satellite

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Nowadays various approaches are suggested in order to monitor natural disasters by an observation data of remote sensing satellites. Additionally, microwave emission on the occasion of rock failures has been confirmed in the laboratory environment for the first time in the world. This result indicates the possibility that microwaves are emitted in connection with rock failures on the occasion of earthquakes and that such microwaves are detected by a satellite in orbit.

Based on this background, we aim to detect some signature associated with earthquakes and volcanic eruptions from the brightness temperature data obtained by the microwave radiometer, AMSR-E loaded on the satellite Aqua.

Generally, a satellite-borne microwave radiometer can observe the Earth's surface with the less influence of climate conditions than an infrared or visible light sensor, but the resolution of a microwave radiometer becomes larger. In order to extract local variations from such observation data, we developed the new data restructuring algorithm first. This is a kind of linear interpolation algorithm and is optimized for the observation data of satellite-borne sensors. This algorithm enables us to obtain a distribution of brightness temperatures at any interval regardless of the sampling interval of AMSR-E.

However, though an observation by a microwave radiometer is insusceptible to climate conditions, some amount of influence of absorption and scattering of the atmosphere is included in a brightness temperature. Therefore, in order to extract faint variations caused only by the specific factor, it is effective to focus on a differential brightness

temperature between neighboring two points. Our data restructuring algorithm enables us to set the distance of two points arbitrarily. Then, we defined a value to evaluate differential brightness temperatures of vertical and horizontal polarized wave at the same point and in the same frequency, and compared these values among different observations.

As a result, we have successfully extracted features associated with an earthquake. This feature cannot be extracted from a brightness temperature directly. This paper demonstrates this data processing method through the analysis result of an earthquake.