

Measurement Plan of Microwave Emission Due to Rock Crash in Volcanic Eruptions

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Microwave emission phenomena due to rock crash were experimentally found for the first time in the world. This fact suggests the microwave emission in association with earthquakes or volcanic eruptions. Based on the experimental results, the remote sensing data by AMSR-E radiometer aboard AQUA satellite were analyzed. Accordingly, microwave due to earthquake was probably detected.

On the other hand, as a reference problem, we are pursuing the research to measure the non-thermal microwave emission due to volcanic eruption. In this case, effects by soil moisture and climate can be eliminated, as is different from the case of remote sensing data. The ground truth data can be stored to correctly evaluate satellite data. Also, the results may contribute to establish the monitoring technology of volcanic eruptions.

In this paper, the ratio of the non-thermal microwave power from an eruption to the thermal noise power from the receiver, namely S/N , will be given on the basis of microwave power obtained in rock crash experiments. The value is determined by the parameters such as the scale of broken rock, the distance to an emission location and receiver characteristics. Next, the whole measurement system is explained including microwave receivers, data loggers, data transmission links, and a power system. Durability against weather and wind is important. Receiving frequencies should be carefully selected to avoid interference. Lastly, observation site candidates are presented. Active volcanoes are often lacking in commercial power and suffer from poor communication circumstances. The way to solve these difficulties is described.