



Consideration on the Mechanism of Microwave Emission Due to Rock Fracture

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Microwave emission due to rock fracture was found at 300 MHz, 2 GHz, and 22 GHz, and its power was calibrated in laboratory for the first time in the world. The observed waveform is impulsive, and contains correspondent frequency component inside the envelope at each frequency band. At such high frequencies, the electro-magnetic signal power can be calibrated as a radiating wave with high accuracy. Accordingly, it was verified that a substantial power is emitted. The microwave emission phenomena were also observed on occasions of hypervelocity impact, and esteemed as phenomena generally associated with material destruction.

Earthquakes and volcanic activities are association with rock fractures so that the microwave is expected to be emitted. Actually, the e emission was confirmed by the data analysis of the brightness temperature obtained by a remote sensing satellite, which flew over great earthquakes of Wuenchan and Sumatra, and great volcanic eruptions of Reventador and Chanten.

It is important to show the microwave emission during rock fracture in natural phenomena. Therefore, the field test to detect the microwave due to the collapse of a crater cliff was planned and persecuted at the volcano of Miyake-jima about 100 km south of Tokyo. Volcanic activity may be more convenient than an earthquake because of the known location and time. As a result, they observed the microwave emission which was strongly correlated with the cliff collapses.

Despite of the above-mentioned phenomenological fruits, the reason of the microwave emission is not fixed yet. We have investigated the mechanism of the emission in consideration of the obtained data in rock fracture experiments so far and the study results on material destruction by hypervelocity impact. This paper presents the proposal of the hypothesis and resultant discussions.

The microwave sensors may be useful to monitor natural hazards such as an earthquake or a volcanic eruption, because the microwave due to rock fracture can penetrate the ionosphere and can be received by a satellite in orbit. However, the relation between a rock fracture and quakes has not been clarified at all, and is left to the future research.

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