Feature extraction of earthquake-associated microwaves from a satellite-borne radiometer's data

Takashi Maeda[1]; Tadashi Takano[2]

[1] EORC, JAXA; [2] ISAS, JAXA

http://www.radionet.isas.jaxa.jp/

Microwaves at 300MHz, 2GHz and 22GHz emitted on the occasion of rock failures were confirmed for the first time in the world. This result suggests similar microwaves are emitted in natural phenomena with rock failures such as earthquakes. Therefore, we have analyzed the data of the microwave radiometer AMSR-E loaded on the remote sensing satellite Aqua and addressed the feature extraction of microwaves associated with earthquakes from this data.

AMSR-E is a multi-frequency (6.9, 10.65, 18.7, 23.8, 36.5 and 89 GHz), dual-polarized microwave radiometer that detects faint microwave emissions from the earth's surface and atmosphere. According to Planck's law, the brightness temperature Tb [K] of an object is given by Tb = e T, where the emissivity of the object is e and the physical temperature is T [K].

On the other hand, the power received in the main lobe of a radiometer P [W] is converted into the antenna temperature Ta [K] as Ta = P / k B, where k is Boltzman constant and B is the band width of the radiometer. Ta is just Tb in the main lobe and Tb is affected by various factors (e.g. emission of the earth's surface and emission, absorption and scattering of the atmosphere). In other words, microwaves emitted from the earth's surface surge by various natural phenomena by the time they reach AMSR-E. However, if we can identify this surge between the neighboring two points, it is guessed differential brightness temperature between them represents differential emission from the earth's surface. Based on this concept, we have developed the interpolation method of brightness temperature data. By applying this method, we can obtain difference brightness temperature at any interval, regardless of the sampling interval of the radiometer itself.

As a result, we can successfully extract features of microwaves associated with earthquakes occurred in Morocco and other places. In this paper, we describe these analysis results.