

Mechanism of generating electric fields just before earthquakes

TAKAHASHI, Kozo^{1*}

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1. Precursory seismic electric fields

We consider that precursory seismic electric fields are generated by the mechanism as follows:(Refer to attached Figure):

- (1) Before earthquakes, micro-cracks run in the source regions (Assumption), and into these cracks pore water pours.
- (2) Uranium compounds, radium compounds and radon, which exist in crystal boundaries, dissolve into the pore water.
- (3) The cracks connect the pore water and spring water, and the radio active materials appear on the surface of source regions.
- (4) The radio active materials ionize the lower atmosphere above the source regions, and the electric conductivity increases there locally and temporarily.
- (5) The ionization increases the current along the trace of cosmic shower between the surface and the ionosphere.
- (6) As the current is pulsating, it radiates wide band radio-waves, which are observed as precursory seismic waves.

For the above mechanism the precursory micro-cracks are indispensable.

2. Mechanism generating the current between the surface and the ionosphere

The top of thunderclouds has the voltage up to about 100MV, so the electrons and negative ions flow into the clouds from the ionosphere. As a result, the ionosphere has a few MV. The mechanism, which increases the voltage at the cloud top, will be as follows:

(I) At middle latitudes, in the cloud lower than -10 deg. waterdrops become crystals, and they collide with each other. Then the water film on the smaller crystal, which is negatively charged, moves to the larger crystal, and makes the smaller crystal charged positive. The smaller crystals blow up to the cloud top and make it high voltage.(1)

(II) At low latitude, in the cloud no crystal will exist, but electric fields of about 1 kv/m exist, as other areas. So, waterdrops are polarized such as the top is negative and bottom is positive. When they collide, the negative part of smaller waterdrops, which have higher speed than the larger ones, neutralizes the positive charge of the larger waterdrops, and the smaller ones become positively charged and blow up to the cloud top, resulting the high voltage.

In the smoke billowing from volcanos, the lightning is observed. The tephra collide with each, other, and are charged by frictional electricity. By the same reason shown in (II), the charge is polarized and high voltage in the upper part of the cloud is generated. If this high voltage is observed, the explanation mentioned above will be considered to be valid.

References

- (1) Kozo Takahashi: Mechanism of generating electromagnetic fields just before great earthquakes, Japan Geoscience Union Meeting 2011, S-SS024-13
- (2) Kozo Takahashi: Mechanism of Generating The Earthquake Cloud just before Shallow Great Earthquakes, Japan Geoscience Union Meeting 2010, S-SS012-08

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