

SSS024-13

Room:301A

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Mechanism of generating electromagnetic fields just before great earthquakes

Kozo Takahashi^{1*}

¹None

Background: The potential of the ionosphere is about a few MV, and from the ionosphere to the ground about 1.4 kA current is flowing. This positive current is compensated by the negative current generated by thunderclouds. As Figure shows, where solid lines show air flow and broken lines show loci of ice crystals and hails, in normal thunderclouds hails are negative and crystals are positive, where -10 degrees or lower. On the other hand where -10 deg. or higher, hails are positive and crystals are negative. The reason is explained as follows:

The melting temperature of solid matter is lower on the surface than the inside, and at -10 deg. the surface of crystals is liquid. The inside of crystals there are free electrons and positive holes, and the electrons can move to the surface water, but the holes can't, so the water is negative, and the solid part of crystals is positive.

In thunderclouds crystals collide with each other. Where lower than -10 deg., the collision approximates to elastic one. Then the positive water on the smaller crystals moves to the larger crystals, the smaller crystals become positive and are blown up by an ascending air current. At the cloud top of about 10 km high, the voltage becomes up to about 30 MV. As the electric conductivity between the cloud top and the ionosphere is relatively larger than that between the cloud bottom and the ground surface, and as the potential at the cloud top is much higher than at the ionosphere, so electrons and negative ions flow from the ionosphere into the cloud top, and the flow keeps the ionosphere charged at a few MV. Where higher than -10 deg., crystals are soft and will crush or to pieces when they collide.

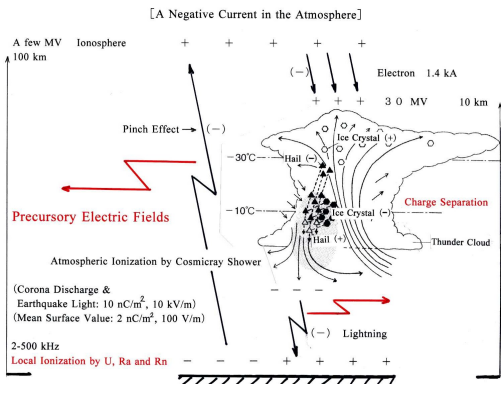
Mechanism generating precursory electric fields: The trace of lightning is zigzag, because the discharge flows along the trace of cosmic ray showers. The current between the surface and ionosphere also flows along the trace of cosmic ray showers, but it is usually invisible, as the resistance in the low atmosphere is large.

About one week before S Hyogo Pref. Eq. (1995/01/17 M: 7.2), the column of cloud like a small tornado was observed, which extended vertically from the source region up in the sky, though strong wind was blowing then. At the same time, the density increase of radioactive Radon (Rn) was observed in the spring water and low atmosphere on the source region. This increase makes the conductivity higher locally and tentatively in the low atmosphere, and makes the current increase between the atmosphere and ionosphere, and the current density increases by Pinch Effect. This current must generate the tornado-like cloud, which is similar to the cloud in Wilson cloud chamber.

The current between the surface and ionosphere, mentioned above, is pulsating current, as the trace of cosmic shower changes rapidly in time and space, so the current radiates wide band radio-waves, which must be observed as precursory seismic electric fields.

Rn and Radium (Ra) are generated by decay of Uranium (U), and U exists in crystal boundary. If micro-cracks run in the source, U, Rn and Ra dissolve into pore water, and the pore water mixes in spring water. So, the micro-cracks generate the free electrons, ions, charged aerosols above the source regions, which are accompanied by many precursors, such as precursory fields.

Reference: Clouds being accompanied by thunder & Clouds being not accompanied by thunder (in Japanese), Tsutomu Takahashi, Kagaku, Sep. 2010, Vol. 80 No. 9, pp. 916-917



Keywords: earthquake prediction, precursory seismic electromagnetic fields