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Seismic cloud of past and present

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Seismic Cloud of Past and Present

[Introduction] Recent observation from the space shows that the prediction from the cloud has been expected to have the success rate of 100%. About one week before S Hyogo Pref. Eq. (1995/01/17 M:7.2), the column of cloud like a small tornado, shown by the attached photo, was observed, and the cloud make us possible to predict the earthquake, because the cloud does not drift but remains at the same point, though the other clouds are drifting with wind. But even though the success rate is high, the alarm rate is low, because the seismic cloud is generated only when the atmosphere is saturated by water vapor, and even if the cloud is generated, it is observed only when it is neither raining nor cloudy.

[Mechanism of generating seismic cloud] Water drops in cumulonimbus change into ice crystals in the area of -10 degs. The melting temperature of the solid is lower on the surface than the inside, and at -10 deg. the crystals are covered with water film. 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 negatively charged, and the solid part of crystals is positively charged. In the clouds crystals collide with each other. Where lower than -10 deg., the collision approximates to elastic one, and the change of speed of smaller crystals is more significant than that of bigger ones. Then the negative surface water on the smaller crystals moves to the bigger ones, and smaller ones become smaller and positive. On the other hand, the bigger crystals become negative, bigger, and drop down on the ground.

The positive smaller crystals 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 conductivity between the cloud top and the ionosphere is not small, 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 ionosphere gets a few MV. This negative current generated by cumulonimbus is compensated by the current between the ionosphere and the ground, which is about 1.8 kA.

The current between the ionosphere and the ground flows, like lightning, along the trace of cosmic ray showers, which is usually invisible, as the registance in the lower atmosphere is high.

When the seismic cloud was observed before the Eq., the density of Radon (Rn) increased in the spring water and low atmosphere on the source region. This increase makes the conductivity higher locally and tentatively there, and the current increases between the ionosphere and ground. The current density becomes high enough by Pinch Effect to generate the tornado-like cloud, which is similar to the cloud in Wilson cloud chamber. This current is pulsating current, as the cosmic shower changes rapidly in time and space, so the current radiates wide band radio-waves, which are observed as precursory seismic electric fields.

Rn and Radium (Ra) are generated by decay of Uranium (U), and U exists not in the crystal but in the boundary. If micro-cracks run in the source, U, Rn and Ra dissolve into pore water, which mixes in spring water. So, the micro-cracks are essential for the short-term prediction.

[End Remark] Like the seismic cloud, some macroscopic anomalies may become new tools for highly reliable prediction. The observing electric fields, for example, may become to predict the place and magnitude when the source regions are located, much more precisely and reliably than the observing crustal movement which are currently adopted now.

[Reference] Japan Geoscience Union Meeting 2010 S-SS012-08 Mechanism of Generating the Earthquake Cloud just before Shallow Great Earthquakes, Kozo Takahashi

Keywords: seismic cloud, earthquake prediction, short-term prediction, precursory electric fields, locating source regions

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