

Mechanism of generating electric fields just before shallow great earthquakes

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[1] None

<http://www.jpгу.org/meeting/>

[Introduction] Since more than fifty years ago, radio noise has been observed before great earthquakes. Though the mechanism was not clear, the following precursors of S Hyogo Pref. Eq. (1995/01/17 M: 7.2) qualitatively shows a mechanism. About one week before the Eq., the column of cloud, which looked like a small tornado, was observed that extended vertically from the source region up in the sky, though strong wind was blowing then. This phenomenon shows that the cloud must be generated by the current between the surface and ionosphere along the track of cosmic ray showers, like the cloud in Wilson cloud chamber does. This phenomenon happened, because the electric conductivity on the source became locally tentatively high, as the density of Radium (Ra) and Radon (Rn) increased in the spring water and surface air on the source region just before the Eq., which was also observed just at the same time when the cloud was observed.

Ra and Rn are generated by decay of Uranium (U), and U exists in crystal boundary. If micro-cracks run in the source, U, Ra and Rn dissolve into pore water, and the pore water mixes in spring water. So the micro-cracks induce the current.

[Background] As the figure shows, water drops in cumulonimbus change into ice crystals in the area of -10 degs, but the surface of crystals remains water then. There are positive holes and free electrons in the crystal, and positive holes do not move into the surface water, but free electrons move into the water. As a result, the surface water becomes charged negatively and the crystal positively. The crystals collide with each other, then the negative water on the smaller crystals moves to the larger crystals. As a result, smaller crystals become positive, smaller and smaller, and are blown up by an ascending air current. The potential becomes up to about 30 MV at the cloud top of about 10 km high. The conductivity between the cloud top and the ionosphere is relatively high, so electrons and negative ions flow from the ionosphere into the cloud top, and the ionosphere becomes positive. On the other hand, the larger crystals become negative, larger and larger, and drop down on the surface. Electrons and negative ions on the surface flow into the ionosphere along the trace of cosmic ray showers, and the potential of the ionosphere balances with about 1 MV.

[Precursory Electric Fields] Usually the current between the surface and the ionosphere is weak and invisible, because the conductivity in the lower atmosphere is relatively low. As a result, the fields induced by the current are not detectable. But when the density of Ra and Rn locally tentatively increases on the surface, the conductivity increases there then, the current increases, and the current density becomes high enough by Pinch Effect for the electromagnetic fields to be observable. The fields are generated at wide bands by the discharge between the surface and the ionosphere, because there are many passes between them, and the radiated waves are pulses.

The anomalous electric fields associated with earthquakes are also observed by DEMETER (Detection of Electro-Magnetic Emissions Transmitted from Earthquake Region: <http://smc.cnes.fr/DEMETER/index.htm>) micro-satellite, which was launched on 29/06/04.

[Other Precursors]

Pinch Effect on the discharge currents in the ionosphere and atmosphere makes ion density locally high, and causes anomalous propagation.

The increase of surface conductivity and the fields accompanying surface current caused by the discharge induce the change of earth potential.

The discharge current short-circuits the surface and the ionosphere, and generates on the surface locally and temporarily high electric fields, which make animals behave anomalously.

Joule heat by the surface current caused by the discharge induces the locally and temporarily high surface temperature.

A Negative Current in the Atmosphere

