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On the generation of electric fields and infrared radiation in aerosol clouds due to radon emanation in the atmosphere before earthquakes

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In the present work, the model of the generation of splashes of local non-stationary electric fields of the Frenkel type of $3 \cdot 10^2$ - 10^4 V/m and of infrared (IR) radiation with characteristic time scales of 1-90 min., proposed by the authors some years ago, is further developed. Such phenomena were indeed obtained in the atmosphere some days before strong earthquakes. The model suggests the existence of aerosols, an increase of the ionization velocity by radon emanation, and upstreaming flows of air. Additional ionization processes, which are connected with the radon emanation, are assumed to be local and of mosaic structure. Mosaic-like occurring and disappearing splashes of local electric fields cause the generation of corresponding splashes of non-equilibrium IR radiation (0.7–20 μm), in particular of the 10.5 μm line of CO_2, and of splashes of the magnetic field. Although anomalies of equilibrium IR radiation had repeatedly been observed by satellites above fault regions at night before earthquakes, splashes of non-equilibrium night-time IR radiation with the mentioned specific spectrum seem not to be investgated up to now. It might happen that the recombination of charged particles proceeds more slowly than usual, e.g. if a region of increased ionization is surrounded by aerosol layers with lower electrical conductivity. In such cases the relaxation time of the plasma may increase by one order, and charged clouds may indeed exist for some hours. So it is also possible, that a positively charged “upper” cloud of

small aerosols which is horizontally transferred by the wind, moves very slowly downward and becomes neutral. At the same time, the “lower” part of the cloud, which is negatively charged, moves downward quicker and becomes newtralized by the Earth’s surface. So a positively charged cloud occurring above the Earth’s surface for some time may considerably modify the near-Earth electric field during a time interval of the order of the local Maxwellian relaxation time. This allows to explain observations of anomalous electric fields of opposite polarity. Structures of aerosol clouds are of great variety and lead to strong gradients of Frenkel electric fields. Regions of the atmosphere with infrared flashes are observed where local maxima of the intensity of the electric field exist.