Testing of electrical methods of exposure on warm cloud to induce precipitations

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We implemented optical technique for testing of full-size pyrotechnical rocket generators of aerosols utilized currently both for the protecting of agricultural crops from hail damage as well as in the experimental modification of precipitation [1]. The elaborated method allows tracking the dynamics of the process in climate chamber and fast calculation of cloud parameters and ice/water droplet-forming process. Powerful cumulonimbus cloud is a metastable system, in which to cause precipitation enough only a small external influence. Along with the thermodynamic phase instability in clouds take place the instability of electric origin. The processes of condensation and coagulation evolve on the background electric fields in the atmosphere and the formation of electric charges of the droplets and crystals [2, 3].

We report on experimental study of electrical methods of exposure on warm cloud to induce precipitations. We investigated the direct impact of high electric field in clouds that affect the phase and microstructure transformations of atmospheric moisture, to regulate the development of rainfall process. Corona induces the water drops falling down at temperatures of testing clouds +2ºC. The estimated efficiency of corona impact at field strength 10^4 V/cm was close to expose of hygroscopic reagent on testing cloud. The mean size of registered droplets was slightly bigger than mean size cloud droplets 20-30 μm whereas density of deposited droplets decreased dramatically with decreasing of field strength. The second approach presented in this work is investigation of impact of electrically charged aerosols on testing cloud. We demonstrate high efficiency of the initiation of rainfall induced by sprayed charged particles of Portland cement. The methods of introducing and parameters of charged aerosols are under discussion.

In summary, we have performed studies of efficiency of wide class of commonly used for weather modification reagents as well as the efficiency of experimental impact methods on testing clouds. We demonstrated that counting of particles and determination of its density and size is possible directly in climate chamber as well as dynamics of particles deposition.

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References:

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