Cloud electrification modelling – preliminary results

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A three-dimensional model describing electrification of clouds has been developed and implemented into the COSMO non-hydrostatic limited-area numerical weather prediction (NWP) model. The three-dimensional implemented model allows for application of several laboratory-based parameterizations. The algorithms that are used in the parameterization are based on graupel-ice collision mechanism, which is considered to be the primary cause of inducing charge separation in clouds. The graupel-ice charge separation is assumed non-inductive (i.e. electric field-independent) in the model. The atmospheric ion processes such as hydrometeor attachment and point discharge at the ground are treated explicitly in the model.

The implemented cloud electrification model has been applied to artificially developed clouds to show the model capacity in simulating electrification of clouds. Secondly, the model has also been tested to real observed data in the Czech Republic.