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Transport and scavenging in deep convective clouds: feedback on parameterization

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In Tropics, deep convective clouds have a significant impact on precipitations and vertical transport of aerosols and atmospheric particles. Indeed those latters can be quickly moved by updrafts and downdrafts along the vertical until they are scavenged. A new scavenging parameterization of transport and scavenging of tracers in deep convective clouds has been developed into the Emanuel convective parameterization and implemented into the Laboratoire de Météorologie Dynamique general circulation model LMDz.
In the study, we use the natural radionuclide 7Be as tracer and by its high tropospheric/low stratospheric source, the tracer is ideal to emphasize scavenging by rain and below-cloud evaporation. The aim of this research and of this new process-based parameterization is to evaluate the influence of the convection and especially the wet scavenging on the vertical distribution of tracers, to diagnose the processes in the deep convection parameterization. Scavenging efficiency is tested in simulations defined within the framework of the international experiment TOGA-COARE (Tropical Ocean and Global Atmosphere, Coupled Ocean-Atmosphere Response Experiment). Simulations use a single column model version of LMDz and results are compared to CTBTO daily data. We show that this new parameterization depicts rather well concentrations of tracers at the surface and highlights effects of convective downdrafts. We first analyze performances of this new scavenging scheme with single column model simulations. In a second part, we present GCM simulations results and compare them to observations.