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Development and Test of the Scale- and Aerosol-Aware Grell-Freitas Convection Parameterization within the Next Generation Global Prediction System (NGGPS)

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A summary of the latest cumulus parameterization modeling efforts at NOAA's Earth System Research Laboratory (ESRL) will be presented on both regional and global scales. The physics packages related to cumulus parameterizations developed at ESRL include a scale-aware parameterization of subgrid cloudiness feedback to radiation (coupled PBL, microphysics, radiation, shallow convection) and the stochastic Grell-Freitas (GF) scale- and aerosol-aware convective parameterization. This talk will focus on the deep convection part in GF which is based on a stochastic approach originally implemented by Grell and Devenyi (2002) and described in more detail in Grell and Freitas (2014, ACP). It was expanded to include PDF's for vertical mass flux in deep, congestus, and shallow convection. modifications to improve the diurnal cycle, and changes in the microphysics. We will describe the latest developments and experiments using the Next Generation Global Prediction System.