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The sensitivity of warm season quantitative precipitation forecasts to modifications of the Kain–Fritch Convective Parameterization Scheme

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The sensitivity of quantitative precipitation forecasts to various modifications of the Kain–Fritsch (KF) convective parameterization scheme (CPS) is examined for twenty selected cases characterized by intense convective activity and widespread precipitation over Greece, during the warm period of years 2005-2007. Namely, the study is conducted using MM5 model. The modifications to the KF CPS, each designed to test model sensitivity to the convective scheme formulation, are discussed. The modifications include: (a) the maximization of the convective scheme precipitation efficiency, (b) the change of the convective time step, (c) the force of the convective scheme to produce more/less cloud material, (d) the alteration of the vertical profile of updraft mass flux detrainment.

One hundred forty numerical simulations have been carried out on two nested domains, with horizontal grid increments of 24 and 8 km respectively. The simulated precipitation from the 8-km grid is verified against raingauge measurements. Model results using the aforementioned modifications of the convective scheme does not show significant improvements in 6-h precipitations totals compared to simulations generated using the unmodified convective scheme. In general, skill scores among the cases and the precipitation thresholds vary widely.