Trigger and Evolution of the Mesoscale Convection: A Case Study over Pearl River Delta in South China

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The Pearl River Delta (PRD) is one of the climatologically heavy precipitation centers in south China during the warm season from May to September. In this area, convection are mostly triggered, developed and propagated along the coast. This study explores, for the first time, the trigger and evolution mechanism of convection in PRD using the storm-scale four-dimensional radar data assimilation system known as the Variational Doppler Radar Analysis System (VDRAS). A heavy rain case, occurred in May 5, 2008 is selected as the research case. The reflectivity and radial velocity data from six S-band operational CINRAD WSR-98D radars in Guangdong Province have been assimilation into the model with the spatial and temporal resolution at 1 km and 6 minutes, respectively. The analyzed fields and the automatic weather station observations show a good agreement for horizontal and vertical velocity, temperature and water vapor mixing ratio fields in terms of both structure and magnitude. It is shown that the convection is firstly triggered near a pre-existing outflow boundary on land, about 80 km north from the coastal line. When this convection moves to the southeast, its gust front collides with the sea-breeze front and new convective cells are triggered. In addition to this process, a few new convective cells are also triggered by the sea-breeze front alone. These convective cells ultimately organize into a mesoscale convective system along the sea-breeze front. Overall, the convergence boundary produces favorable conditions for convection, but the actual triggering locations of convection depends on localized forcing. More details will be introduced on this conference.