The October 25th 2015 super-cell storm over central Israel: numerical simulations with the WRF model

Barry Lynn (1) and Yoav Yair (2)

(1) Hebrew University of Jerusalem, Earth Science Institute, Jerusalem, Israel, (2) Interdisciplinary Center (IDC) Herzliya, School of Sustainability, Herzliya, Israel (yoav.yair@idc.ac.il)

We present high-resolution WRF simulations with lightning assimilation (Fierro et al., 2012; Lynn et al., 2015) coupled with the Dynamic Lightning Scheme (Lynn et al., 2012) of the October 25th 2015 super-cell event in the eastern Mediterranean. That storm developed within the northern tip of a Red-Sea trough off the Egyptian coastline near Alexandria, with deep convective cells rapidly growing over the sea, exhibiting cloud top temperatures colder than -70°C (~18 km) and radar reflectivity cores > 65 dBz at 10 km. As the cells crossed the Israeli coastline north of Tel-Aviv, they exhibited intensive lightning activity, severe hail, downbursts, and intense rain. The lightning detection system of the Israeli Electrical Corporation registered a total of over 17,000 CGs, and for 20 minutes at the peak of the event recorded CG flash-rates greater than 430 strokes per minute (if including IC strokes, it was likely higher). The results of the simulations properly reconstruct the rapid growth of vertically extensive high-reflectivity cores, with significant amounts of graupel, ice and supercooled water within the charging zone below -20°C. This guaranteed the effectiveness of non-inductive charge separation processes leading to the exceptional flash rates that were observed.

