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

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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 coast-line 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 -20C. This guaranteed the effectiveness of non-inductive charge separation processes leading to the exceptional flash rates that were observed.

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