



Lightning data assimilation to improve the RAMS short-term precipitation forecast

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This study presents the assimilation of total lightning data to improve the short-term precipitation forecast with the Regional Atmospheric Modeling System (RAMS).

Two events are considered: the 12 October 2012 and the 15 October 2012 case studies. The first event was characterized by localized convection over central Italy and by moderate precipitation, while the second was characterized by widespread convection over Italy and by intense rainfall in several parts of the country. So, these events represent two different types of precipitation regimes. These case studies are included in the Special Observing Period 1 (SOP1) of the HYdrological cycle in the Mediterranean EXperiment (HyMeX) and are well documented by observations. More specifically, a database of hourly precipitation of thousands of raingauges over the Italian territory is used to verify the methodology, while flashes data are provided by LINET (LIGHtning detection NETwork; Betz et al., 2009). LINET is a European lightning location network for high-precision detection of total lightning, ground strokes (exchanging charges between the cloud and the ground - CG cloud-to-ground) and cloud lightning (not making ground contact - IC intracloud), with utilization of VLF/LF techniques (in range between 1 and 200 KHz). The network counts over 120 sensors in 17 European countries with a good coverage of the central and western Mediterranean (from 10° W to 35° E in longitude and from 30° N to 65° N in latitude).

The assimilation technique uses the following procedure: whenever a flash occurred in a grid column, water vapour is added to the charging zone (273-248 K) by a function which depends on the flash rate and which is adapted from Fierro et al. (2012).

Results for the two cases show the ability of the methodology to improve the short-term (3h) precipitation forecast and an operational implementation of the methodology is discussed.

References:

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