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The influence of the sea surface temperature on the nocturnal offshore line of precipitation near Mediterranean coastline

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Drainage winds lead offshore the cold inland air, which might form a coastal front when interacting with the warm and wet air over the Mediterranean. This air may lift over this cold drained air mass, and convective clouds may appear if the air reaches the Level of Free Convection (LFC). Nocturnal offshore lines and cells of precipitation near the coastline caused by the convergence between drainage winds and a synoptic flow have been well studied in the tropical areas (e.g. Yu et al., 2004; Frye, 2001; Oshawa et al., 2001; Mapes et al., 2003). In the Mediterranean basin, despite some works studied this phenomenon (Newman, 1951; Greich et al., 2004; Callado et al., 2002; Mazón and Pino, 2009 and 2012a, b) there is still some lack of understanding about the main mechanisms driving the formation of the coastal fronts.

By using observations and the version 3.3 of the WRF mesoscale model we analyze the role of the sea surface temperature in these lines and cells of precipitation. Several numerical experiments varying SST according the simulation obtained in Somot et al. (2008) have been performed, accordingly the Mediterranean region and season. Three events have been selected in the west, middle and east of the Mediterranean basin at different seasons: late winter (minimum SST) and early autumn (maximum SST). The numerical experiment done in early autumn shows that the increasing the SST enhances the drainage wind. However, this relative cold wind warm fast over the Mediterranean Sea. The numerical experiment shows an increase of the intensity, the accumulated precipitation and the number of the precipitation cells. However, this precipitation areas use to be located more offshore the coastline.