

Supplementary Material

The unusually long cold spell and the snowstorm Filomena in Spain in January 2021

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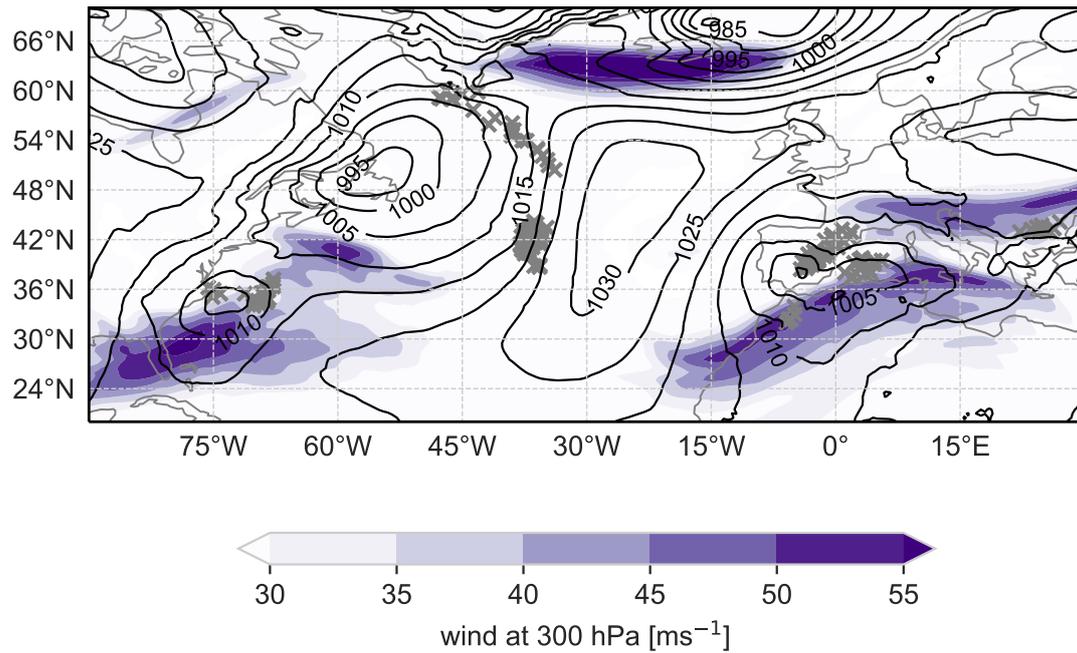


Figure S1. Synoptic maps with sea level pressure (black), wind speed at 300 hPa, and the position of every 30th WCB trajectory in the ascent phase valid at 00 UTC 09 January 2021.

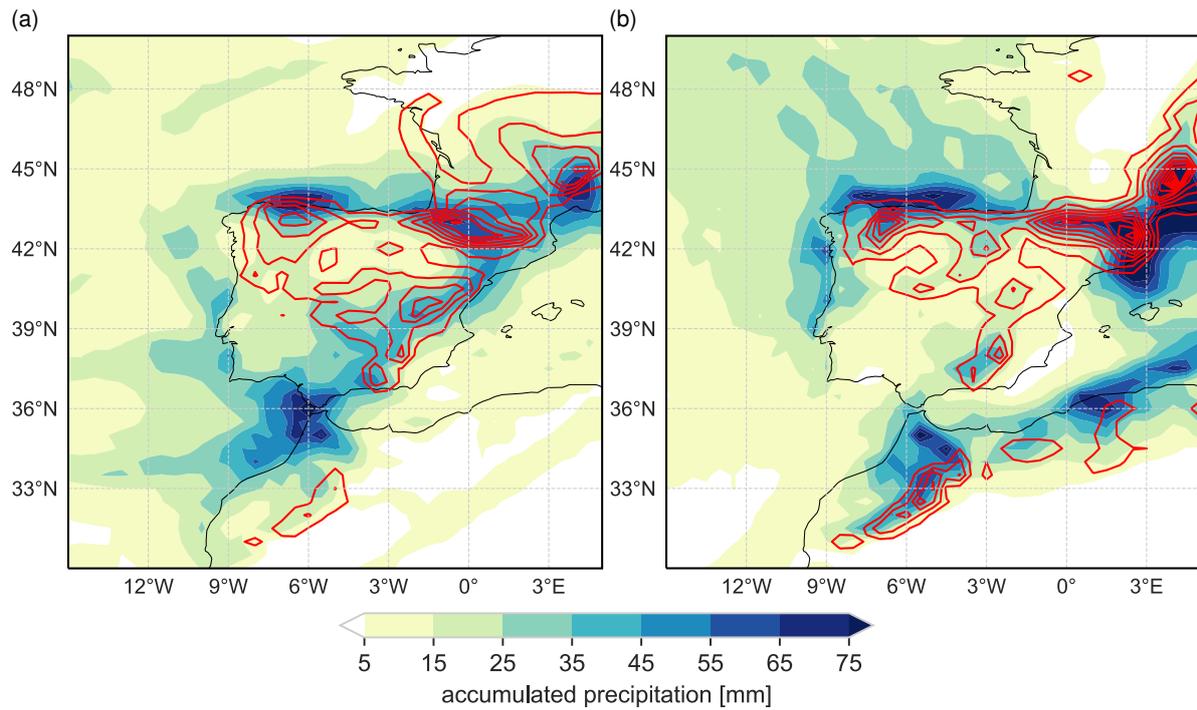


Figure S2. Precipitation accumulated from (a) 00 UTC 02 January to 00 UTC 06 January 1997 and (b) 00 UTC 28 January to 00 UTC 01 February 1986 (from ECMWF short-range forecasts). The red contours denote the accumulated snowfall in this period, starting from 5mm in 10mm increments.

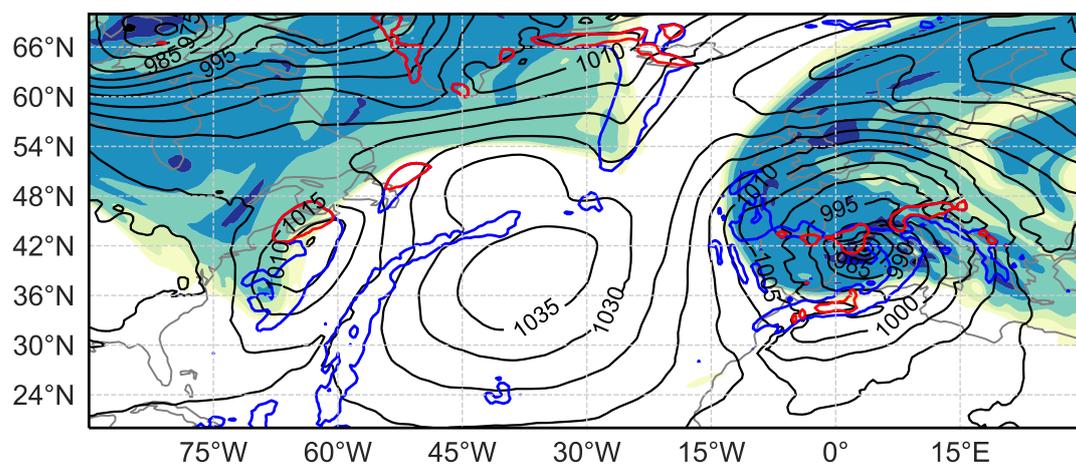


Figure S3. Synoptic maps with sea level pressure (black), 1-h accumulated total precipitation (blue contours for 1 mm), 1-h accumulated snowfall (red contours for 1 mm), and PV at 320K in colour shading, valid at 21 UTC 30 January 1986.

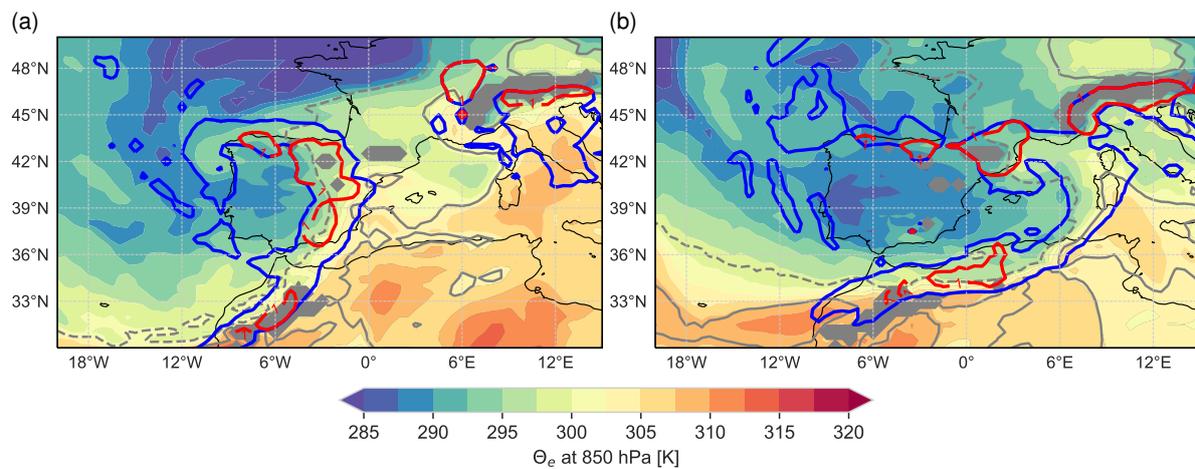


Figure S4. Maps with equivalent potential temperature (θ_e) at 850 hPa (colour shading), 1-h total accumulated precipitation (blue contours for 1 mm), and 1-h accumulated snowfall (red contours for 1 mm), valid at (a) 03 UTC 03 January 1997 and (b) 21 UTC 30 January 1986.