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Impact of high-resolution sea surface temperature representation on the forecast of small Mediterranean catchments' hydrological responses to heavy precipitation

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The following figures show, for both case studies 1 and 2: for all the simulations carried out, a comparison between observed and lower boundary skin SST values for selected locations (Fig. S1); for all the simulations, the skin SST fields in the Domain D02 with time steps of 6 (case study 1) and 24 hours (case study 2) (Fig. S2 and Fig. S4, respectively); for simulations IFS-O, IFS-DA-O and IFS-DA-M, wind direction and wind speed at 850 hPa for selected times (Fig. S3 for case study 1 and Fig. S6 for case study 2, respectively). Finally, only for case study 2, a comparison between the observed and simulated accumulated precipitation over the 72-hours period starting from 00 UTC 31 October 2015 is shown (Fig. S5).

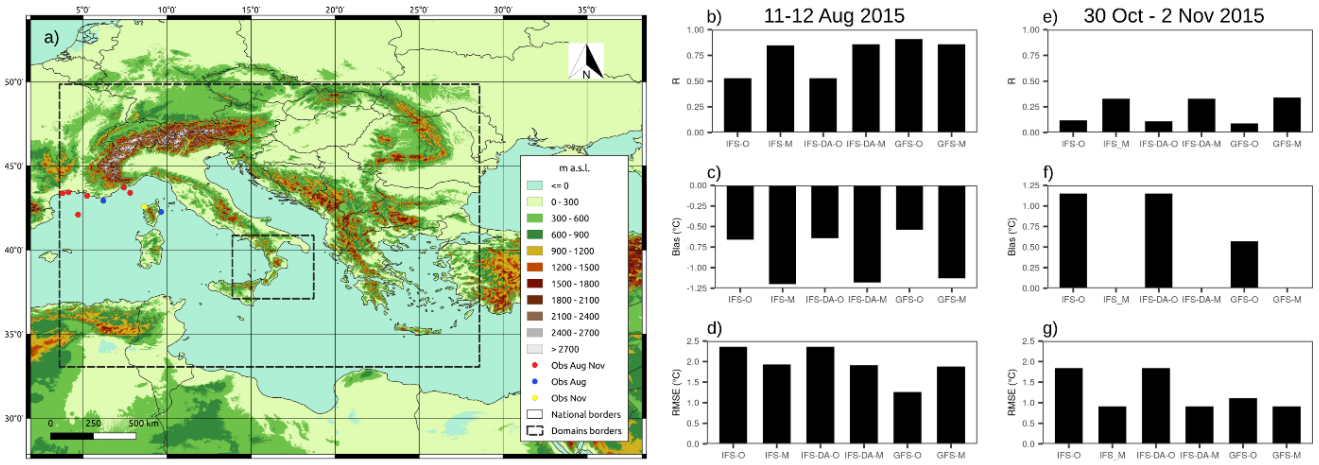

Fig. S1. a) Location of the measurements *in situ* selected from the CORA database (Cabanes et al., 2013). Available continuous measurements with a sub-daily time step at the sea-surface interface (depth 0 m) were compared with the skin SST fields used as lower boundary conditions in the different simulations listed in Table 2 in the paper. All the selected points are located within the external domain D01, having a spatial resolution of 10 km and a time resolution of 3 hours. Red dots represent locations with data available both in case study 1 and 2, blue dots only in case study 1, and yellow dots only in case study 2; (b-d) performance indices (correlation coefficient r, bias in °C and root mean square error RMSE in °C) calculated for the skin SST fields of the different configurations in the case study 1; (e-g) same as (b-d), but for the case study 2.

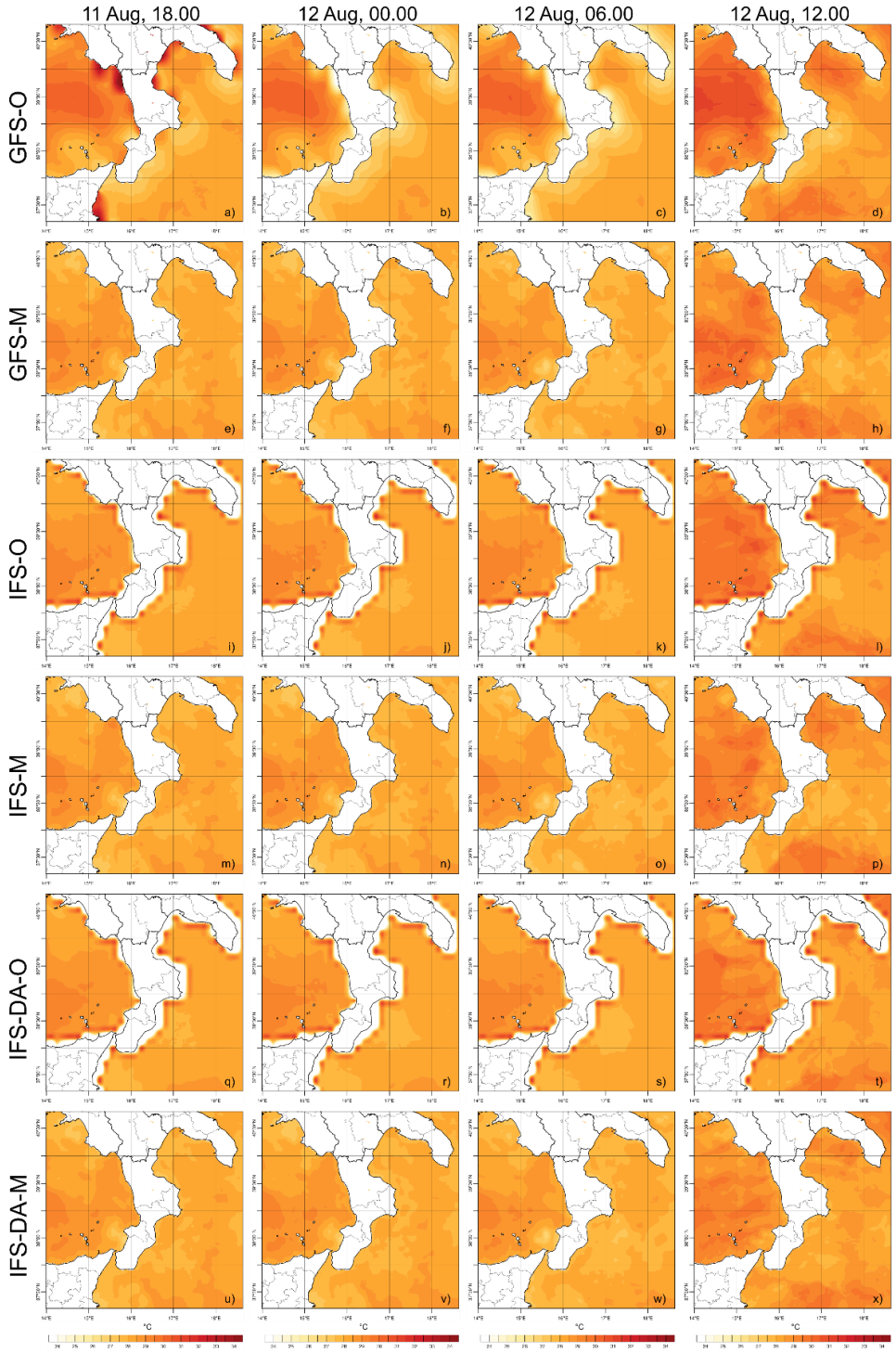

Fig. S2. Case study 1: maps of SSTSK (°C) in the domain D02, for the six simulations listed in Table 2, from 18 UTC 11 August 2015 to 12 UTC 12 August 2015, every 6 hours.

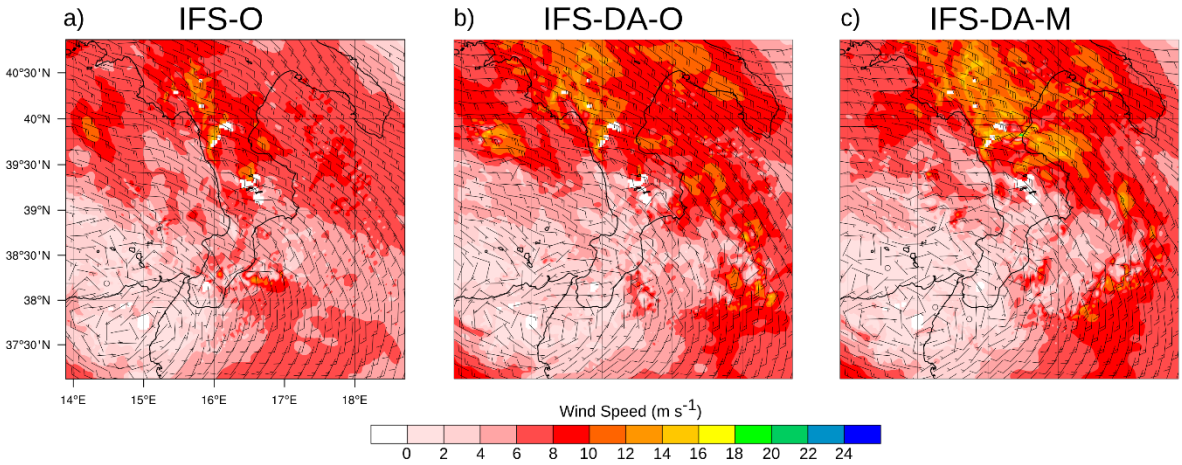

Fig. S3. Wind direction (barbs) and wind speed (m s^{-1}), shown both as barbs and colour, at 850 hPa at 00 UTC 12 August 2015, for a) IFS-O, b) IFS-DA-O and c) IFS-DA-M, respectively.

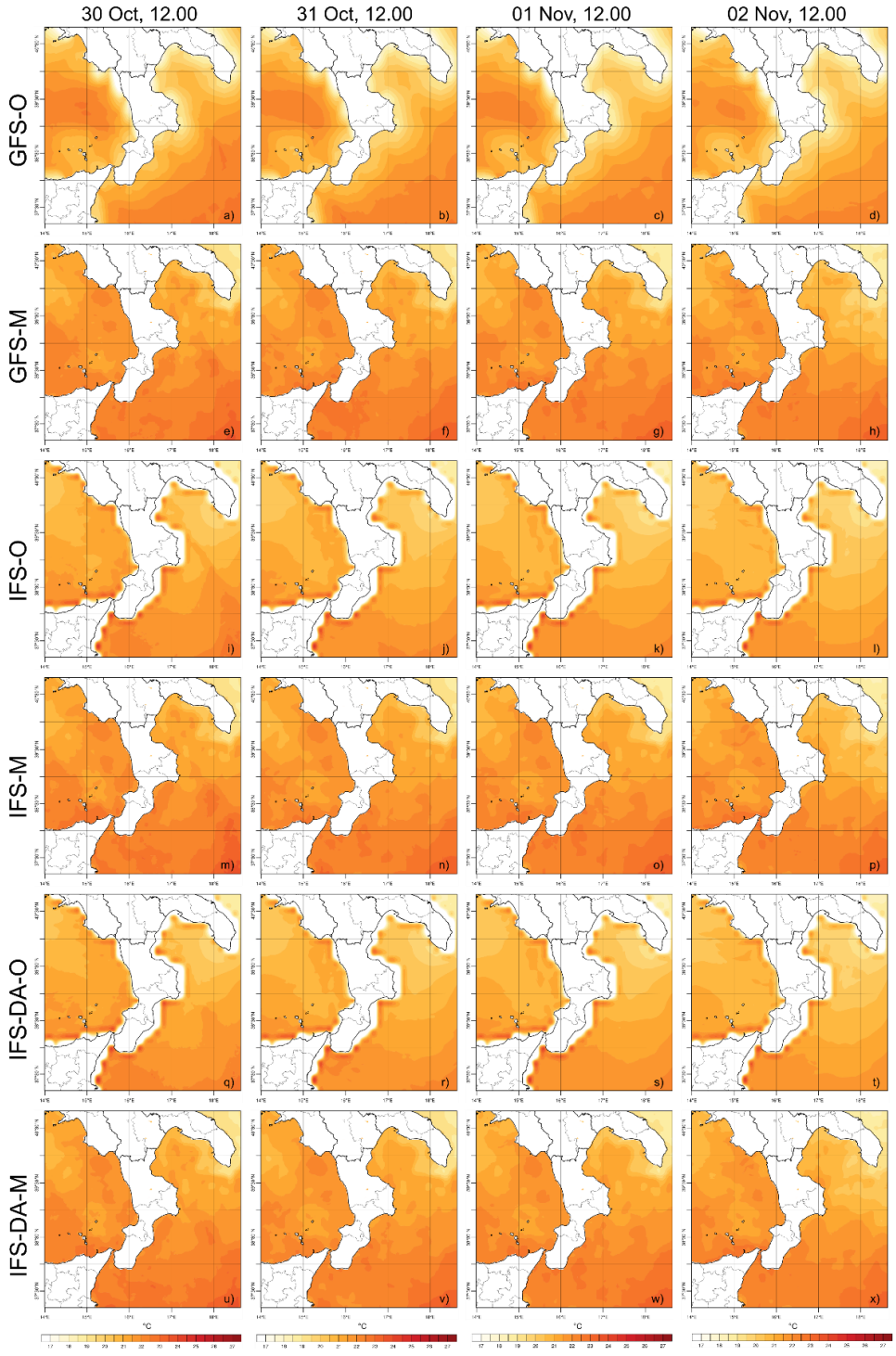

Fig. S4. Case study 2: maps of SSTSK (°C) in the domain D02, for the six simulations listed in Table 2, from 12 UTC 30 October 2015 to 12 UTC 02 November 2015, every 24 hours.

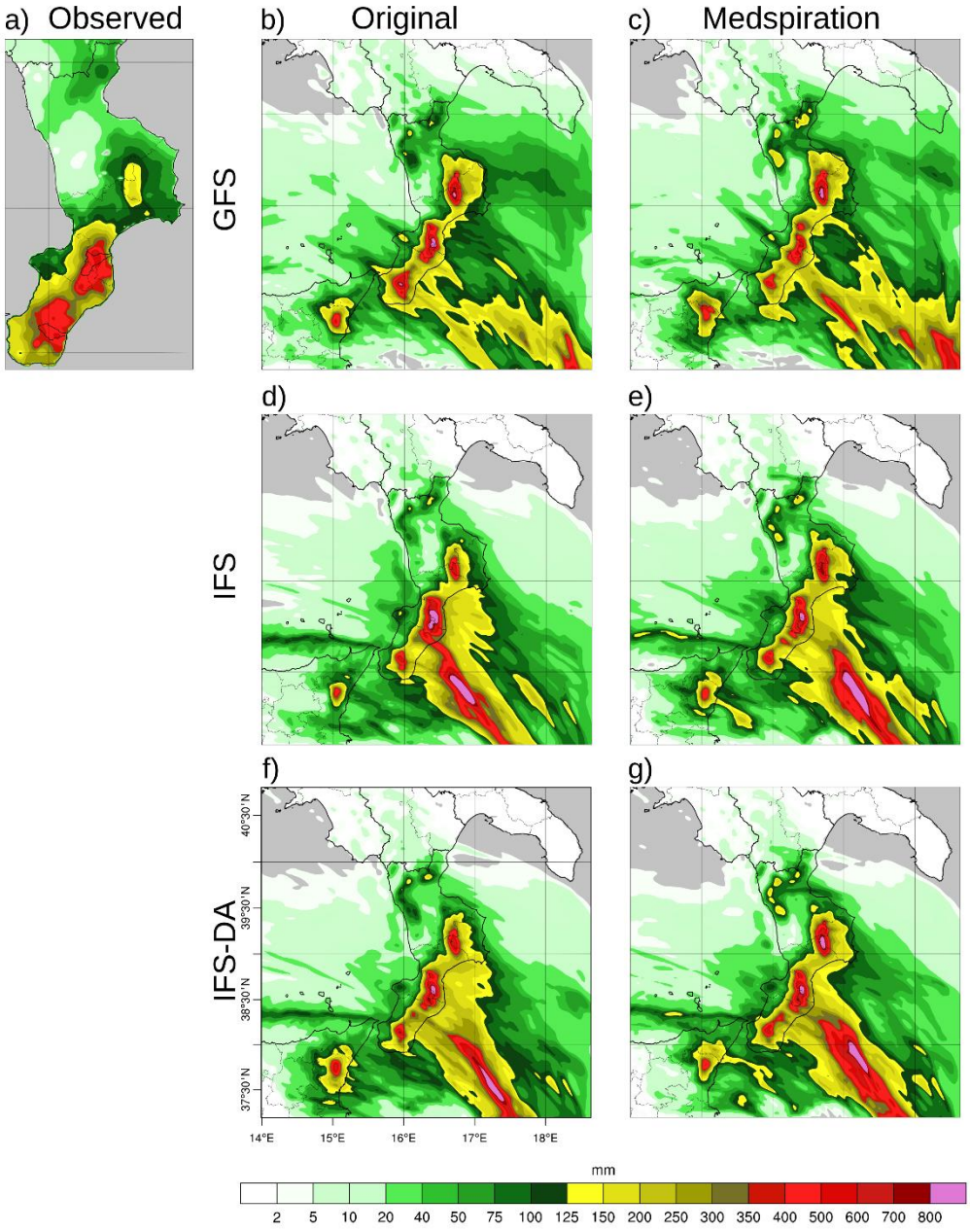

Fig. S5. Accumulated precipitation (mm) over the 72-hours period starting from 00 UTC 31 October 2015: a) merged ground measurements and radar observations; b-g) simulated fields with the different configurations.

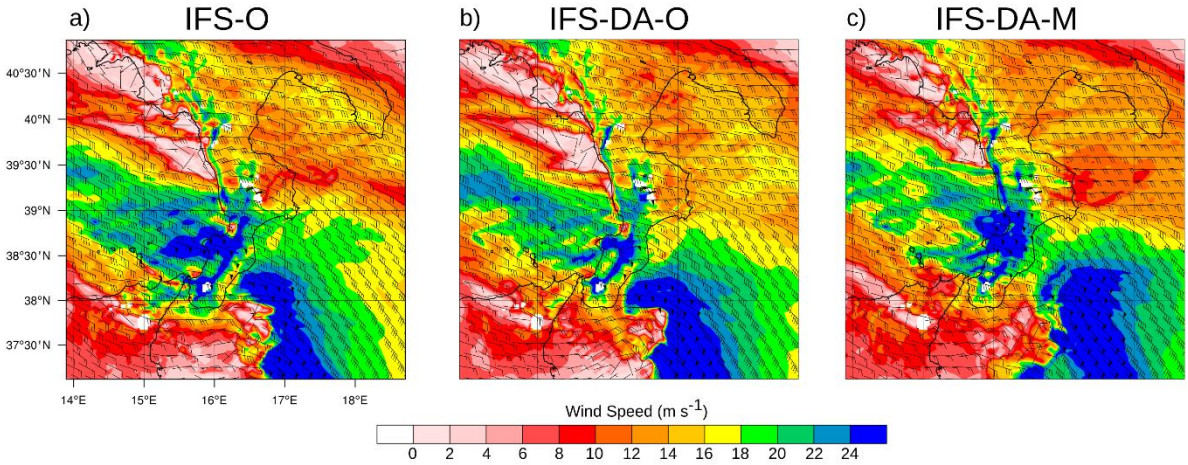

Fig. S6. Wind direction (barbs) and wind speed (m s^{-1}), shown both as barbs and colour, at 850 hPa at 21 UTC 31 October 2015, for a) IFS-O, b) IFS-DA-O, and c) IFS-DA-M, respectively.