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Multi-scale dynamics and mesoscale drivers of the catastrophic September 2022 Marche (central Italy) flood

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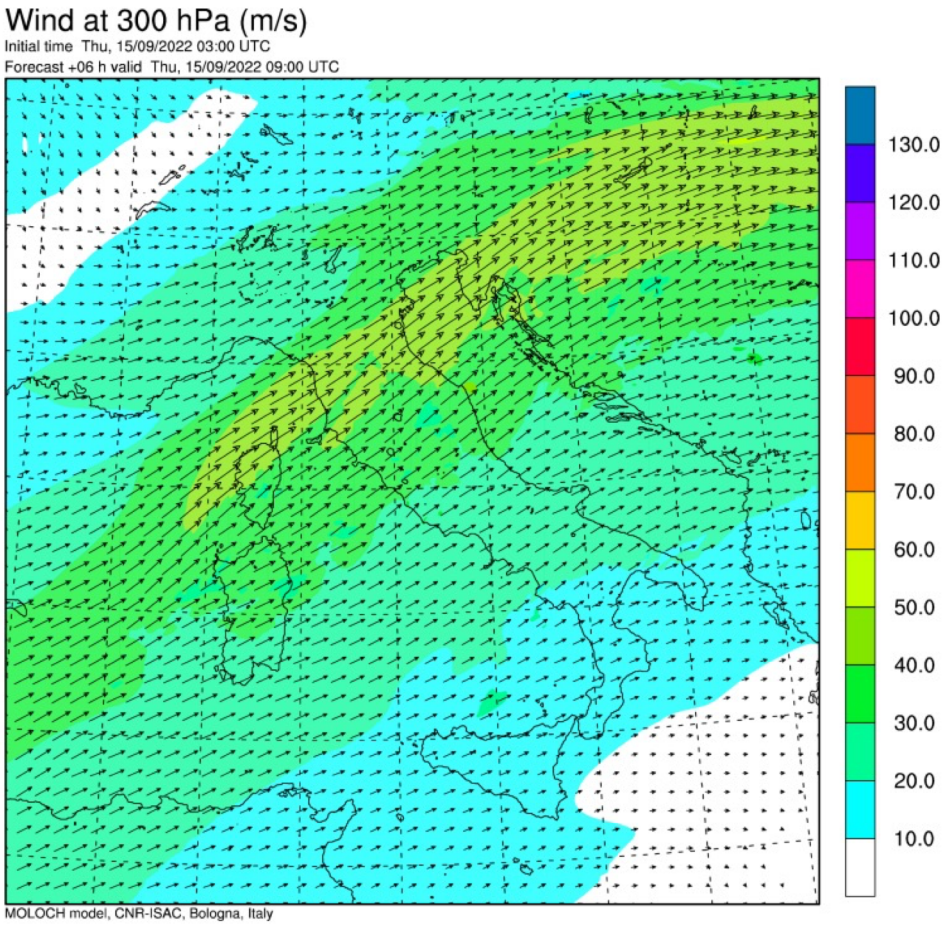


Figure S1. Wind field at 300 hPa on 15 September 2022 at 09:00 UTC, derived from the MOLOCH model. Source: CNR-ISAC (https://www.isac.cnr.it/dinamica/projects/forecasts/) (last access: 28 October 2026).

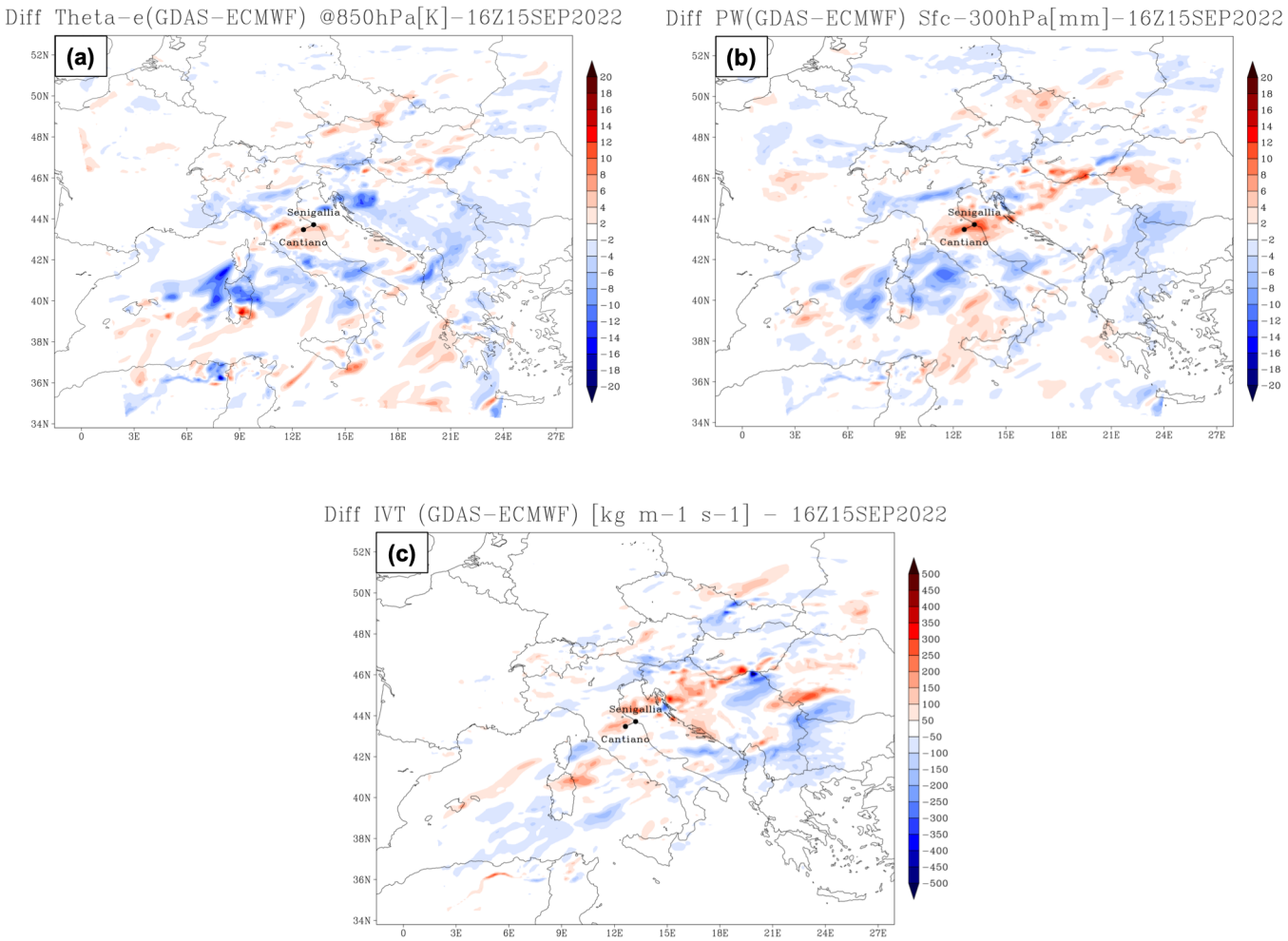


Figure S2. Differences in atmospheric fields between the GDAS- and ECMWF-forced runs on 15 September 2022 at 16:00 UTC: (a) Equivalent potential temperature (θ_e) at 850 hPa [K]; (b) Precipitable Water (PW) [mm]; and (c) Integrated Vapor Transport (IVT) [$kg\ m^{-1}s^{-1}$].

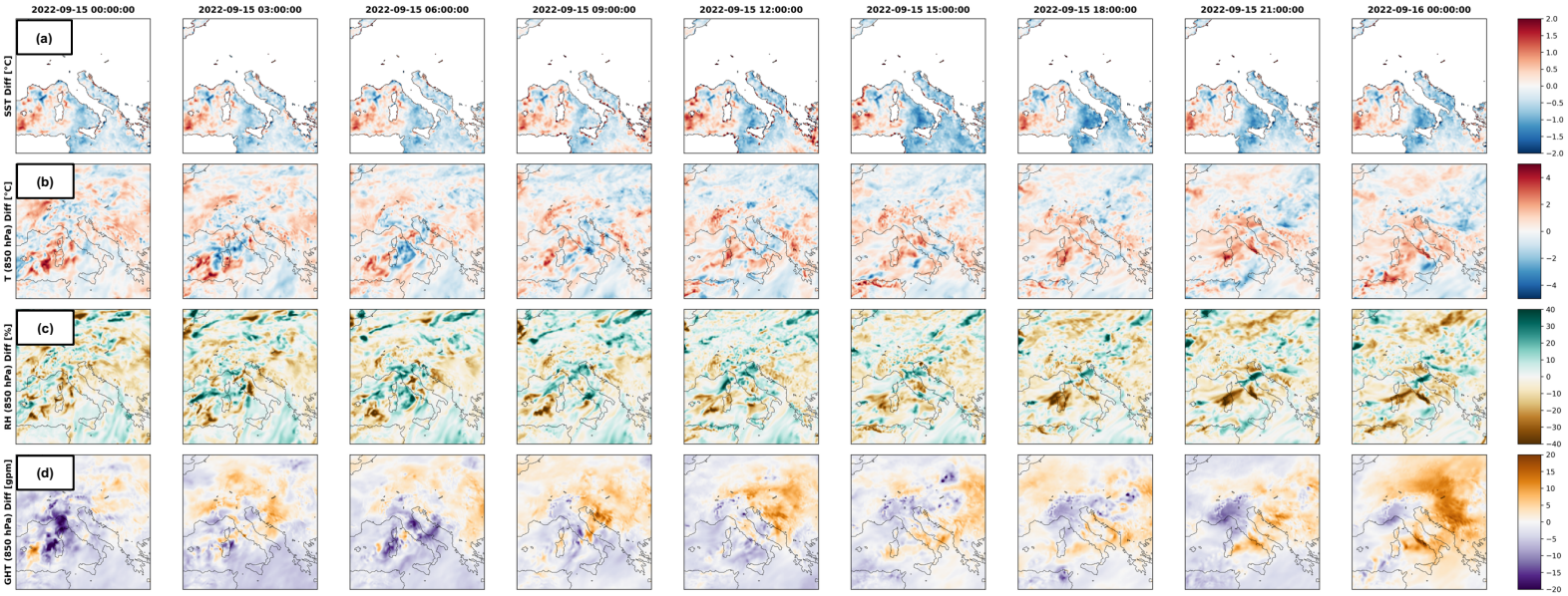


Figure S3. Spatiotemporal evolution of lower-troposheric and surface differences between the driving forcing dataset (REF minus ECMWF) throughout the event. Rows from top to bottom show differences in: (a) Sea Surface Temperature (°C), (b) 850 hPa temperature (°C), (c) 850 hPa relative humidity (%), and (d) 850 hPa geopotential height (gpm). Columns show the evolution at 3 h steps throughout the simulation.