

# Supporting Information for "On Convection During Vb-Cyclone Events in Present and Warmer Climate"

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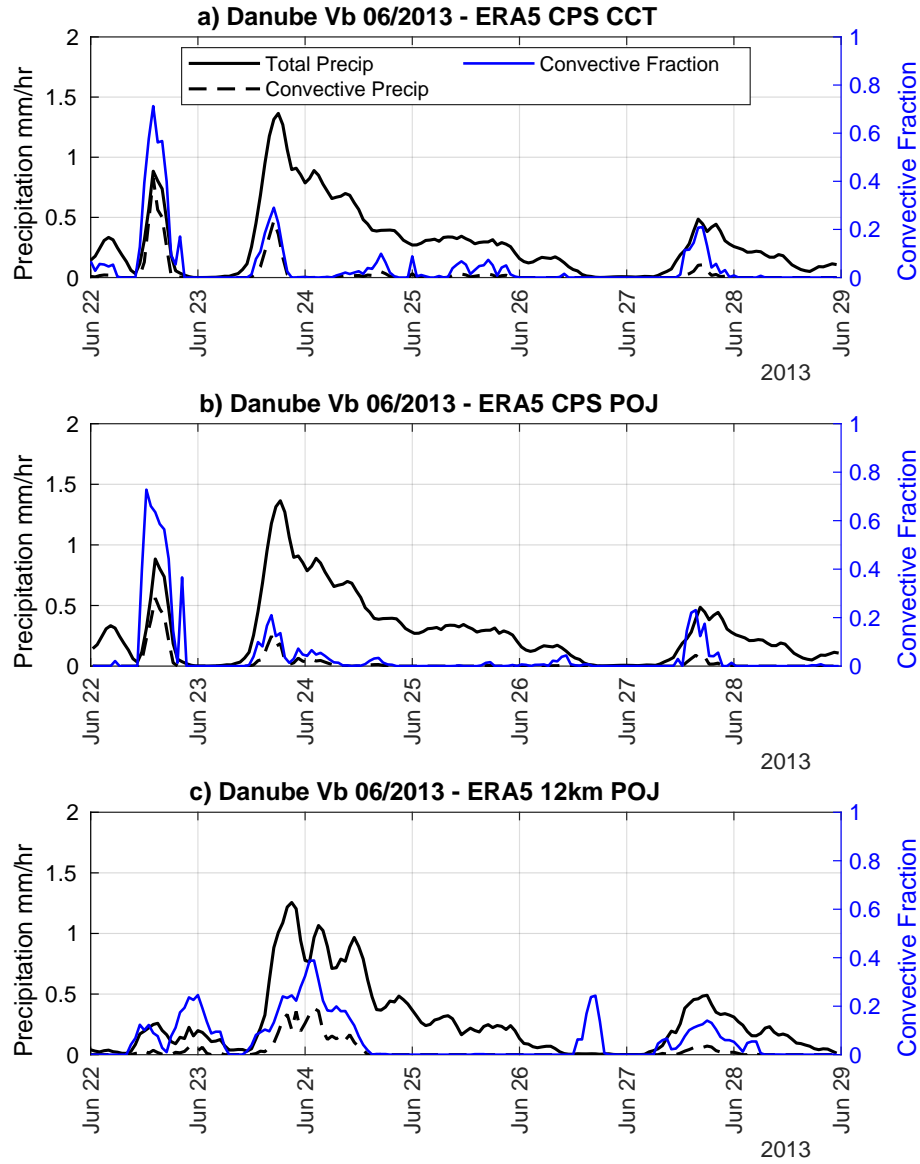
<sup>2</sup>Astronomy and Meteorology Department, Faculty of Science, Cairo University, Cairo, Egypt.

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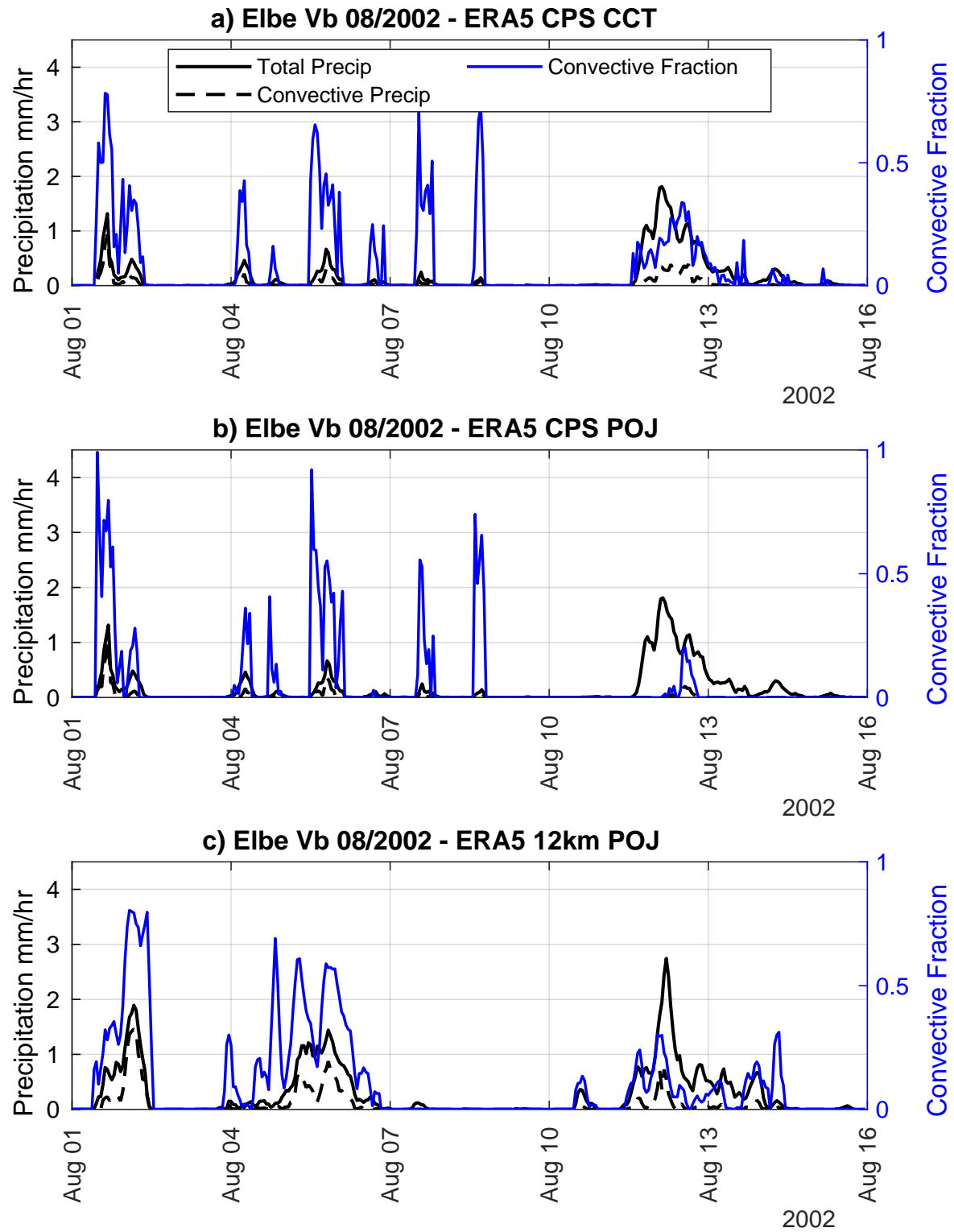
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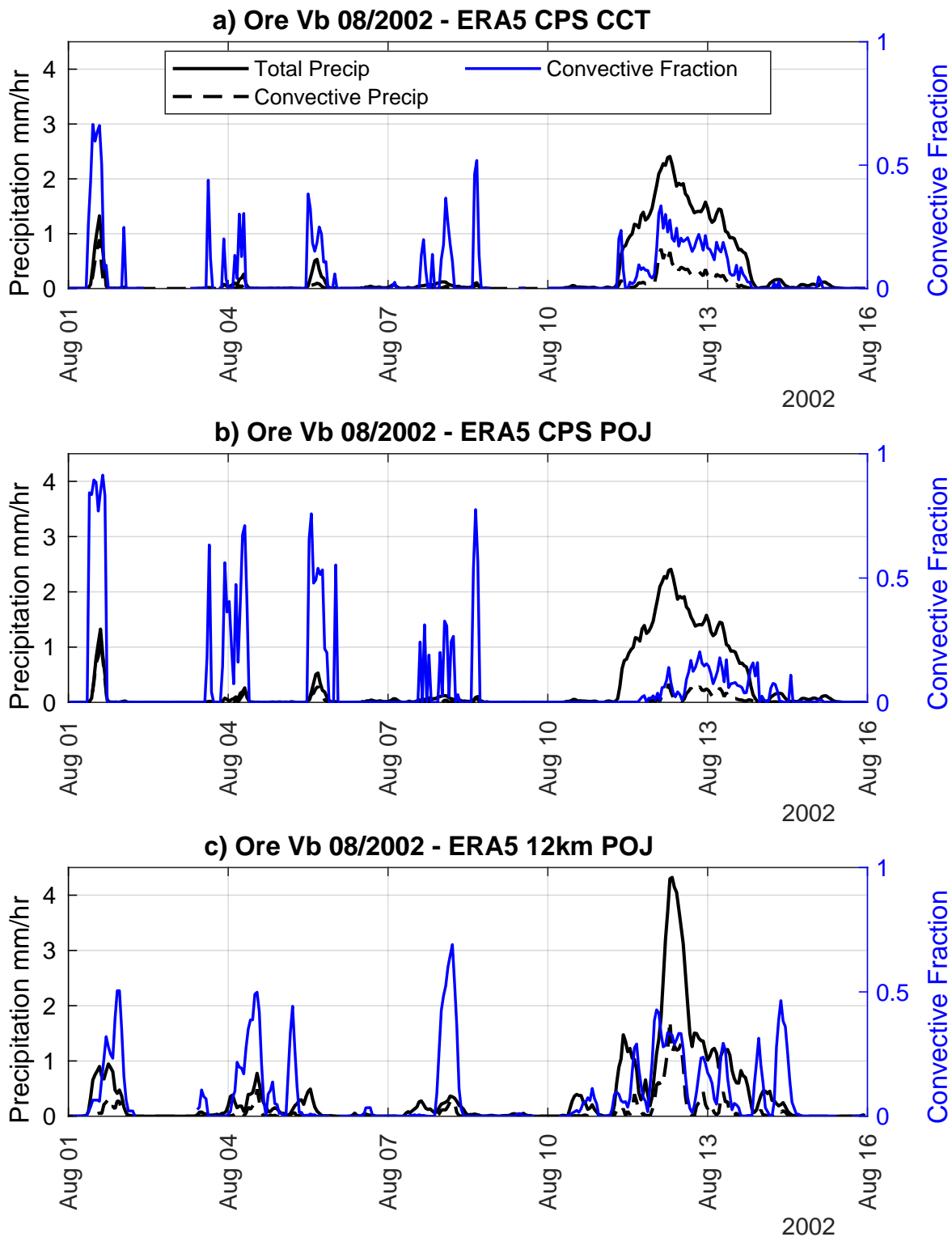
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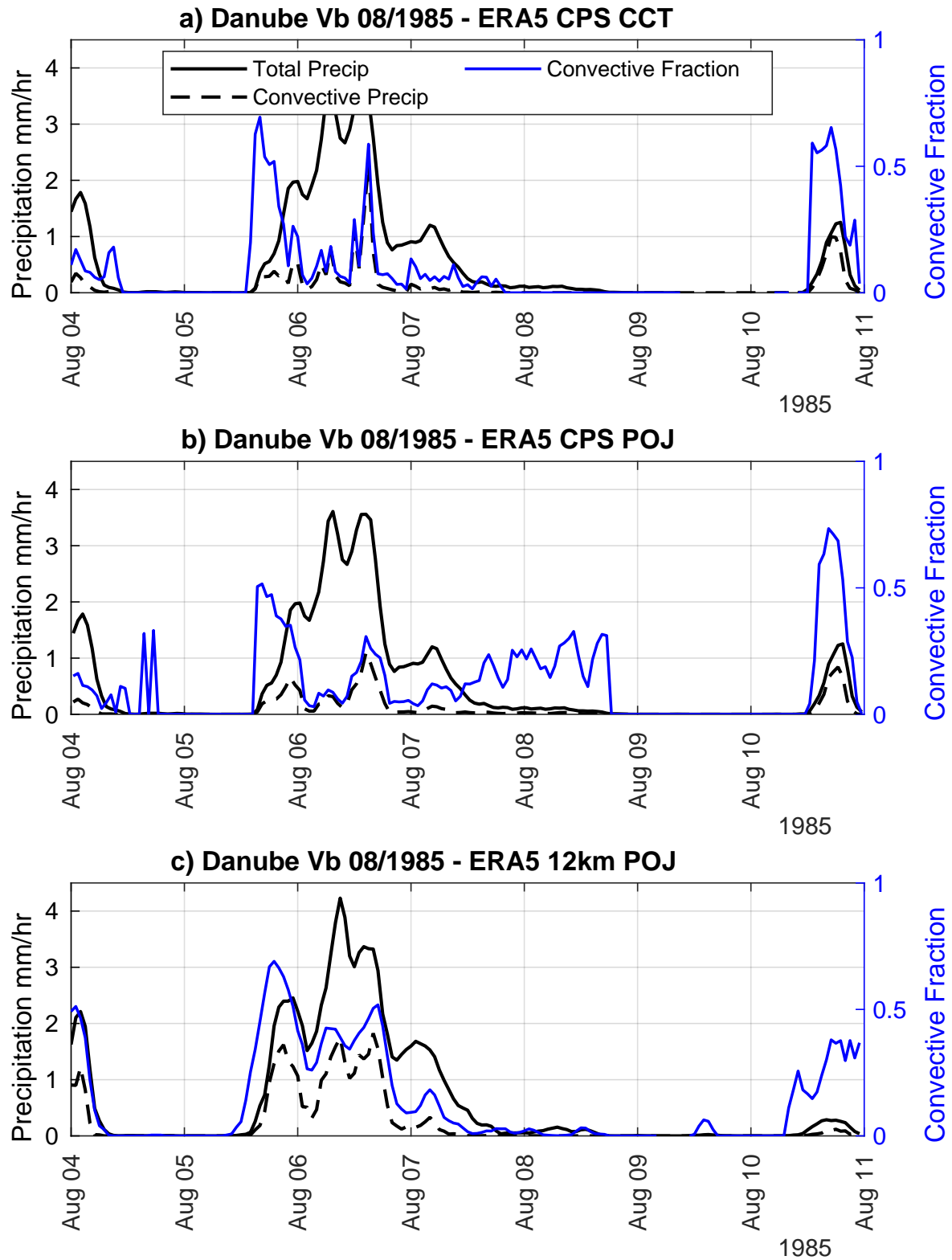
**Figure S1.** Similar to figure 3 in main text, except for June 2013.  $CC(a,b)=0.91$



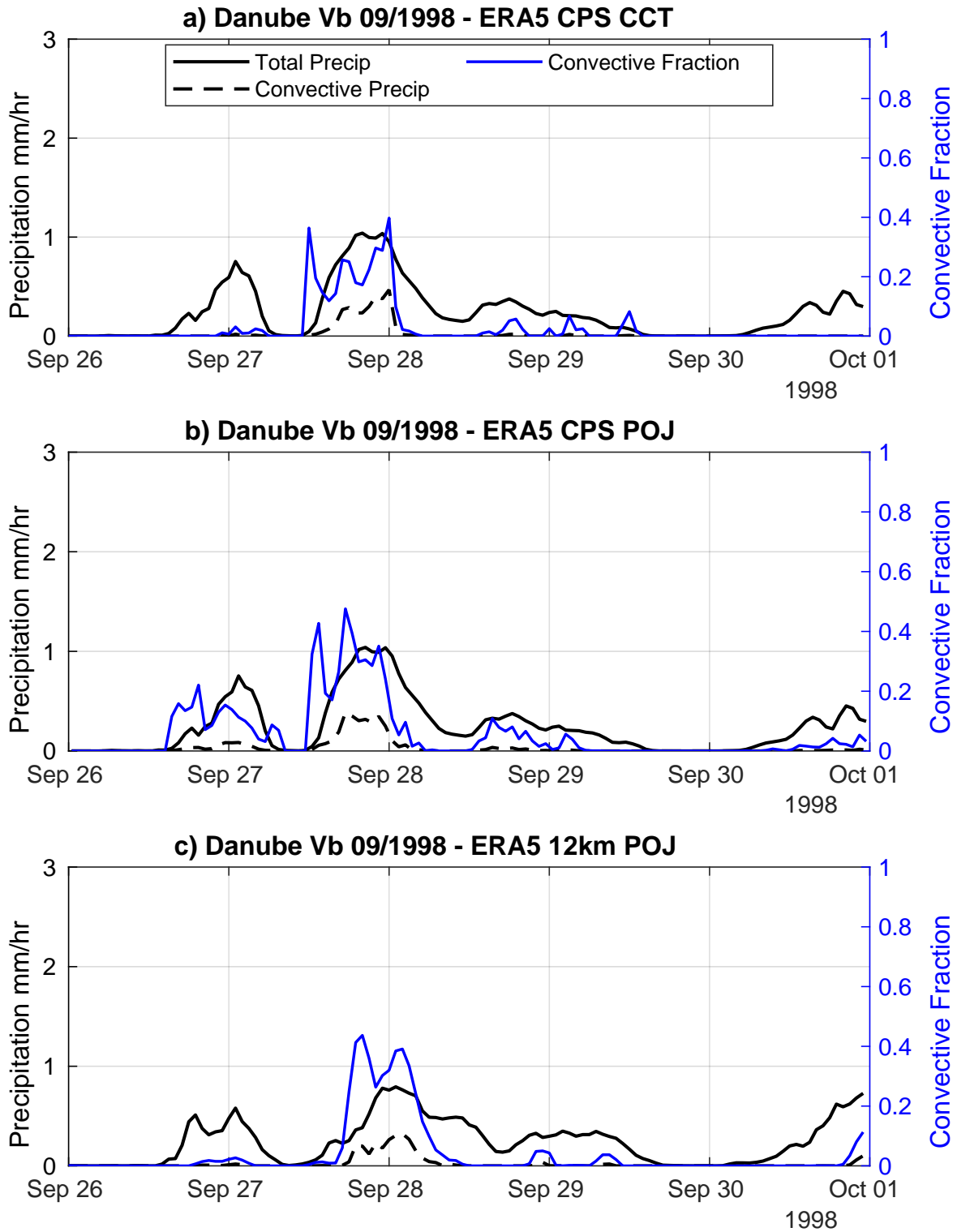
**Figure S2.** Similar to figure 3 in main text, except for August 2002.  $CC(a,b)=0.81$



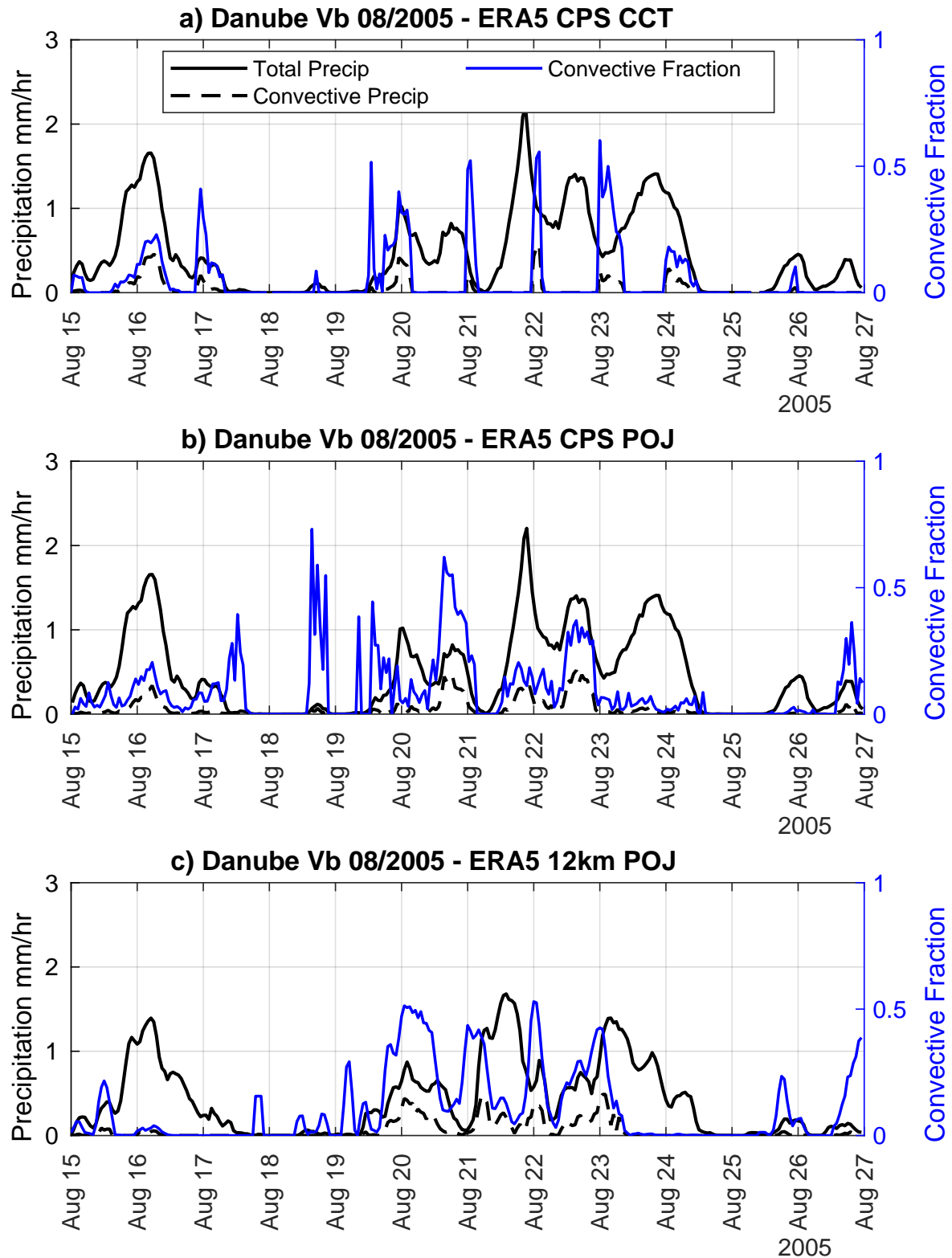
**Figure S3.** Similar to figure 3 in main text, except for August 2002.  $CC(a,b)=0.76$



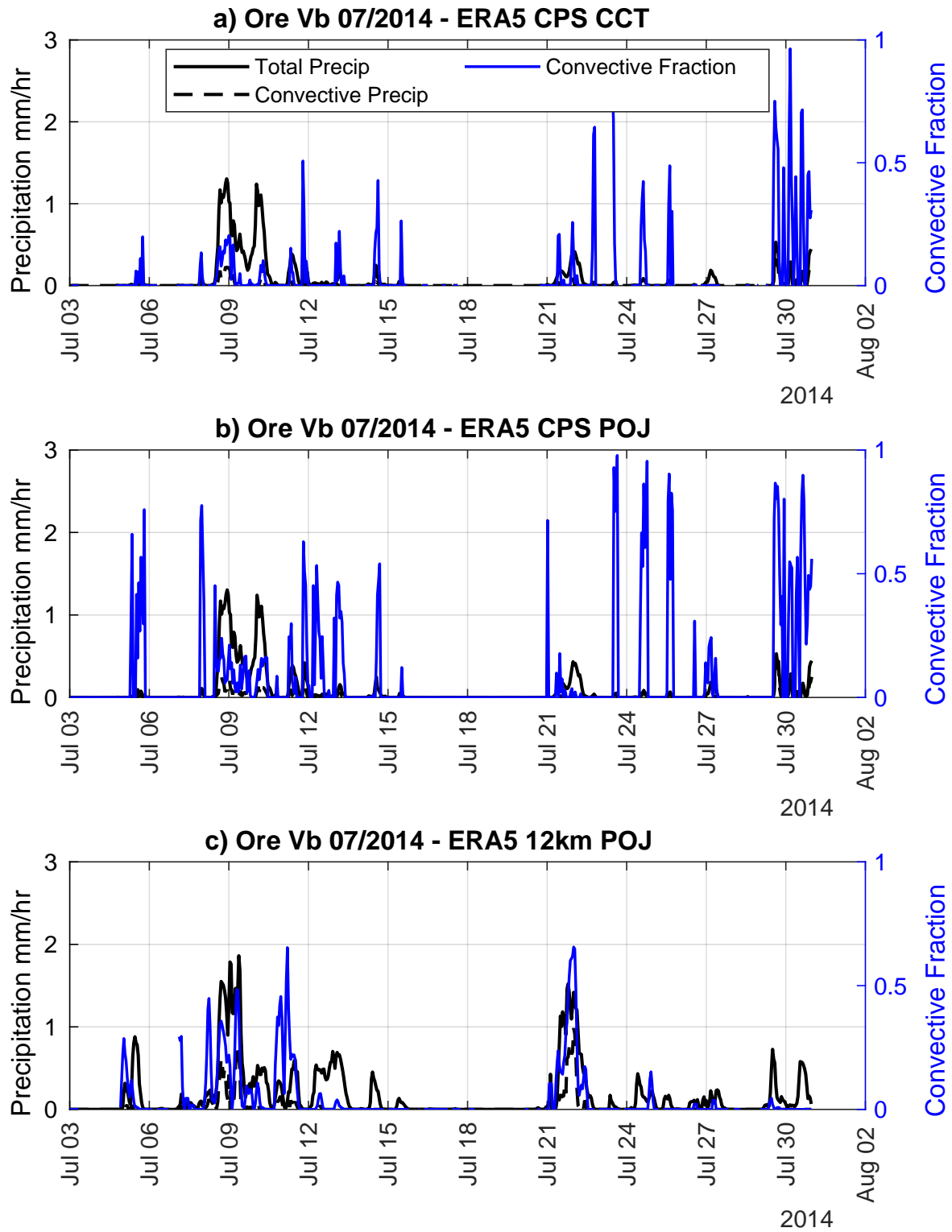
**Figure S4.** Similar to figure 3 in main text, except for August 1985.  $CC(a,b)=0.76$



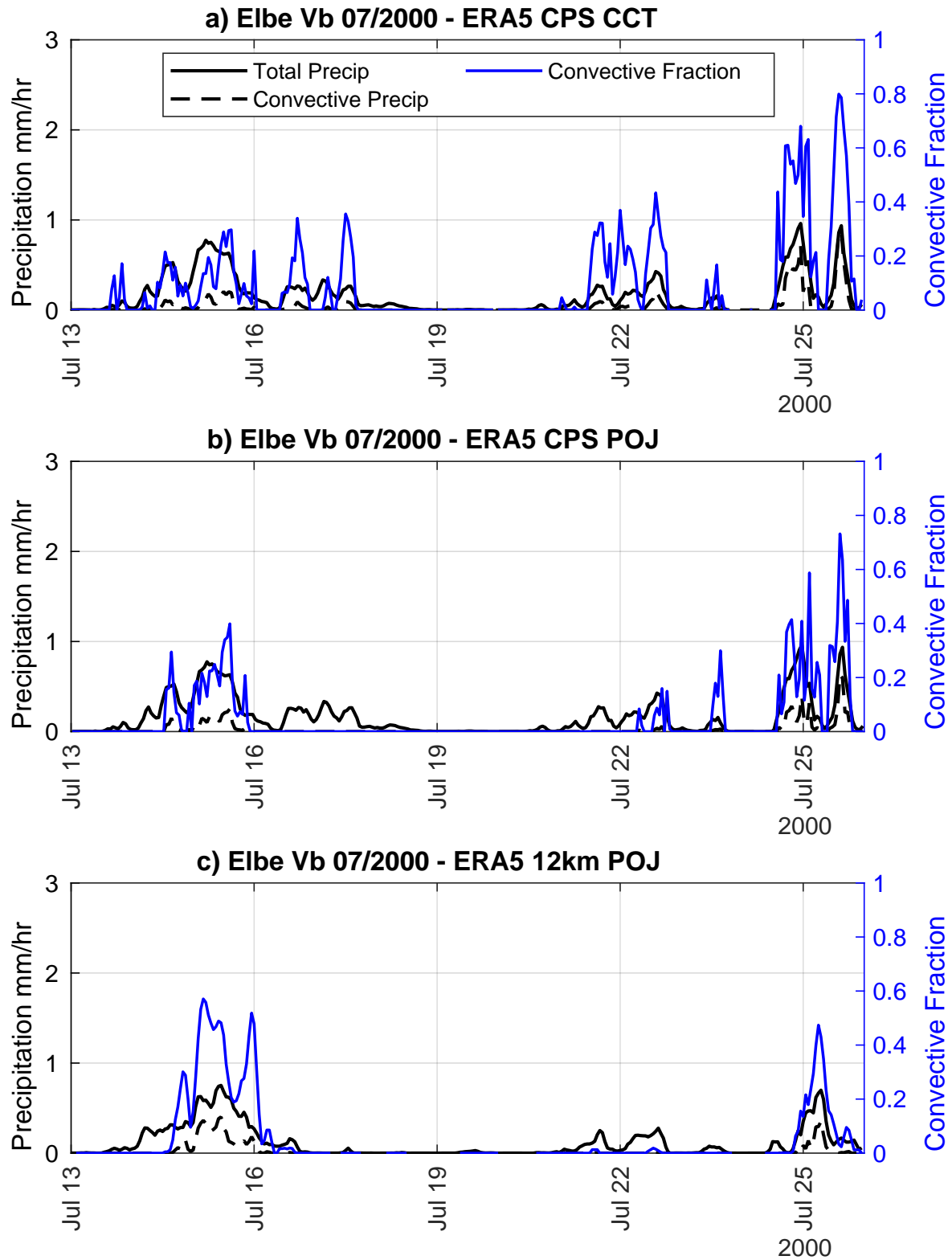
**Figure S5.** Similar to figure 3 in main text, except for September 1998.  $CC(a,b)=0.59$



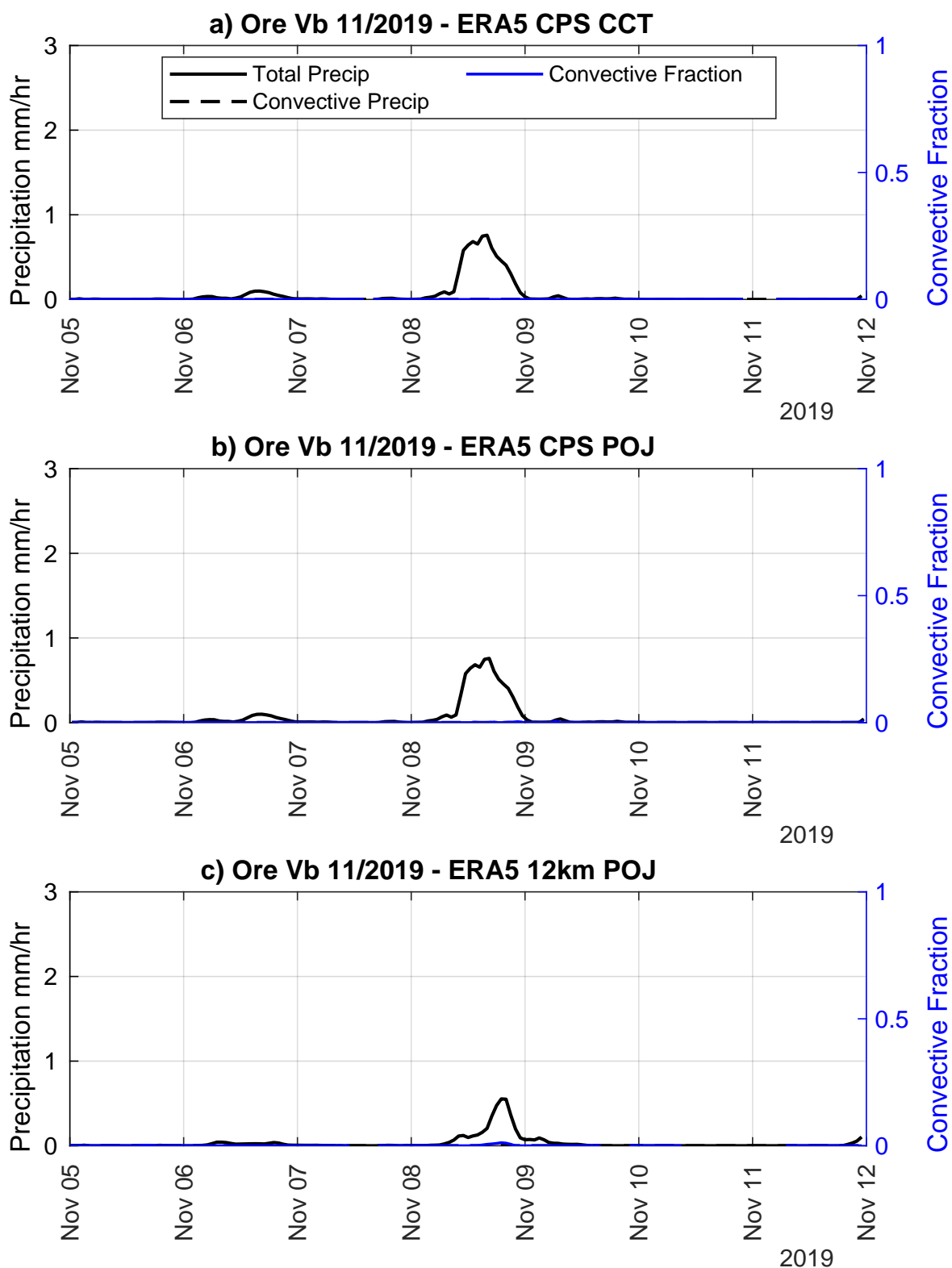
**Figure S6.** Similar to figure 3 in main text, except for August 2005.  $CC(a,b)=0.55$ .



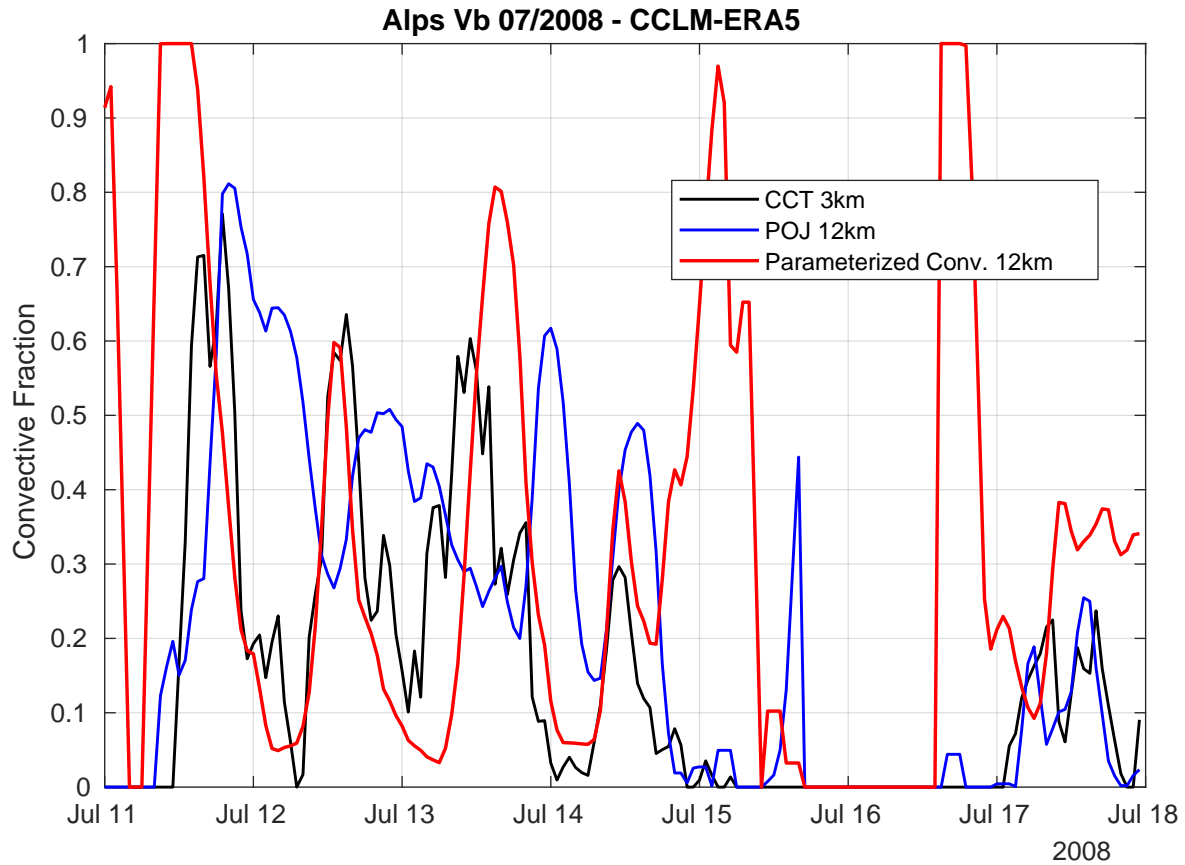
**Figure S7.** Similar to figure 3 in main text, except for July 2014.  $CC(a,b)=0.61$



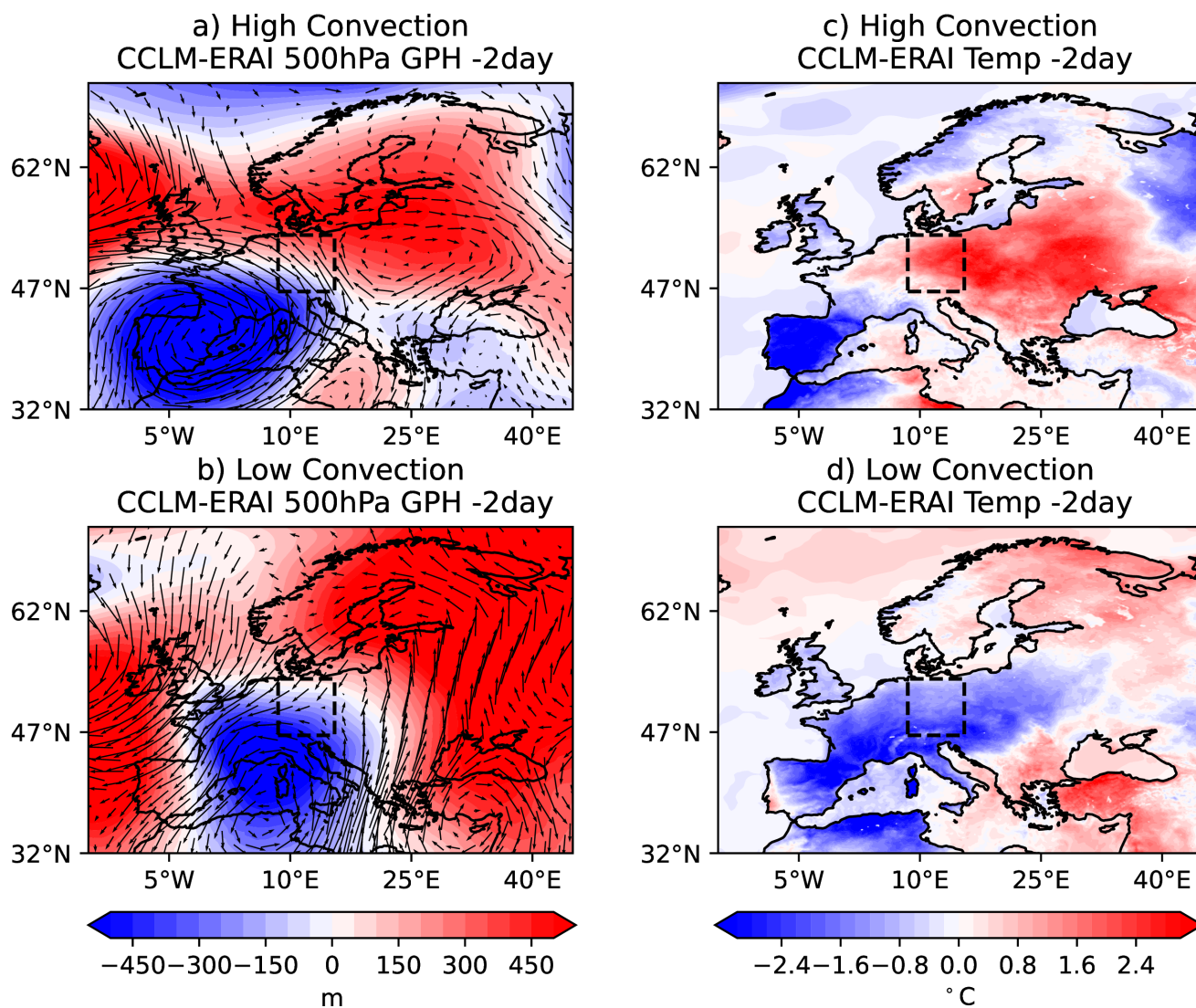
**Figure S8.** Similar to figure 3 in main text, except for July 2000.  $CC(a,b)=0.74$ .



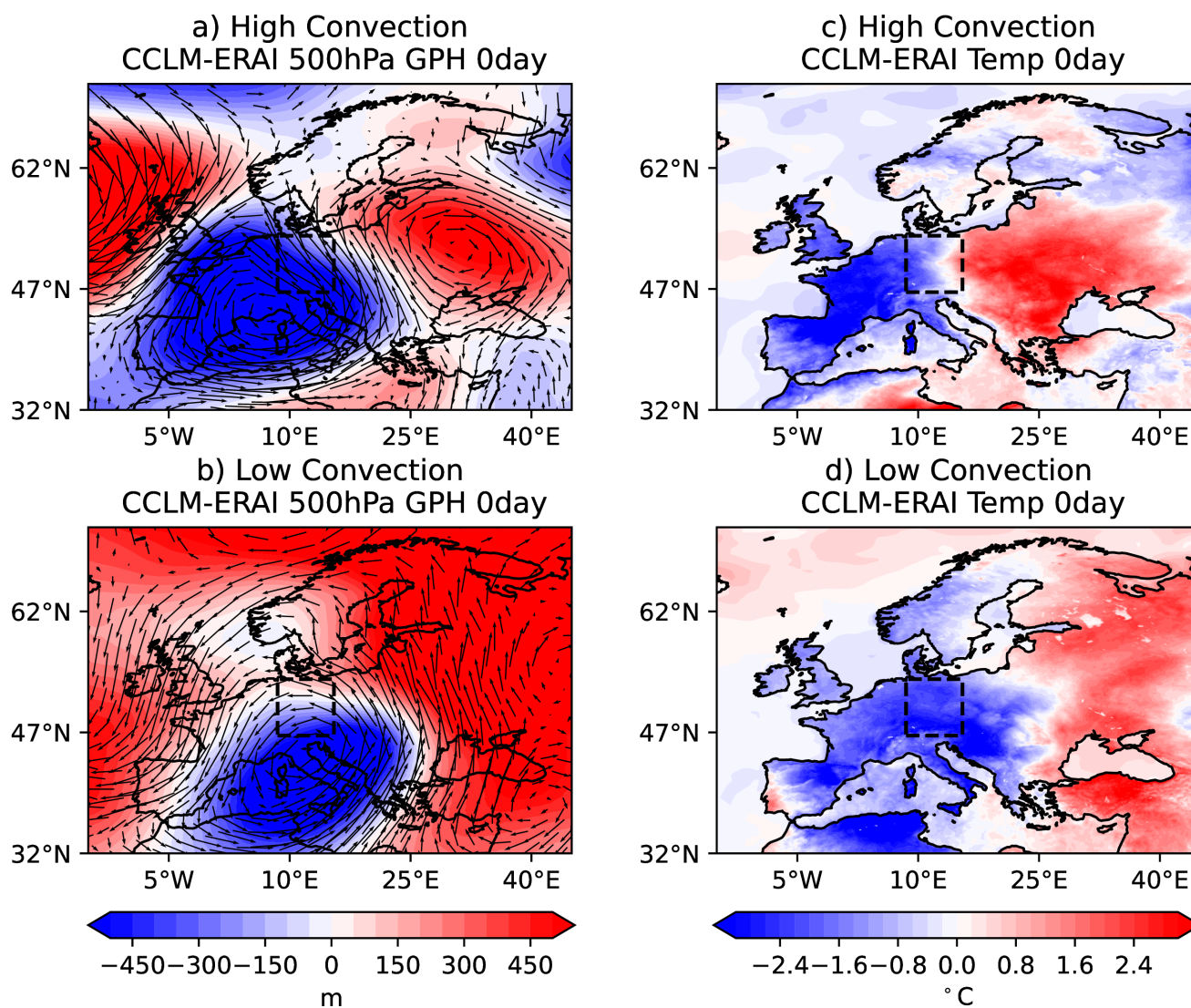
**Figure S9.** Similar to figure 3 in main text, except for November 2019.



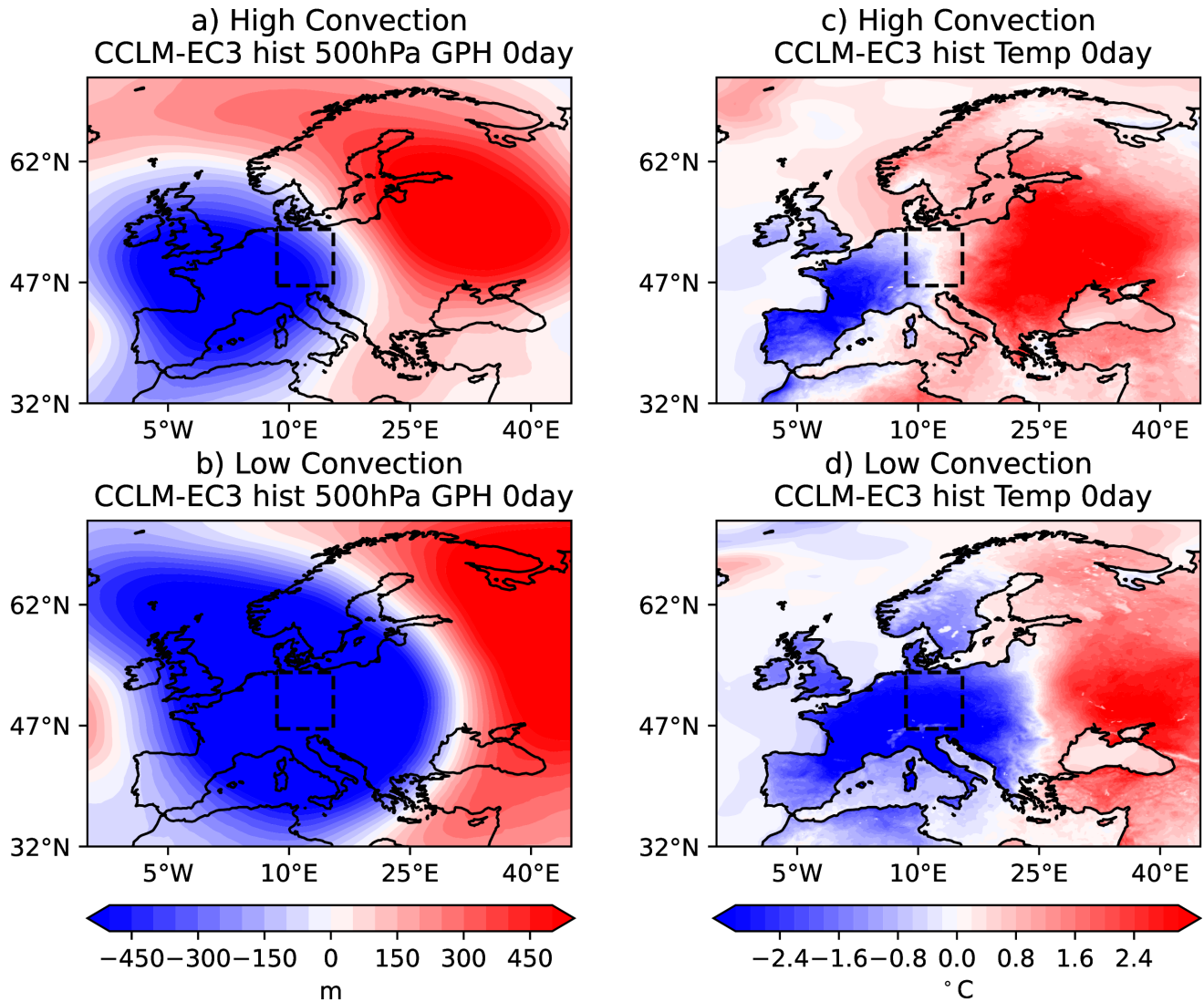
**Figure S10.** Time series of convection fraction during Vb-cyclone event of July 2008 down-scaled from ERA5 reanalysis using CCLM. Black: convection detected by convective cell tracking at 3 km. Blue: convection detected by POJ method at 12 km. Red: convection detected by model's convection parameterization scheme at 12 km.



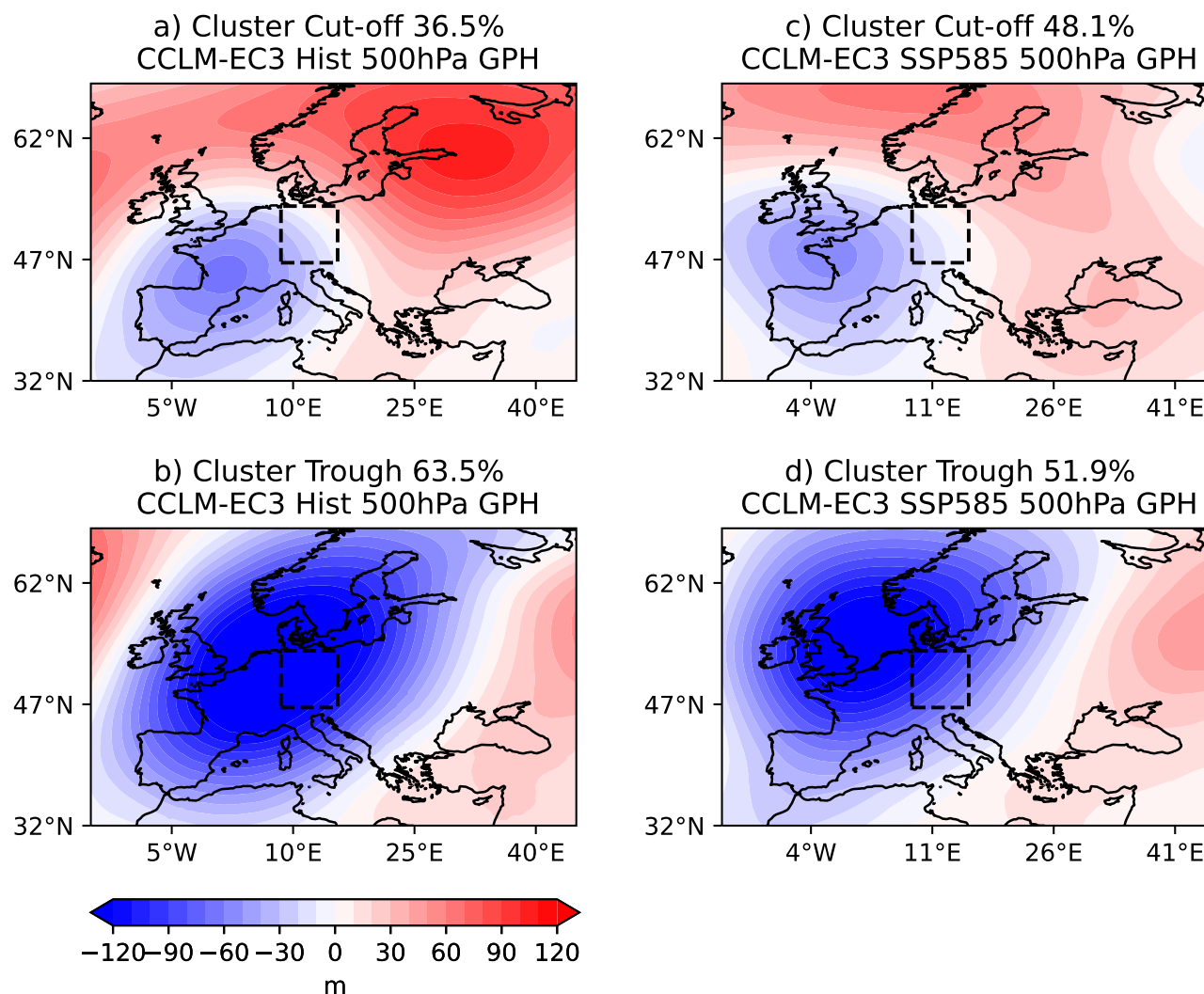
**Figure S11.** Similar to figure 5, except for lag 2 days before the onset.



**Figure S12.** Similar to figure 5, except for lag 0 (the day of the onset).



**Figure S13.** Similar to figure 5, except for lag 0 (the day of the onset) in CCLM-EC3 Historical scenario.



**Figure S14.** Two clusters (Cut-off and Trough; top and bottom rows) of 500 hPa GPH anomalies in CCLM-EC3 Historical and SSP5-8.5 scenarios (left and right columns). The percentage of each cluster is indicated on top of each panel.