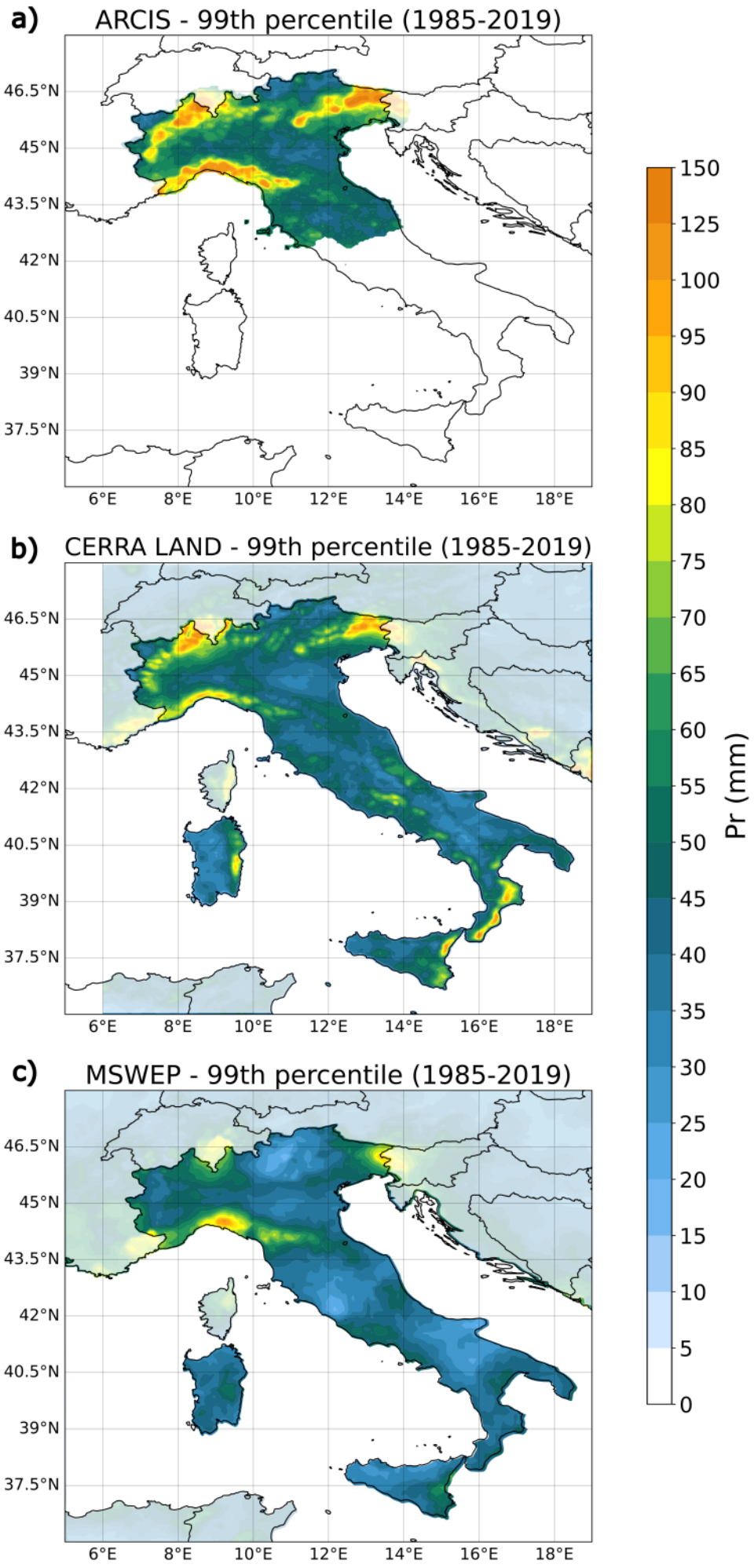
Additional Information

Fig. A1
The 99th percentile of daily precipitation computed on wet days for (a) ArCIS, (b) CERRA-Land, and (c) MSWEP precipitation datasets.



Additional Information

Fig. A2
Annual frequency of (a) WT1, (b) WT2, (c) WT3, (d) WT4, (e) WT5, and (f) WT6. The trend line is overplotted. Trends' significance has been assessed through the Mann-Kandall test. Only WT3 exhibits a statistical significant trend with p-value < 0.10

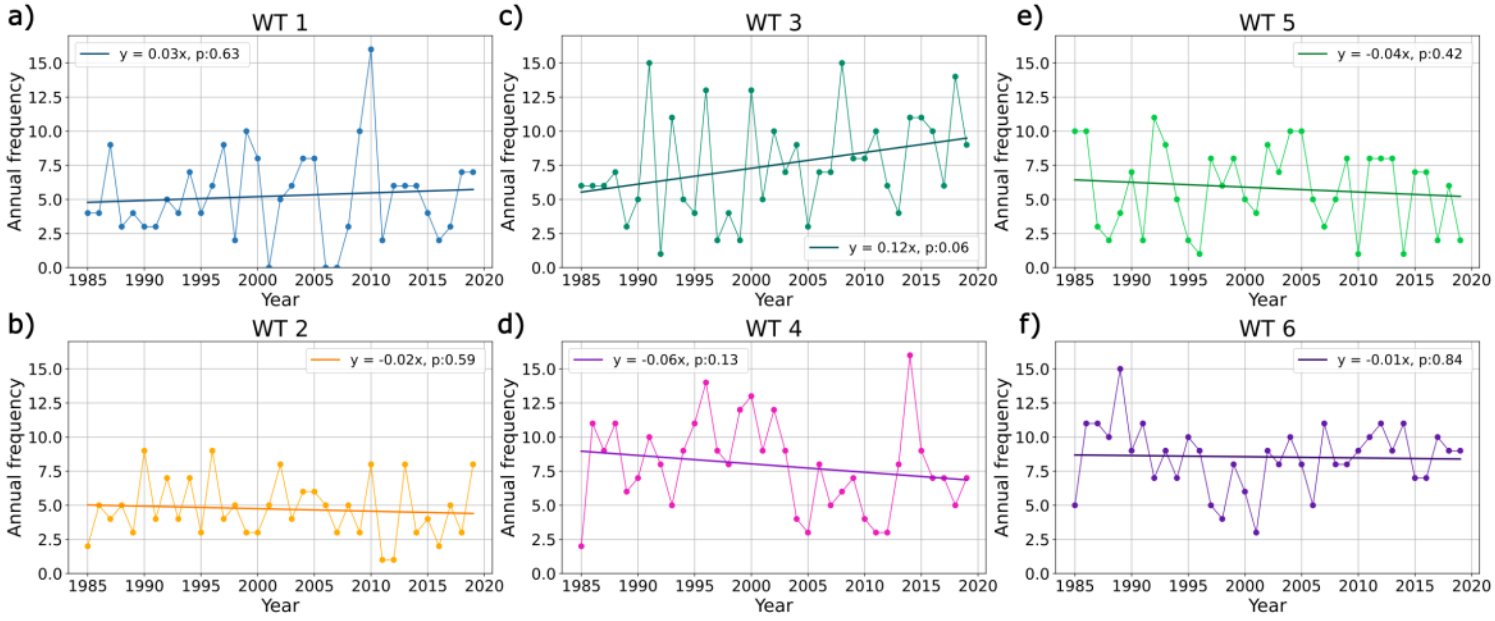


Fig. A3
Seasonal decomposition (DJF, MAM, JJA, SON) of the annual frequency of WT3. Only SON annual frequencies exhibit a statistical significant trend according to the Mann-Kendll test with p-value< 0.05.

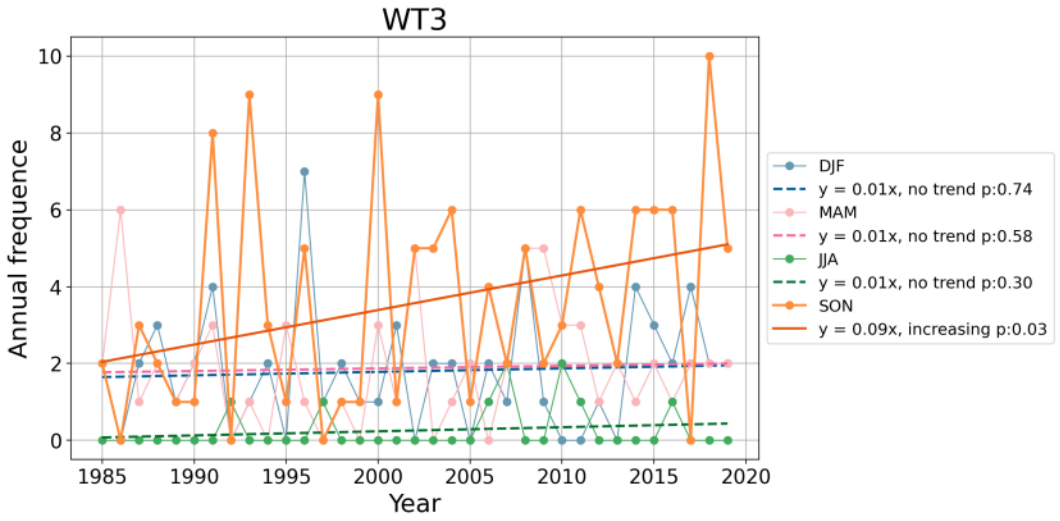


Table A1
SOM configuration

TABLE A1 SOM configuration

Domain	row by col	neighborhood function	sigma	learning rate	decay function
North-Central Italy[a]	2 × 2	gaussian	1	0.002	`asymptotic_decay`
Italy[b]	2 × 3	gaussian	1	0.005	`asymptotic_decay`

[a]Same for ArCIS, CERRA-Land and MSWEP.
[b]For CERRA-Land, extendend to all Italy.

Additional Information

Table A2

Summary table with the characterizations of EPEs weather types of Italy

TABLE 1 Characterizations of EPEs weather types of Italy

	Weather type	Frequency	Moisture flux	Affected areas	Seasonality	Notable events
WT1	Atlantic cyclone over France/northern Tyrrhenian Sea associated with deep upper-level trough over British Isles	13.22 %	Southerly to south-westerly	Tyrrhenian side, Liguria, Central-Eastern Alps, western side of Sardinia and Sicily	Late Autumn, Winter.	Storm Vaia (29-10-2019);
WT2	Mediterranean cyclone over Central Italy associated with upper-level trough over north-central Europe	11.85 %	Cyclonic (northwesterly over N. Italy, westerly over S. Italy, easterly over N.E. Italy)	Eastern Po Valley, southern Tyrrhenian side	All year.	Sarno flood (04-05-1998)
WT3	Western Mediterranean cyclone associated with upper level trough over Iberia	18.89 %	Southerly	Northwestern Italy, northcentral Tyrrhenian side, Eastern Alps, Ionian side, Sardinia, Sicily	Spring and Autumn, particularly October and November.	Major Po river flood (14-10-2000)
WT4	Westerly zonal flow associated with wide upper-level trough over north Atlantic, shallow cyclone over Ligurian Sea	19.90 %	Westerly to south-westerly. High TCWV values.	North Italy, Central Alps, Tyrrhenian side	Summer and autumn.	Livorno flood (09-09-2017)
WT5	Western Mediterranean cyclone associated with upper level trough over north Italy and ridge over Southern Italy.	14.66 %	Southerly, recurving southeasterly over the Po Valley	Eastern Sardinia, Ionian sides	Late Summer to early Winter	Ionian Calabria flood (31-10-2015)
WT6	Mediterranean cyclone centered over Southern Italy.	21.48 %	South-westerly over S. Italy, easterly over the Po Valley	Adriatic and Ionian side, eastern Po Valley	Summer, Autumn and Spring.	Romagna and Marche flood (07-10-1996); Calabria (Soverato) flood (8-9-2000)

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