



LEGAMBIENTE



Venerdì 10 maggio 2024
h 9.00 / 17.00

Arezzo, Sala Convegni/Borsa Merci
Piazza Risorgimento n. 23

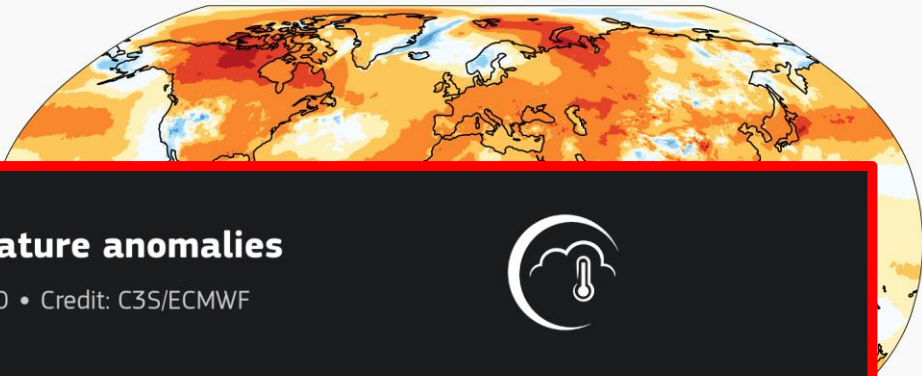


Cambiamento climatico e risorsa idrica

Bernardo Gozzini

THE 2023 ANNUAL CLIMATE SUMMARY

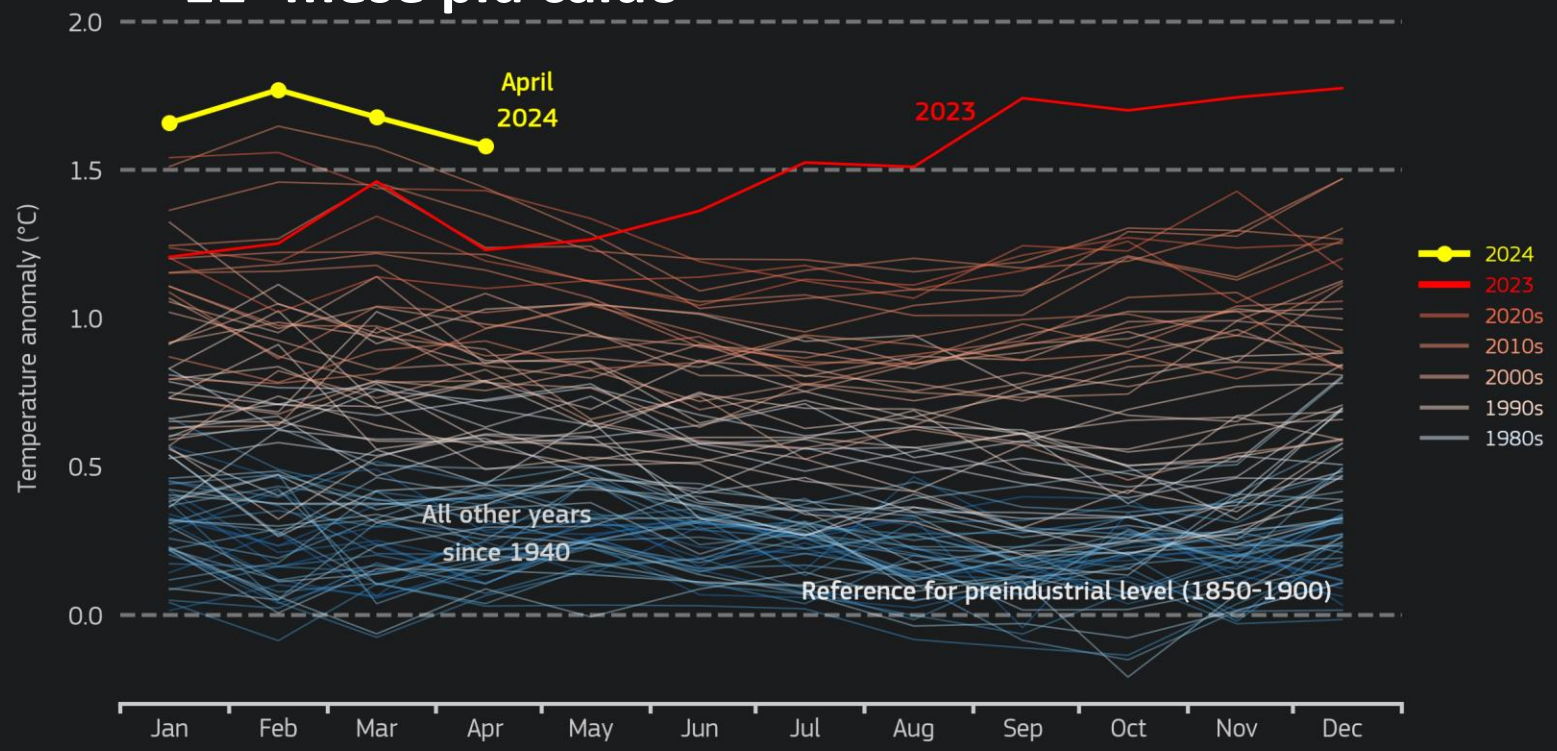
Global Climate Highlights 2023



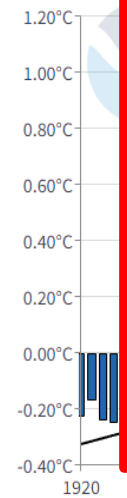
Monthly global surface air temperature anomalies

Data: ERA5 1940-2024 • Reference period: 1850-1900 • Credit: C3S/ECMWF

11° mese più caldo



Global Land
January-December



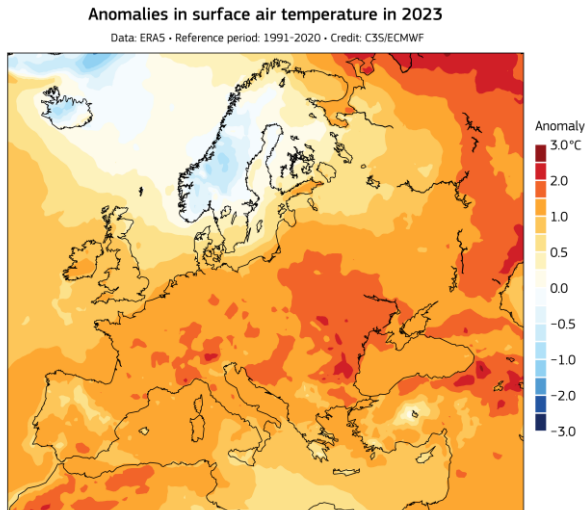
PROGRAMME OF THE
EUROPEAN UNION



EUROPEAN STATE OF THE CLIMATE REPORT 2023

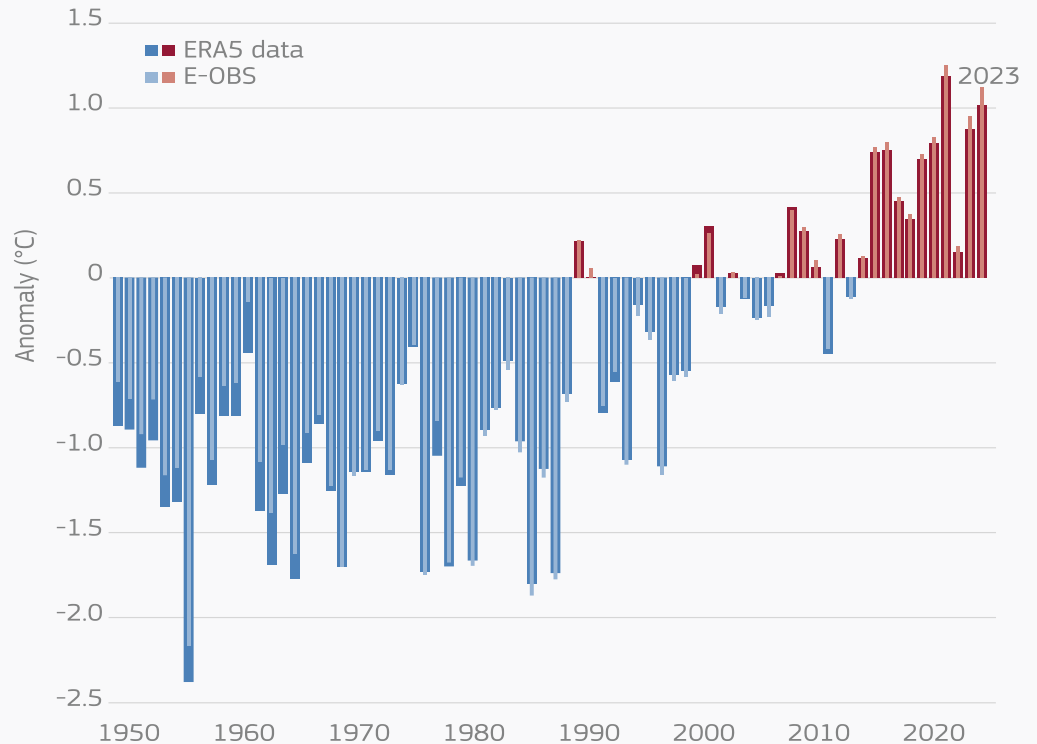


- 2023 secondo più caldo (2020) + 1,02°
- I primi 3 dal 2020, i primi 7 dal 2007



Anomalies in annual surface air temperature for European land (C3S domain)

Increase above 1991–2020 reference level



Data: ERA5, E-OBS • Credit: C3S/ECMWF/KNMI

EUROPEAN STATE OF THE CLIMATE REPORT 2023

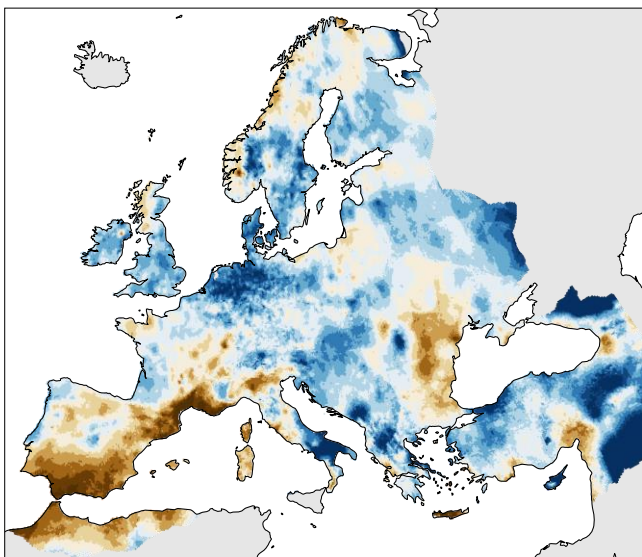


- 2023 particolarmente piovoso + 7% (1991–2020)
- 2 serie di dati molto lunghe – E-OBS and ERA5 – mostrano un trend, Europa Nord più umida, Europa Sud più secca

Anomalies in annual precipitation over European land

Anomalies in precipitation in 2023

Data: E-OBS • Reference period: 1991-2020 • Credit: C3S/ECMWF/KNMI

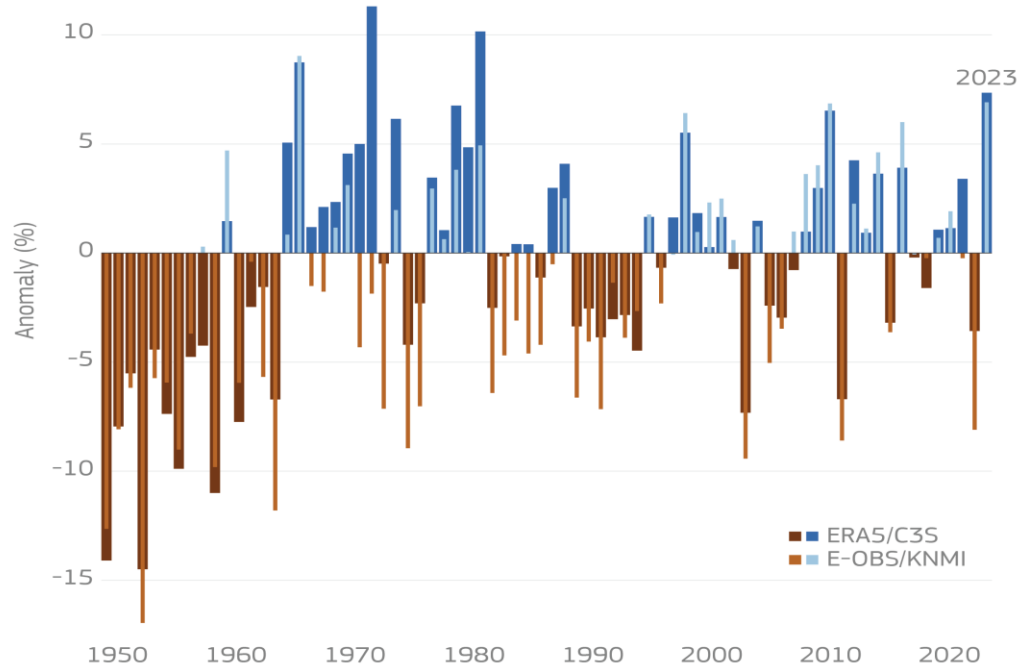


Copernicus Climate Change Service
European State of the Climate | 2023

PROGRAMME OF
THE EUROPEAN UNION

Copernicus

ECMWF



Data: ERA5, E-OBS • Reference period: 1991–2020 • Credit: C3S/ECMWF/KNMI

Copernicus Climate Change Service
European State of the Climate | 2023

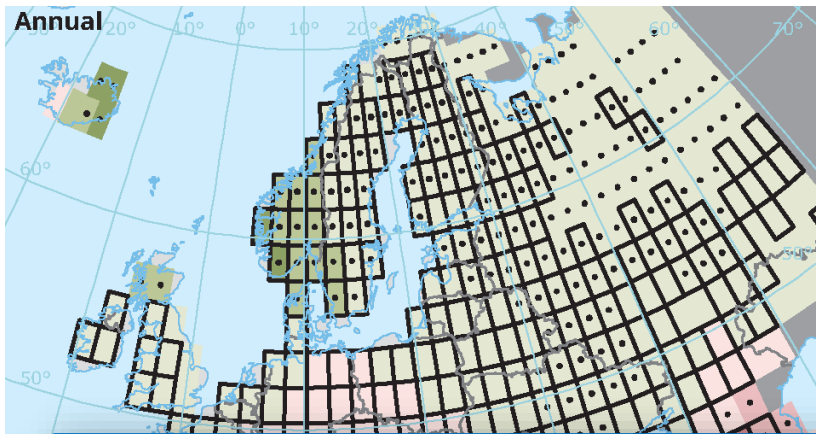
PROGRAMME OF
THE EUROPEAN UNION

Copernicus

IMPLEMENTED BY
ECMWF

CAMBIAMENTI CLIMATICI

PRECIPITAZIONE IN EUROPA



Gli stati dell'Europa meridionale sono indebitati o piccoli per affrontare da soli l'investimento necessario. Paesi europei devono aiutarsi a vicenda per affrontare gli impatti del cambiamento climatico

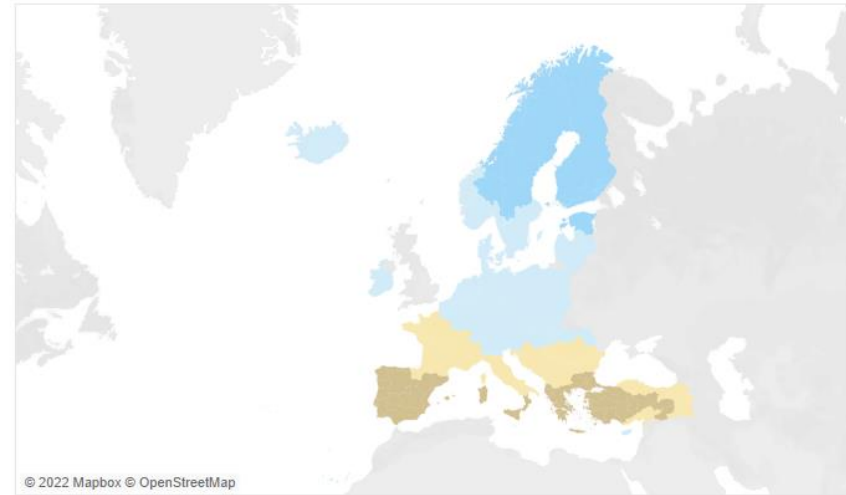
<https://www.eea.europa.eu/publications/europes-changing-climate-hazards-1/wet-and-dry-1/wet-and-dry-mean-precipitation>

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Projected change in precipitation sum

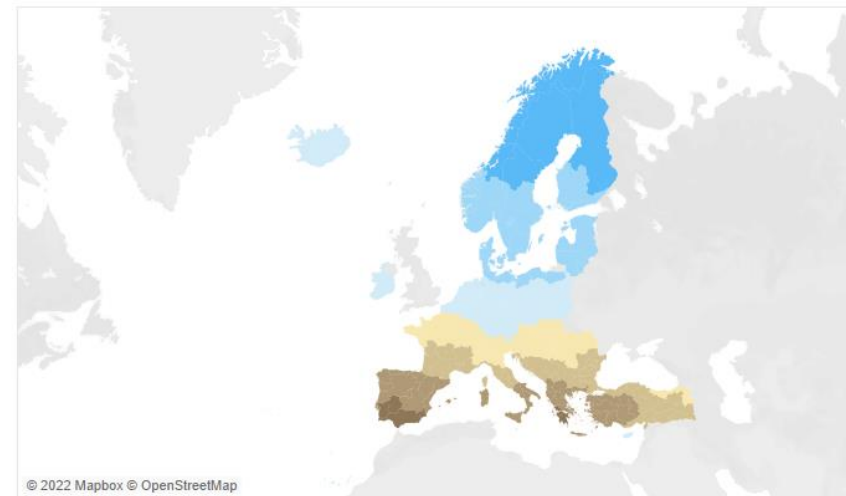
Time Period 2041-2070 Season Annual Scenario RCP8.5



% change

Projected change in precipitation sum

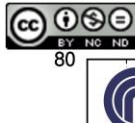
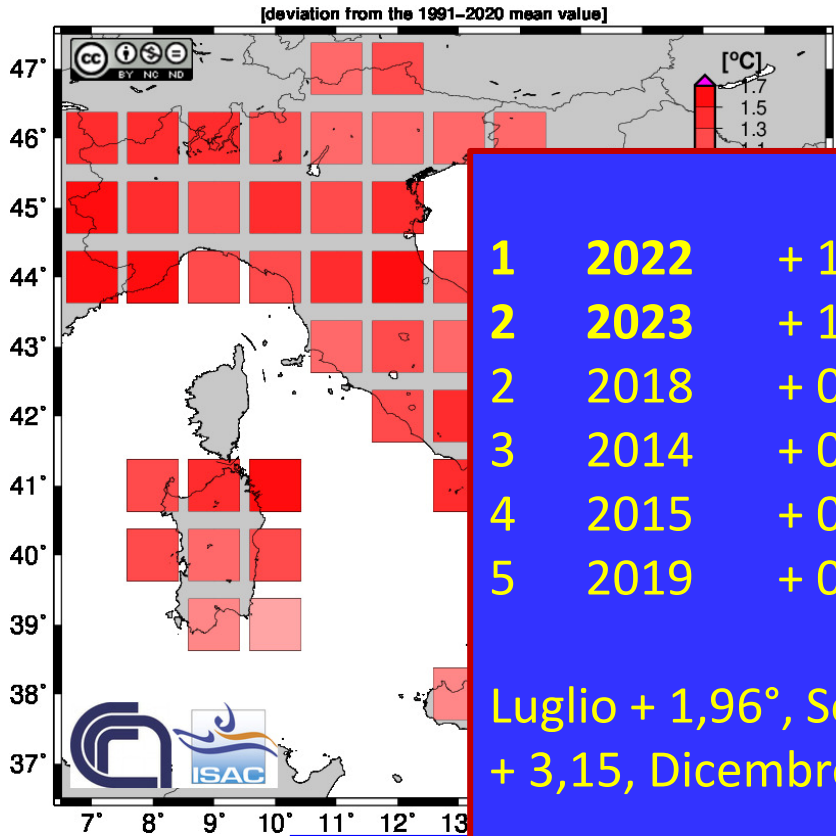
Time Period 2071-2099 Season Annual Scenario RCP8.5



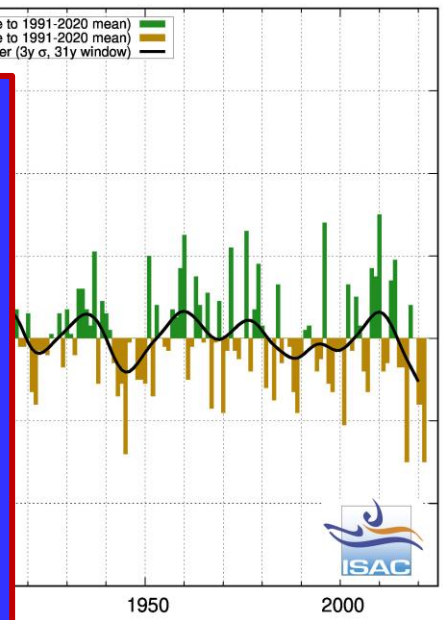
% change



ITALIA 2023



ANNUAL PRECIPITATION



Classifica		
1	2022	+ 1,15°C
2	2023	+ 1,12°C
2	2018	+ 0,75°
3	2014	+ 0,6°
4	2015	+ 0,59°
5	2019	+ 0,55°

Luglio + 1,96°, Settembre + 2,17°, Ottobre + 3,15, Dicembre + 1,87°

2023: secondo + 1,12 2022 + 1,15
MAX: secondo + 1,15° 2022 + 1,40°
MIN: il più caldo + 1,07°

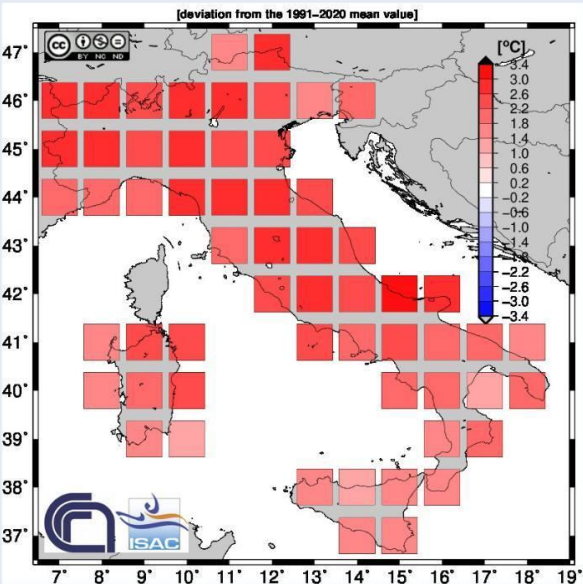
Clima calcolato sul periodo 1991-2020

INVERNO (DGF)

FEBBRAIO

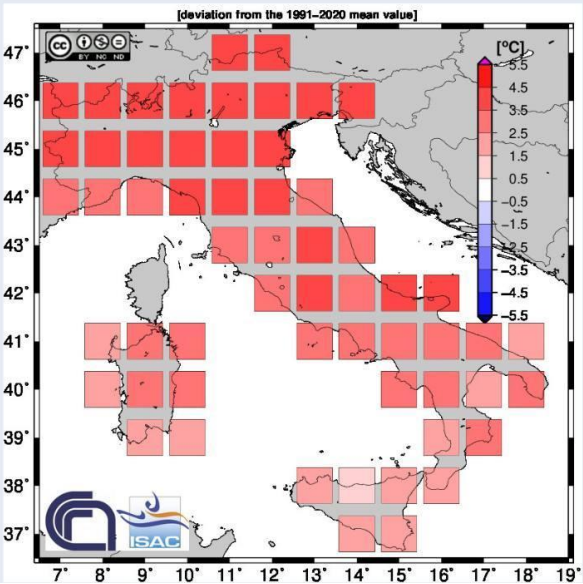
ANCHE IN **ITALIA** L'INVERNO 2024 È
STATO IL **PIÙ CALDO MAI REGISTRATO**
DAL 1800 A OGGI

+ 2,19°C RISPETTO ALLA MEDIA
DEL PERIODO 1991-2020



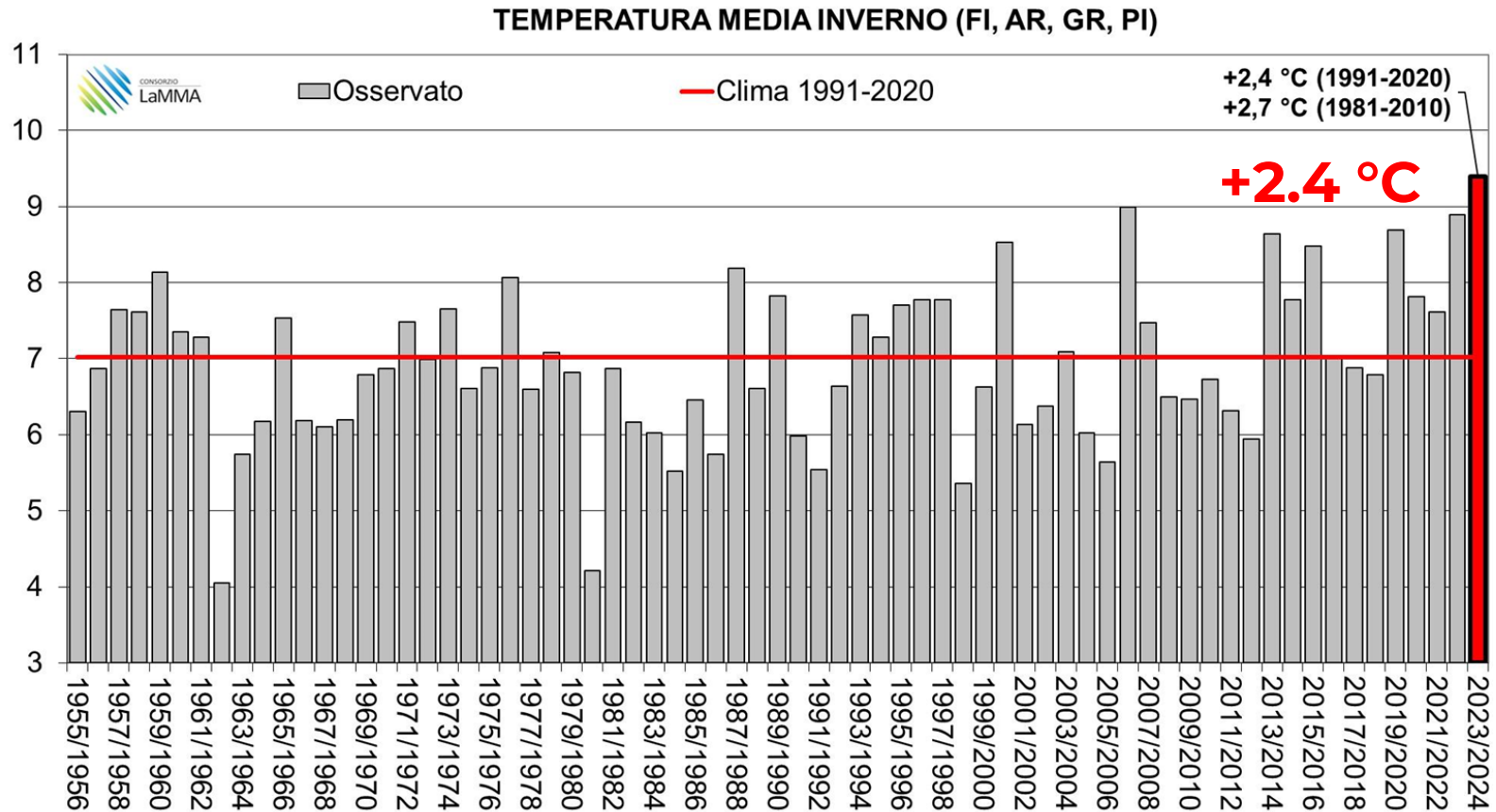
ANCHE IN **ITALIA** IL FEBBRAIO 2024 È
STATO IL **PIÙ CALDO MAI REGISTRATO**
DAL 1800 A OGGI

+ 3,09°C RISPETTO ALLA MEDIA
DEL PERIODO 1991-2020



TOSCANA: si chiude il NON INVERNO

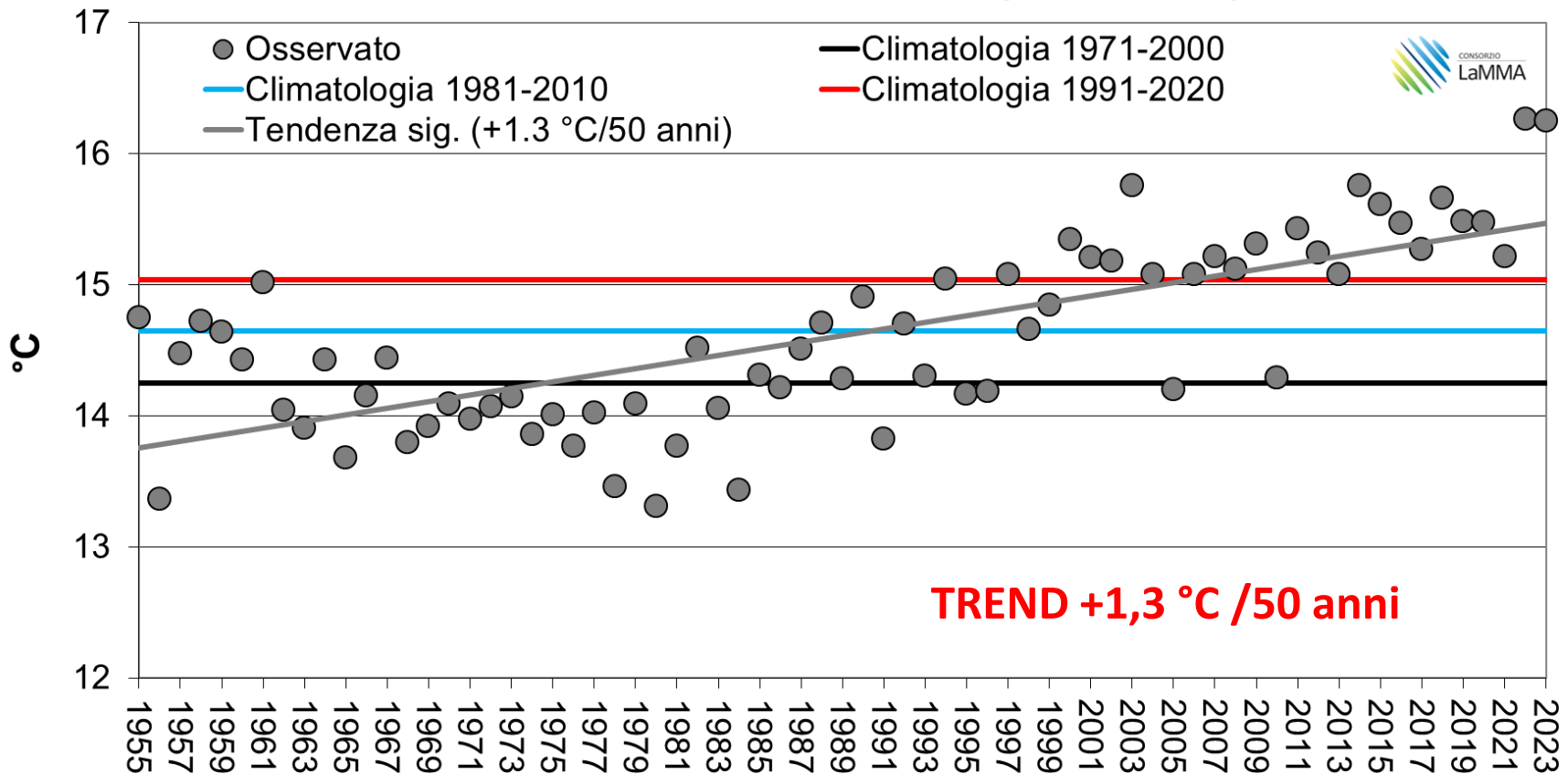
il più caldo degli ultimi 70 anni



Temperature medie annue 1955-2023

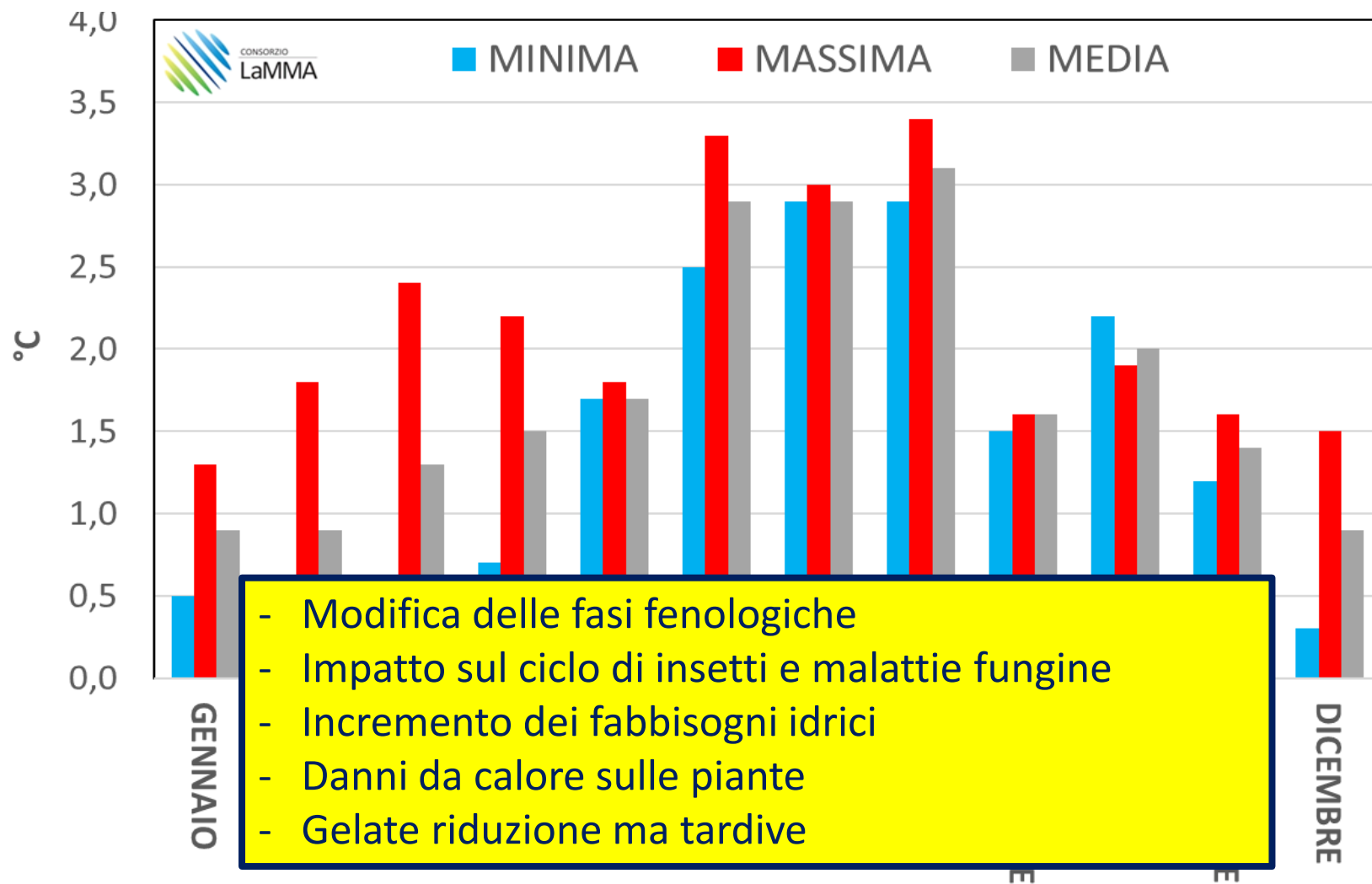
Toscana (AR, FI, GR, PI)

Temperatura media annua (AR,FI,GR,PI)



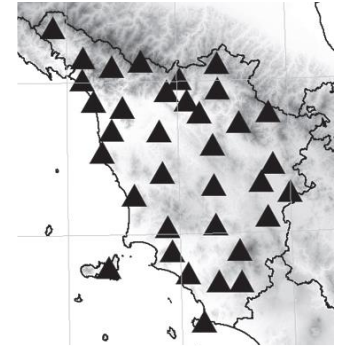
Trend (50 anni): Massime +1,5°, Minime +1,0°

AUMENTO TEMPERATURA IN TOSCANA DAL 1955 (FI, PI, GR, AR)

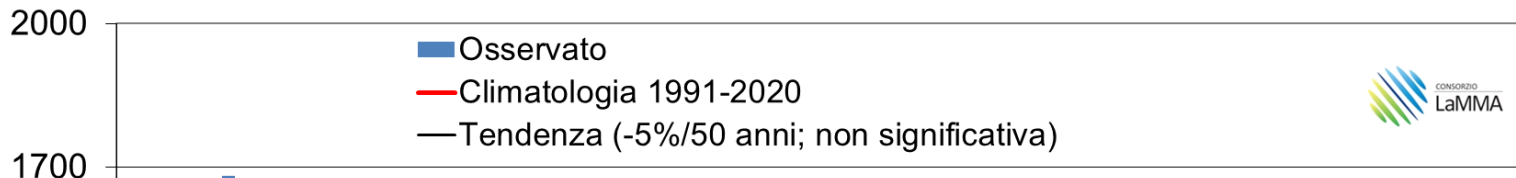


CAMBIAMENTI CLIMATICI

PIOGGIA CUMULATA ANNUALE

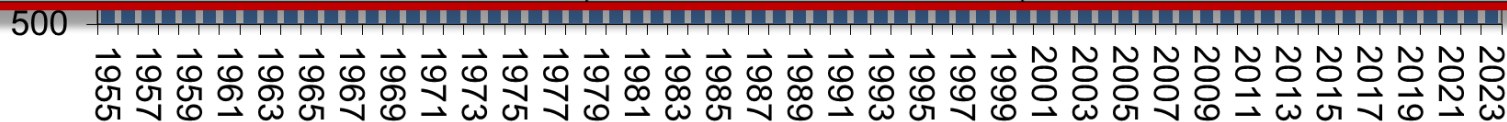


Pioggia annuale



VARIAZIONE % OGNI 50 ANNI DAL 1955 AL 2023

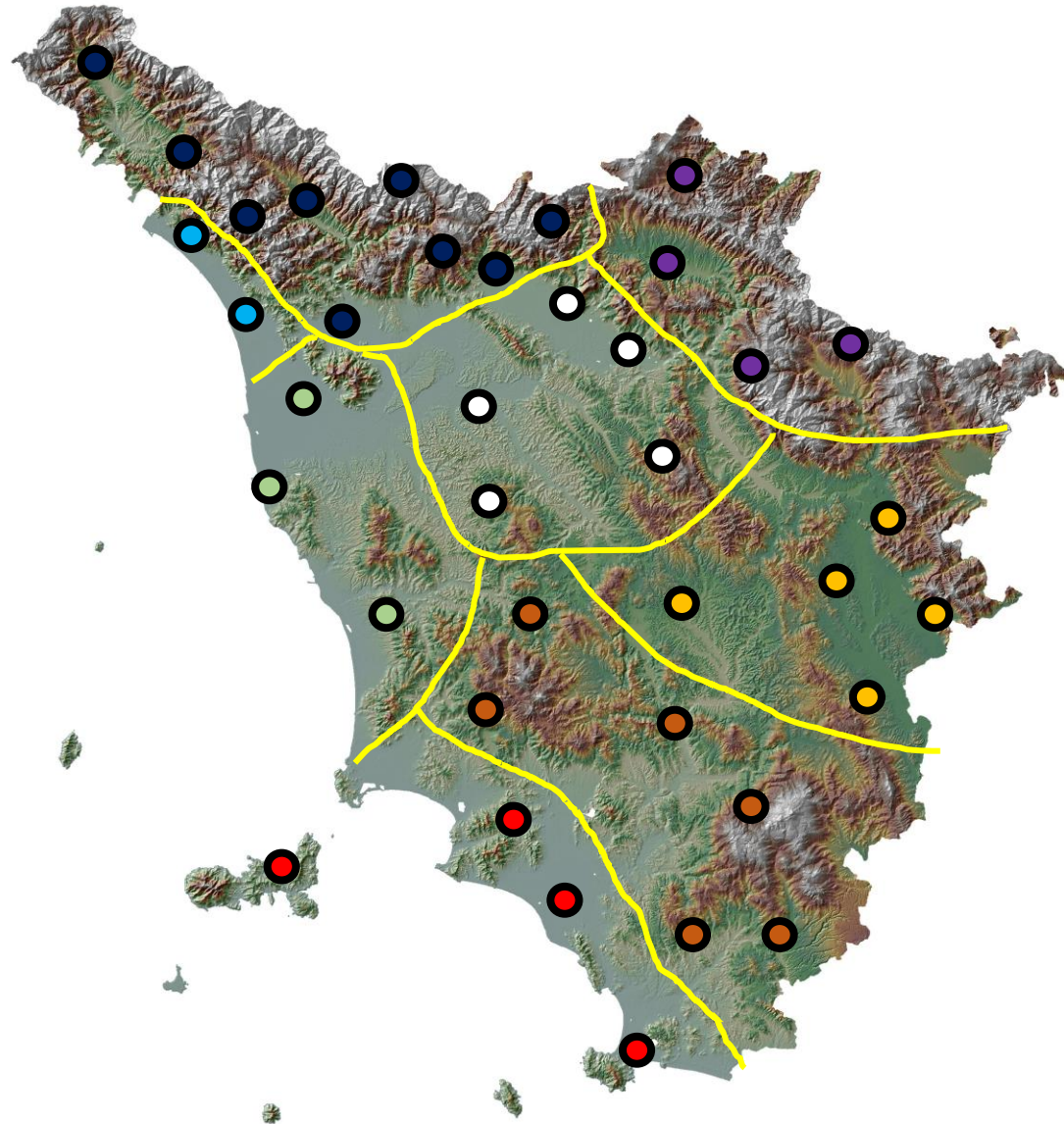
PERIODO	PIOGGIA	GIORNI DI PIOGGIA
ANNO	-5	-8
PRIMAVERA	-14	-20
ESTATE	-16	-23
AUTUNNO	3	3
INVERNO	-3	-8



Pioggia: Suddivisione Toscana in 8 aree

AREE:

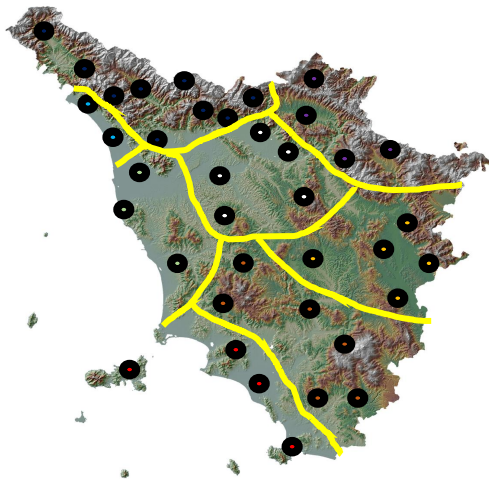
1. NO Nord Ovest
2. App Orien
3. Costa Nord
4. Costa Centro
5. Fi-Chianti
6. Amiata-Coll.Met.
7. Chiana-Coll.Siena
8. Costa Sud



Pioggia

Trend annuali e stagionali sulle 8 aree 1955-2023

AREE	ANNUALE	PRIMAVERA	ESTATE	AUTUNNO	INVERNO
NORD OVEST	-6	-18	-21	2	2
APPEN. ORIEN.	-1	-7	-17	7	7
COSTA NORD	-2	-13	-20	10	10
COSTA CENTRO	-3	-18	-22	4	4
FI-CHIANTI	-8	-15	-25	4	4
AMIATA-COLL. MET.	-9	-18	-2	-3	-3
CHIANA-COLL. SIENA	2	-6	4	5	5
COSTA SUD	-4	-16	0	10	10



Non ci sono trend significativi se non
diminuzione in:

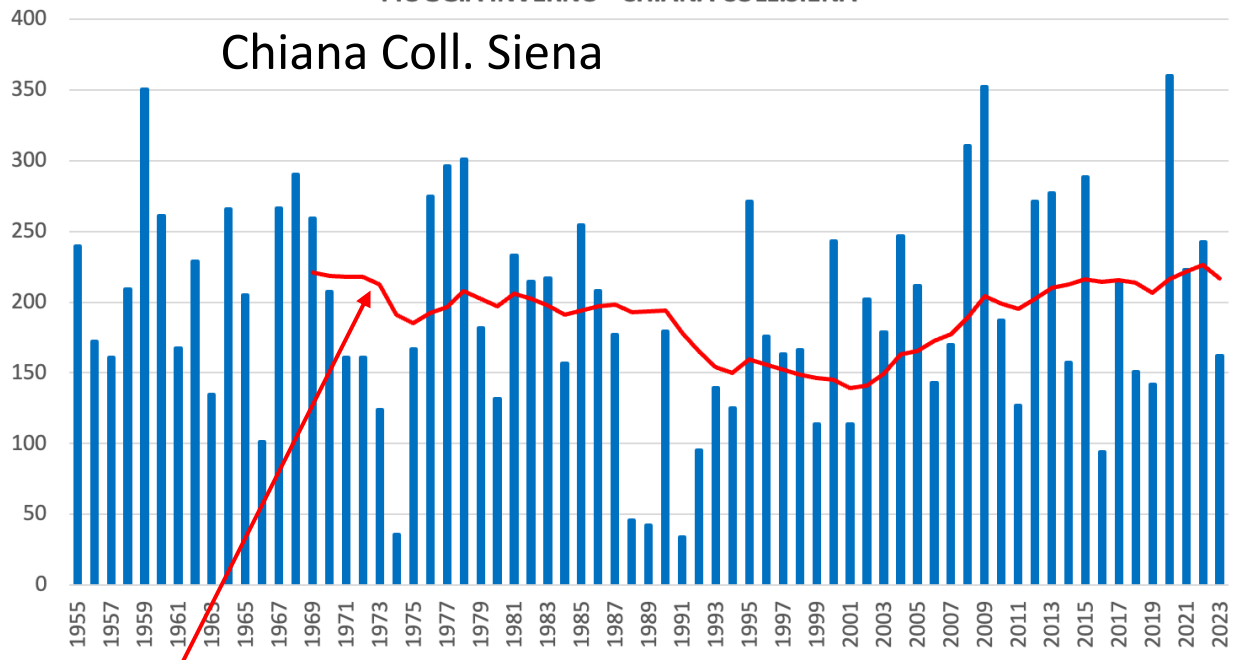
PRIMAVERA: Costa Centro

ESTATE: Nord-Ovest, Fi-Chianti

minore attività temporalesca?

PIOGGIA INVERNO - CHIANA COLL.SIENA

Chiana Coll. Siena

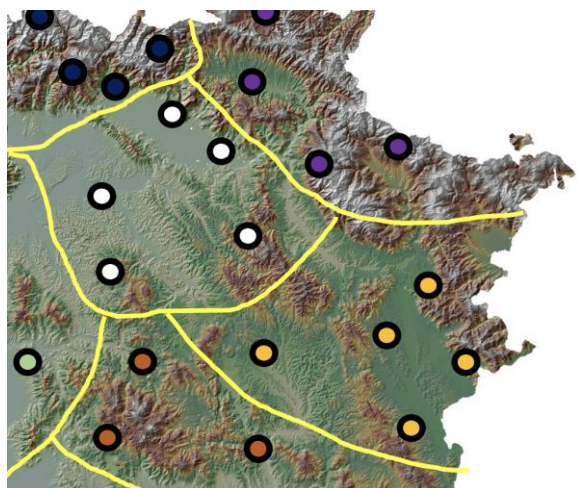


Media mobile 15 anni

PIOGGIA-STAGIONI

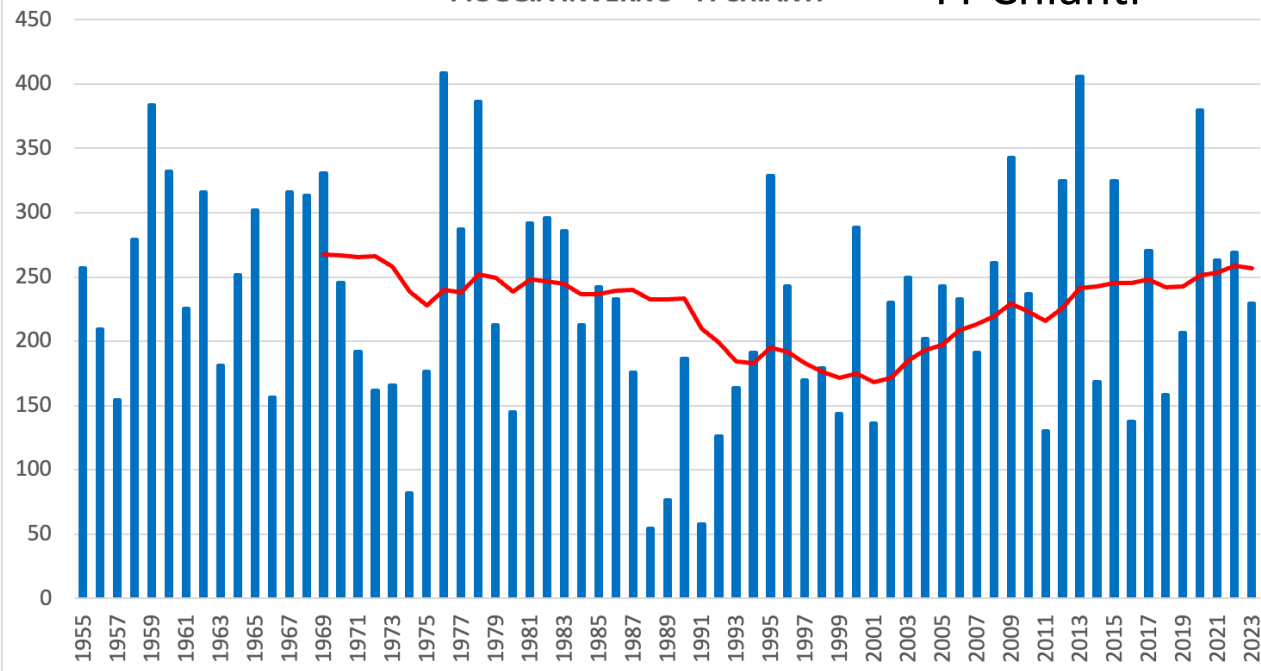
Inverno

In calo nella prima parte della serie in deciso aumento nella seconda parte in tutte le aree
Autunno comportamento opposto

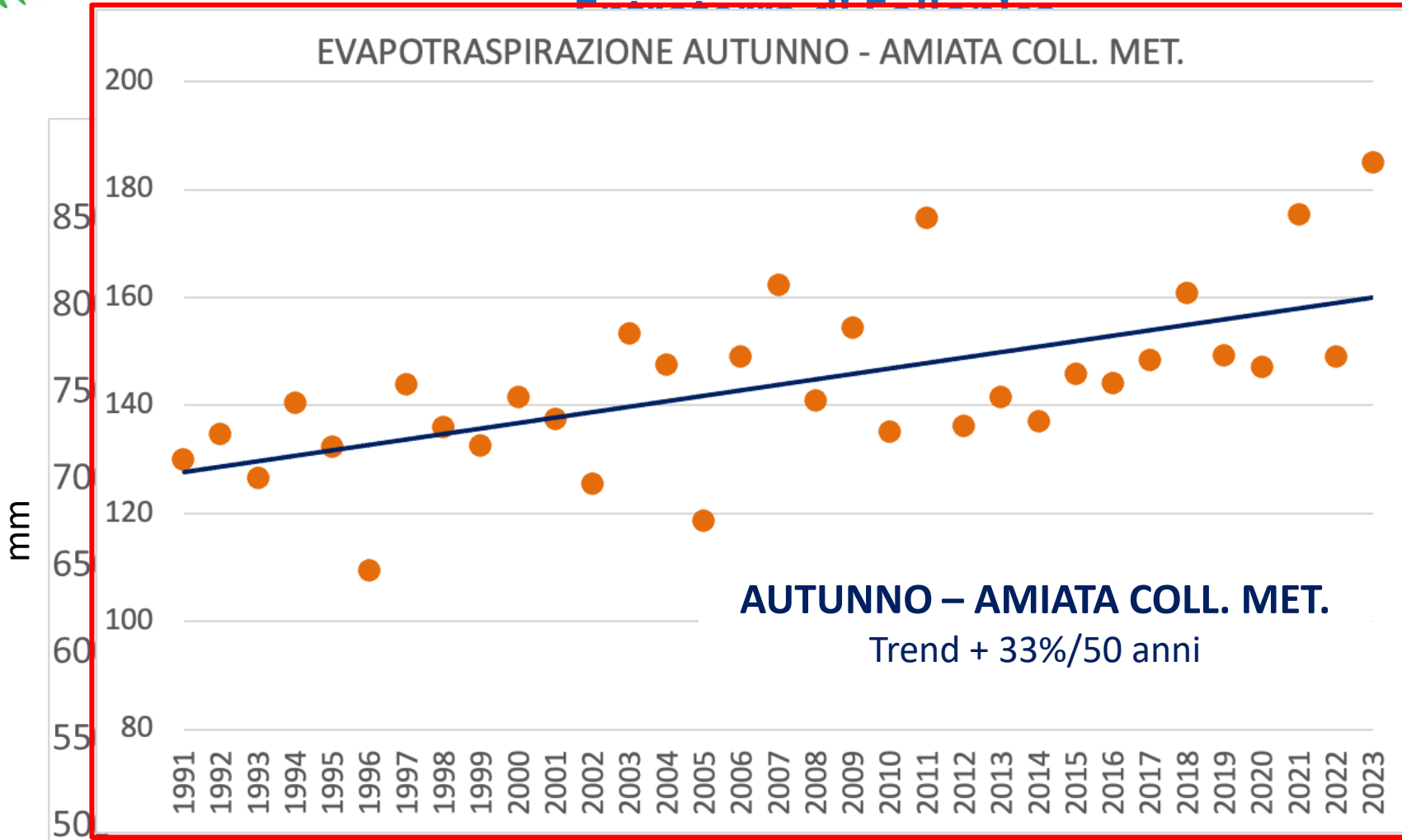


PIOGGIA INVERNO - FI CHIANTI

FI-Chianti



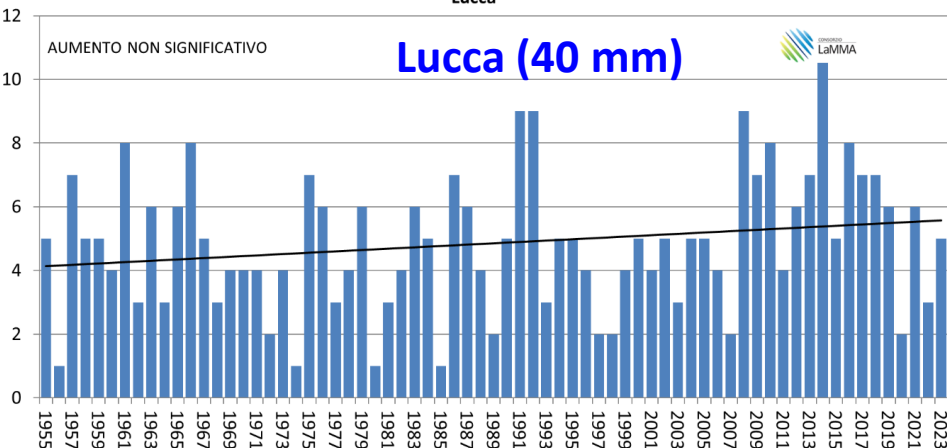
TREND DELL'EVAPOTRASPIRAZIONE POTENZIALE



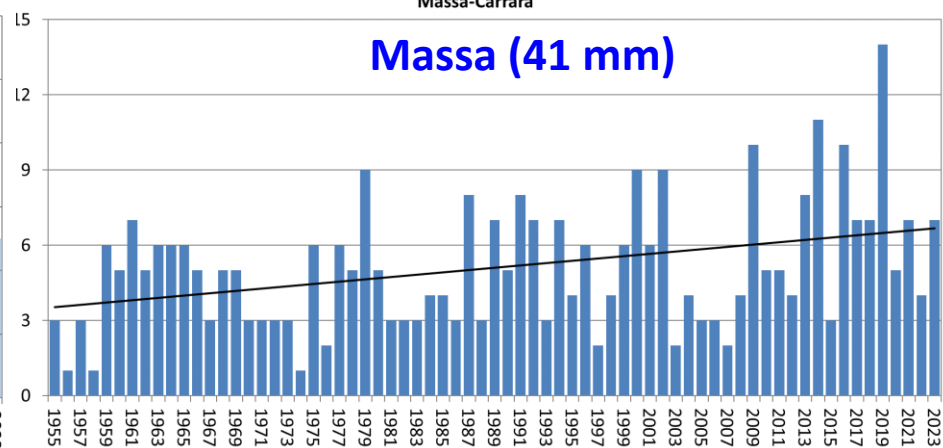
Aumenti in tutte le aree: >30% Costa N, Costa C, Costa S. e Nord-Ovest

Numero di giorni con precipitazione maggiore del 95° percentile 1955-2023

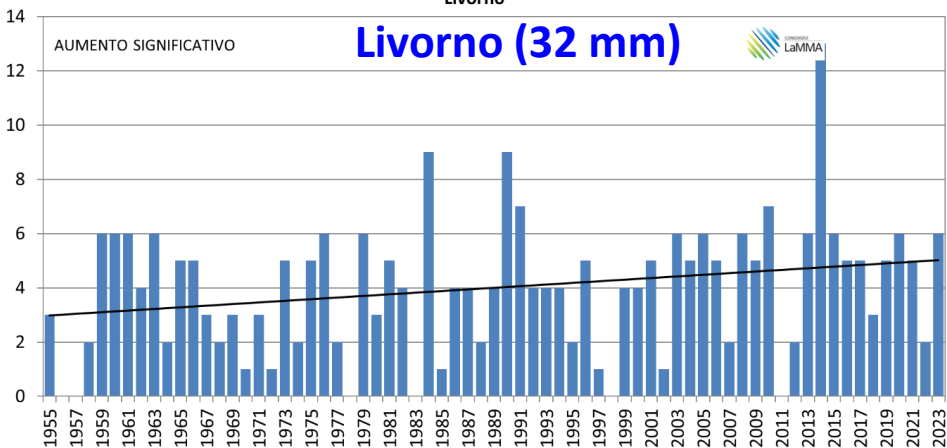
Giorni annui con pioggia giornaliera > 40 mm (95 percentile)
Lucca



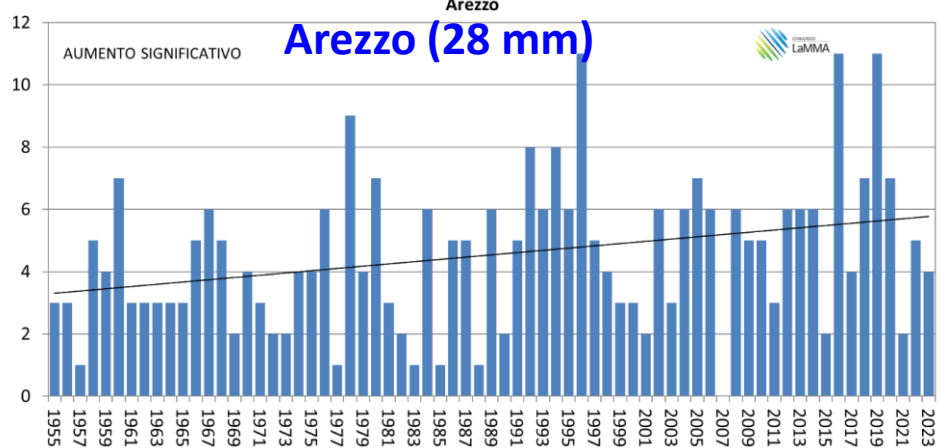
Giorni annui con pioggia giornaliera > 41 mm (95 percentile)
Massa-Carrara



Giorni annui con pioggia giornaliera > 32 mm (95 percentile)
Livorno



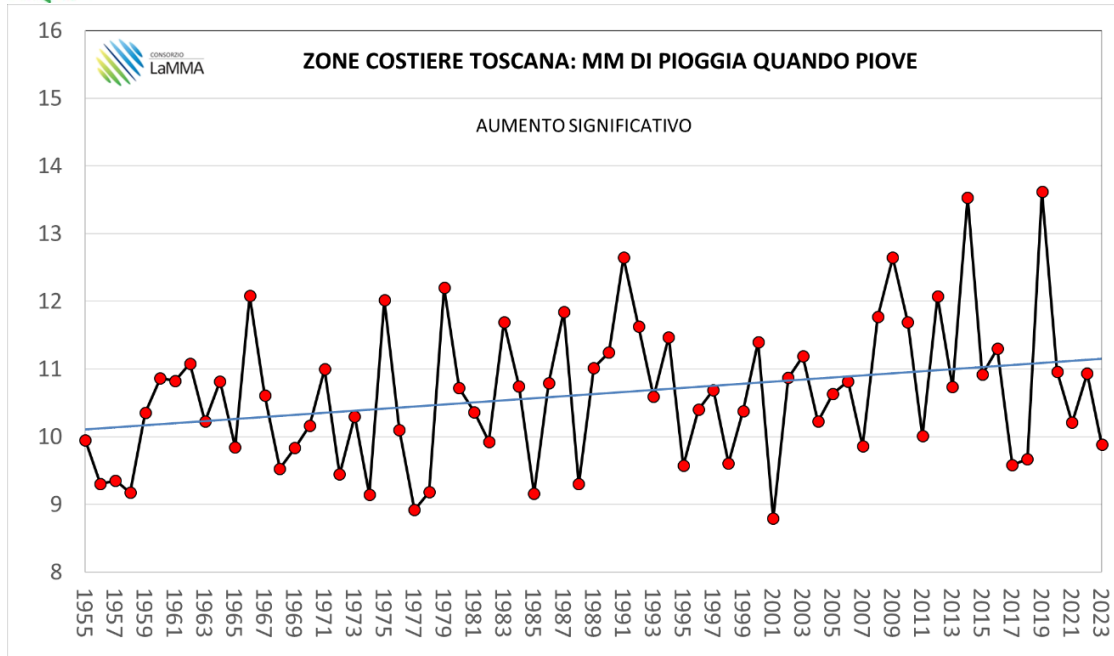
Giorni annui con pioggia giornaliera > 28 mm (95 percentile)
Arezzo



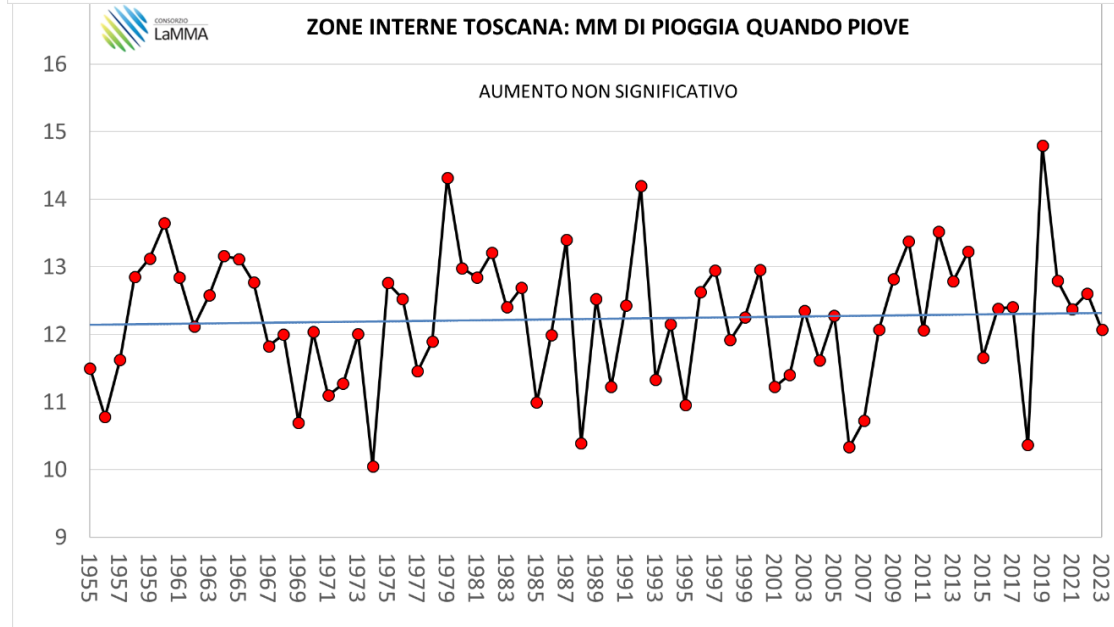
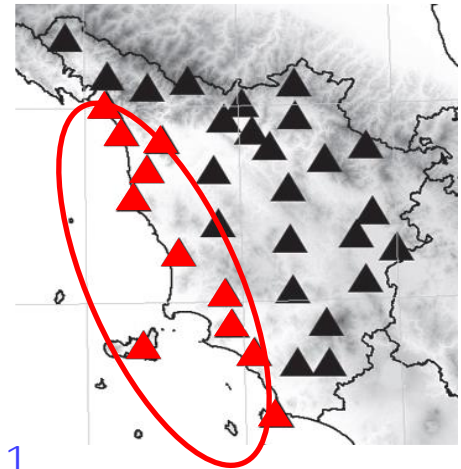
SEGNALI DI UN AUMENTO DELL'INTENSITA'



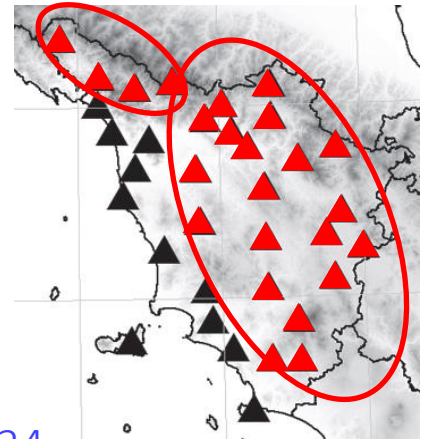
Quanto piove quando piove! (1955-2023)



Costa 11



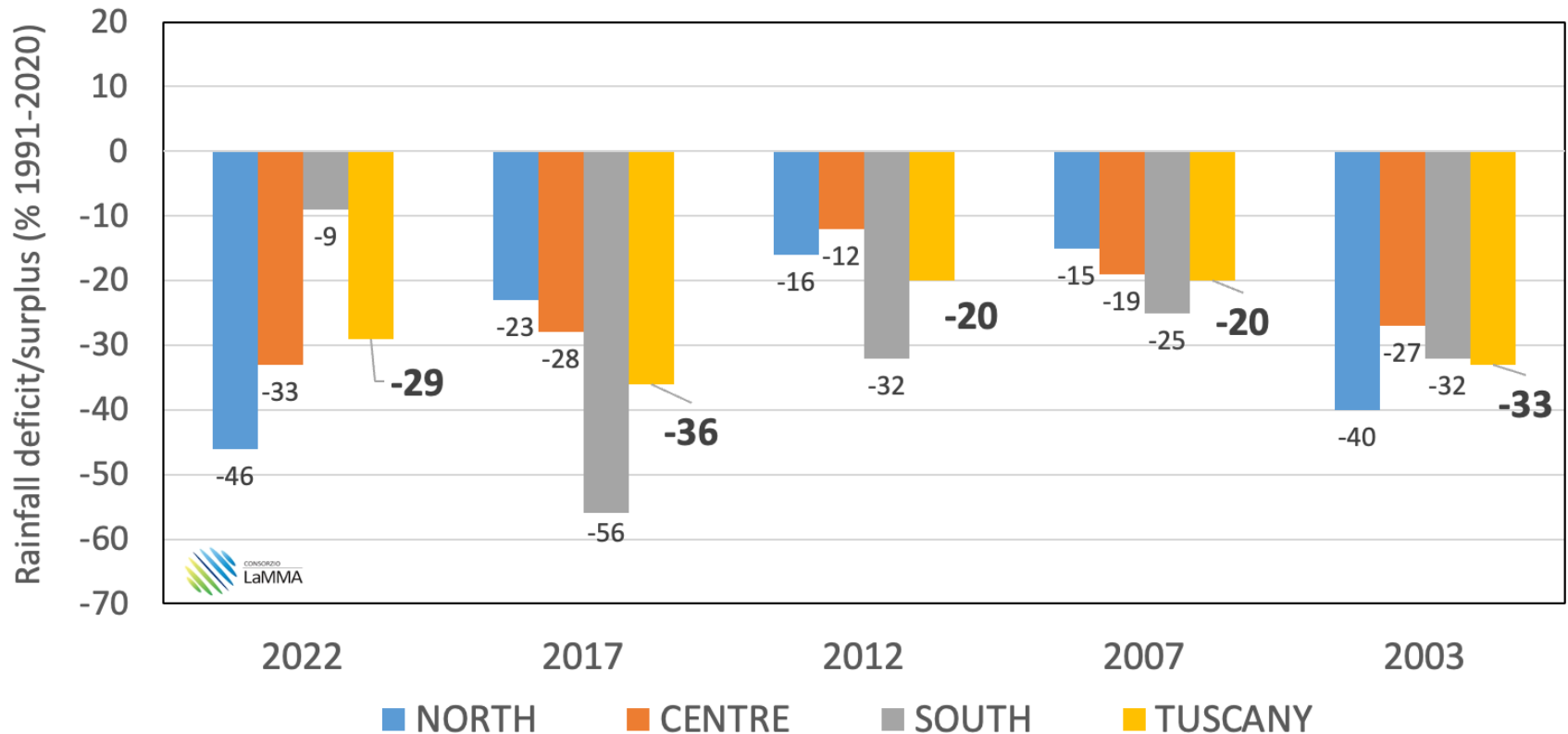
Interno 24



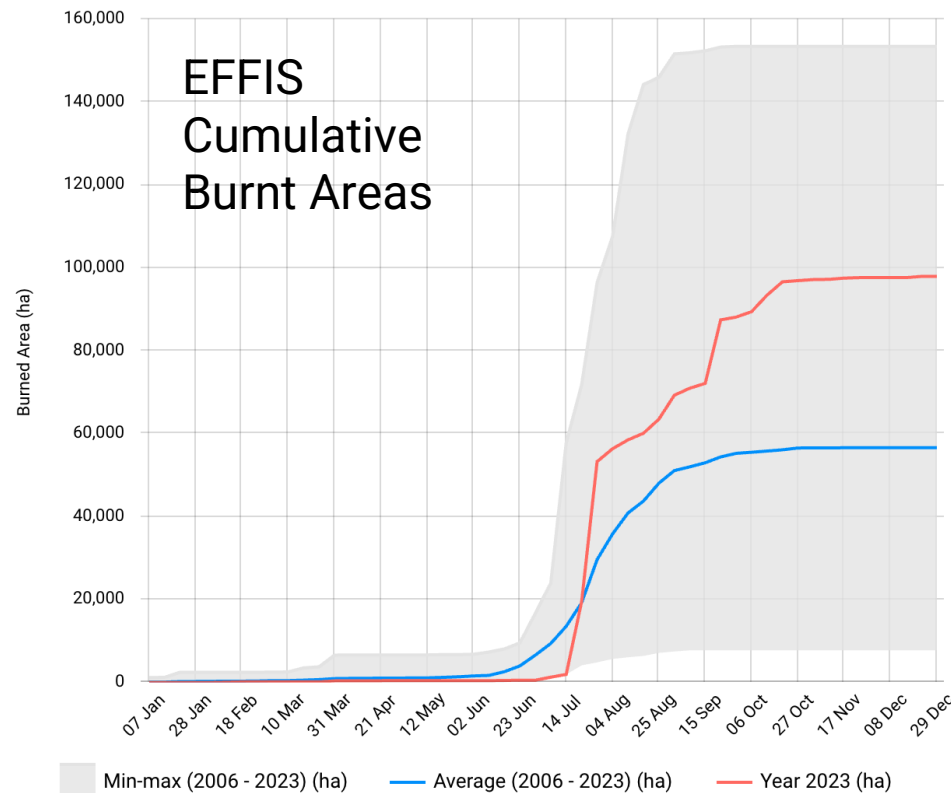
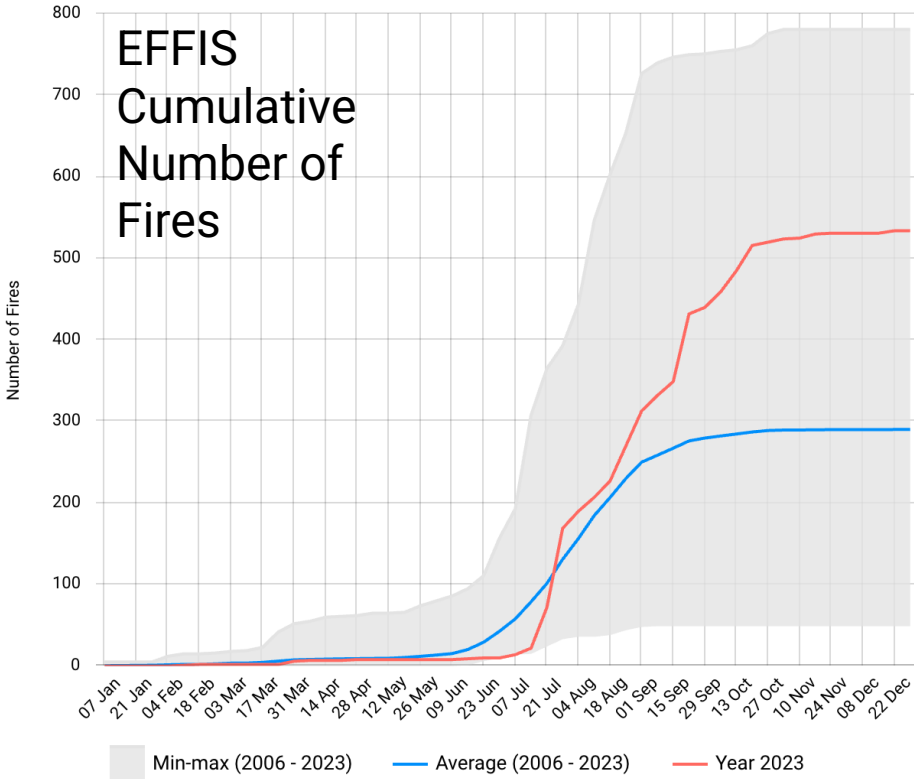


Forti siccita' in Toscana Gennaio-Ottobre (2000-2022)

THE WORST DROUGHTS OF RECENT YEARS IN TUSCANY
(JANUARY 1- OCTOBER 31 period)



Incendi boschivi ITALIA 2023

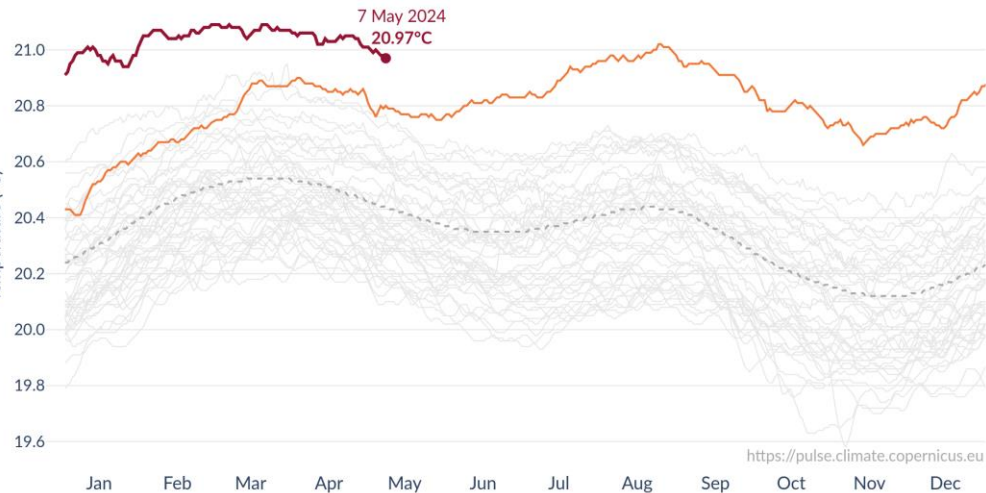


**TOSCANA: 591 incendi, 2247 ha, 3,5 ha per event
(mean 2015-2021 was 2,1)**

Daily sea surface temperature for 60°S–60°N

Data: ERA5 1979–2024 • Credit: C3S/ECMWF

— 2024 — 2023 — 1979–2022 - - - 1991–2020 average



<https://pulse.climate.copernicus.eu>



PROGRAMME OF THE EUROPEAN UNION

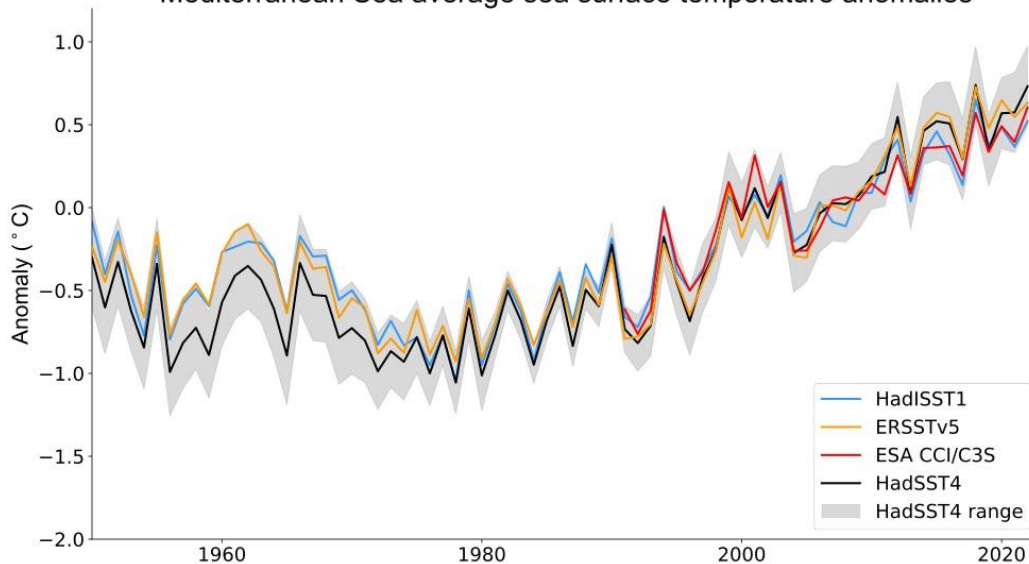


Temperatura Sup. Mare

7 maggio - Temperatura
oceani 60°S-60°N

Mediterraneo
Anomalie di
temperatura
superficiale del
mare

Mediterranean Sea average sea surface temperature anomalies



Copernicus Climate Change Service
Climate Indicators | 2022



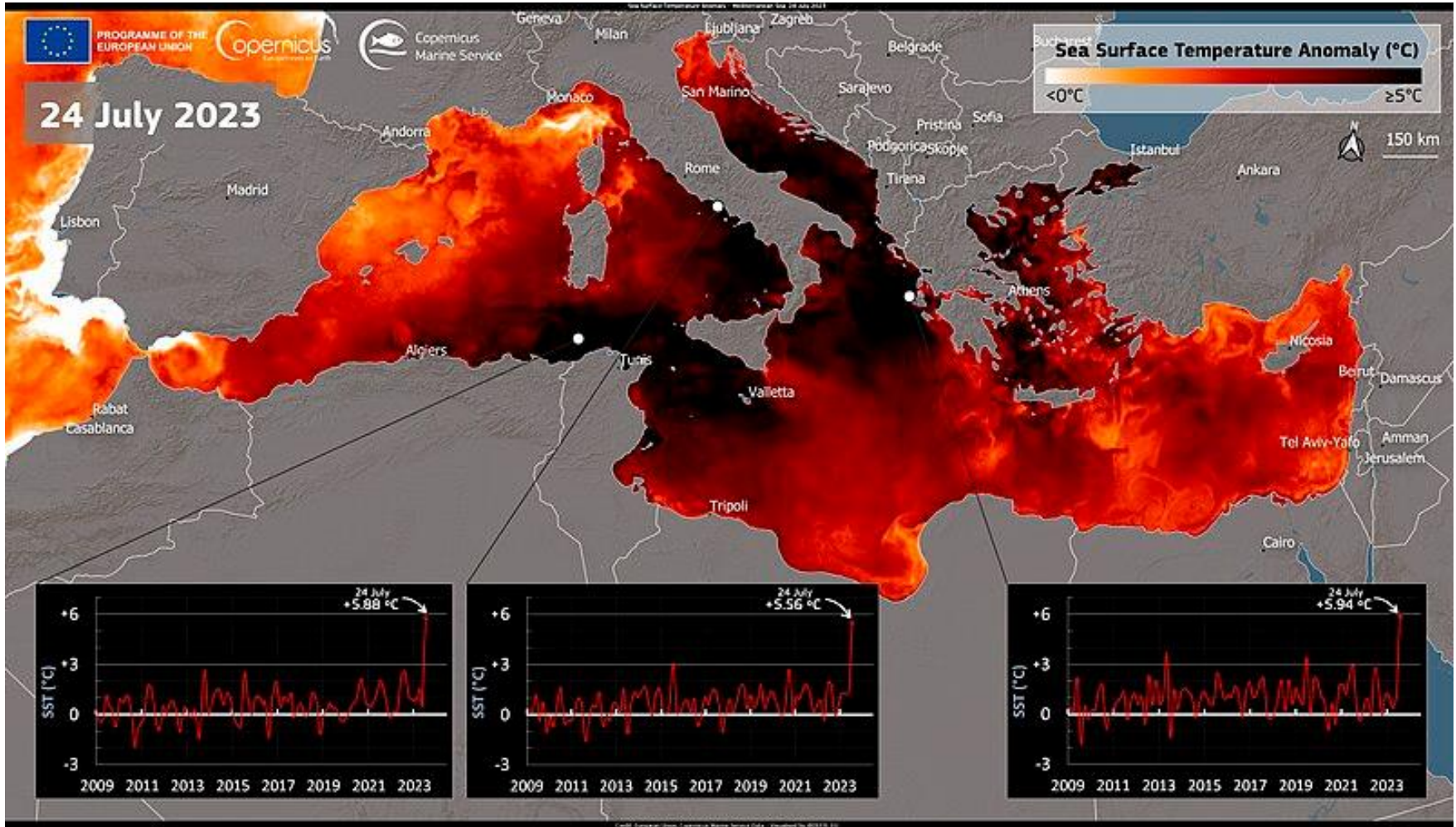
PROGRAMME OF THE EUROPEAN UNION



IMPLEMENTED BY



Temperatura superficiale del mare 24 luglio 2023



+ evaporazione, + energia, + umidità

Eventi Estremi 2023



SLOVENIA: 275 mm in 48 ore
Primi agosto



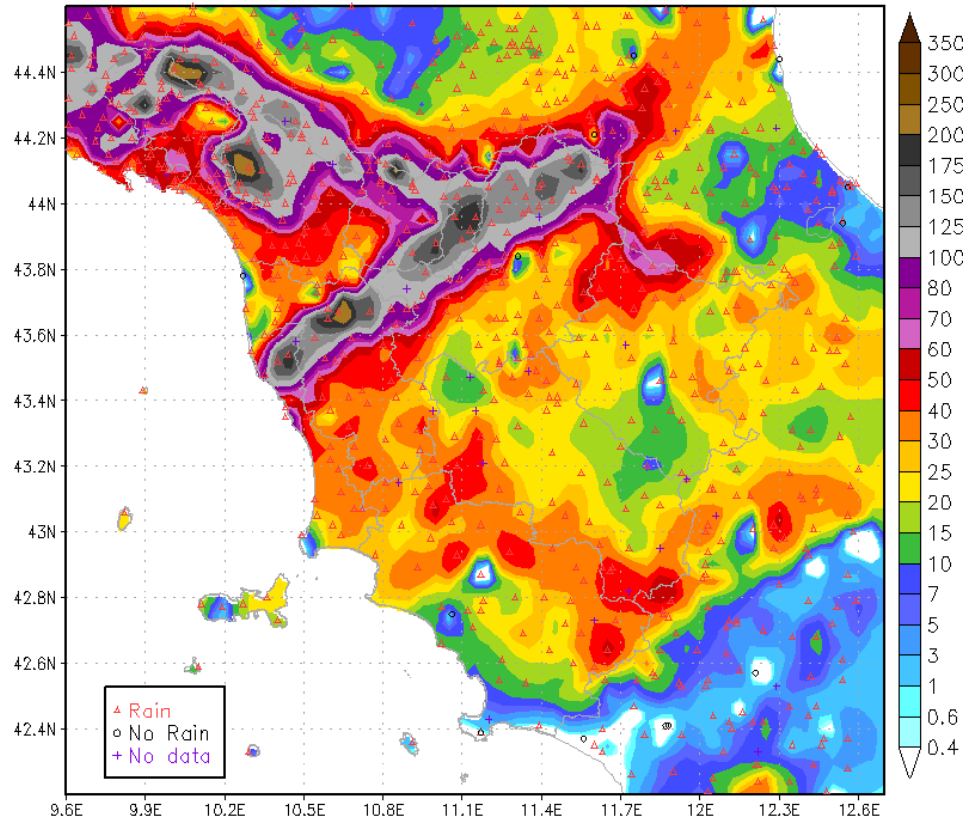
TESSAGLIA: 754 mm in 18 ore, fino a 900 mm in 36 ore
10/11 settembre



Nord Italia: grandinate record
Chicco di grandine più grande mai caduto in Europa - 19 cm diametro
24 luglio Friuli



Total Precipitation [mm] cumulated on
Thu, 02/11/2023



Station Number 834/860 Interpolation Grid: 0.05 deg

Cumulati

157,4 mm media su Bisenzio
all'idrometro Vaiano Gamberame (140,7
in 12 ore)

200 mm Appennino, Apuane e
Garfagnana, 250 Vagli di sotto (181 in 12
ore)

Intensità

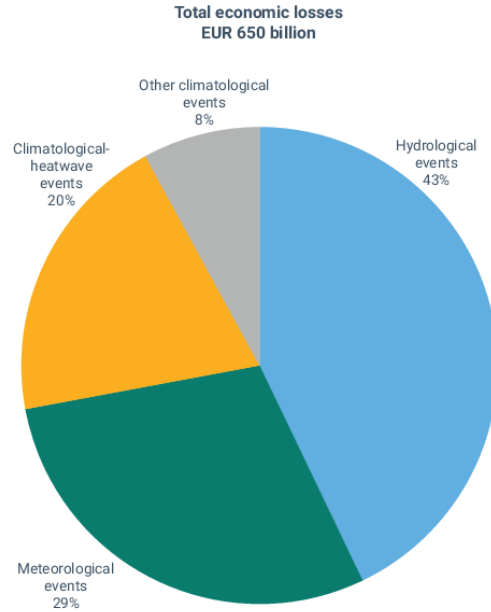
1h: 113,8 mm Pontedera, 104,2 Gello.

3h: 191,8 Pontedera, 115,8 Vaiano, 112,4
La Ferruccia, 101,2 Gamberame.

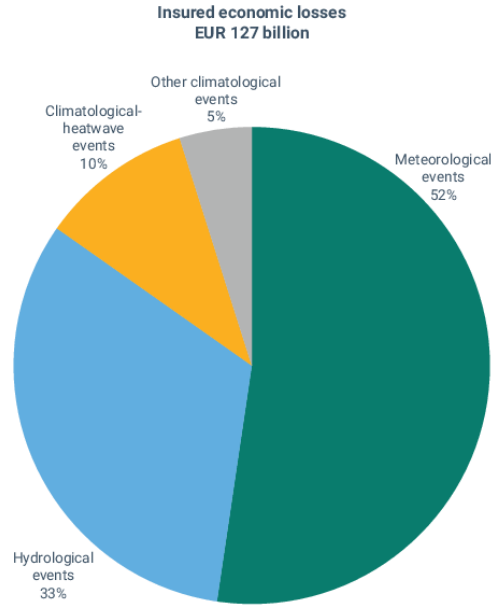
25 pluviometri hanno registrato cumulate sulle 6 ore con periodo
di ritorno > 200 anni

Perdite economiche dovute a eventi estremi in Europa dal 1980 al 2022

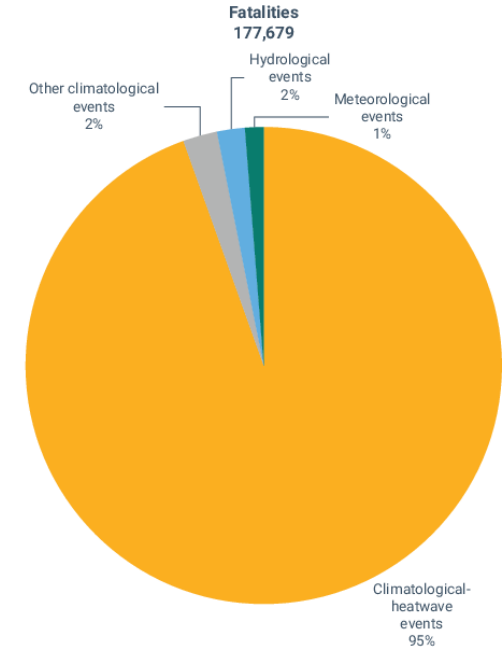
650 Mil. €



Ass. 127 Mil. €



Perdite umane



Germania 167.000, Francia 120.000, Italia 111.000

Global Risk Report 2024 World Economic Forum

Meteo (verde): tempeste, grandine, fulmini, **Clima (giallo):** ondate di calore, siccità, incendi, ondate freddo, **Idro (blu):** alluvioni



GRAZIE PER L'ATTENZIONE

