



**Third Edition**

## **RISK MANAGEMENT**

**Knowledge, Forecasting, Prevention,  
Protection, Planning, Preparedness**

**20 - 27 July 2025**



# **Climatic risk in the Mediterranean basin: droungh and floods**

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*Orvieto*  
**27 July 2025**

# Weather Vs Climate..... (source WMO - ESA)

**Weather** shows how the atmosphere behaves and can change from minute to minute, hour to hour, and day to day. There are many components to weather, including temperature, rain, wind, hail, snow, humidity, floods, storms, heat waves, and more. **When you look out the window at any given moment, what you see is the weather.**

**Climate** is the weather in a specific area over a **long timespan – usually 30 years or if it's possible more.** When scientists talk about climate, they look for trends or cycles of variability, such as changes in temperature, humidity, precipitation, ocean-surface temperature and other weather phenomena that occur over longer periods of time in a specific location.

# CLIMATE

the Set of weather or environmental conditions that characterize a geographic region and are defined in terms of statistical properties (e.g., average value of temperature or a total precipitation in a region or the typical range over which it can vary).

## CLIMATE CHANGE

**Statistically significant change** in the mean state of the climate or its variability, persisting over an extended period (typically decades or more).

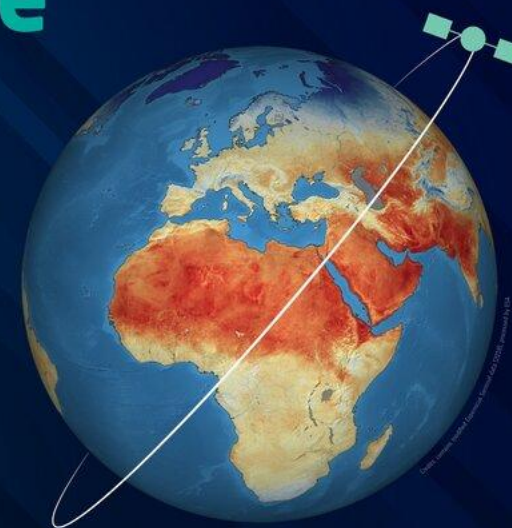
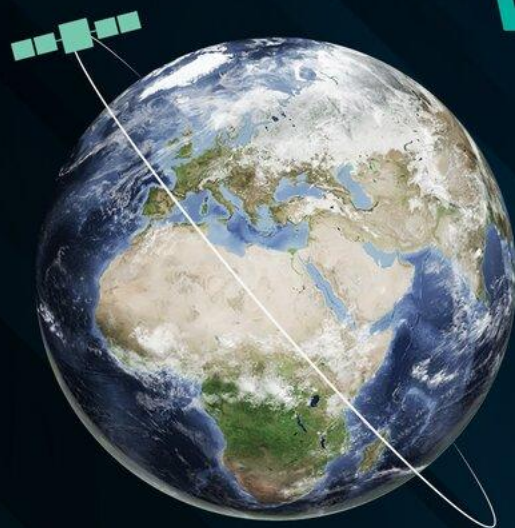
All this while remembering that:

- Climate is determined by Earth's energy balance
- The natural "Greenhouse Effect": the atmosphere keeps us "warm" enough to live



# Weather versus Climate

The difference between weather and climate is a matter of time



## Weather

refers to short-term changes in the atmosphere. It can change minute-to-minute, hour-to-hour and day-to-day

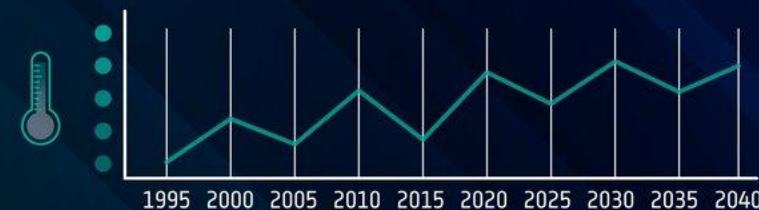


## Climate

describes the average weather conditions in a specific area over a long period of time – 30 years or more



Satellites measure several aspects of Earth's weather as well as provide essential data over decades to monitor how our climate is changing



For more information, visit [space for our climate:](https://www.esa.int/climate)  
[www.esa.int/climate](https://www.esa.int/climate)



# CLIMATE DEFINITION..

**CLIMATE CHANGE** – ANY SHIFT IN THE LONG-TERM STATISTICS OF WEATHER ELEMENTS (SUCH AS TEMPERATURE, RAINFALL, OR WINDS) SUSTAINED OVER SEVERAL DECADES OR LONGER. THIS CAN INCLUDE CHANGES TO BOTH AVERAGES OF THESE ELEMENTS AS WELL AS MEASURES OF VARIABILITY AND EXTREMES. THESE CHANGES CAN BE CAUSED BY **NATURAL FORCING**, SUCH AS CHANGES IN SOLAR EMISSION OR SLOW CHANGES IN THE EARTH'S ORBITAL ELEMENTS; BY NATURAL INTERNAL PROCESSES OF THE CLIMATE SYSTEM, SUCH AS GLACIATIONS; OR, RECENTLY, ALMOST BY “HUMAN ACTIVITIES“ (**ANTHROPOGENIC FORCING**).

**CLIMATE NORMAL (CLINO)** – **THE LATEST THREE-DECADE AVERAGES OF CLIMATOLOGICAL VARIABLES**, INCLUDING TEMPERATURE AND PRECIPITATION. CLIMATE NORMALS ARE UPDATED EVERY 10 YEARS, WHEN DATA FOR THE LAST FULL DECADE HAVE BEEN COMPILED. ACTUALLY THE REFERENCE CLINO IS **1991-2020**

**CLIMATE VARIABILITY** – THE PATTERN AND RANGE OF CLIMATE PARAMETERS (AGGREGATE WEATHER) FOR A PARTICULAR PLACE OR REGION OVER A GIVEN TIME PERIOD. **THESE MAY INCLUDE ALSO EXTREME EVENTS.**

# WEATHER – TEMPERATURES AT 10 AM LT - 23 JULY 2025

## Station details

Station name

Orvieto

Network

dpcn-umbria

Latitude

42.71611

Longitude

12.10639

Station elevation above sea level

213 m

## DATI GENERALI

### TEMPERATURA



**31.9°C**

Min:  
**14.9°C**

Max:  
**33.1°C**

Var.24h:  
**-0.7°C**

Heat Index:  
**31.9°C**

### UMIDITÀ RELATIVA



**32.0%**

Dew Point:  
**13.2°C**

Wet bulb:  
**20.3°C**

Var.24h:  
**-9%**

Humidex:  
**34.8°C**

### PRESSIONE - VARIE



**1001.3 mb**

Rad. solare:  
**N/D W/mq**

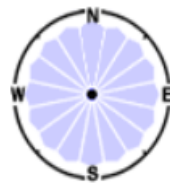
Indice UV:  
**0.0**

Var.24h:  
**1.3 mb**

Base cumuli:  
**2632 m**

## VENTO

### VELOCITÀ E DIREZIONE



**5.0 km/h da NW**

**Maestrale (315.0 °)**

**1 - Bava di vento**

## PRECIPITAZIONI

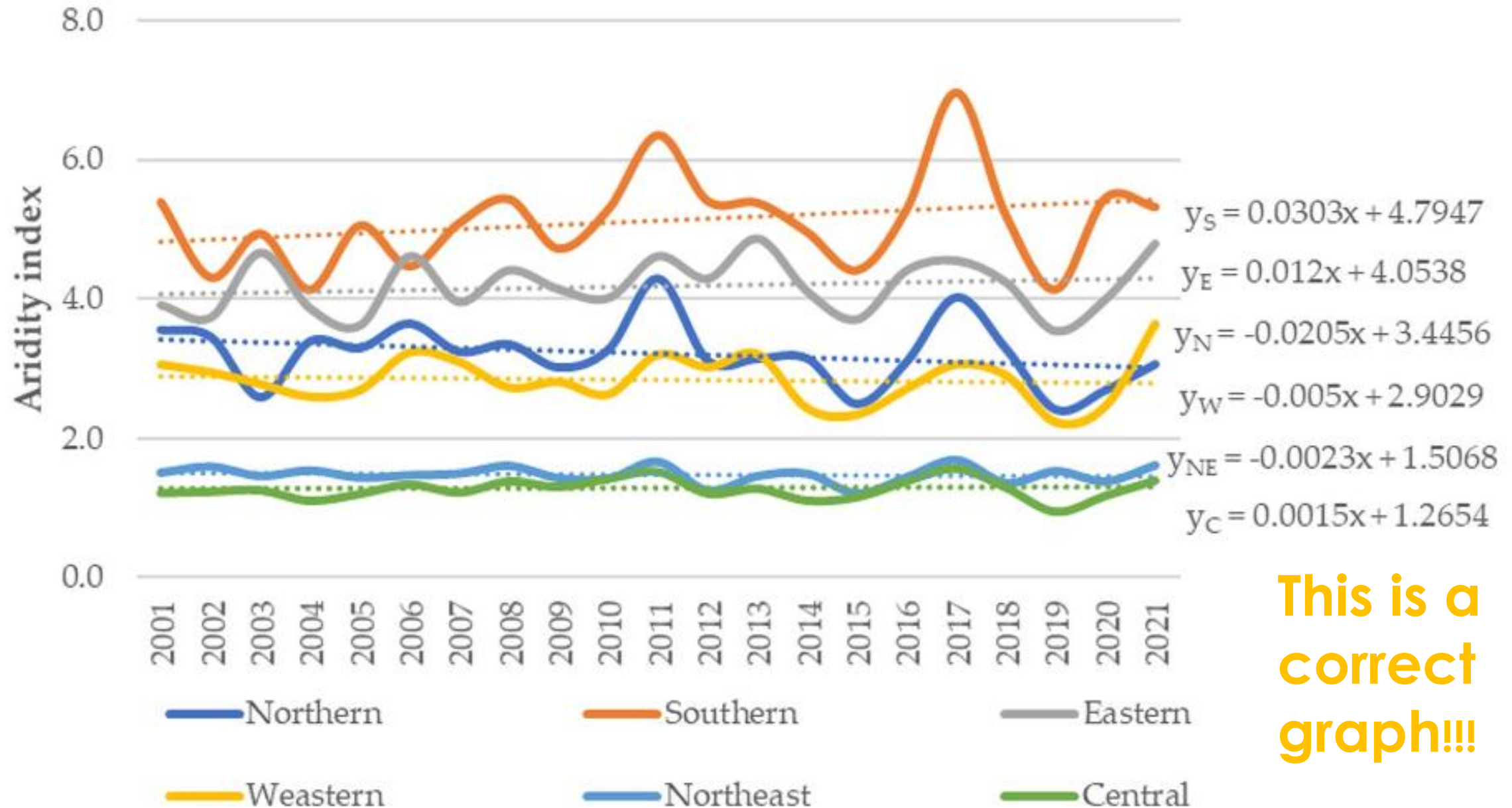
### PIOGGIA ODIERNA



**0.0 mm**

Intensità: **0.0 mm/h**  
**Precipitazione assente**

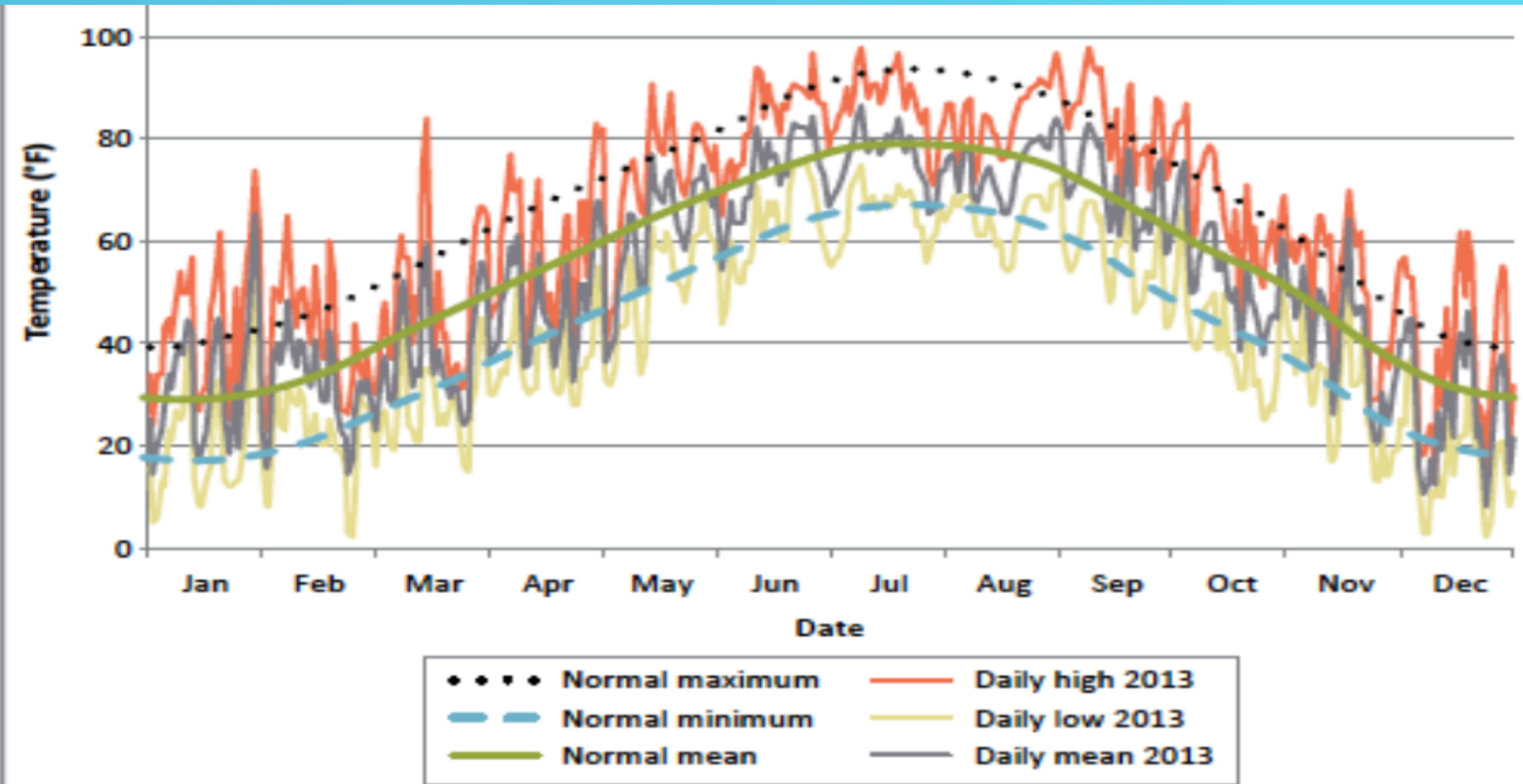
# THE CLIMATE



This is a  
correct  
graph!!!

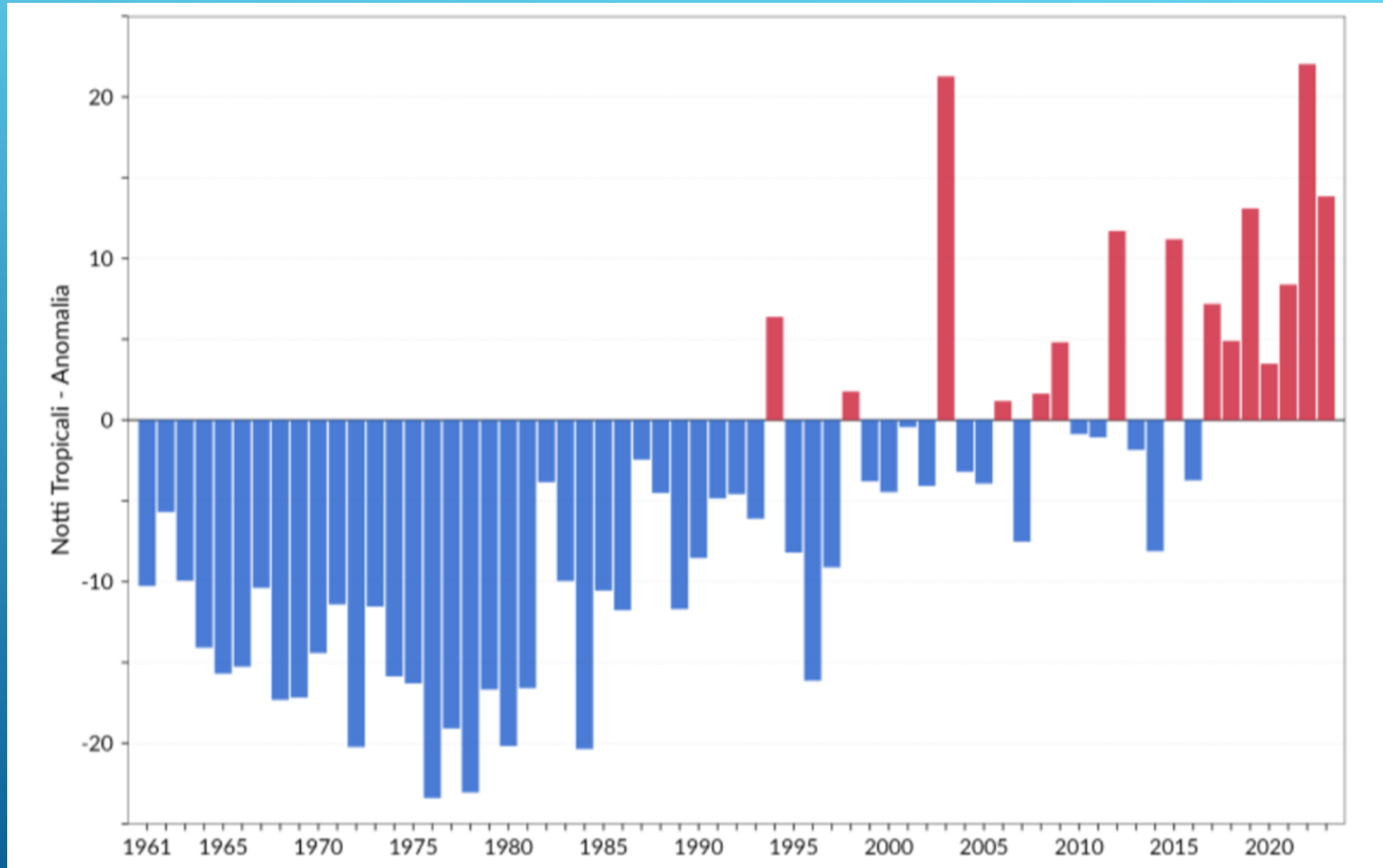


# THE 90' PERCENTILES...



Indicatore	trend (°C / 10 anni)
ANNUALE	
Temperatura media Italia	+0.40±0.04
Temperatura minima Italia	+0.38±0.04
Temperatura massima Italia	+0.42±0.05
Temperatura media Nord	+0.45±0.05
Temperatura media Centro	+0.41±0.05
Temperatura media Sud e Isole	+0.36±0.04
STAGIONALE (Italia)	
Temperatura media inverno	+0.32±0.10
Temperatura media primavera	+0.34±0.09
Temperatura media estate	+0.60±0.09
Temperatura media autunno	+0.37±0.08

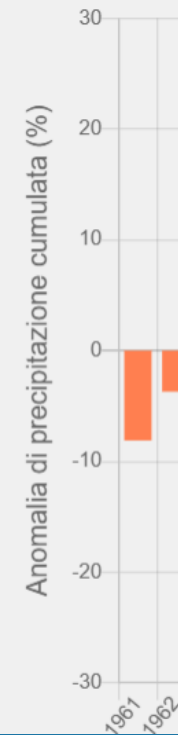
# THE CLIMATIC RECENT ANOMALIES IN CENTRAL ITALY



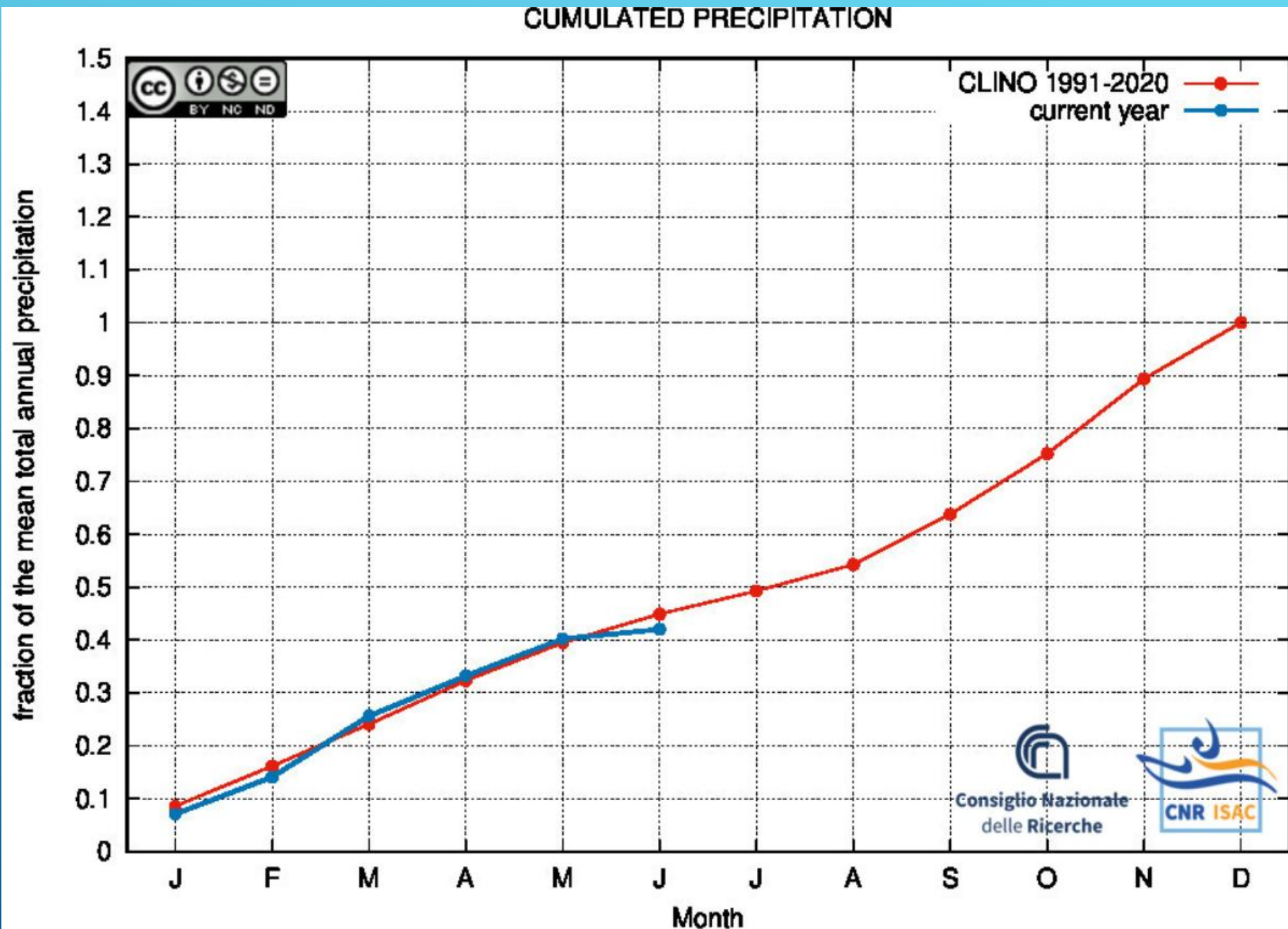


# The trend of total precipitation..

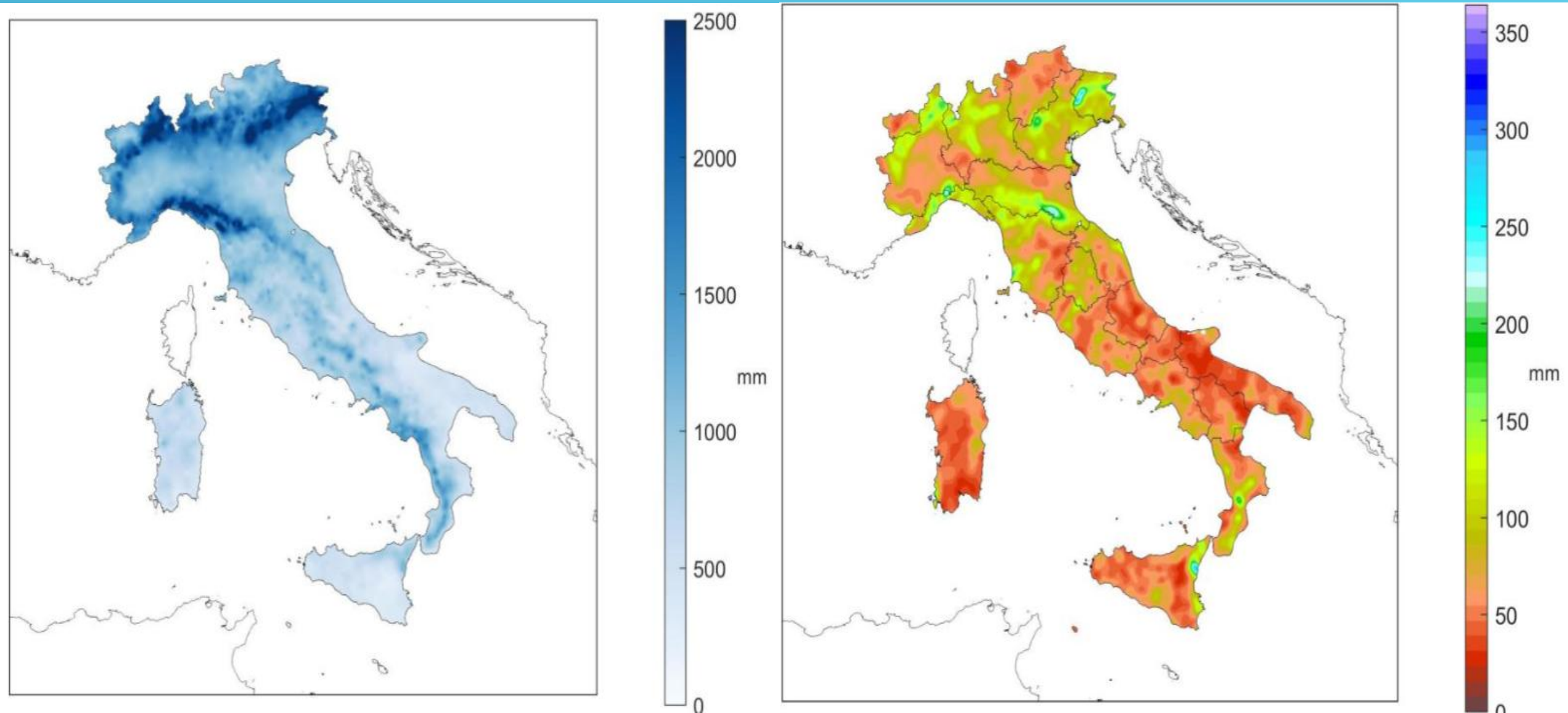
Precipitazione cumulata	trend (%/10 anni)
ANNUALE	
Italia	$(-0.4 \pm 0.9)$
Nord	$(-0.1 \pm 1.1)$
Centro	$(-1.5 \pm 1.0)$
Sud e Isole	$(-0.1 \pm 1.1)$
STAGIONALE (Italia)	
Inverno	$(-2.5 \pm 2.2)$
Primavera	$(+0.3 \pm 1.4)$
Estate	$(-1.5 \pm 2.2)$
Autunno	$(+1.1 \pm 1.5)$



# Cumulated total precipitation in 2025

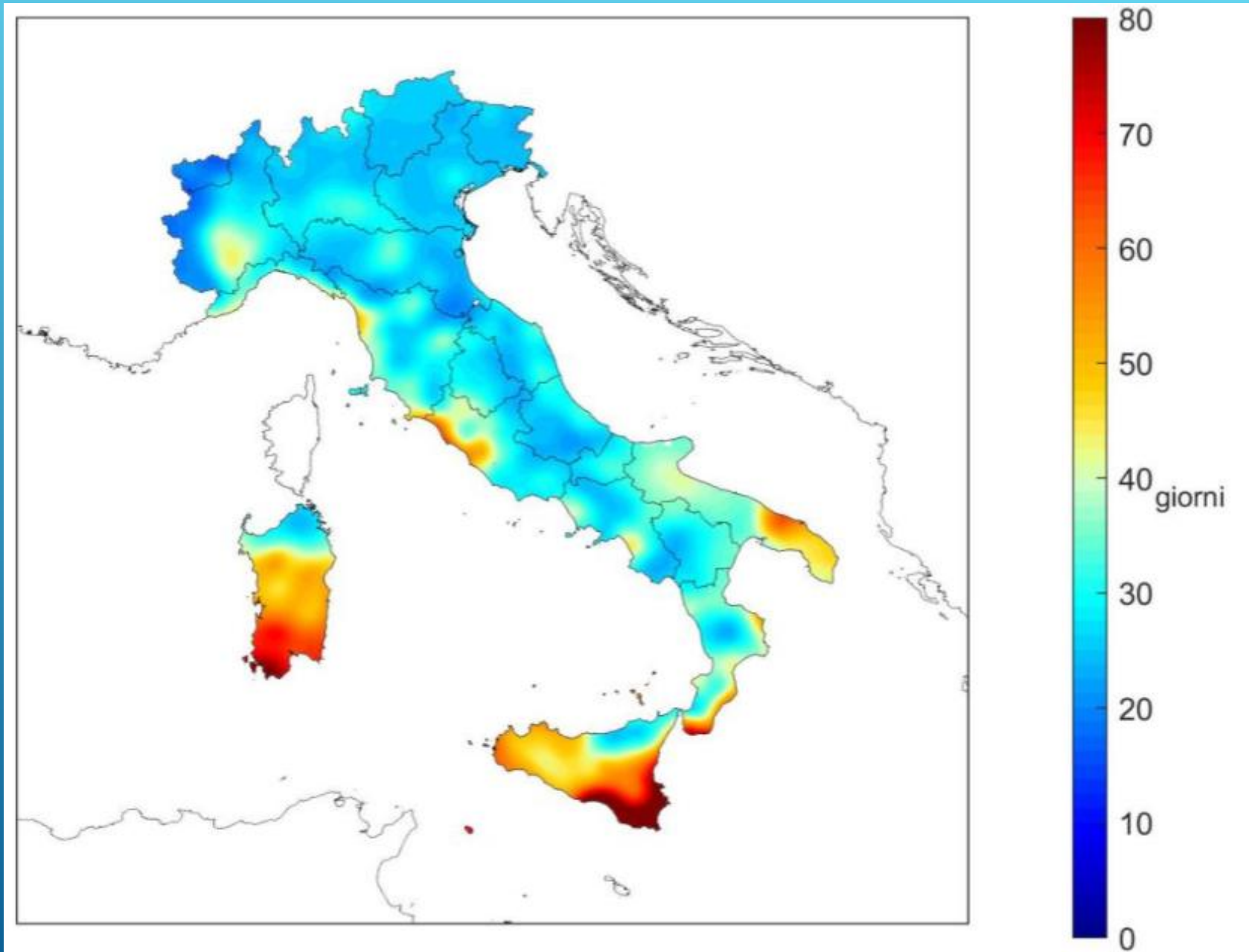


# 2024 Annual precipitation (L) and maximum daily precipitation (R) - mm





# ANNUAL DRY DAYS AND CONSECUTIVE DRY DAYS IN 2024





In Italia gli eventi meteorologici che hanno causato danni stanno avendo impatti sempre maggiori in termini economici e sulle vite delle persone.

Nella lotta alla #crisiclimatica l'Italia è ancora troppo in ritardo. Continuiamo a rincorrere le emergenze senza una strategia chiara di prevenzione, che permetterebbe di risparmiare il 75% delle risorse spese per riparare i danni. Non c'è più tempo da perdere.

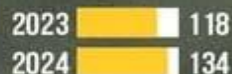
**351**  
 EVENTI

## NUMERO DI EVENTI PER CATEGORIA



## CATEGORIE CON MAGGIORE INCREMENTO

### ALLAGAMENTI DA PIOGGE INTENSE



+11,9%

### ESONDAZIONI FLUVIALI



+23,9%

### DANNI DA SICCITÀ PROLUNGATA



+54,5%

## NUMERO DI EVENTI ESTREMI

### PER ANNO



### CHE HANNO CAUSATO STOP A FERROVIE E TPL



## NUMERO DI EVENTI



## CITTÀ PIÙ COLPITE



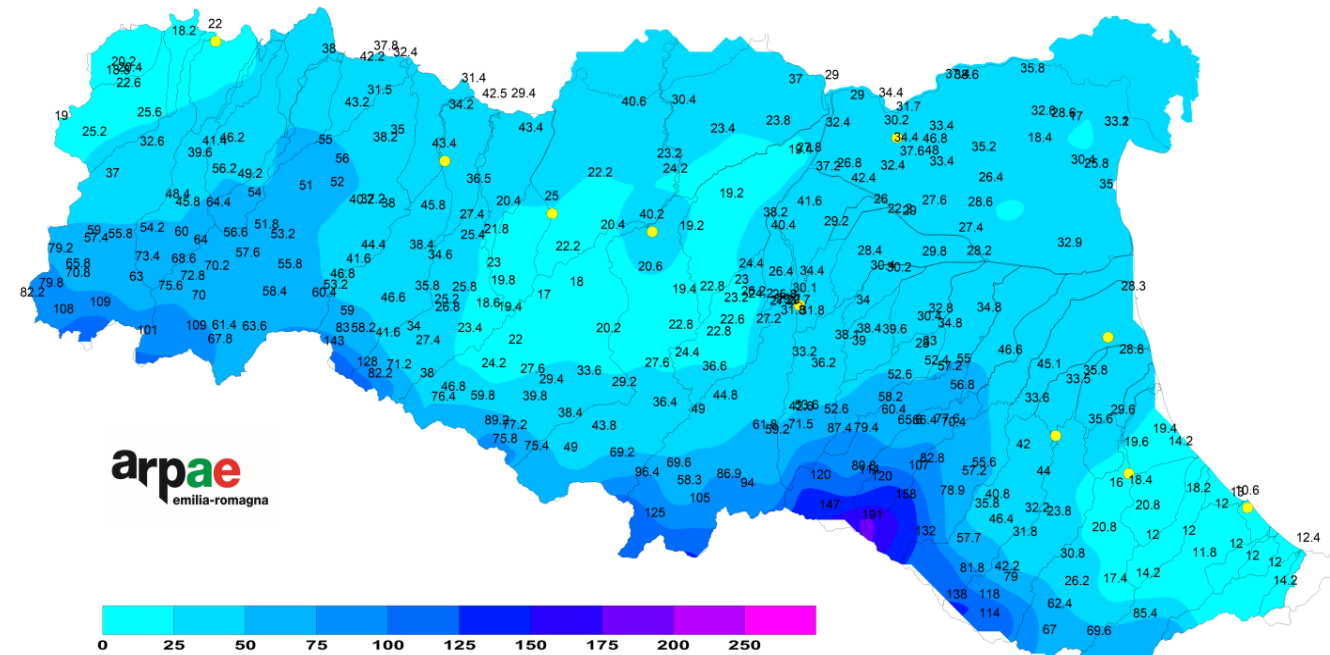
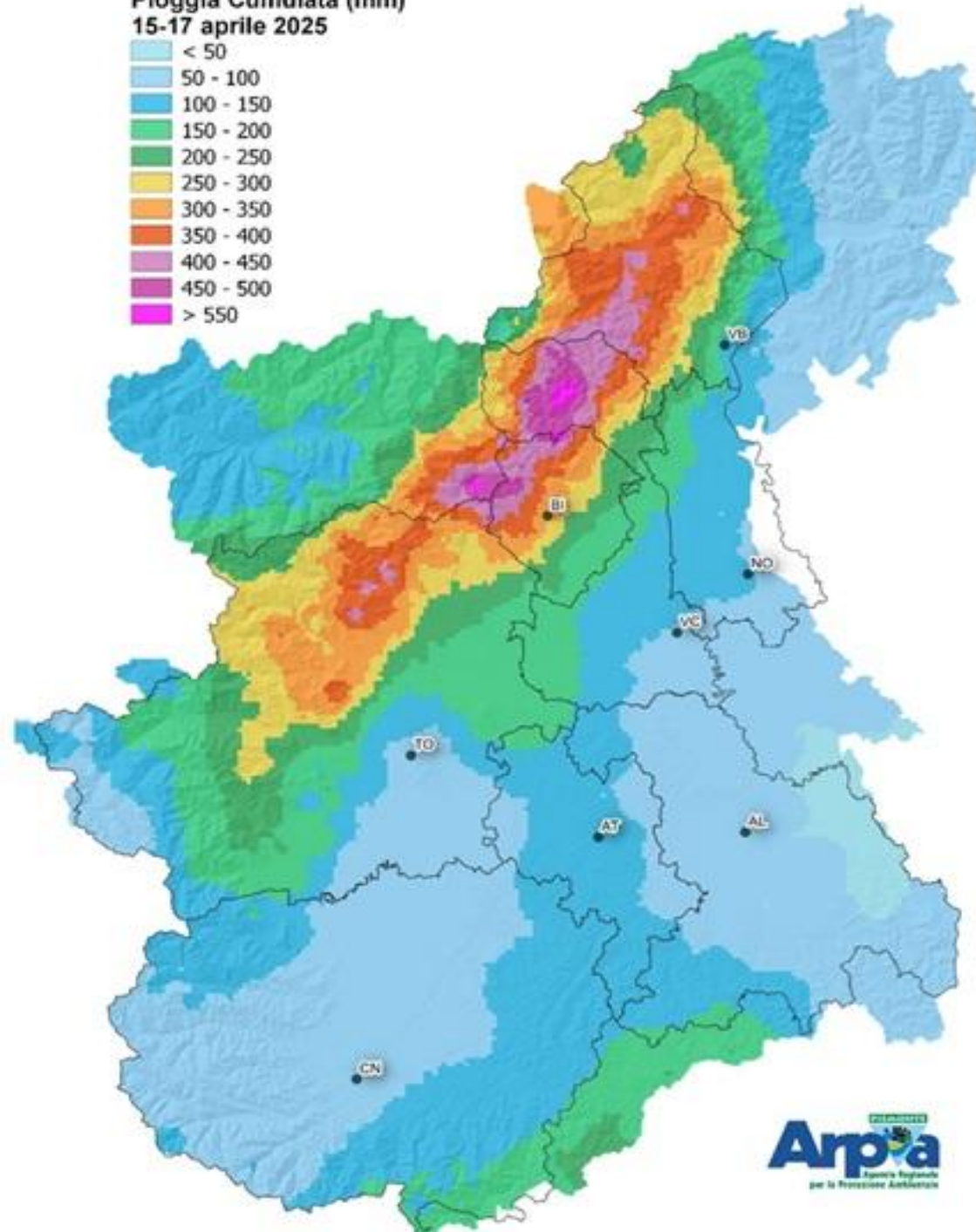
## PROVINCE PIÙ COLPITE



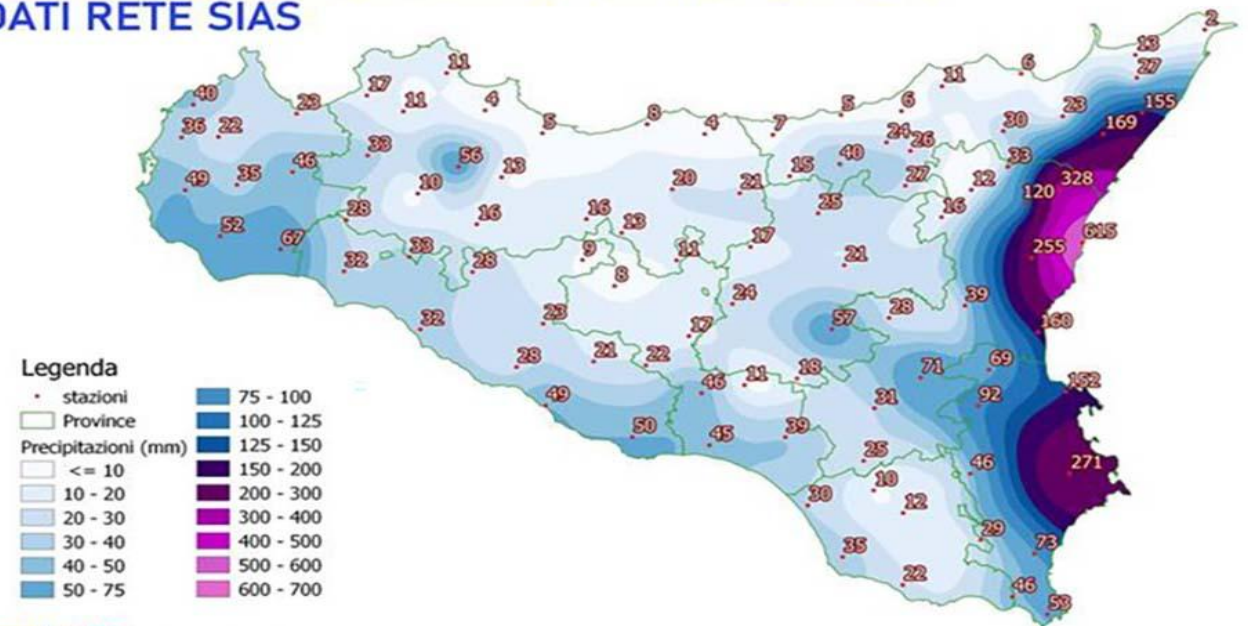
Puoi trovare  
 tutti i dati  
 aggiornati  
 in Italia nella  
 nostra mappa su  
[cittaclima.it](http://cittaclima.it)



# Pioggia Cumulata (mm) 15-17 aprile 2025

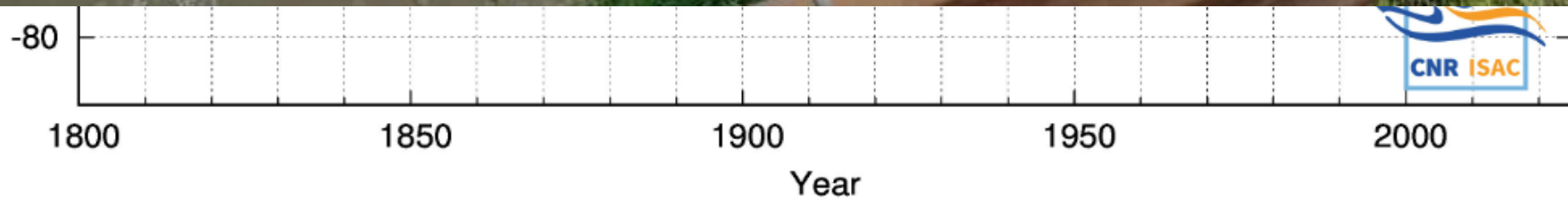


## PRECIPITAZIONI MENSILI SICILIA - NOVEMBRE 2024 (PARZIALE AL 13/11) DATI RETE SIAS

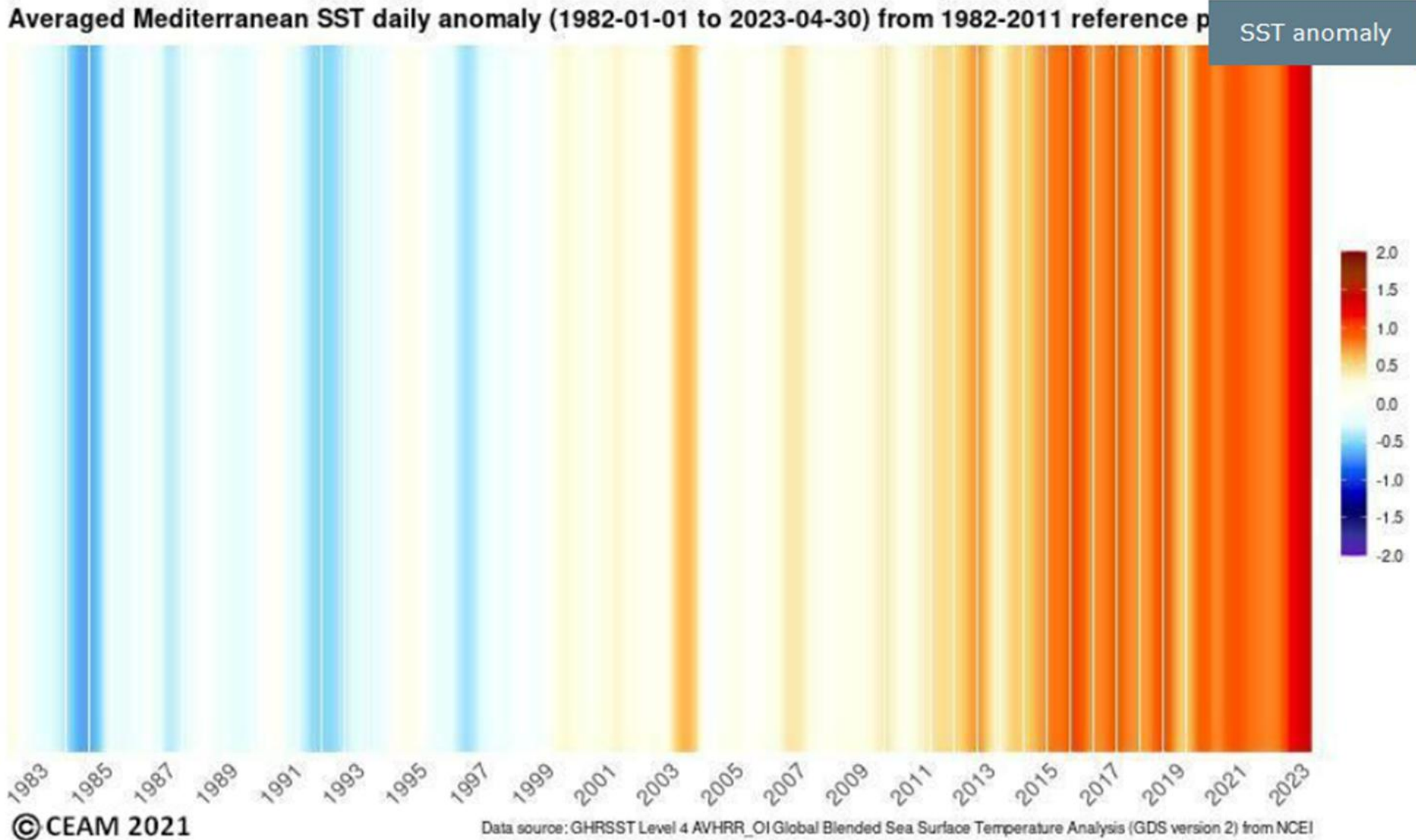




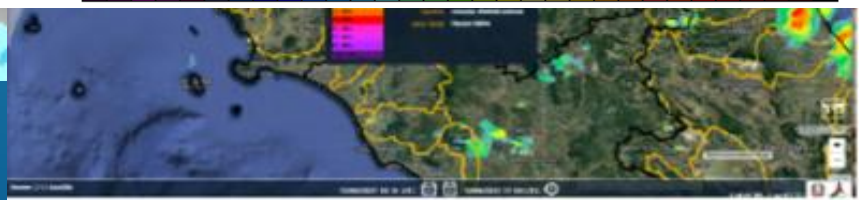
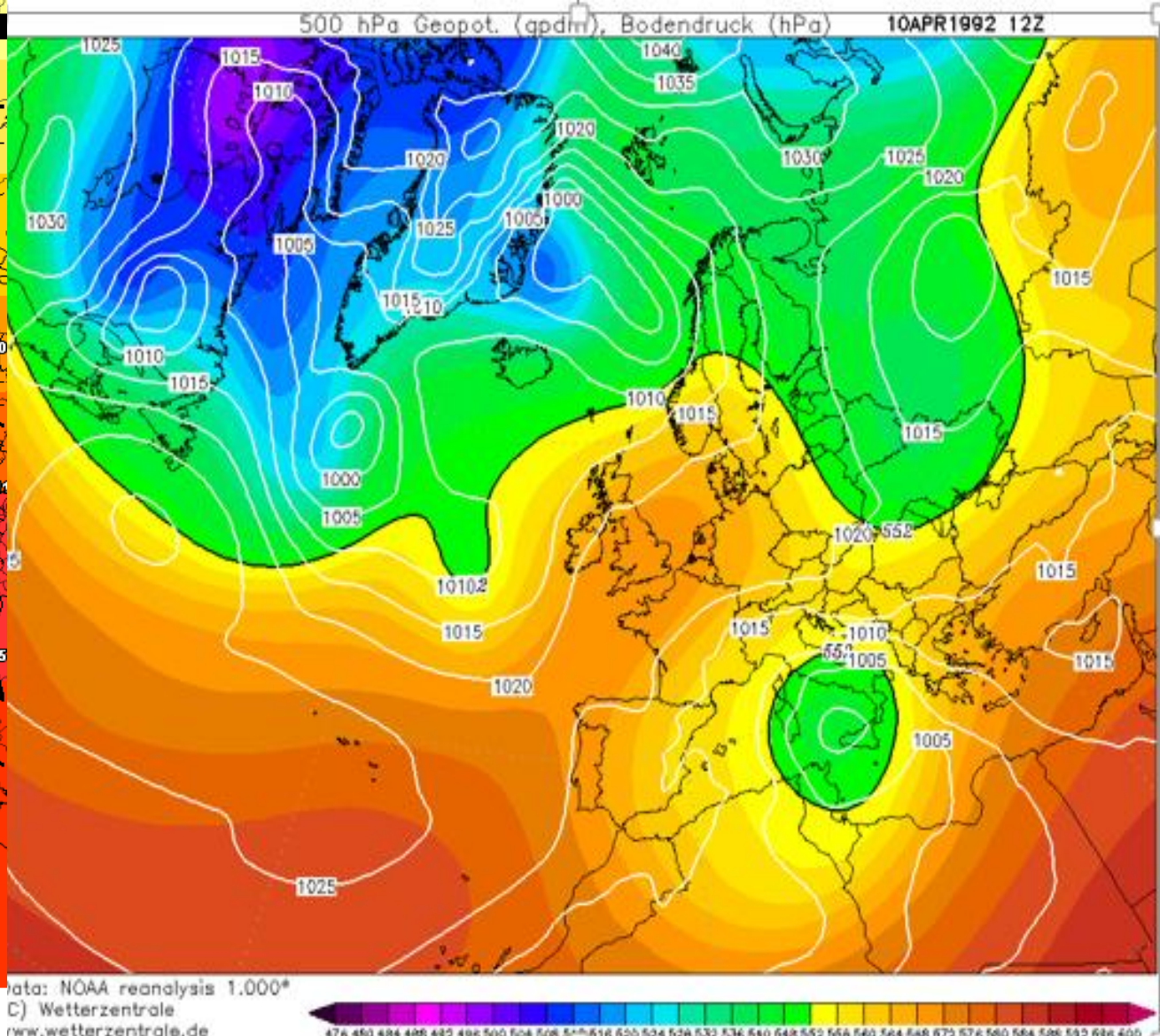
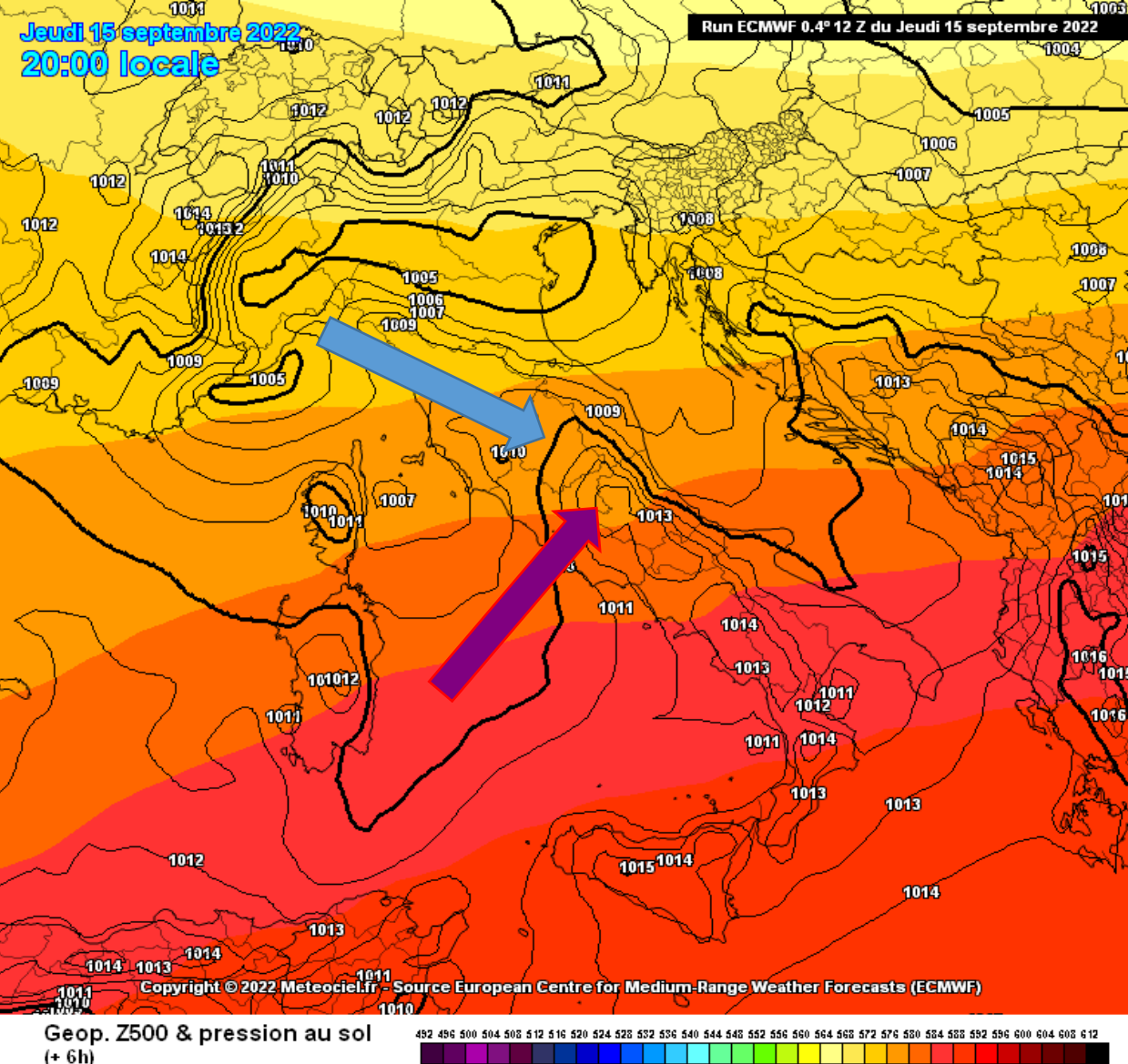
This extreme behaviour has become more frequent since 2021 in all season but in particular in autumn...



# The most important problem: the SST increase more fastly!!!!







## IN HIGH MOUNTAINS AREAS FLASH FLOOD AND DEBRIS FLOW ARE MORE FREQUENTLY ALSO DURING LATE SPRINGS BECAUSE:

- Spring snowfalls are increasingly heavy but characterized by very high density. They melt very quickly due to sudden increases in temperature and cause sudden flooding in steep watersheds.
- If this melting of the snow cover is accompanied by heavy rainfall, more intense flooding and debris flows are triggered, which often reach inhabited valley floors.
- These “mixed” phenomena are facilitated by an ever-increasing abundance of loose debris at the base of the rocks, mainly due to the degradation of interstitial permafrost.

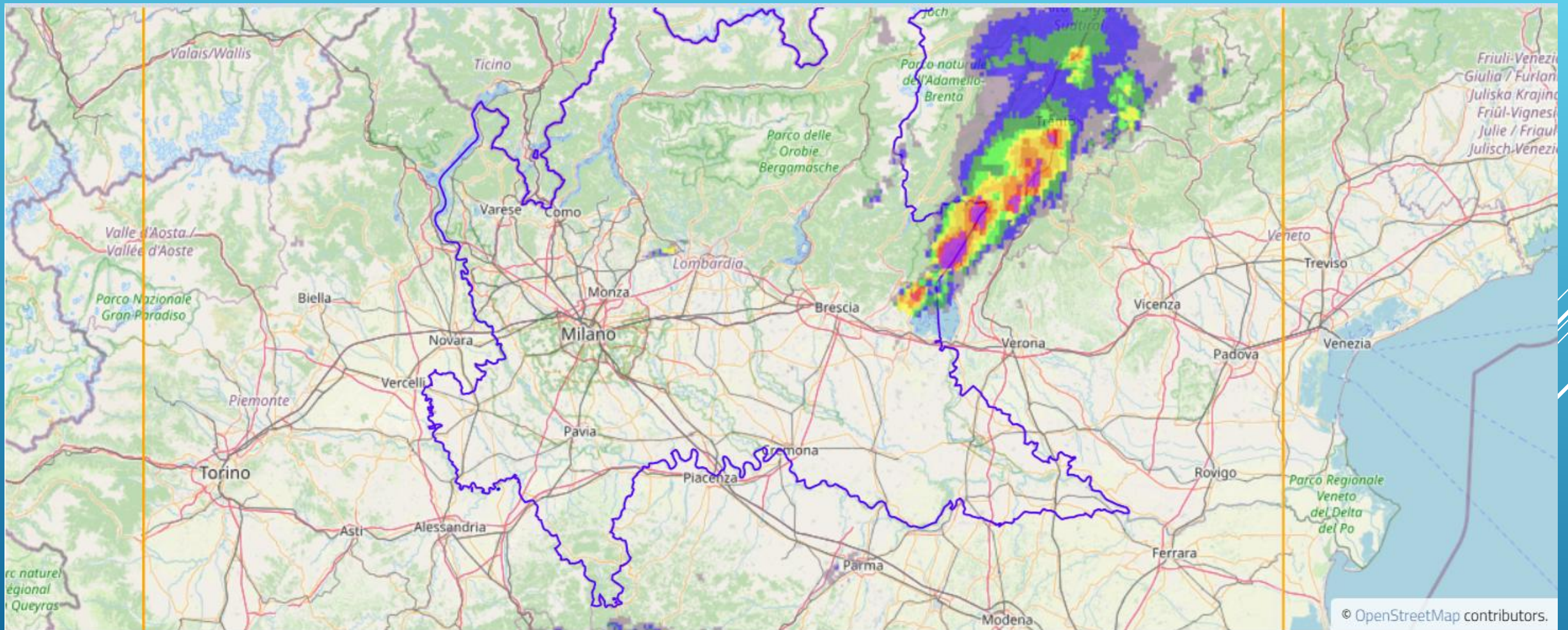


IN THE FIRST PART OF SUMMER 2025, SEVERAL *DEBRIS FLOW* OCCOURS IN THE ITALIAN ALPS – FROM WEST TO EAST..

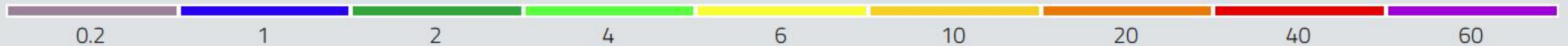




# RADAR METEO IMAGE - JULI 24<sup>TH</sup> AT 4 PM LT



Intensità di precipitazione [mm/h]



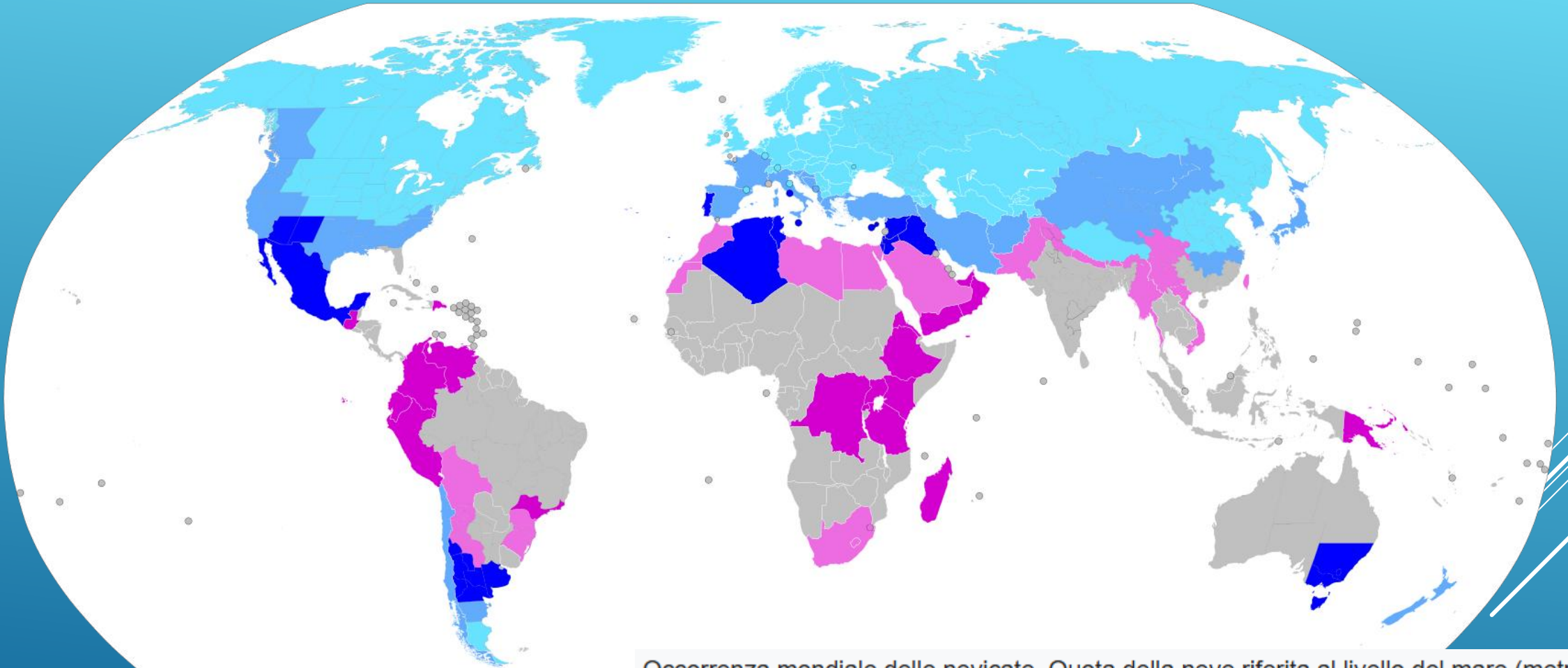


**AND THE SNOW? DOES IT REALLY NO LONGER SNOW IN ITALY?**

# **Climatologia della neve - Distribuzione a livello globale e nazionale**



# GLOBAL DISTRIBUTION OF SNOWFALL



Occorrenza mondiale delle nevicate. Quota della neve riferita al livello del mare (metri): :

- Inferiore ai 500, tutti gli anni
- Inferiore ai 500, tutti gli anni, ma non in tutto il territorio.
- Inferiore ai 500, occasionalmente.
- Superiore ai 500, tutti gli anni.
- Superiore ai 2.000 all'anno.
- Qualsiasi quota: nessuna.



# TO CHARACTERIZE “SNOW” IN AN AREA, STATISTICAL STUDIES MUST BE APPLIED TO THE FOLLOWING VARIABLES:

**Fresh snow ( $H_n$ )** and snow on the ground ( $H_s$ ), measured in [m] or more commonly in [cm], according to the codes used by EAWS. Since snowfall is a dynamic phenomenon that undergoes significant changes depending on the measurement location and the presence of obstacles, the type of crystals, the air temperature, the presence of wind, and the measurement intervals, it is necessary to use standardized methods in accordance with international conventions, otherwise the measurements will not be comparable.



In particular, with regard to fresh snow, since the thickness of the snowpack generally tends to compact as it increases, it has been established that  $H_n$  is the amount that deposits in a single 24-hour snowfall, generally measured between 8 and 9 a.m., on a cleared surface or snow gauge board.

## **- Number of days with snowfall**

This represents the frequency of snowfall, considering a day with snowfall to be one in which at least 1 cm of snow has fallen. This parameter is widely used as it requires only basic visual observations, but it has obvious limitations, especially if the observation period is short. Furthermore, it attributes the same climatological magnitude to marginal events and to more significant ones.

## **- Duration of snow cover**

This represents the number of days on which the ground remains covered with snow. A distinction can be made between 'total duration' and 'duration of the longest period of snow cover'. Unfortunately, the legislation leaves room for different interpretations, as it does not distinguish between days of total coverage and those with partial coverage of the ground.

## **- Snow coefficient**

This is the percentage ratio between accumulated melted snow (solid precipitation) and accumulated total precipitation in a year (solar, climatic, or hydrological).

# SNOW IN ITALY – HISTORICAL DATA

RIEPILOGHI RELATIVI ALL'ALTEZZA DELLA NEVE FRESCA ANNUALE, AI GIORNI NEVOSI (GN), ALL'ALTEZZA DELLA NEVE MASSIMA IN 24 ORE (HNG) E ALL'ALTEZZA MASSIMA DELLA NEVE AL SUOLO (HNS)														
STAZIONI	ALTITUDINE m. s. l. m.	OTT	NOV	DIC	GEN	FEB	MAR	APR	MAG	GIU	TOT cm	GN	HNG cm	HNS cm
REGIONE ALPINA														
RECOARO	445	0	0	8	23	27	34	12	0	0	104	10,4	37	37
TARVISIO	751	0	26	42	55	36	32	9	0	0	200	13,8	62	62
CASTEDELFINO	1296	0	25	63	42	41	57	73	0	0	301	17,2	91	91
MISURINA	1756	7	31	85	51	58	69	53	18	0	372	32,4	105	105
PASSO ROLLE	1984	8	63	102	62	85	72	74	12	1	479	53,3	67	67
LAGO DI CAMPOSECCO	2325	20	164	112	58	53	94	146	24	3	674	46,6	74	74
VALLE PADANA														
MILANO	121	0	1	6	17	9	3	0,2	0	0	36,2	6,2	55	55
PIACENZA	67	0	4	12	23	11	6	1,8	0	0	57,8	9	61	65
BOLOGNA	53	0	3	17	15	11	4	0	0	0	50	12,1	38	41
APPENNINO VERSANTE ADRIATICO														
MONTE CIMONE	2165	2	27	56	94	98	71	63	20	0	431	33,2	121	273
VERGHERETO	812	0	12	18	55	44	65	7	0	0	201	13,8	70	110
CAMERINO	664	0,3	8	30	25	46	10	4,5	0,7	0	125	16,2	79	148
SCANNO	1030	0	18	53	79	49	46	9	8	0	262	22	65	160
ROCCACARAMANICO	1050	0,4	6	32	55	110	115	7	5	0	330	25,6	130	570
CAPRACOTTA	1421	0	10	62	155	85	86	12	9	0	419	32	150	300
APPENNINO VERSANTE TIRRENICO														
PASSO FUTA	851	0,5	16	28	33	42	32	16	0	0	168	11,6	37	85
ABETONE	1340	1	23	47	74	78	54	31	0	0	308	24	60	233
TERMINILLO	1873	1	38	107	83	103	78	68	5	0	483	35	50	390
FRIGENTO	1011	0	4	24	33	62	30	1	0	0	154	12,5	62	96
MONTEVERGINE	1270	1	12	36	71	92	80	21	0	0	313	30	145	226
CAMIGLIATELLO SILANO	1251	0	7	48	70	64	49	18	0	0	256	19,8	50	120
GAMBARIE D'ASPROMONTE	1300	0	8	49	55	54	46	21	0	0	233	20,6	70	81
RILIEVI INSULARI														
PETRALIA SOTTANA	930												46	58
FLORESTA	1250												21	71
VALLICCIOLA	1000												45	61

FREQUENZA DI GIORNI CON PRECIPITAZIONI NEVOSE (HN 24 ore > 1 cm) IN DIFFERENTI DOMINI GEOGRAFICI E A DIFFERENTI QUOTE							
AREA CLIMATOLOGICA	500 m	1000 m	1300 m	1700 m	2000 m	2500 m	3500 m
REGIONE ALPINA	12	18	26	35	42	50	170
PIANURA PADANA							
ZONA DEI LAGHI PREALPINI	12	18	26	30	35	45	
ALTO ADRIATICO							
APPENNINO SETTENTRIONALE ADRIATICO	12	18	28	33	40		
APPENNINO CENTRALE ADRIATICO	13	18	29	35	42		
APPENNINO LIGURE TIRRENICO	8	15	23	27			
APPENNINO CENTRALE TIRRENICO	10	15	23	25			
TOSCANA	10	15	23	25			
UMBRIA E LAZIO	10	15	22	25			
CAMPANIA	10	14	22				
APPENNINO CALABRO	10	13	20	24			
SICILIA	8	10	18	22			

# RECENT SNOW IN ITAY (FAZZINI ET AL. 2024) DAYS – DABATBASE SMAM

**FREQUENZA MEDIA DEL NUMERO DI GIORNI CON NEVICATE > 5 cm  
A QUOTE CRESCENTI PER ALCUNE LOCALITA' ITALIANE  
Periodo 1982 - 2004 (Fonte SMAM - Pratica Di Mare)**

LOCALITA'	QUOTA	LAT.	LONG.	OTT	NOV	DIC	GEN	FEB	MAR	APR	TOTALE	TEND. %
MONTE SANT'ANGELO	847	41,7	15,95		0,27	0,86	1,48	1,87	1,13	0,2	5,8	0,36
LATRONICO	896	40,08	16,2			0,7	0,61	1,13	0,74	0,1	3,3	0,27
FRONTONE	574	43,5	12,7		0,4	1,32	1,43	1,48	0,91	0,13	5,7	0,13
GIOIA DEL COLLE	352	40,77	16,93			0,22	0,39	0,7	0,18		1,5	0,11
ENNA	1007	37,57	14,28			0,42	0,56	0,87	0,61		2,5	0,06
PESCARA	10	42,62	14,33		0,11	0,13	0,21	0,16	0,05		0,7	0,047
POTENZA	845	40,61	15,79	0,04	0,48	1,19	1,24	2,29	1,38	0,14	6,8	0,031
MONDOVI	559	44,51	7,77		0,83	1,77	3,2	2,16	0,95	0,37	61,6	0,009
FONNI	992	40,11	9,2			0,81	0,82	1,43	0,83	0,1	4,0	-0,08
CAMPOBASSO	807	41,57	14,65		0,3	2,1	1,96	2,6	1,82	0,23	9,0	-0,11
PRIZZI	1035	37,7	13,4		0,08	0,65	1,01	1,3	0,91	0,13	4,1	-0,11
RADICOFANI	918	42,9	11,8		0,24	0,66	0,77	1,3	0,87	0,04	3,9	-0,13
PASSO CISA	1040	44,43	9,93	0,13	1,36	3,74	3,56	3,7	3,01	1,39	16,9	-0,16
PARMA	67	44,81	10,28		0,67	0,87	1,01	1,03	0,67	0,1	4,4	-0,18
BRIC DELLA CROCE	710	45,13	7,73	0,09	0,68	1,9	2,9	2,48	1,09	0,35	62,4	-0,20
MILANO LINATE	140	45,57	8,89	0,11	0,57	0,58	0,67	0,45	0,17		57,0	-0,21
TARVISIO	777	46,50	13,58	0,3	1,7	3,6	5,1	4,4	1,7	0,9	17,7	-0,22
PRETURO	672	42,37	13,3		0,35	1,78	1,39	1,61	1,06	0,24	6,4	-0,27
TORINO	280	45,41	7,72		0,5	0,67	0,53	0,47	0,2		55,5	-0,28
BOLZANO	254	46,51	11,37		0,3	0,8	1,6	0,9	0,1		61,6	-0,28



# FINALLY THE MOST RECENT ANALYSIS (FAZZINI ET. AL, 2023)

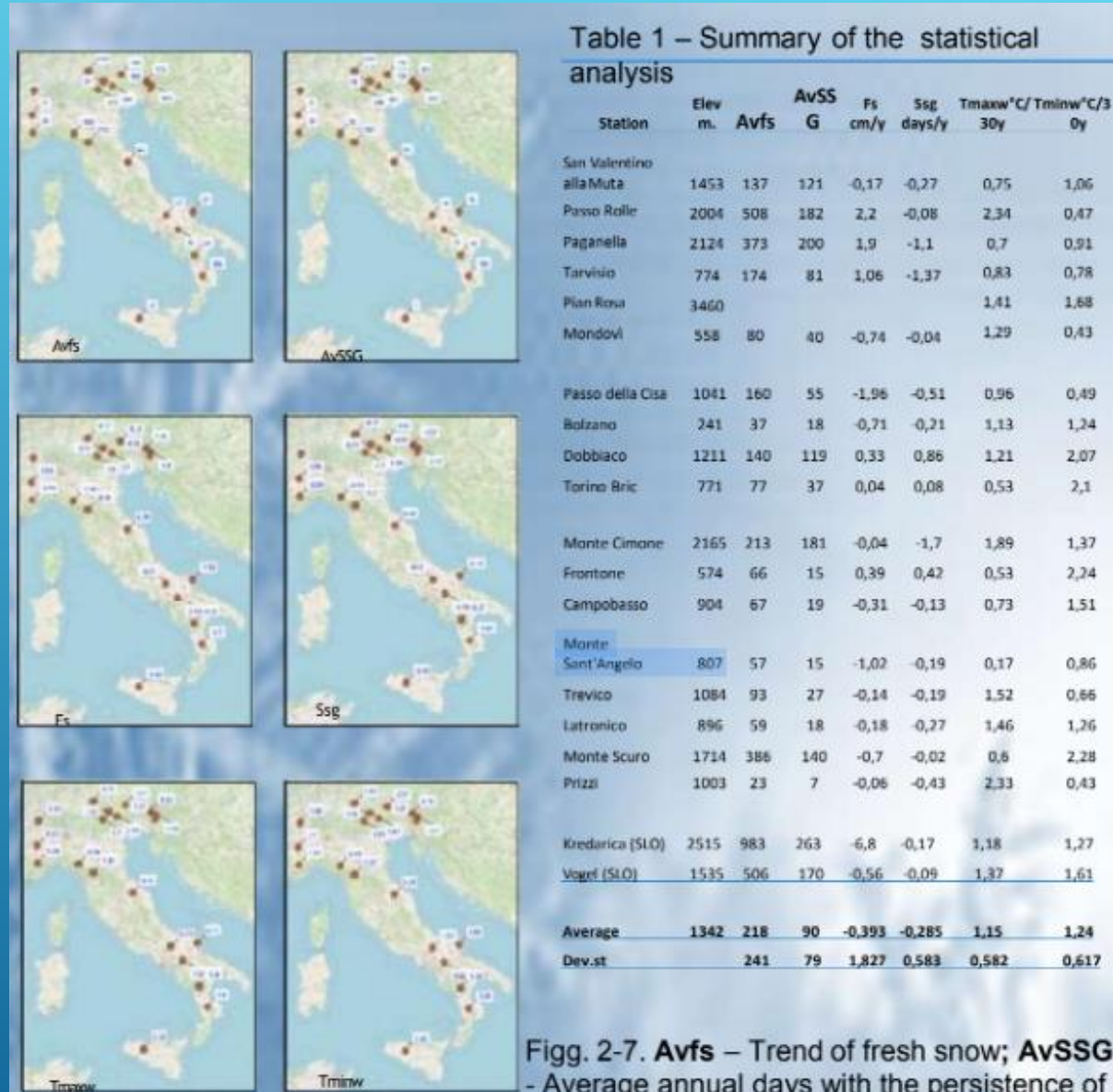


Fig. 2-7. **Avfs** – Trend of fresh snow; **AvSSG** - Average annual days with the persistence of snow at ground; **Fs**: Annual Fresh Snow; **SSG** - Annual persistence snow at ground; **Tminw** and **Tmaxw**: trend of Tmin and Tmax on cold season

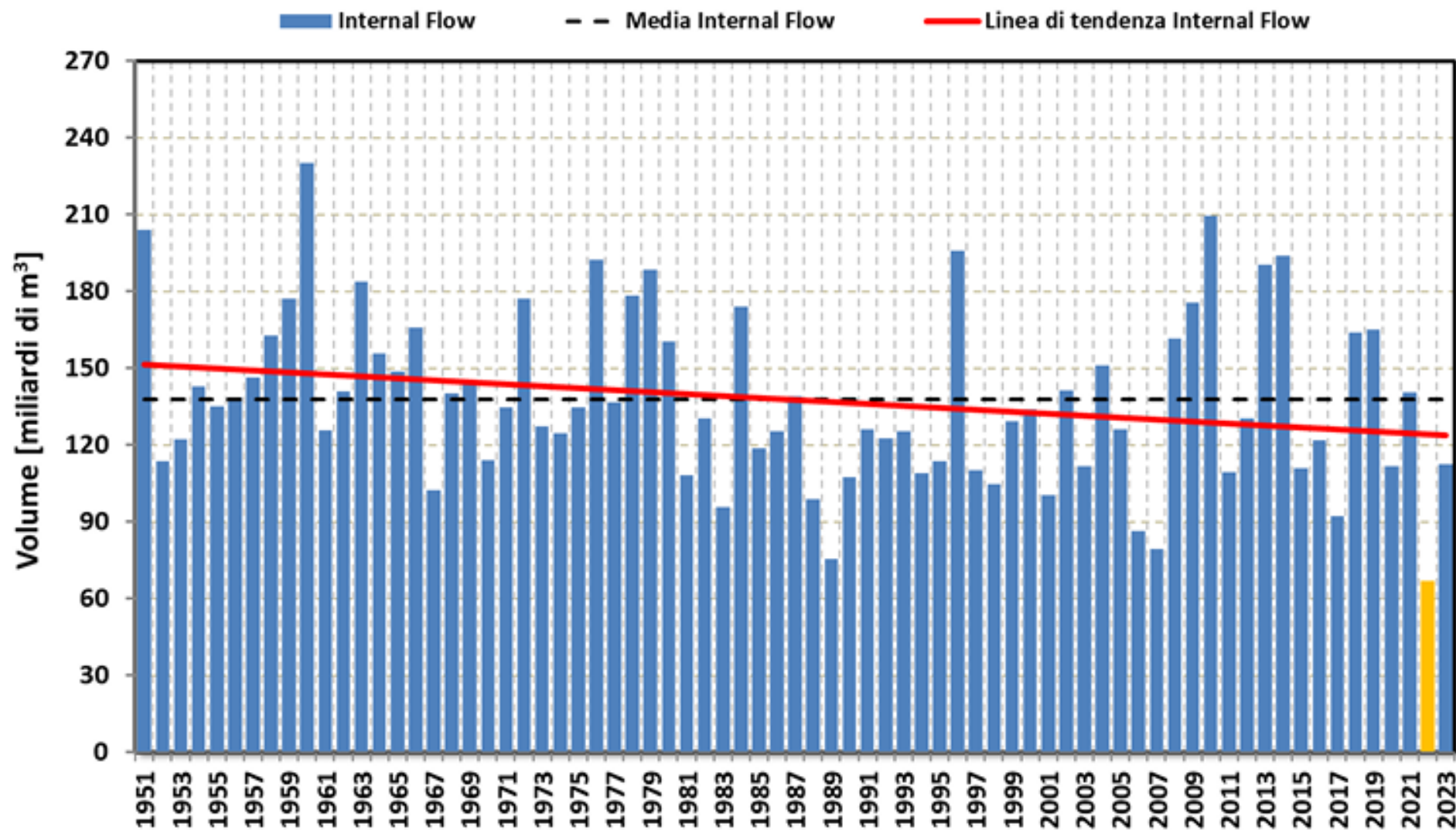
## The study clearly shows that:

- **seasonal fresh snowfall** decrease strongly up to an altitude of 1,500 m, particularly in plain and hilly areas where it is no longer possible to compile statistics - above this altitude, the signs are mixed, and above 2,000 m, the totals show a general increase
- The **number of days with snowfall doesn't show** a substantial trend
- The stay of snow on the ground, on the other hand, shows an **extreme decline**, primarily due to the delay in the start of the winter season, followed by rapid melting of the snow cover up to high altitudes already in spring.

All this is due to the increase in temperature, which is more pronounced in the mountains than elsewhere

# FINALLY.....

## BIGBANG 8.0 [1951-2023] ITALIA DISPONIBILITÀ DI RISORSA IDRICA (*Internal Flow*)





CO

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pre  
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# NECESSARIO UN APPROCCIO INTERDISCIPLINARE DIALOGO

Giacomo Leopardi, 1824

Dialogo Della Natura  
e di un Islandese  
Operette Morali

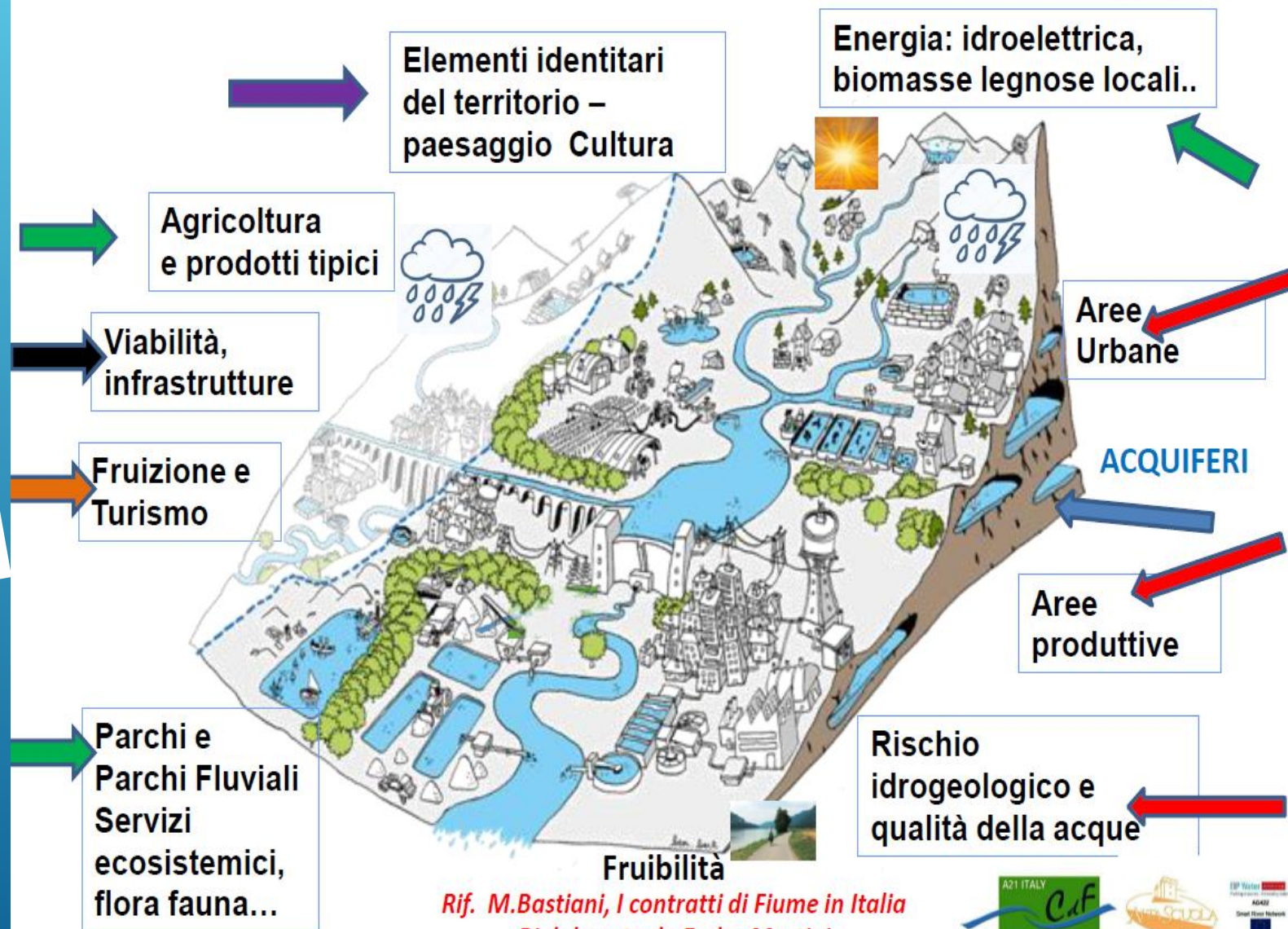
"... Tal volta io mi ho sentito crollare il tetto in sul capo pel gran carico della neve, tal altra, per l'abbondanza delle piogge, la stessa terra, fendendosi, mi si è dileguata di sotto ai piedi; alcune volte mi è bisognato fuggire a tutta lena dai fiumi, che m'inseguivano, come fossi colpevole verso loro di qualche ingiuria".

UN DIALOGO tra **TUTTI** i **SOGGETTI**  
interessati nei Tavoli di Lavoro dei  
Contratti di Fiume

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## I FIUMI: ORGANISMI VIVENTI **COMPLESSI** & **DIVERSIFICATI**

● I tanti interessi intorno ad un fiume e tanti conflitti ?!



Rif. M.Bastiani, I contratti di Fiume in Italia  
Rielaborato da Endro Martini





The background image shows a vast, arid landscape. The foreground is dominated by a field of cracked, dry earth, with the cracks forming a complex, polygonal pattern. In the middle ground, there are several clumps of low, green, scrubby bushes scattered across the dry terrain. The horizon is visible in the distance, where the land meets a sky filled with soft, wispy clouds. The sky transitions from a pale yellow near the horizon to a deep blue at the top, indicating a sunset or sunrise. The overall mood is one of desolation and natural beauty.

THANKS SO MUCH  
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