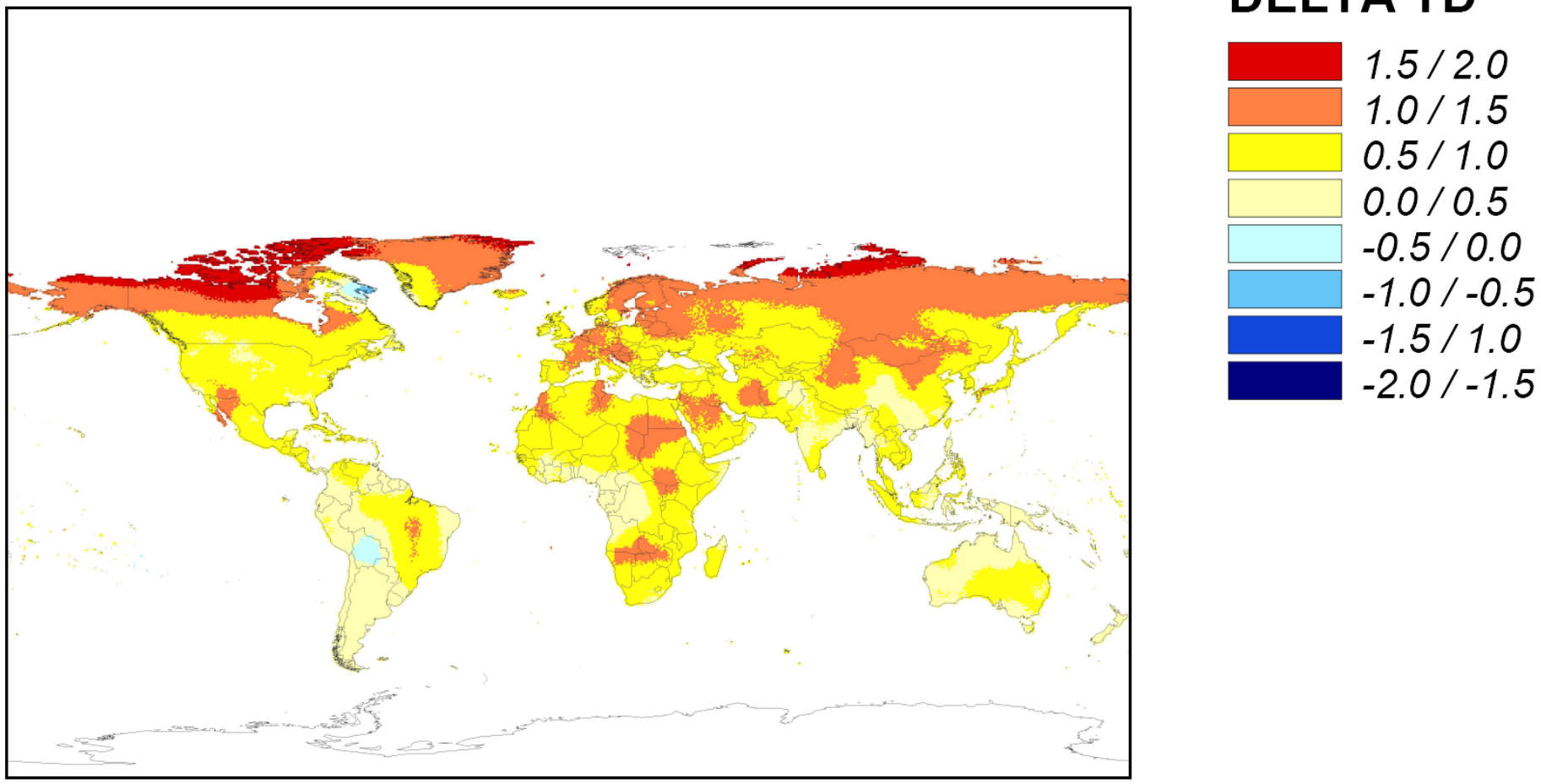
Cambiamento climatico
Fenomenologia per Montepulciano

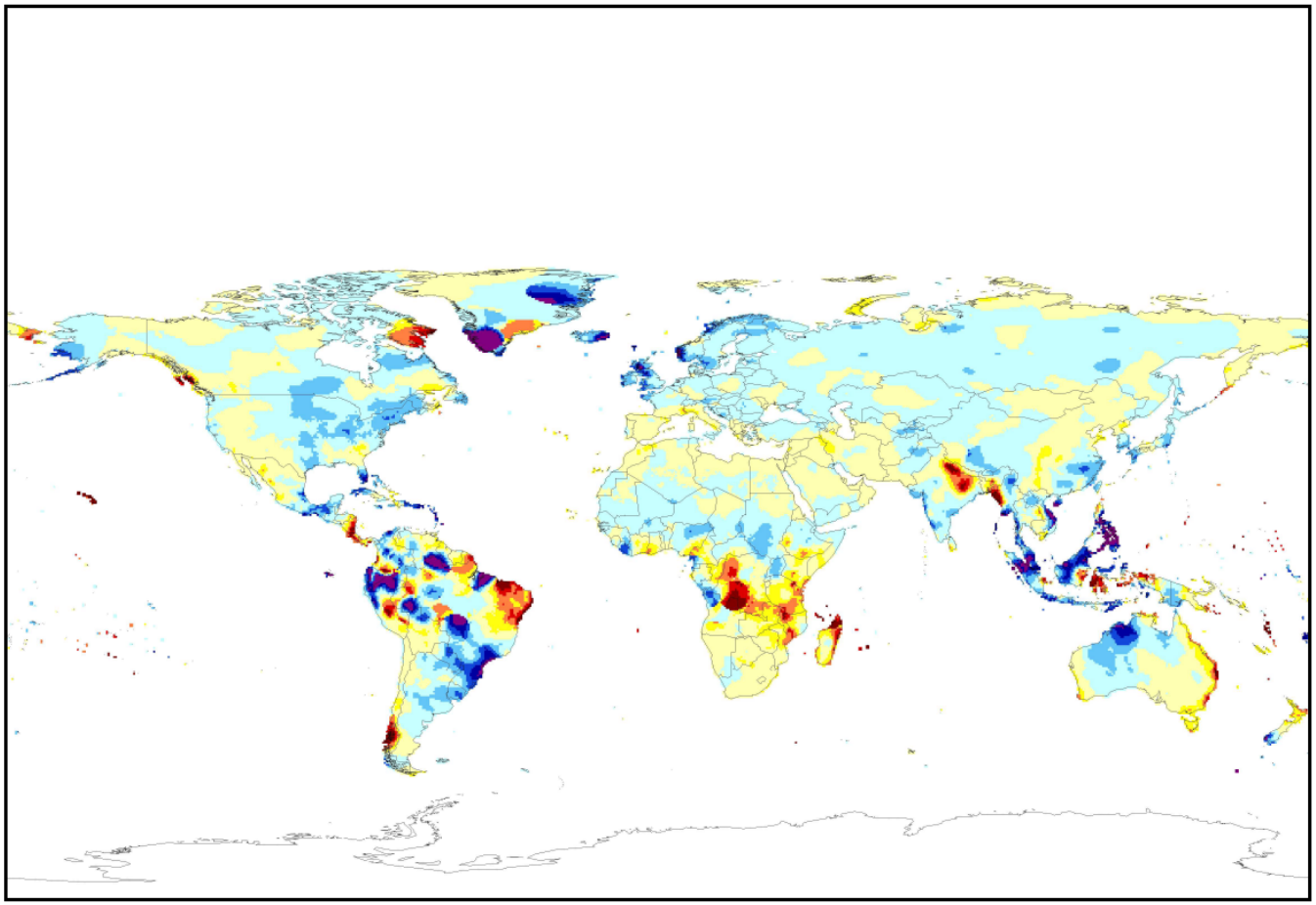
Luigi Mariani

Alcuni dati a livello globale, europeo e italiano

YEARLY TEMPERATURE (VARIATION)



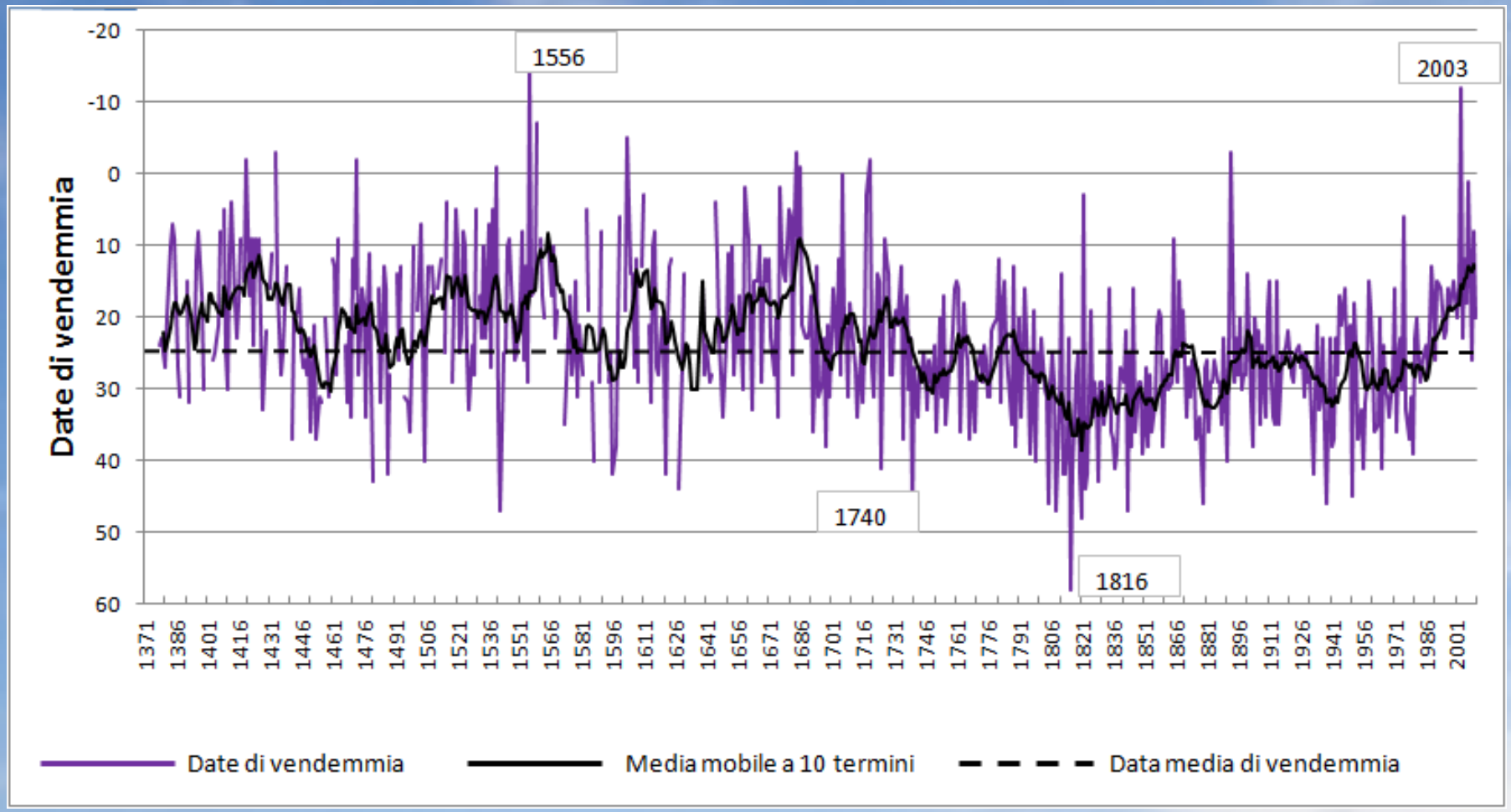
YEARLY PRECIPITATION (VARIATION)



DELTA RR

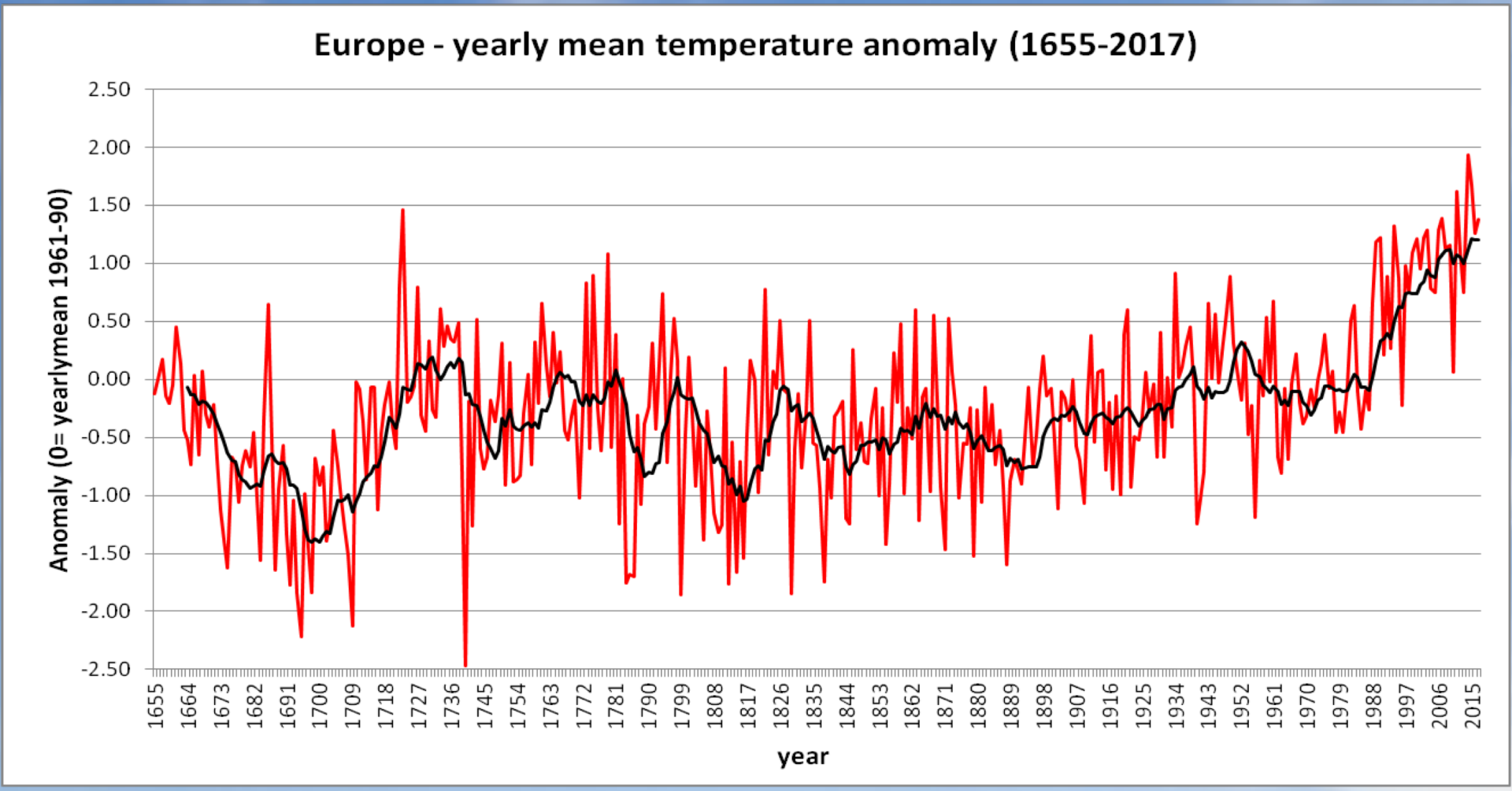
- < - 200
- -200 / -150
- -150 / -100
- -100 / -50
- -50 / 0
- 0 / 50
- 50 / 100
- 100 / 150
- 150 / 200
- > 200

Date di vendemmia a Beaune (1371-2010)



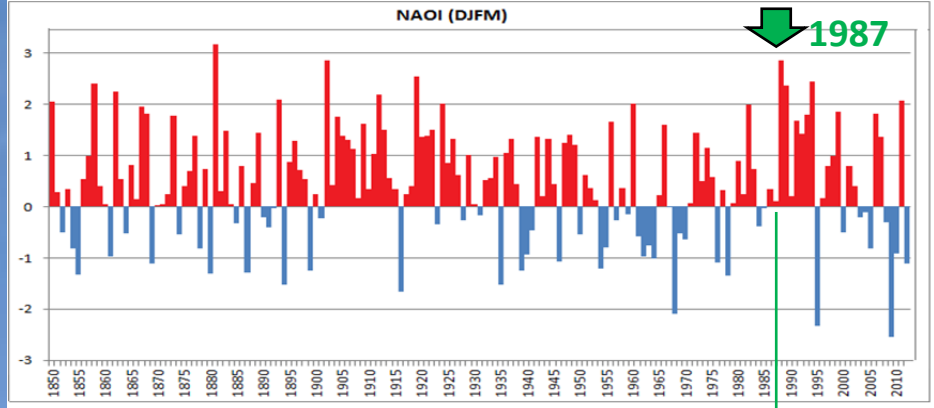
Labbé T., Gaveau F., 2013. Les dates de vendange à Beaune (1371-2010). Analyse et données d'une nouvelle série vendémiologique, Revue historique, n° 666, 2013/2, p. 333-367.

TEMPERATURE EUROPEE DAL 1655 AL 2017
La serie storica strumentale più lunga del mondo

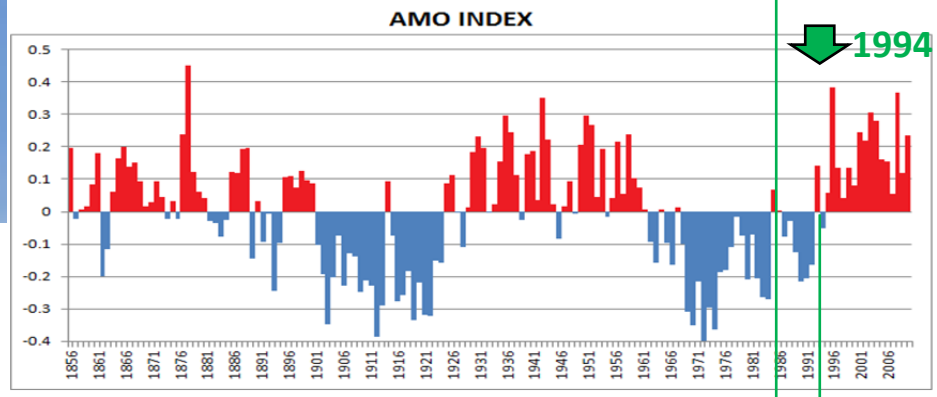


Mariani L., Zavatti F., 2017. Multi-scale approach to Euro-Atlantic climatic cycles based on phenological time series air temperatures and circulation indexes, Science of the Total Environment 593–594 (2017) 253–262

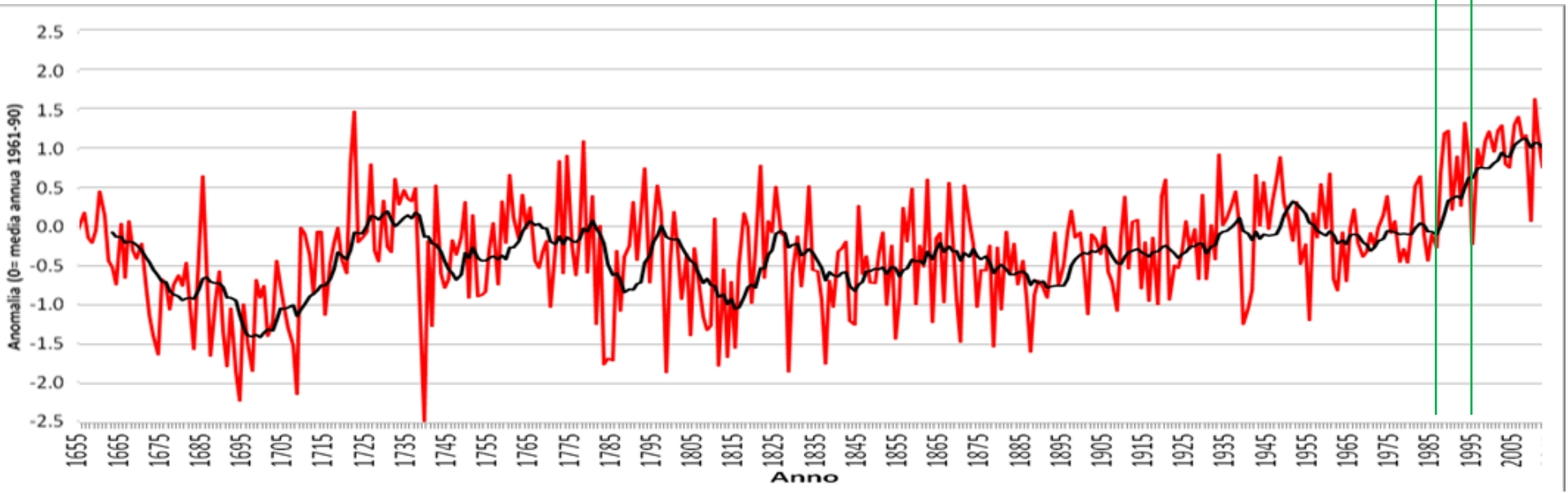
TEMPERATURES
Effects of circulation indexes changes on European temperatures



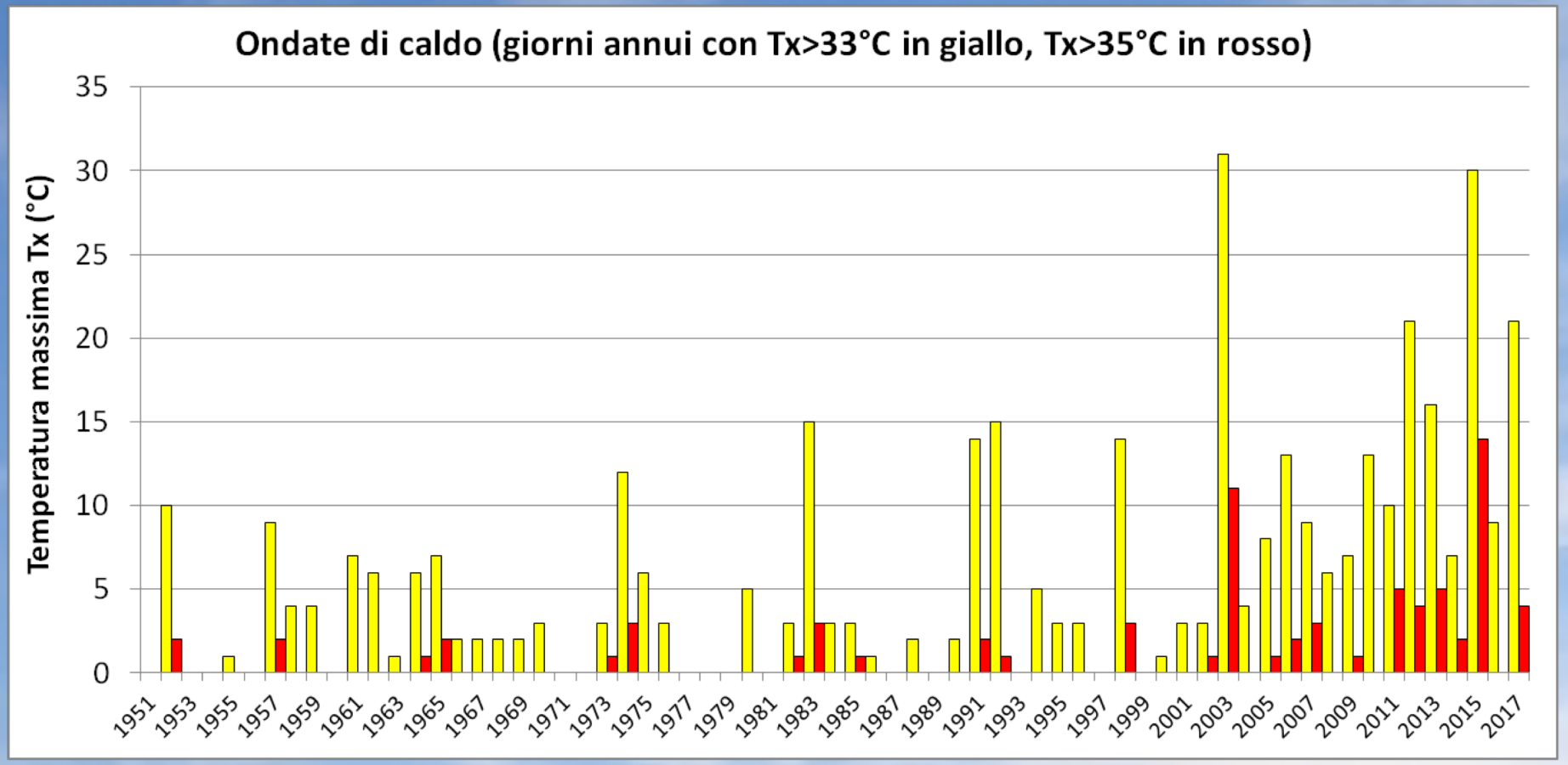
Indice NAO (media da dicembre a marzo) (fonte: CRU - East Anglia University)



Mariani L., Zavatti F., 2017. Multi-scale approach to Euro-Atlantic climatic cycles based on phenological time series air temperatures and circulation indexes, Science of the Total Environment 593–594 (2017) 253–262



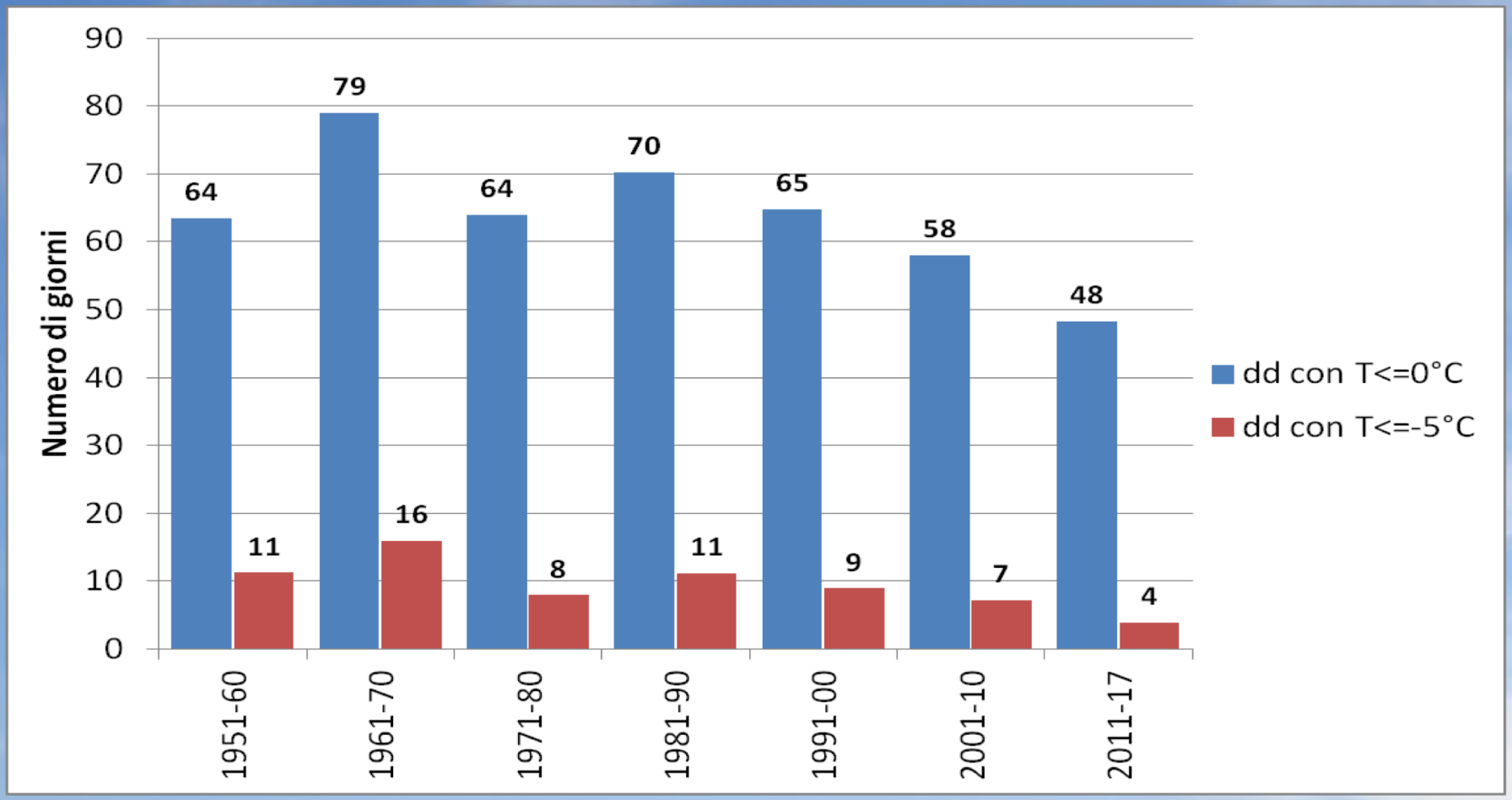
TREND - Area rurale Milanese - Ondate di calore
(dati da Linate 1951-1992; Montanaso 1993-2017)



TX>=33°C (media 1951-2000=2.8 dd; media 2001-2016=11.4 dd)

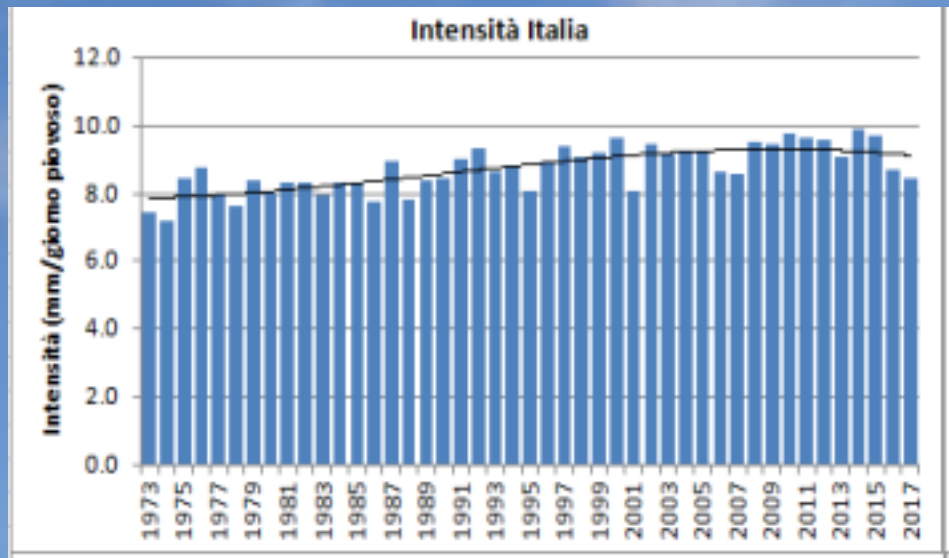
TX>35°C (media 1951-2000=0.3 dd; media 2001-2016=2.7 dd)

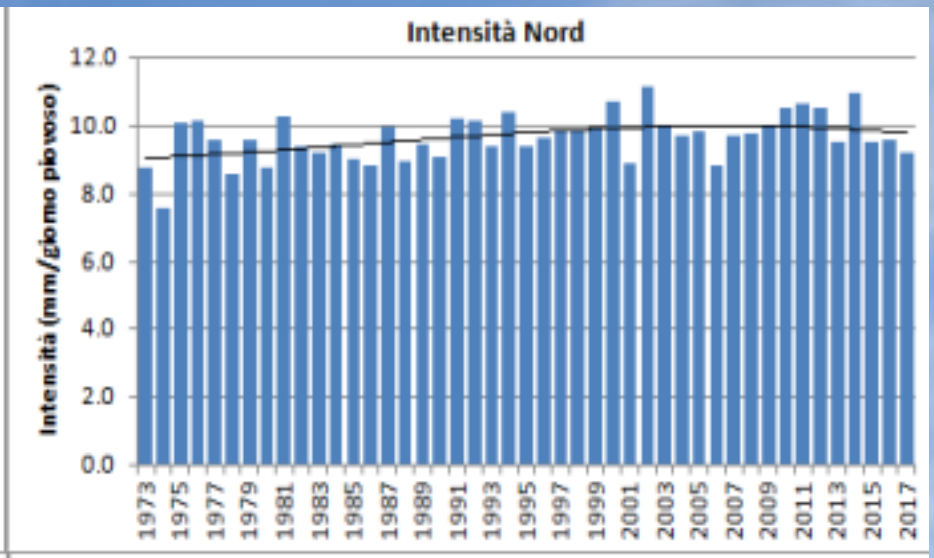
TREND - Area rurale Milanese - Giorni con gelo (T<0 e T<-5°C) (dati da Linate 1951-1992; Montanaso 1993-2017)

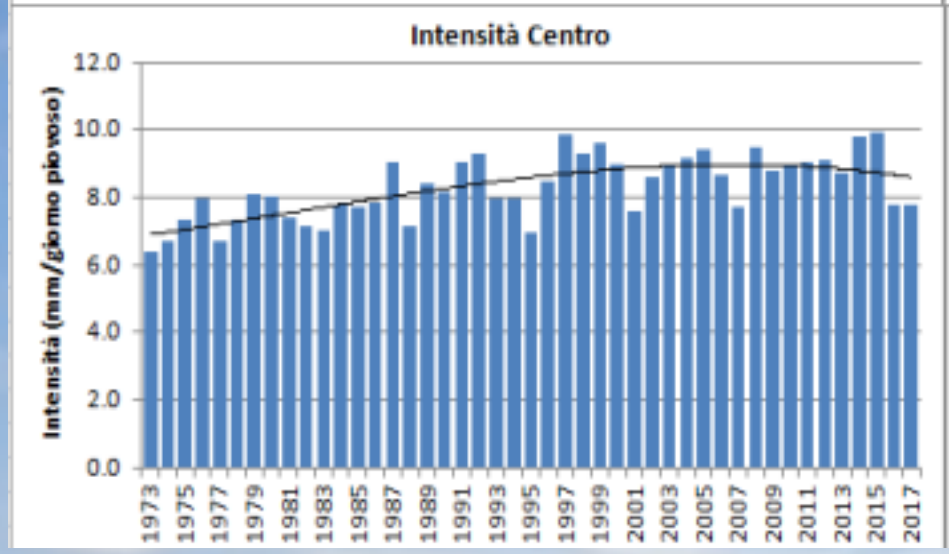


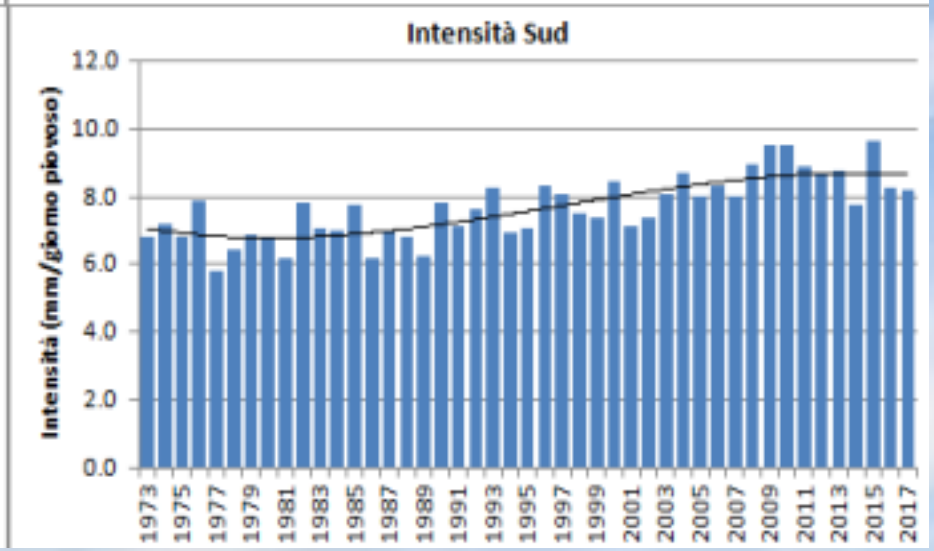
Serie storica della temperatura per l'area rurale prossima a Milano (°C). I dati 1951-1992 sono relativi a Milano Linate (fonte: Servizio Meteorologico dell'Aeronautica Militare e Enav), quelli 1993-2017 sono relativi a Montanaso Lombardo (LO) (fonte: Crea).

TREND - Intensità pluviometriche per l'area italiana 1973-2017. (Elaborazioni su dati di 202 stazioni della rete NOAA GSOD)









L Mariani, dati non pubblicati

Significatività dei trend di intensità pluviometrica per l'area italiana

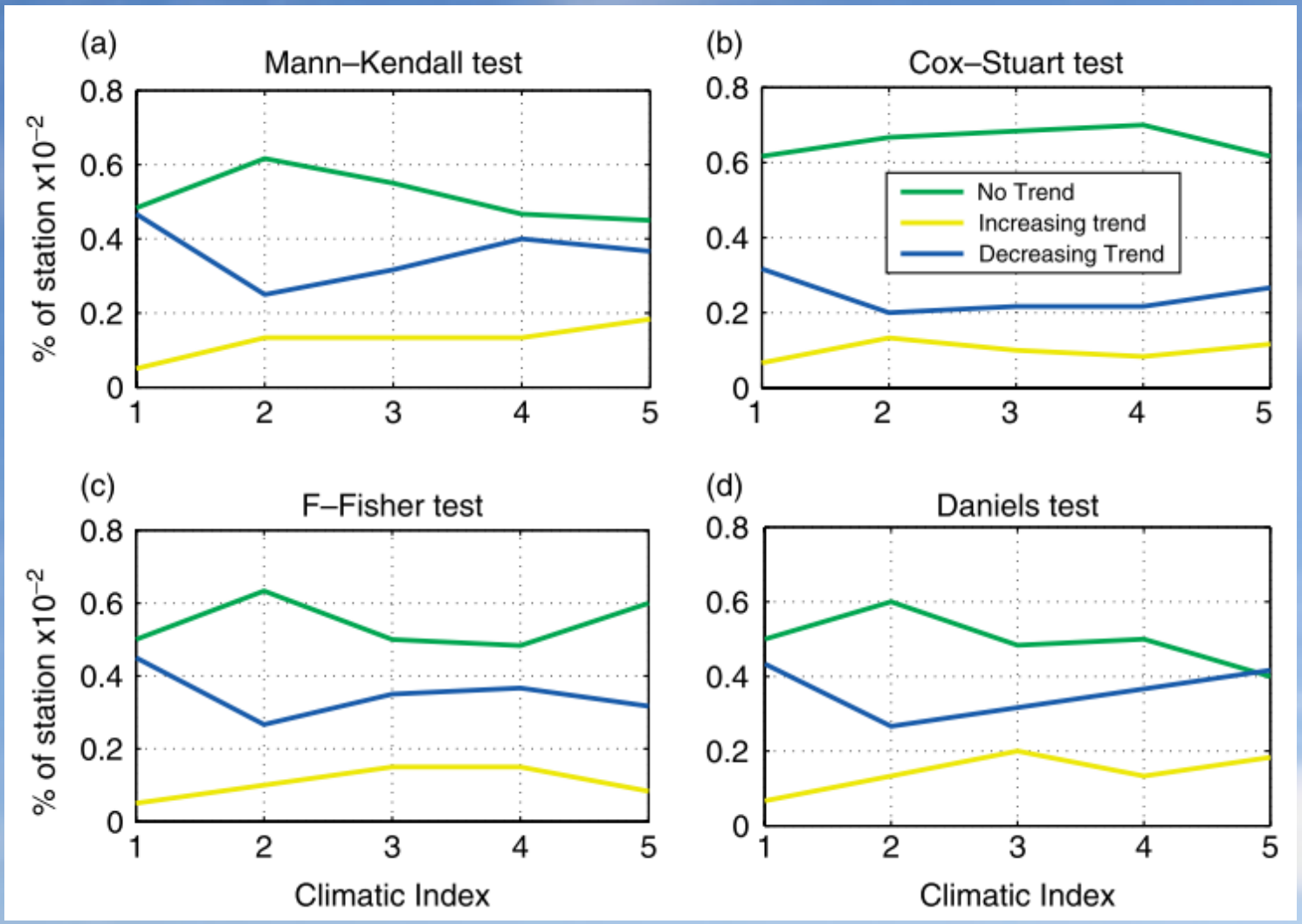
	1973-1999	2000-2017
Nord	ns 1.88	ns -0.68
Centro	** 3.75	ns 0.68
Sud	ns 2.33	ns 1.44
Italia	** 3.59	ns 0.45

Livelli di significatività: **=99%; *=95%; ns=non significativo

Test Z di Mann Kendall eseguito con il pacchetto statistico Makesens 1_0 (Salmi et al., 2002)

L Mariani, dati non pubblicati

Intensità pluviometriche per la Toscana



Legenda
1=1 ora; 2=3 ore; 3=6 ore; 4=12 ore; 5=24 ore

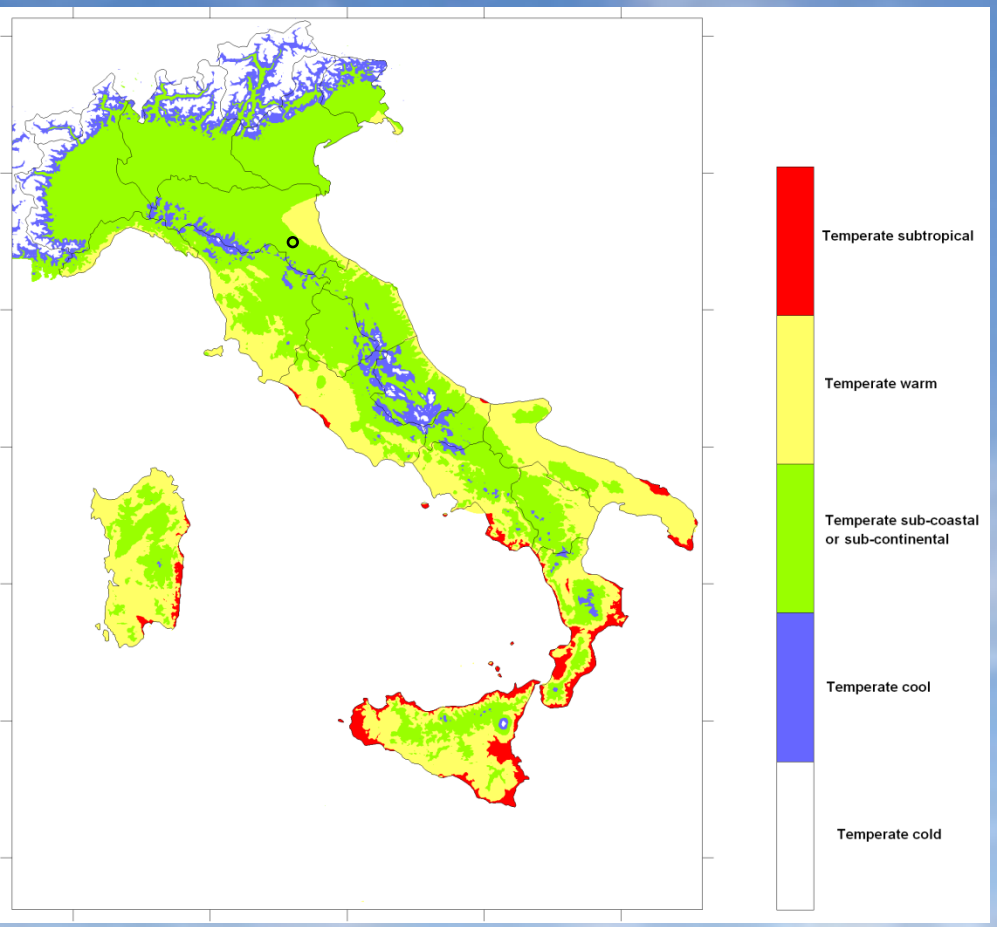
Periodo 1916–2003
Stazioni considerate: 785

Fatichi S., Caporali E., 2009. A comprehensive analysis of changes in precipitation regime in Tuscany, International Journal of Climatology, Volume 29, Issue 13, 1883–1893.

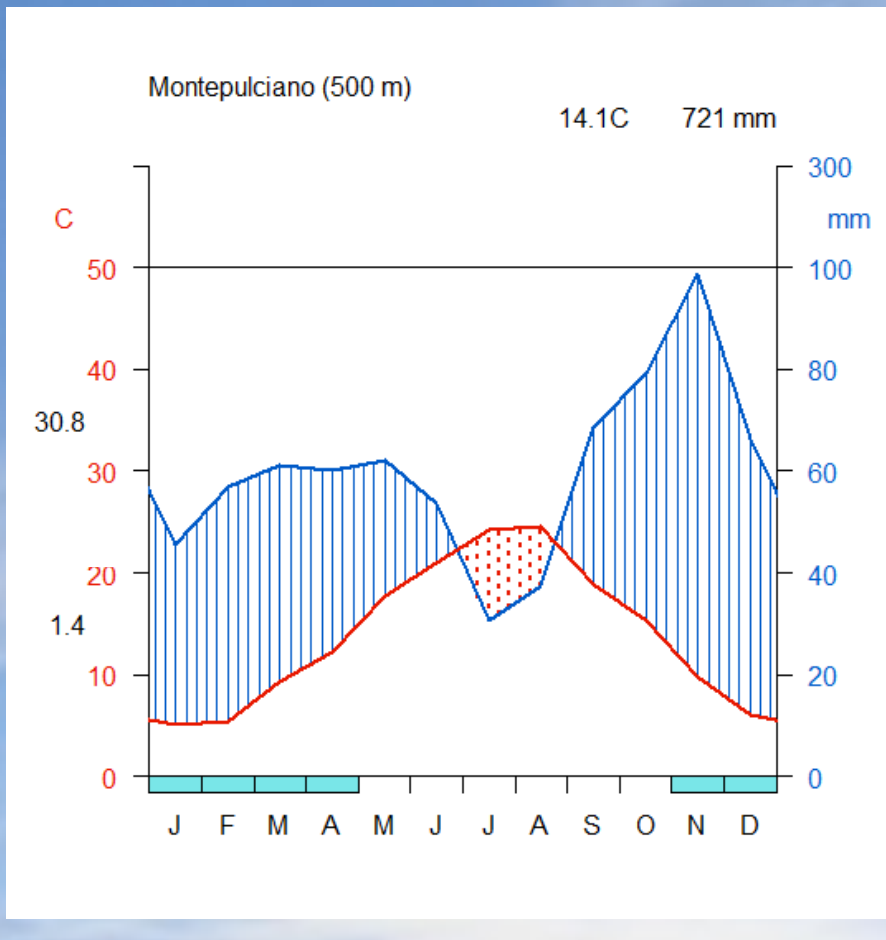
Montepulciano

Regime termico e pluviometrico di Montepulciano

Classificazione termica di Mario Pinna



Climogramma di Bagnouls Gaussen



Clima temperato sublitoraneo
TDanno: 10 - 14.4 °C;
TD mese più freddo: 4 - 5.9 °C;
Escursione annua: 16-19°C;
Mesi con TD > 20°C: 3

La ricetta del clima – Montepulciano, Italia

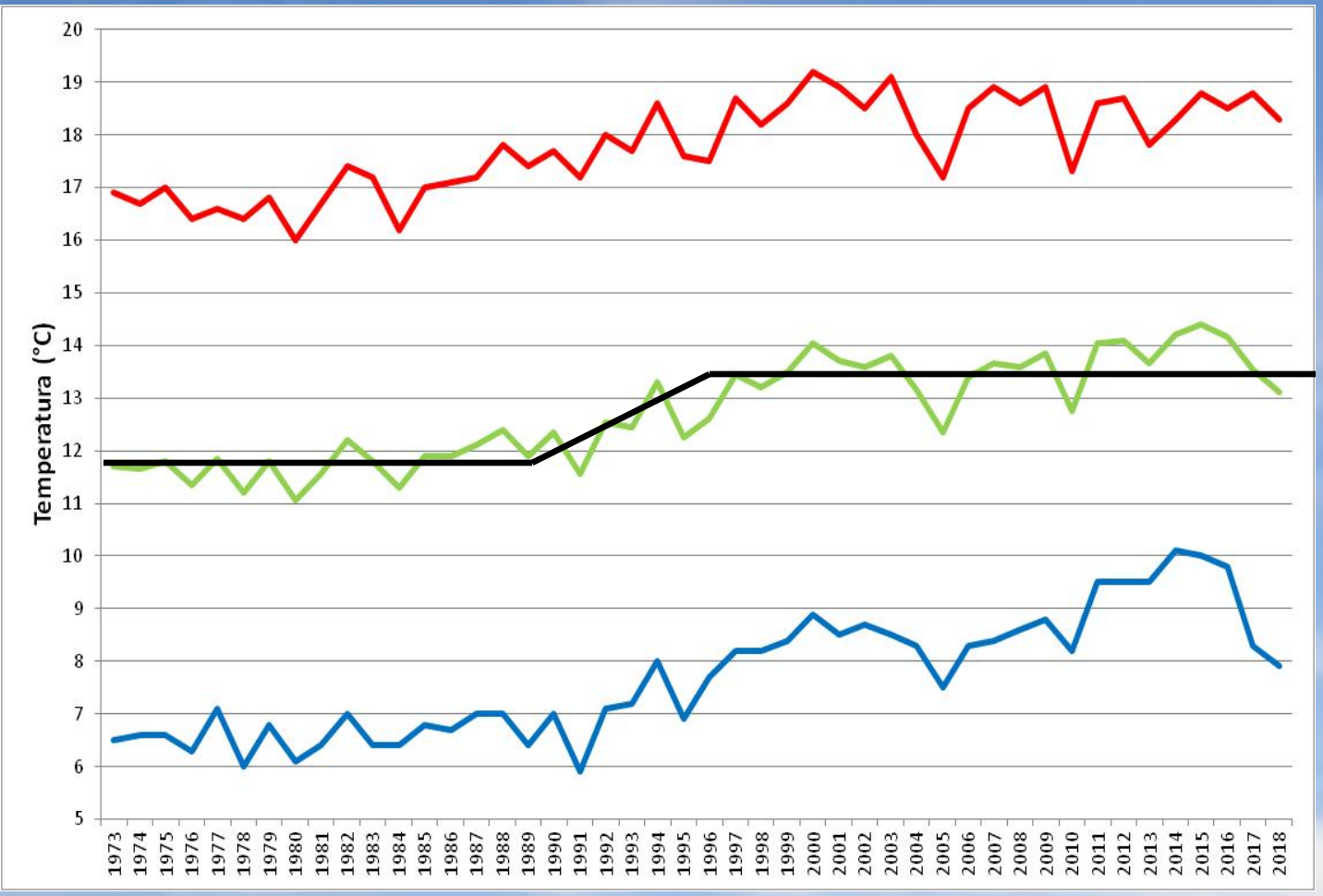
Il clima delle medie latitudini dipende dalla circolazione atmosferica -> **pattern circolatori** mediamente presenti ogni anno:

- **anticicloni** (tempo stabile e soleggiato): **180-220 dd**

-**perturbazioni** – saccature atlantiche o minimi mediterranei (tempo instabile con pioggia o neve): **80-120 dd**

-**tipi intermedi** (di transizione fra i tipi suddetti): **q.b. per arrivare a 365 dd.**

Temperature medie annue di Montepulciano (1973-2018)



Tmax

Più sensibili al forcing sinottico

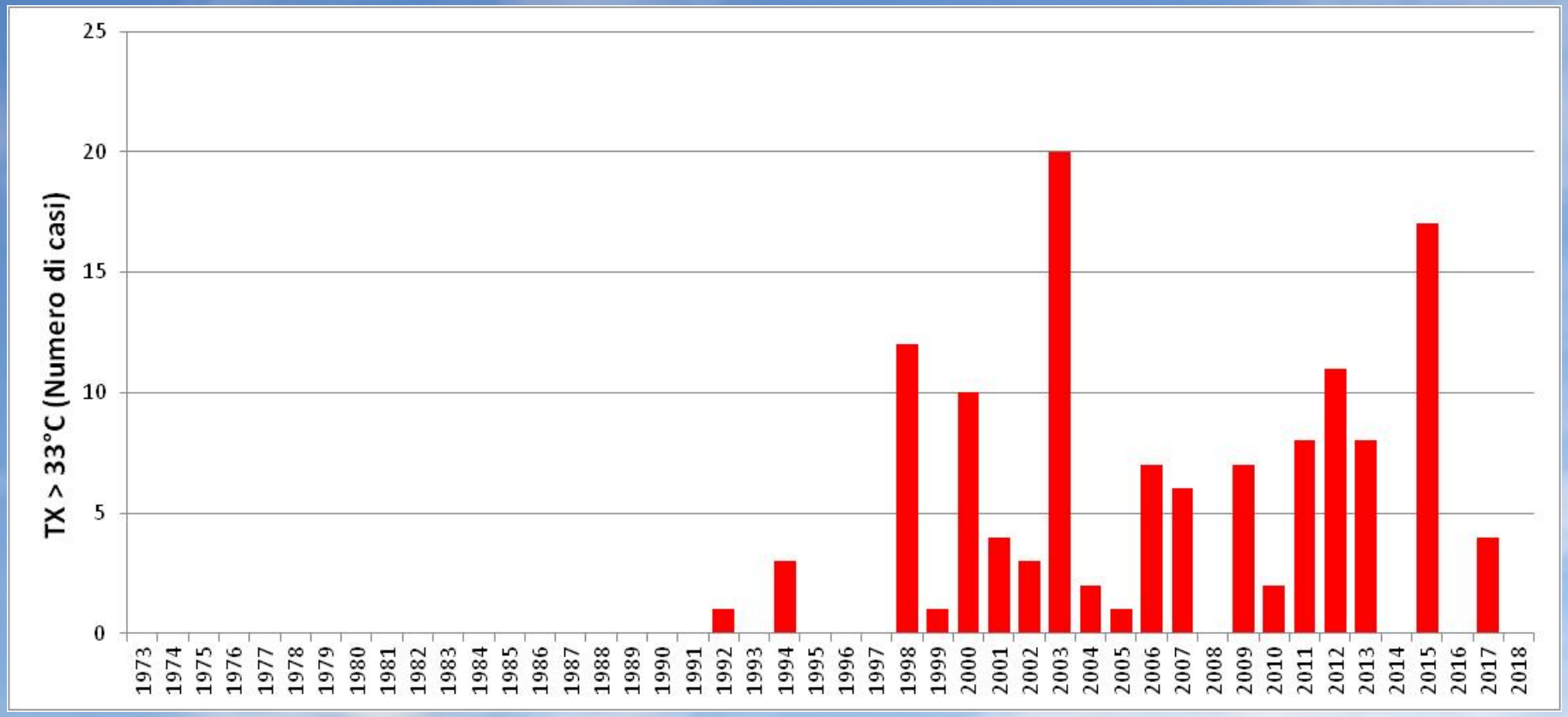
Tmed

Tmin

Più sensibili ai fattori locali

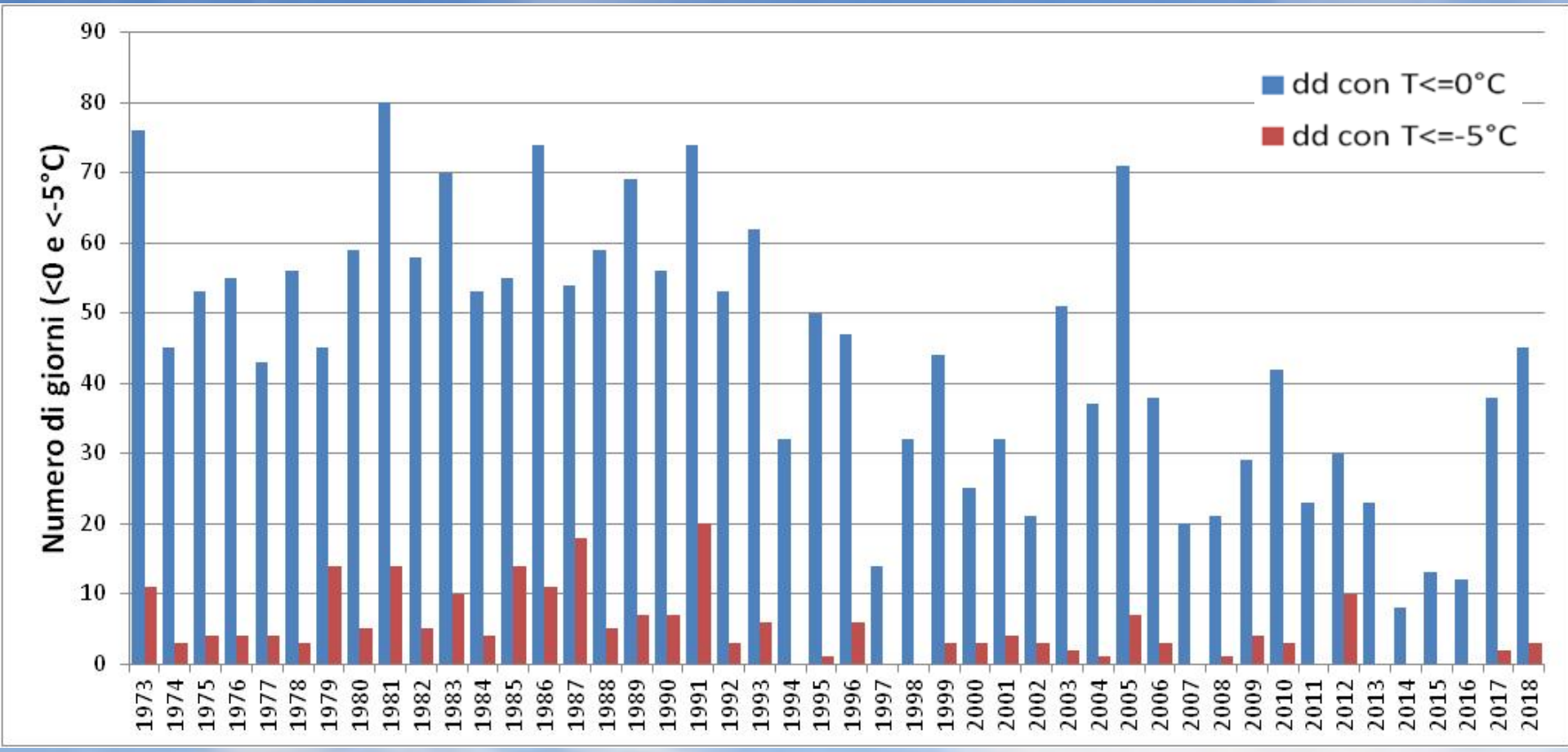
	1973-1990	1991-2018	Differenza
Media delle massime	16.9	18.3	+1.4°C
Media delle minime	6.6	8.4	+1.8°C
Media delle medie	11.8	13.4	+1.6°C

Ondate di calore - Montepulciano (1973-2018)



TX>=33°C (media 1973-1990=0 dd; media 1991-2018=4.5 dd)

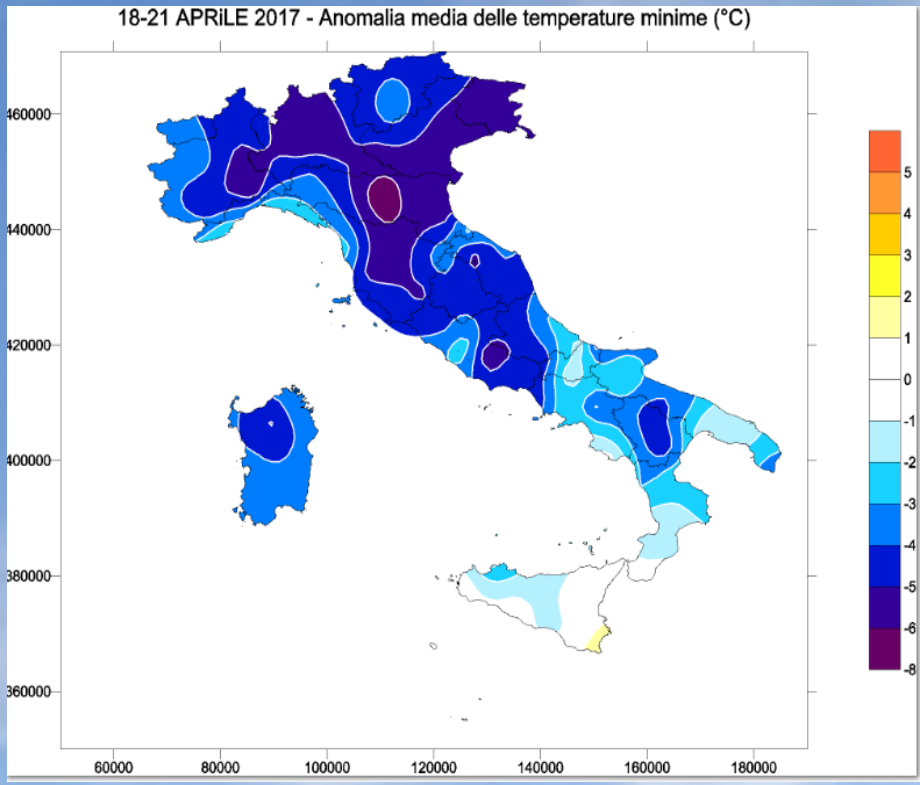
Giorni con gelo (T<0 e <-5°C) - Montepulciano (1973-2018)

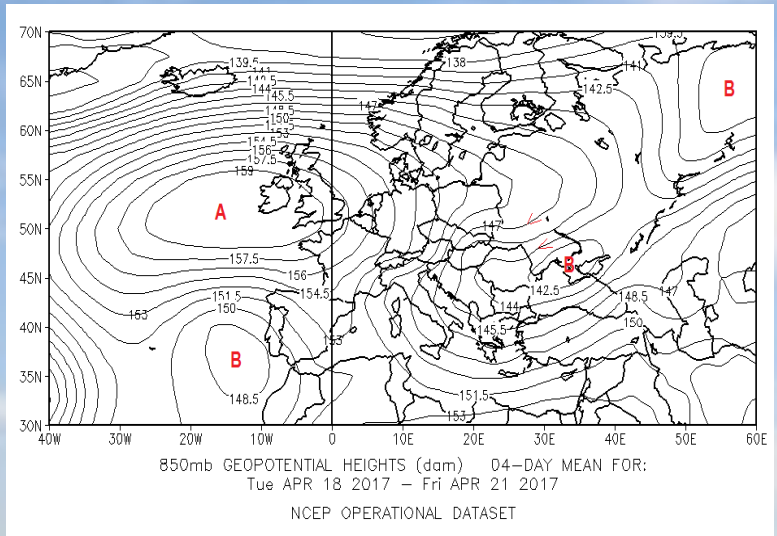


TN<0°C (media 1973-1990=59 dd; media 1991-2018=35 dd)

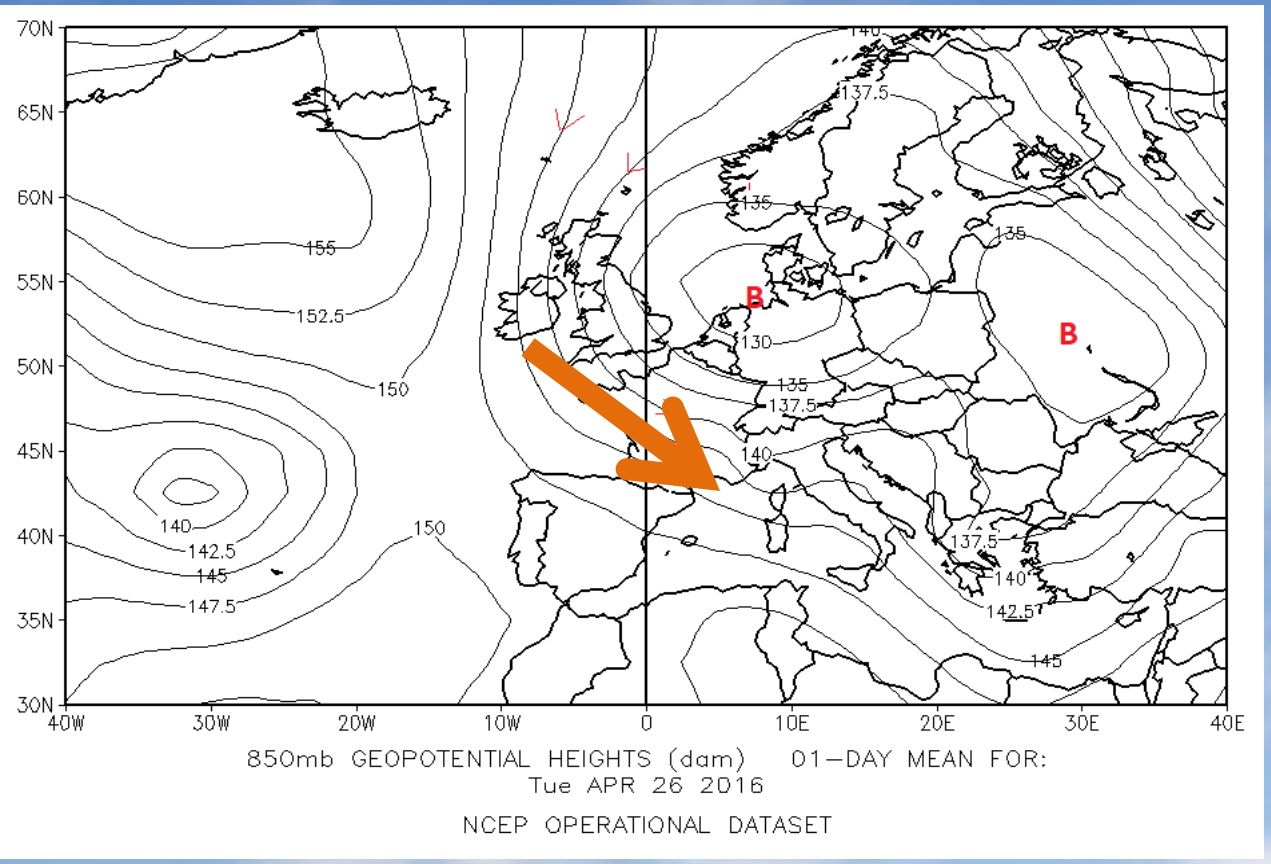
TN<-5°C (media 1973-1990=8 dd; media 1991-2018=3 dd)

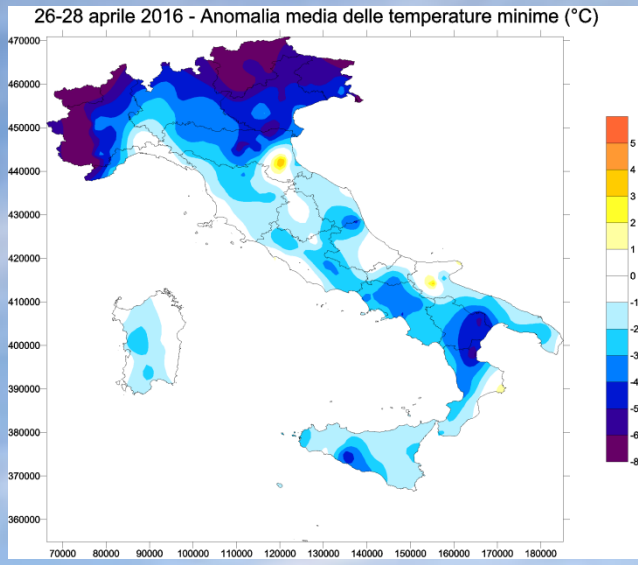
Italia – La gelata tardiva del 2017





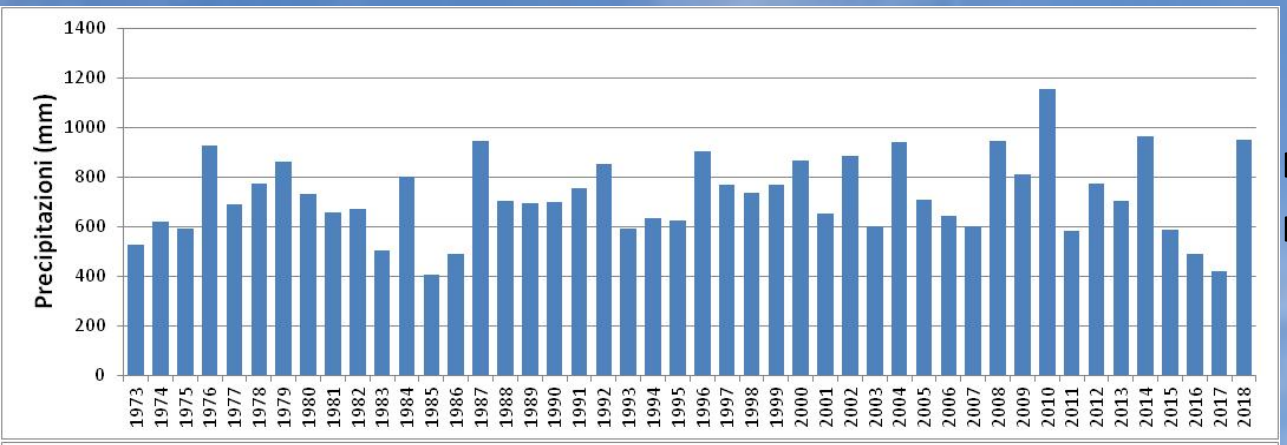
Gelate tardive - Evento del 26-28 aprile 2016



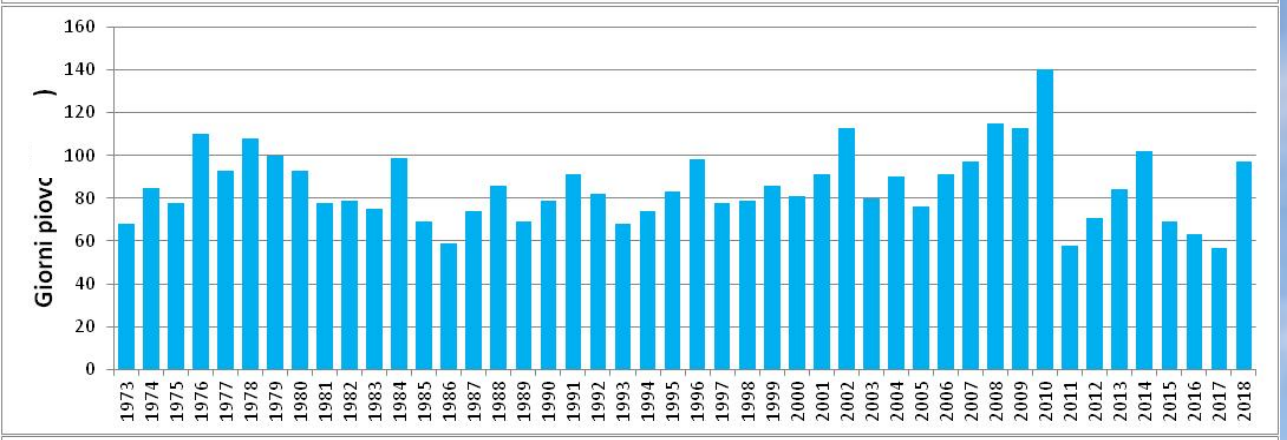


Irruzione fredda a macroscala (18-21 aprile 2017) e risposta termica al suolo (anomalia rispetto a media 1986-2015)

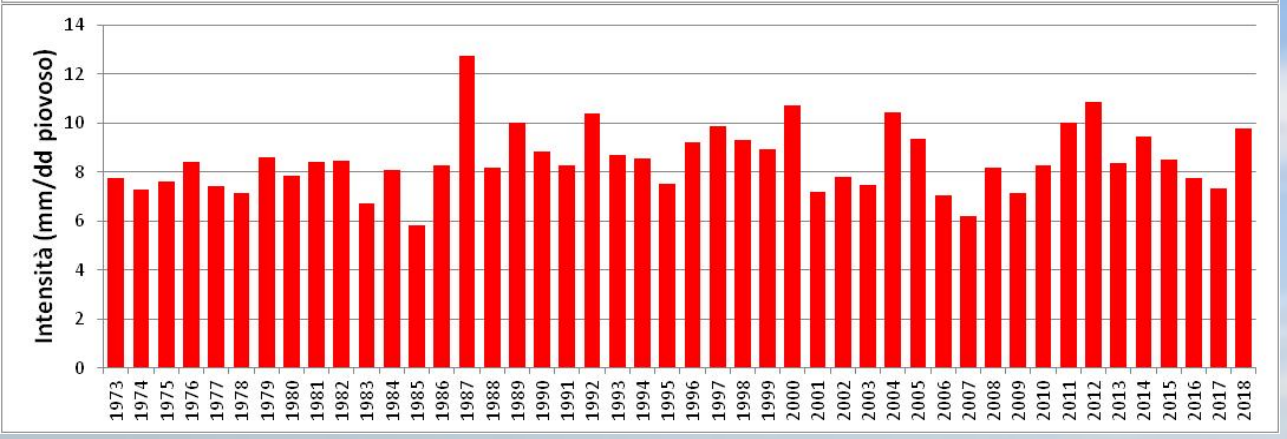
Precipitazioni annue - Montepulciano (1973-2018)



RR (+9%)
media 1973-1990=682 mm
media 1991-2018=746 mm

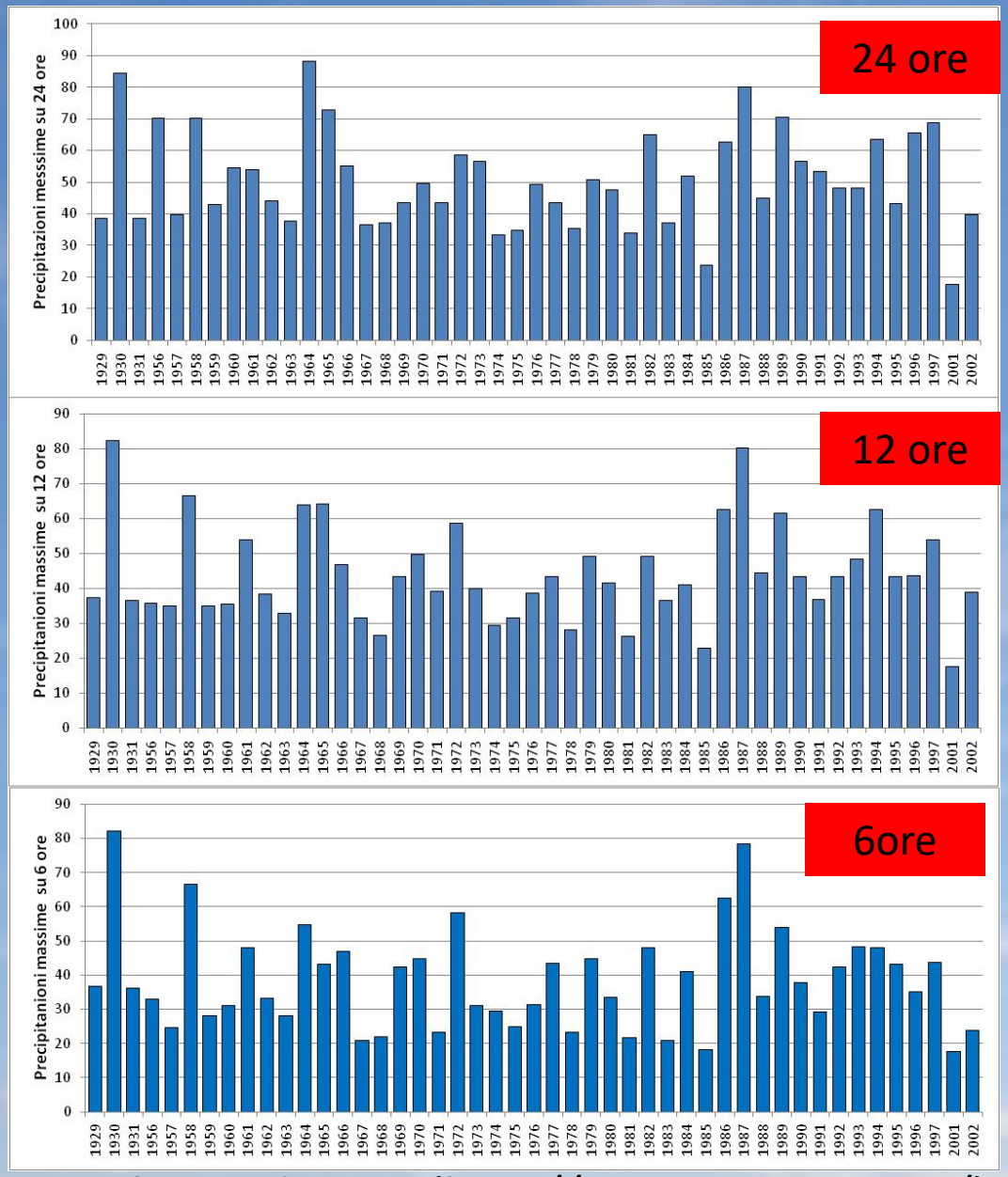


NGP (+3%)
media 1973-1990=83 dd
media 1991-2018=87 dd



Intensità (+0.5%)
media 1973-1990=8.2 mm
media 1991-2018=8.7 mm

Pioggia massima di 6, 12 e 24 ore - Montepulciano (1929-2002)

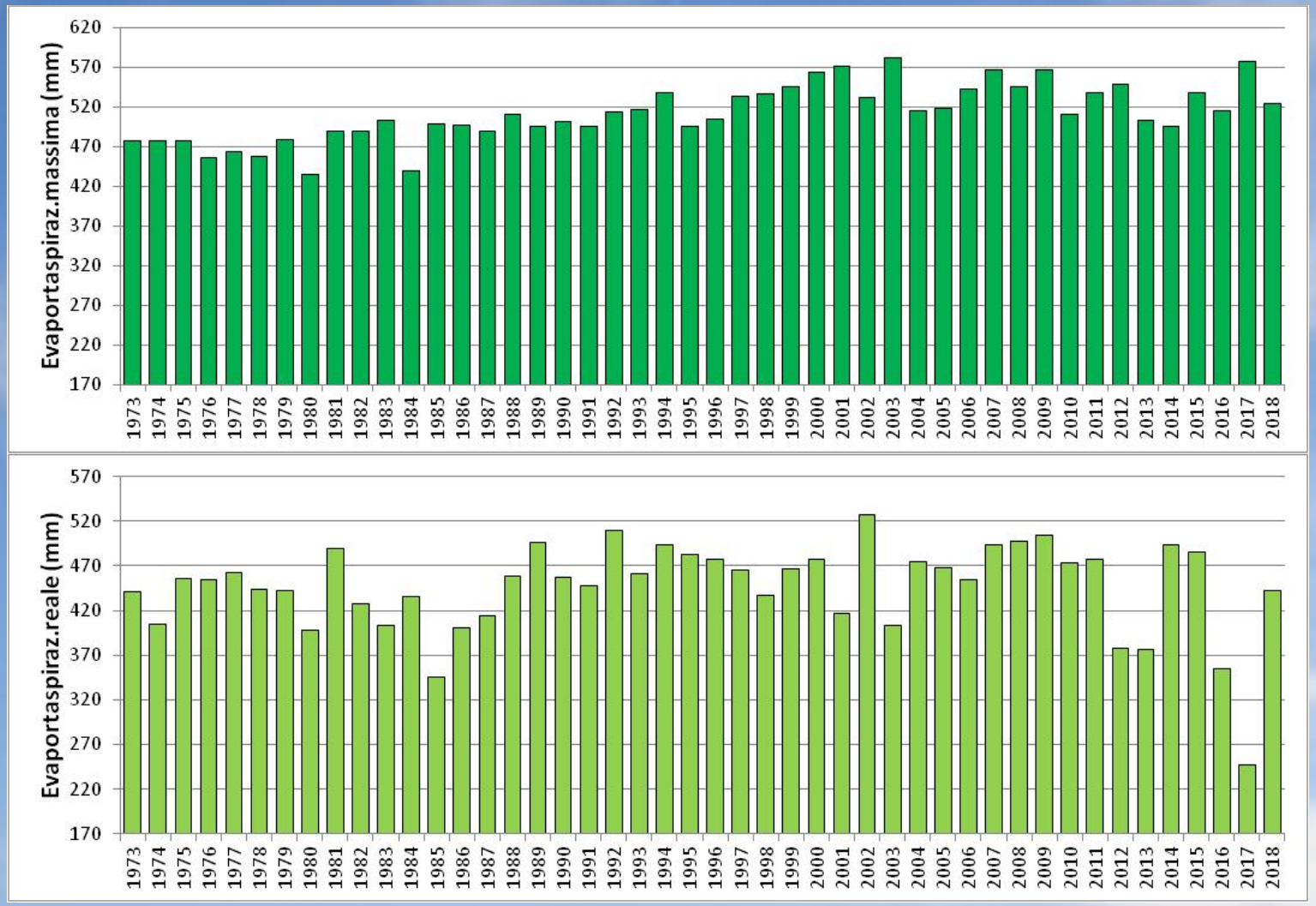


Fatichi S., Caporali E., 2009. A comprehensive analysis of changes in precipitation regime in Tuscany, International Journal of Climatology, Volume 29, Issue 13, 1883–1893.

Lionello P., Trigo I.F., Gil V., M. L. R. Liberato et al. 2016. Objective Climatology of Cyclones in the Mediterranean Region: a consensus view among methods with different system identification and tracking criteria, Tellus, May 2016, DOI: 10.3402/tellusa.v68.29391

Fonte: banca dati SIR (http://www.sir.toscana.it/)

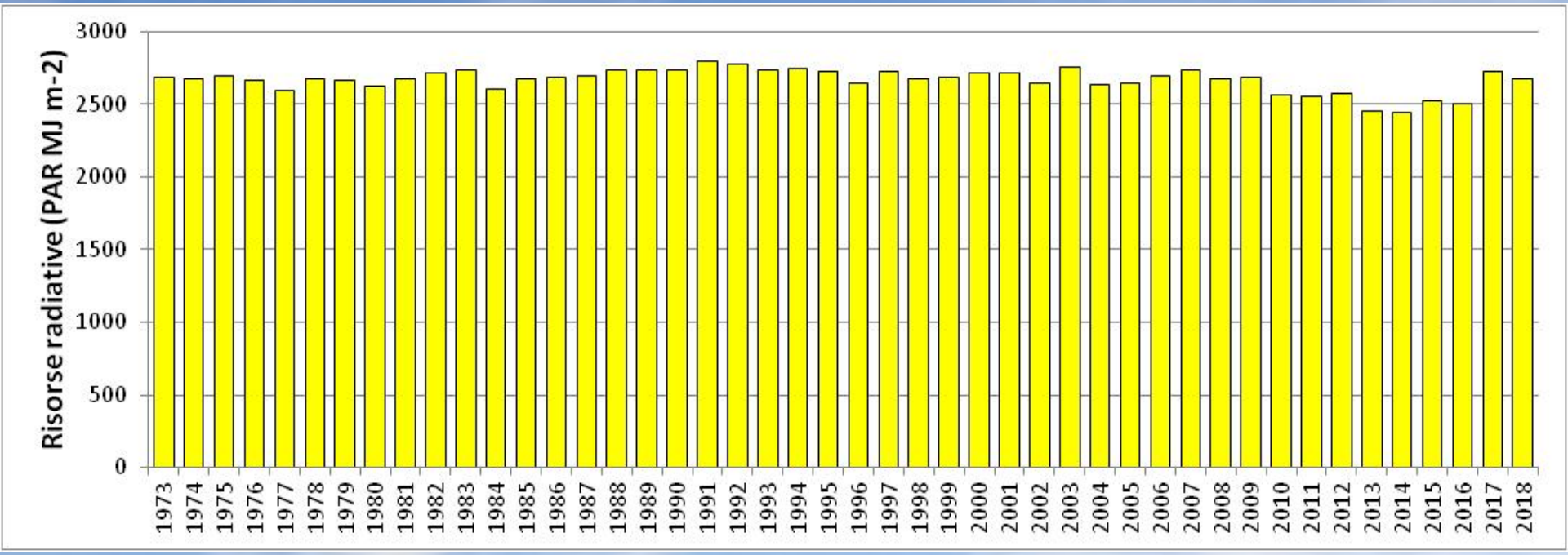
Evapotrasp. massima (ETM) e reale (ETR) - Montepulciano (1973-2018)



ETM: media 1973-1990: 480 mm; media 1991-2018: 533 mm (+11%)

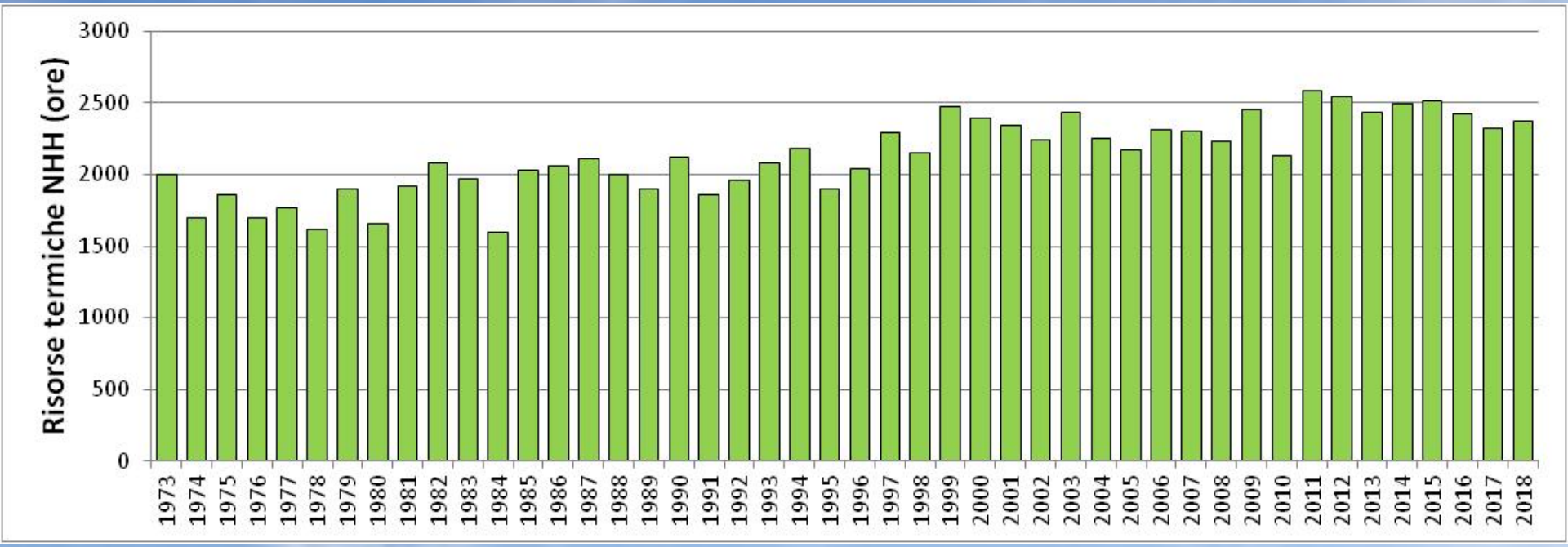
ETR: media 1973-1990: 435 mm; media 1991-2018: 452 mm (+4%)

Risorse radiative - PAR annua per Montepulciano (1973-2018)



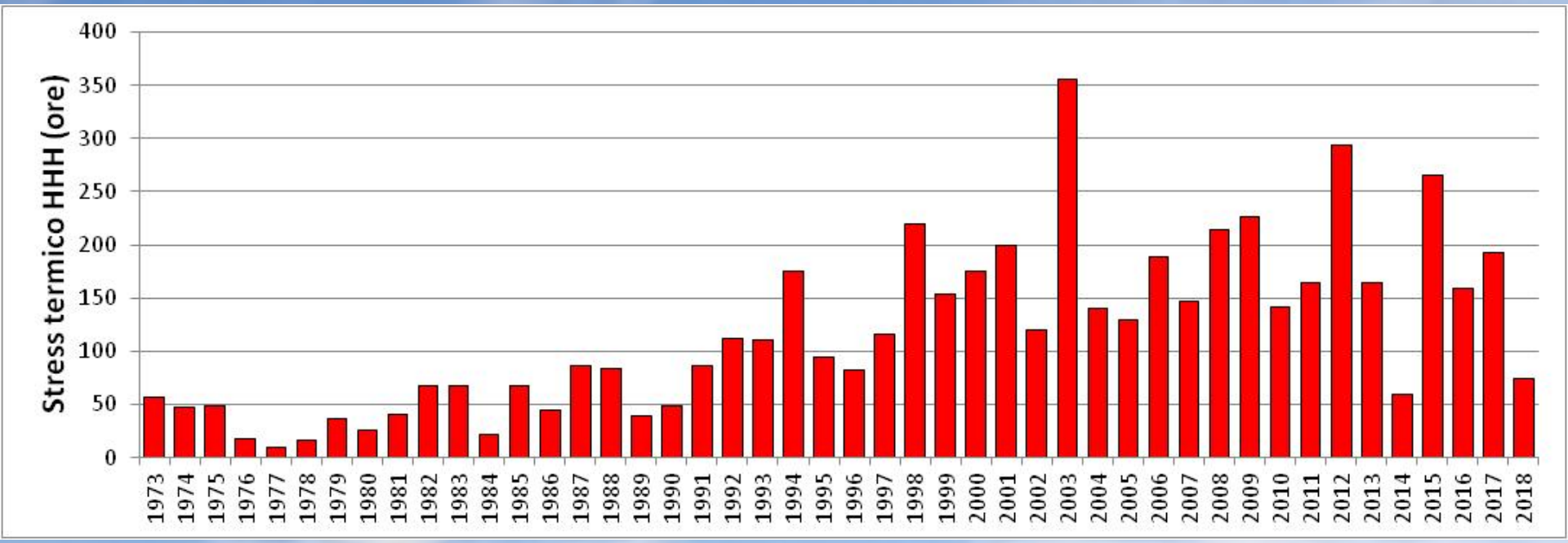
Media 1973-1988: 2682 MJ m^{-2}; Media 1989-2018: 2660 MJ m^{-2} (-0.8%)

Risorse termiche (Ore normali di caldo NHH)-Montepulciano (1973-2018)



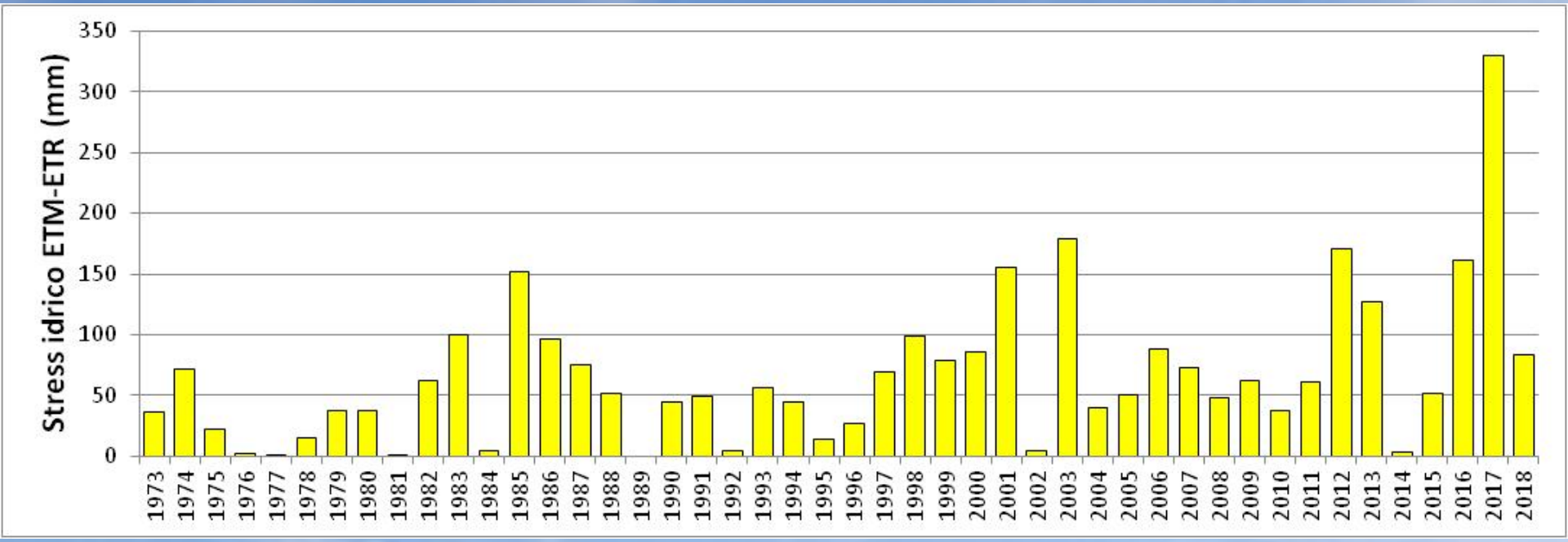
Media 1973-1988: 1888 ore; Media 1989-2018: 2282 oer (+21%)

Ore di stress da eccesso termico (HHH)-Montepulciano (1973-2018)



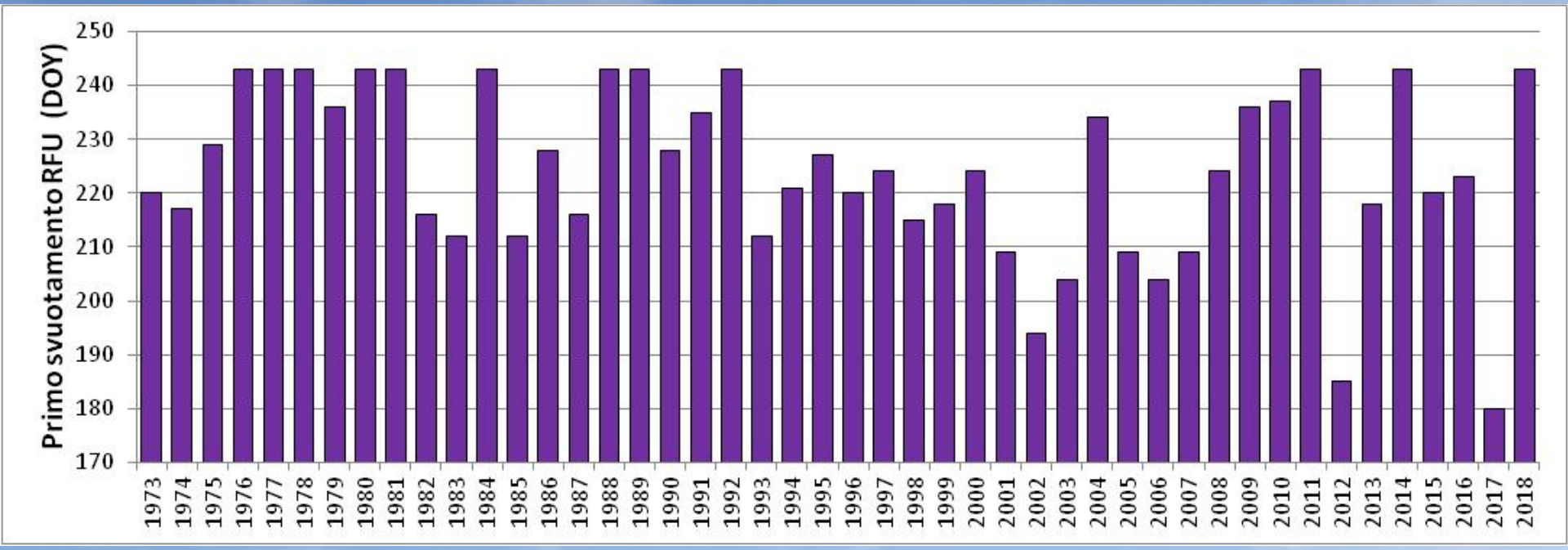
Media 1973-1990: 46 ore; Media 1991-2018: 163 ore (+163%)

Stress idrico (ETM-ETR)-Montepulciano (1973-2018)



Media 1973-1990: 45 mm; Media 1991-2018: 81 mm (+79%)

Riserva facilm.utilizzable – Data primo esaurimento - Montepulciano (1973-2018)



Media 1973-1990: 231; Media 1991-2018: 220 (-11 giorni)

Sintesi - Fase climatica 1991-2018 rispetto alla 1973-1990

Risorse radiative per la fotosintesi stazionarie
Potenziale produttivo più elevato (aumento CO2)
Risorse termiche in lieve aumento
Risorse pluviometriche stazionarie
Consumi idrici in lieve aumento
Stress da carenza idrica in aumento
Stress da eccesso termico in sensibile aumento
Stress da basse temperature in calo (gelata del 2017?)
Il tutto condito con una notevolissima variabilità interannuale

Consigli
Monitorare l'andamento meteorologico in azienda (misure + diario)
Calcolare bilanci idrici, risorse termiche, stress, ecc.
Osservazioni sulla vite (fenologia, curve di maturazione, ecc.)
Cura delle sistemazioni idraulico agrarie.