

Analisi meteorologica nel Lazio durante il periodo di lockdown

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Studio della qualità dell'aria a Roma e nel Lazio durante il lockdown 2020

Webinar - Venerdì 26/2/2021

Effetto della meteorologia sulle concentrazioni di inquinanti durante il lockdown 2020

Obiettivi:

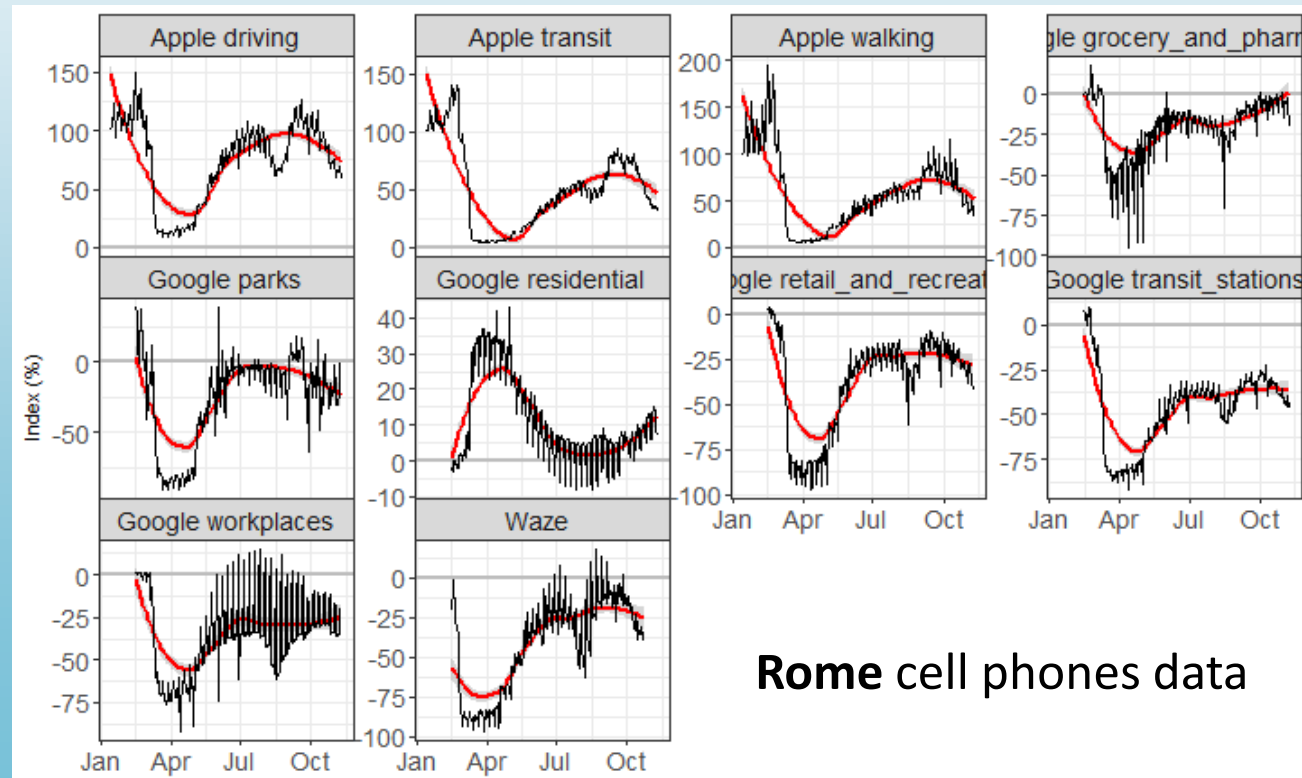
- Individuare le forzanti meteorologiche sulle concentrazioni di inquinanti misurate
- Definire la confrontabilità delle osservazioni 2020 con quelle degli anni precedenti
- Supportare la quantificazione dell'effetto dovuto alla riduzione delle emissioni

Metodo:

- Analisi delle anomalie 2020 rispetto ai valori medi degli anni precedenti (reanalisi ERA5 ed osservazioni locali)
- Esame delle condizioni meteorologiche occorse durante i mesi del lockdown

Periodi di lockdown

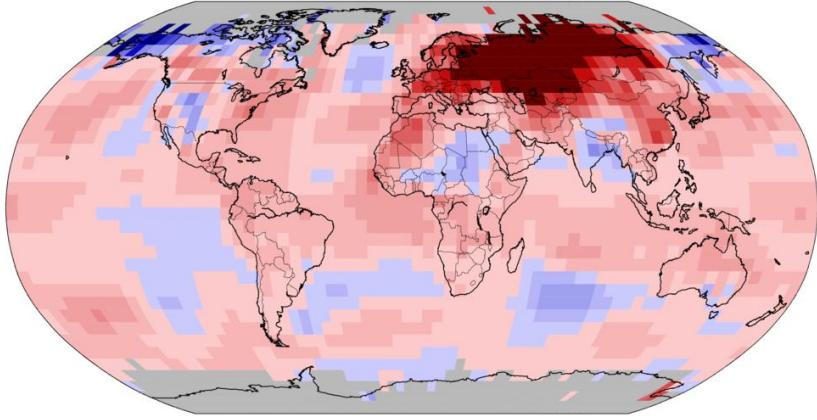
	PreLock	ParLock	FullLock	ParRelax
inizio	25/01/2020	25/02/2020	16/03/2020	04/05/2020
fine	24/02/2020	15/03/2020	03/05/2020	20/06/2020



Trend climatico e confronto con le normali meteorologiche

Land & Ocean Temperature Departure from Average Feb 2020
(with respect to a 1981–2010 base period)

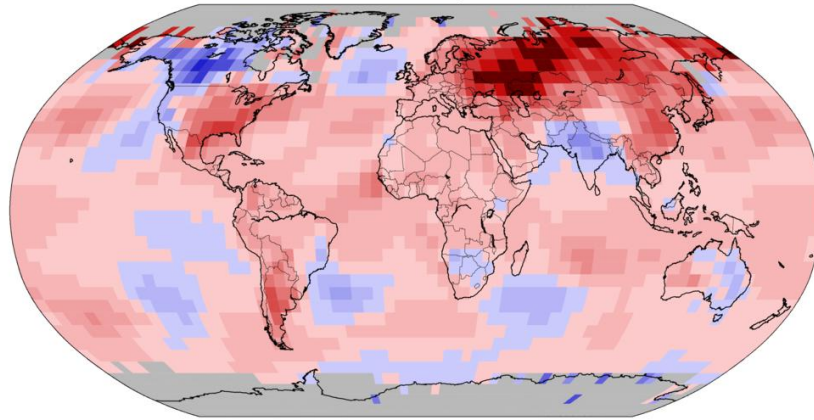
Data Source: NOAAGlobalTemp v5.0.0–20200308



National Centers for Environmental Information
GHCNM v4.0.1.20200307.qfe
Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Departure from Average Mar 2020
(with respect to a 1981–2010 base period)

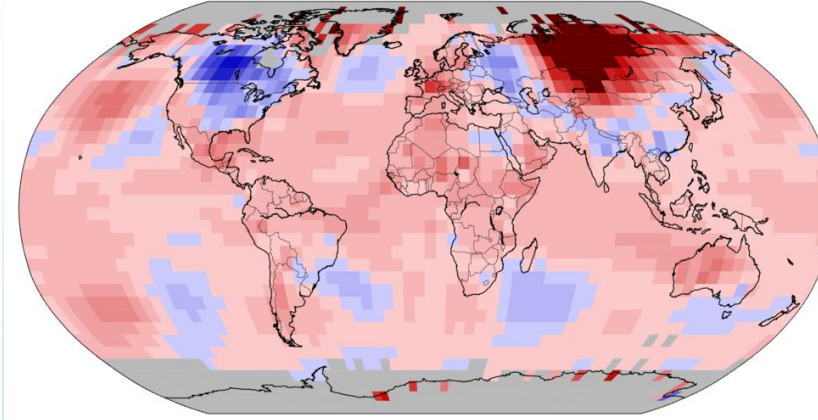
Data Source: NOAAGlobalTemp v5.0.0–20200408



National Centers for Environmental Information
GHCNM v4.0.1.20200407.qfe
Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Departure from Average Apr 2020
(with respect to a 1981–2010 base period)

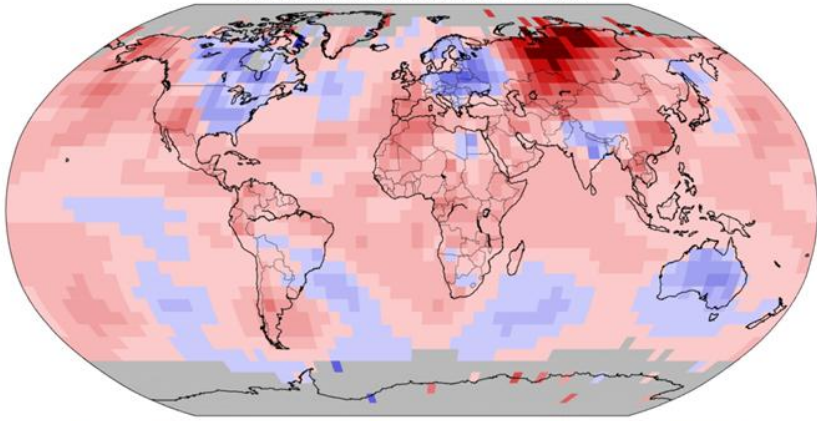
Data Source: NOAAGlobalTemp v5.0.0–20200508



National Centers for Environmental Information
GHCNM v4.0.1.20200507.qfe
Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Departure from Average May 2020
(with respect to a 1981–2010 base period)

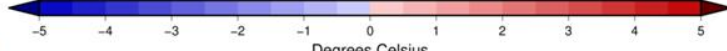
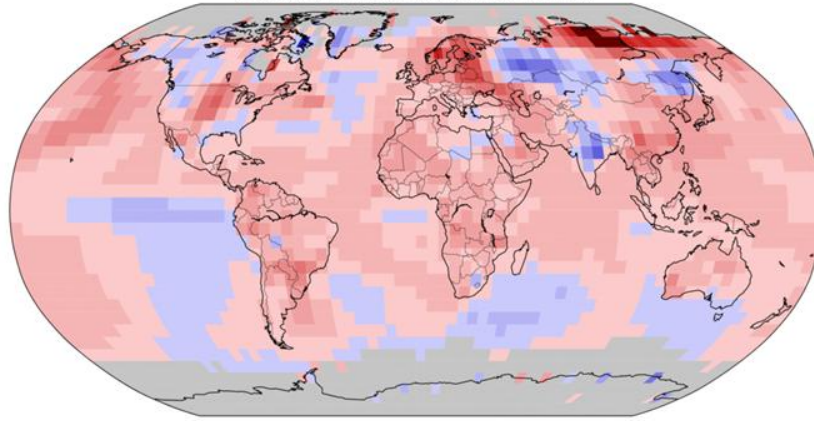
Data Source: NOAAGlobalTemp v5.0.0–20200608



National Centers for Environmental Information
GHCNM v4.0.1.20200607.qfe
Please Note: Gray areas represent missing data
Map Projection: Robinson

Land & Ocean Temperature Departure from Average Jun 2020
(with respect to a 1981–2010 base period)

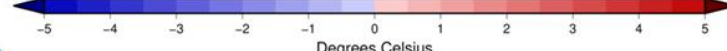
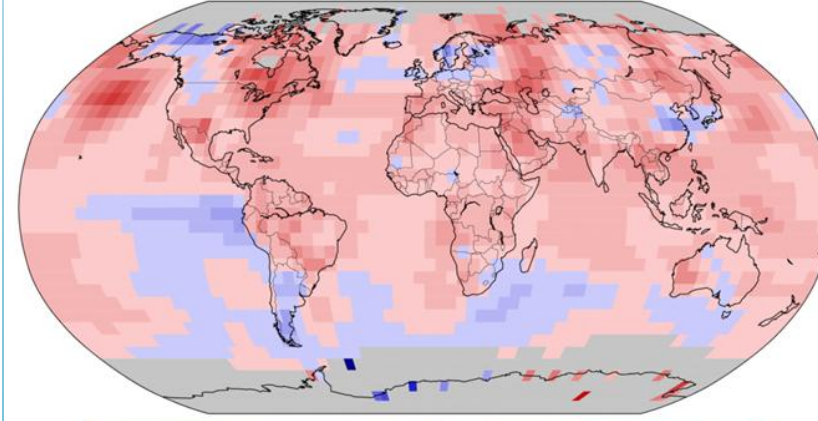
Data Source: NOAAGlobalTemp v5.0.0–20200707



National Centers for Environmental Information
GHCNM v4.0.1.20200706.qfe
Please Note: Gray areas represent missing data
Map Projection: Robinson

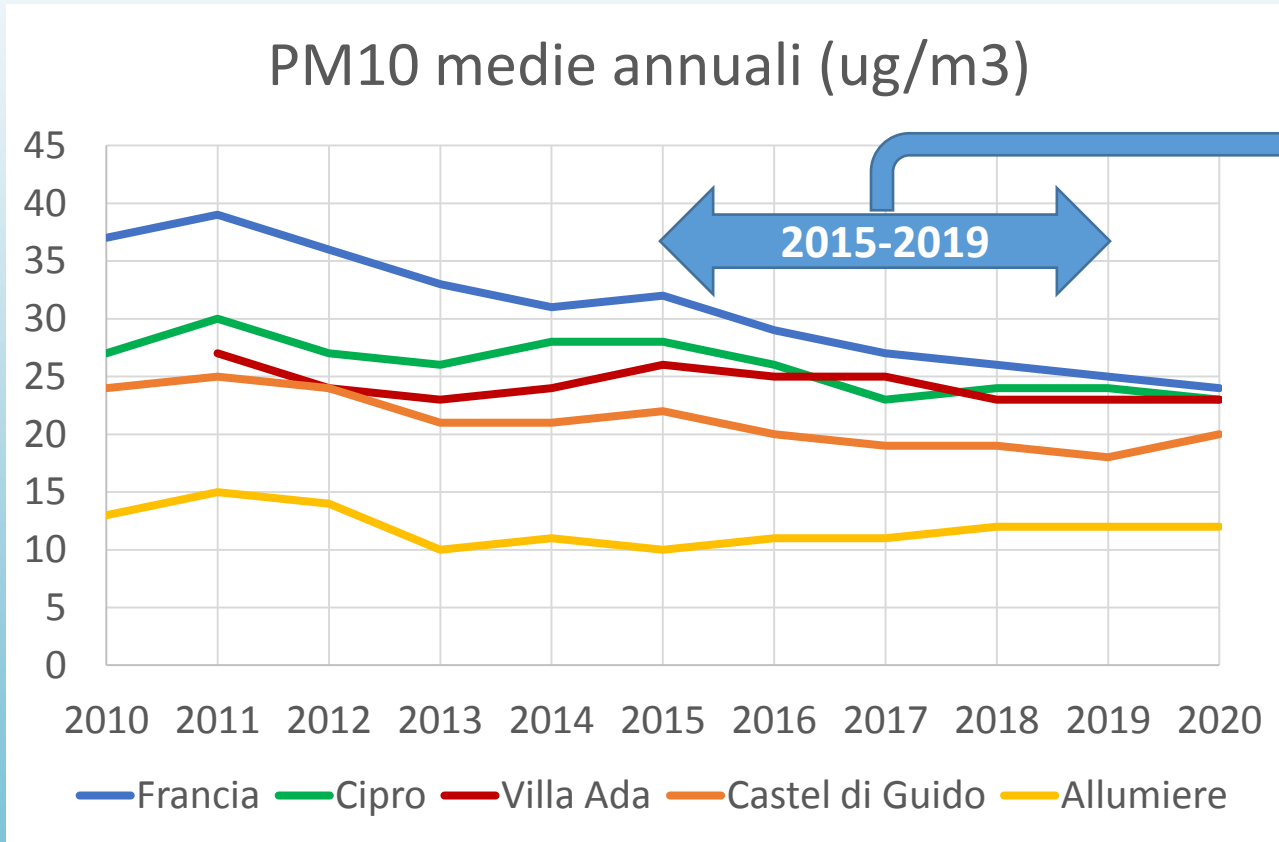
Land & Ocean Temperature Departure from Average Jul 2020
(with respect to a 1981–2010 base period)

Data Source: NOAAGlobalTemp v5.0.0–20200808



National Centers for Environmental Information
GHCNM v4.0.1.20200807.qfe
Please Note: Gray areas represent missing data
Map Projection: Robinson

Variabilità delle concentrazioni e definizione del periodo di confronto

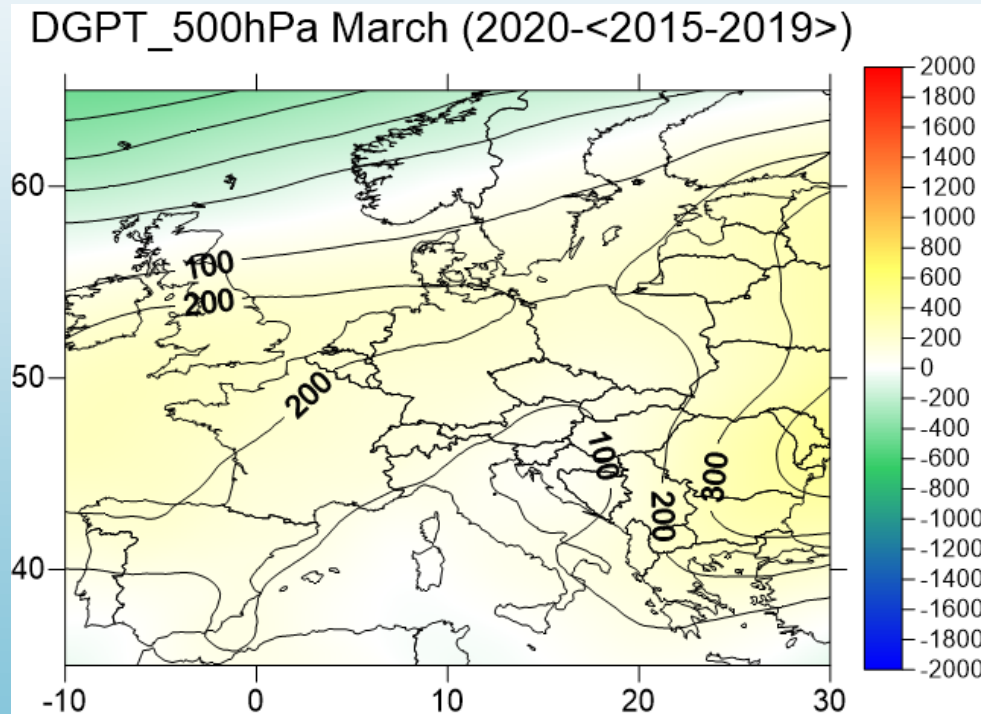


Anomalie medie mensili 2020 rispetto al periodo 2015-2019

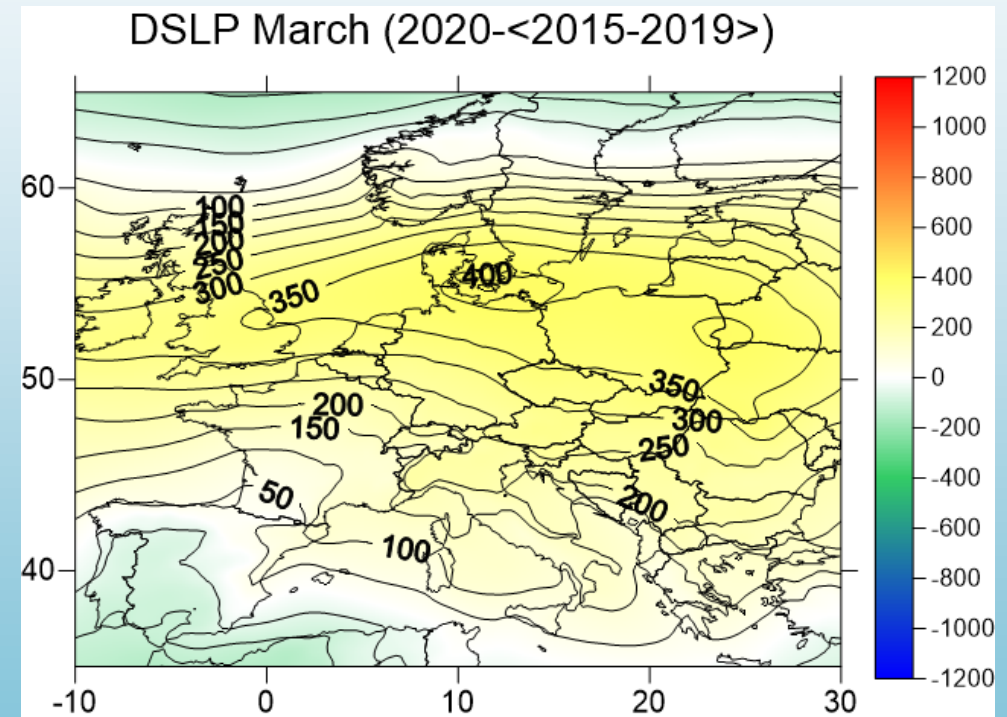
- Abbastanza lungo da includere la variabilità meteorologica recente;
- Abbastanza breve da minimizzare il trend delle concentrazioni dovute alla riduzione delle emissioni antropogeniche

Anomalie Marzo 2020 - <2015-2019>

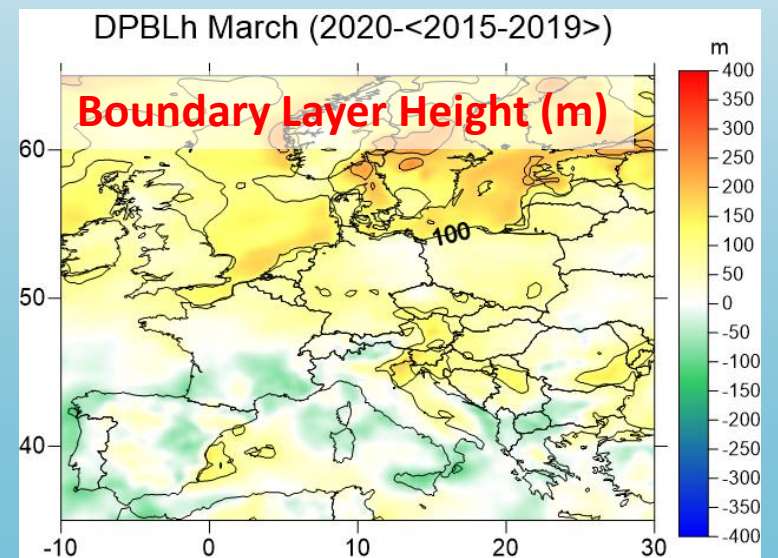
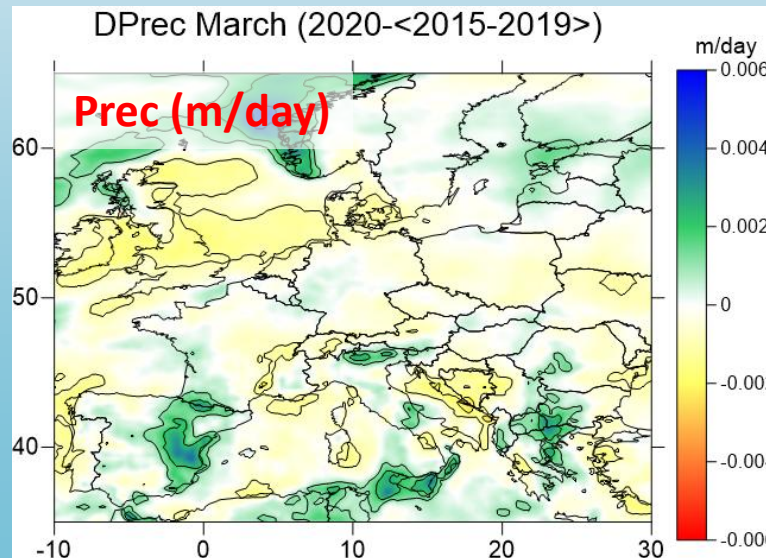
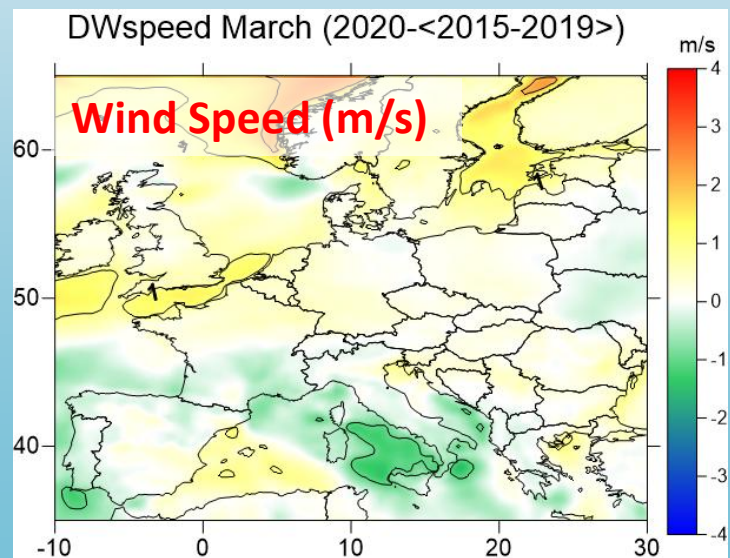
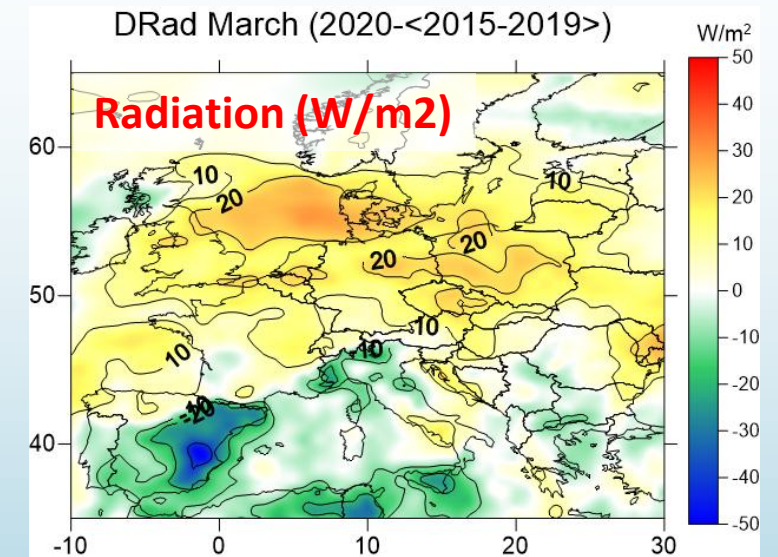
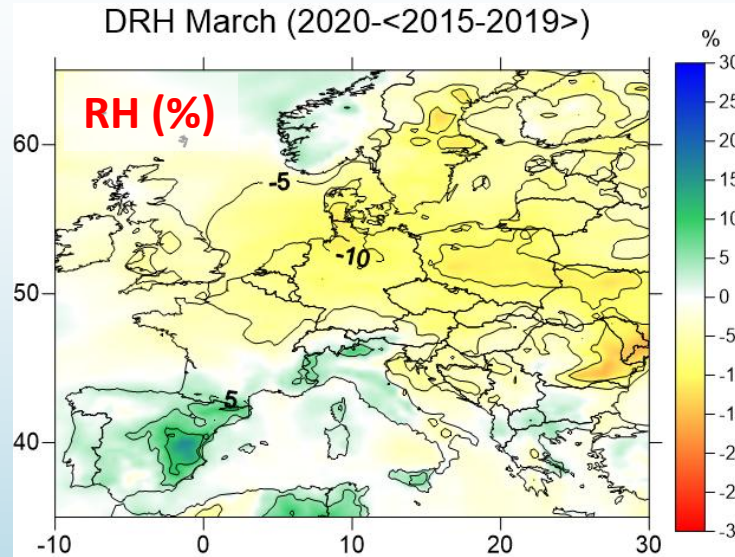
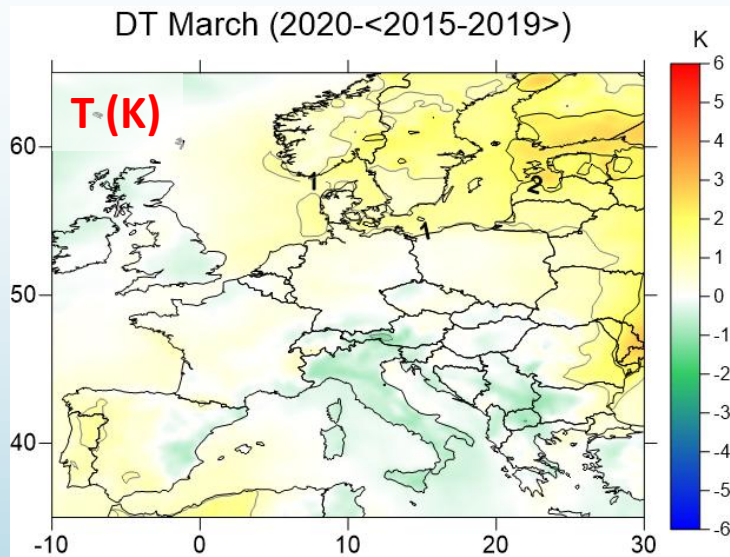
500 hPa Geopot (m2 s-2)



SLP (Pa)

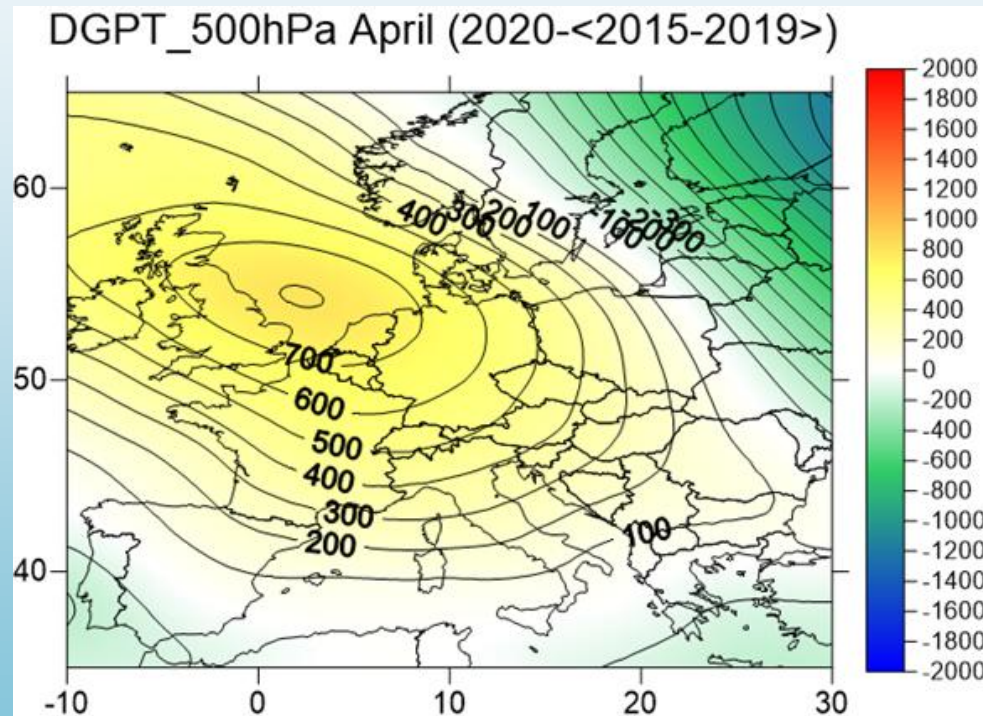


Anomalie Marzo 2020 - <2015-2019>

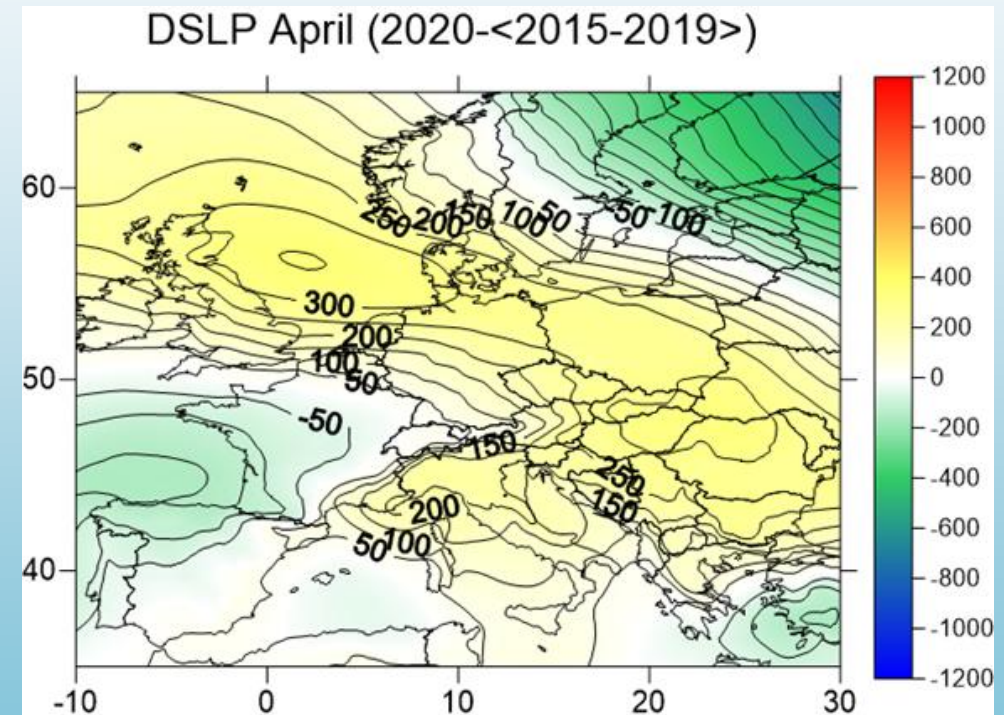


Anomalie April 2020 - <2015-2019>

500 hPa Geopot (m2 s-2)

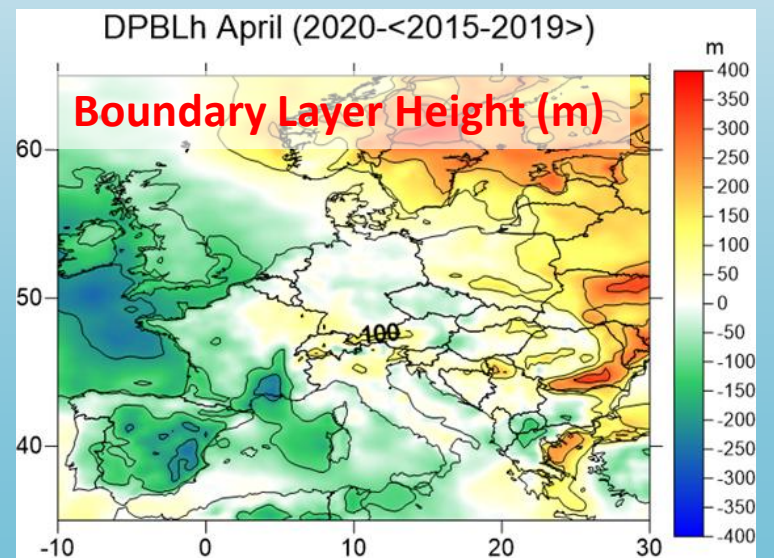
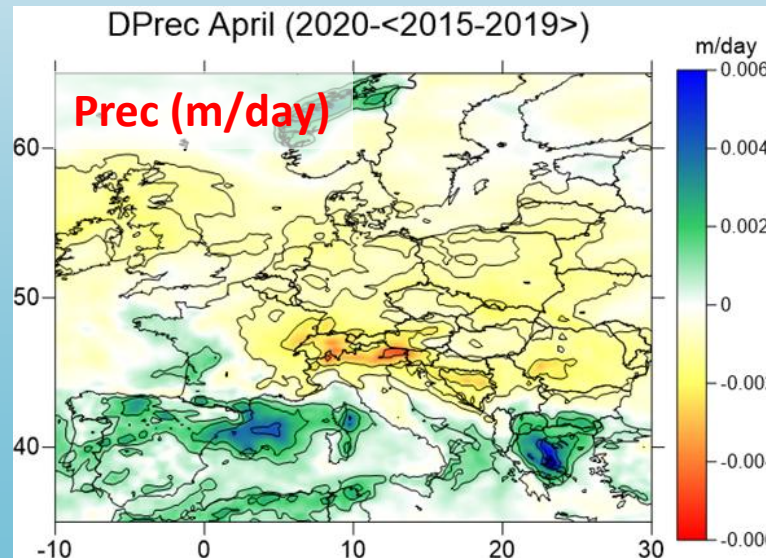
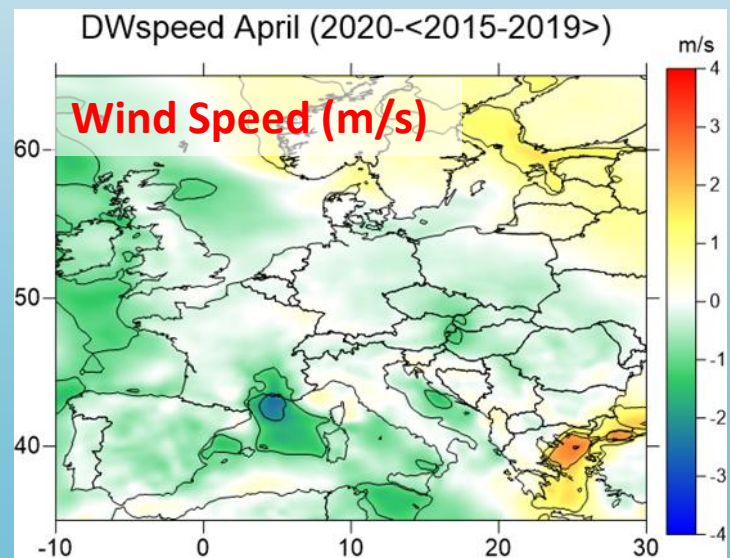
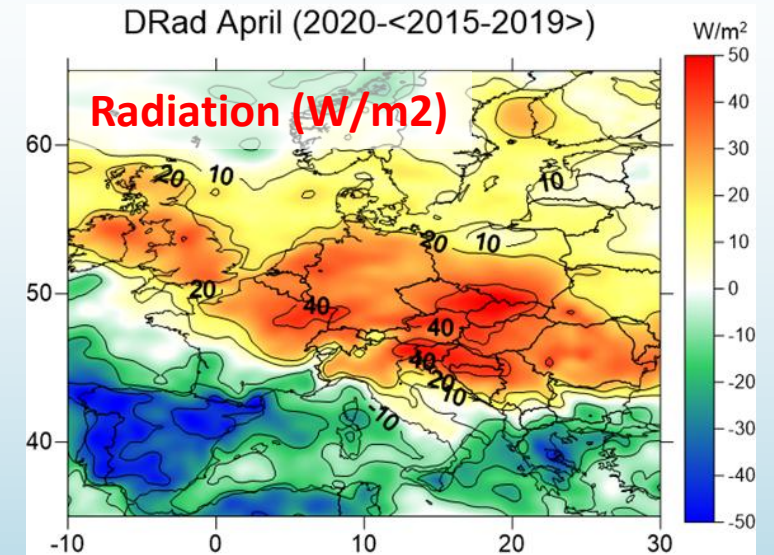
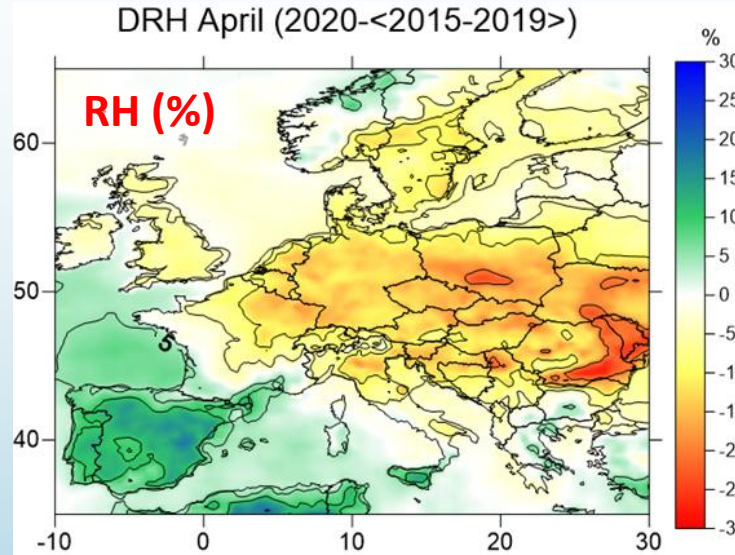
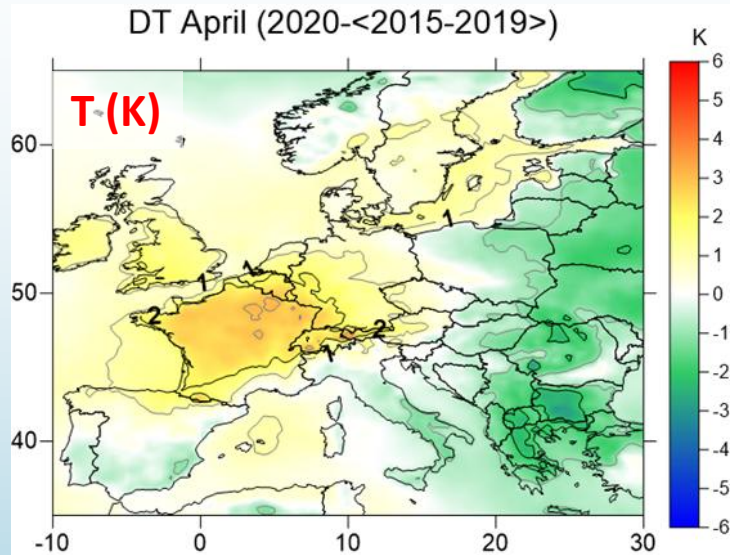


SLP (Pa)



Calcolate a partire dalle reanalisi meteorologiche ERA5

Anomalia Aprile 2020 - <2015-2019>

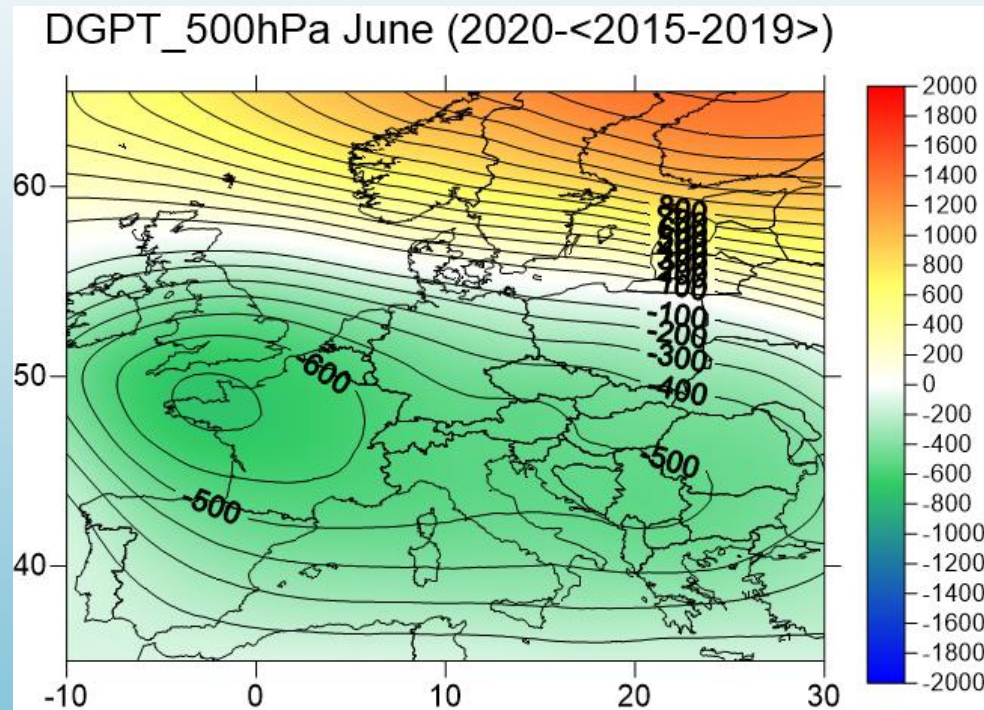


Anomalia osservazioni locali (Tor Vergata) rispetto alle medie 2015-2019 sugli stessi periodi stagionali

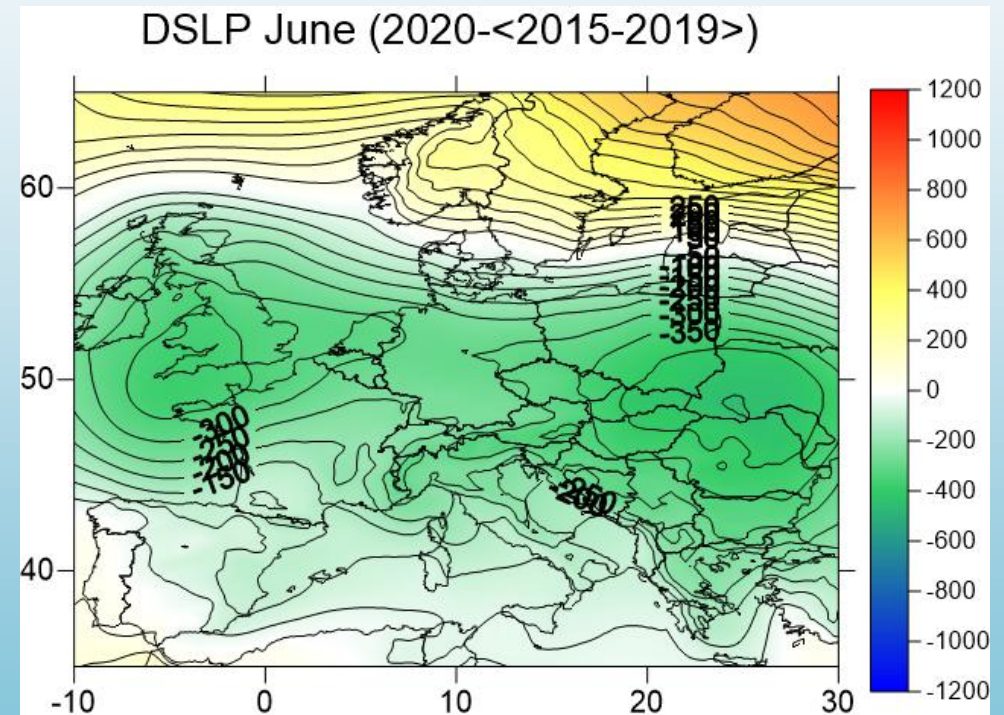
	inizio	25/01/2020	25/02/2020	16/03/2020	04/05/2020
	fine	24/02/2020	15/03/2020	03/05/2020	20/06/2020
2020		PreLock	ParLock	FullLock	ParRelax
T (K)		1.24	1.57	-0.71	0.85
WS (m/s)		-0.44	-0.17	-0.15	0.33
RH (%)		8.06	9.04	6.56	-7.03
Prec (mm)		-1.27	-1.65	-1.07	-0.46
An/SD		PreLock	ParLock	FullLock	ParRelax
T		1.09	0.79	-1.06	0.31
WS		-1.94	-0.56	-1.30	1.87
RH		1.68	1.14	1.61	-0.66
Prec		-1.16	-0.70	-1.03	-0.40

Anomalie giugno 2020 - <2015-2019>

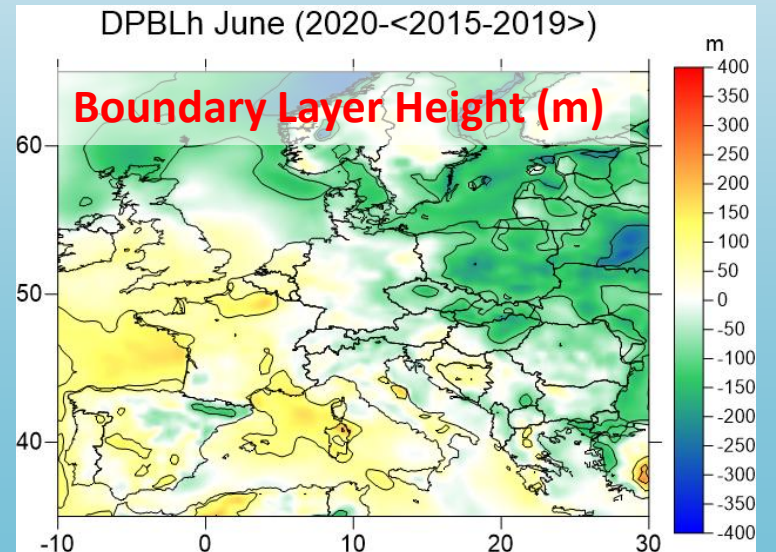
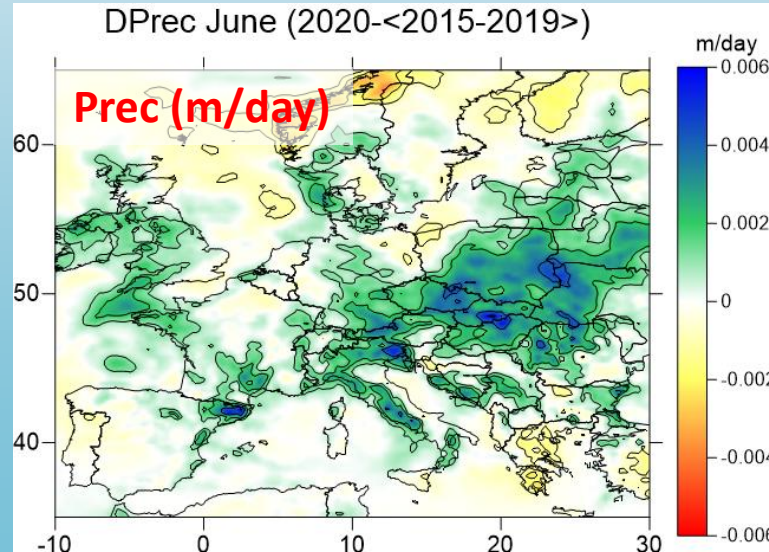
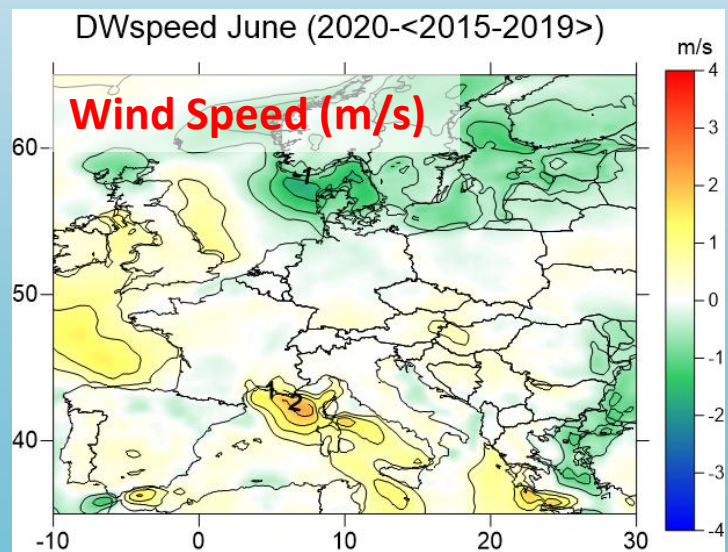
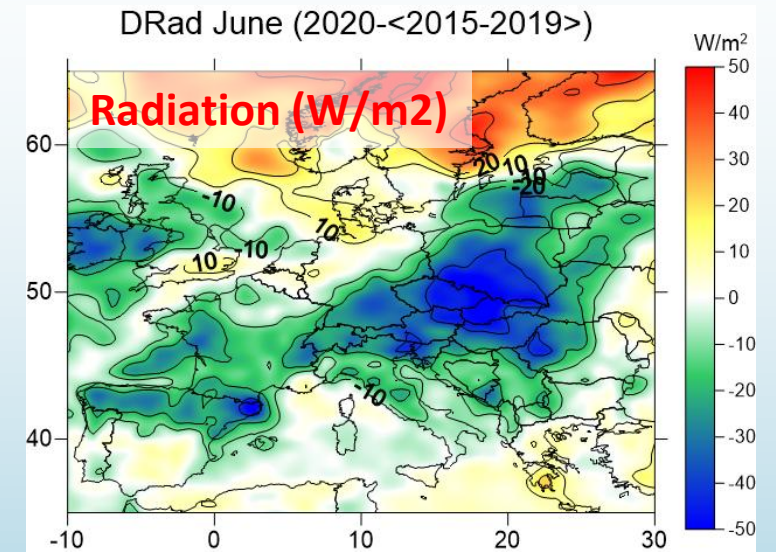
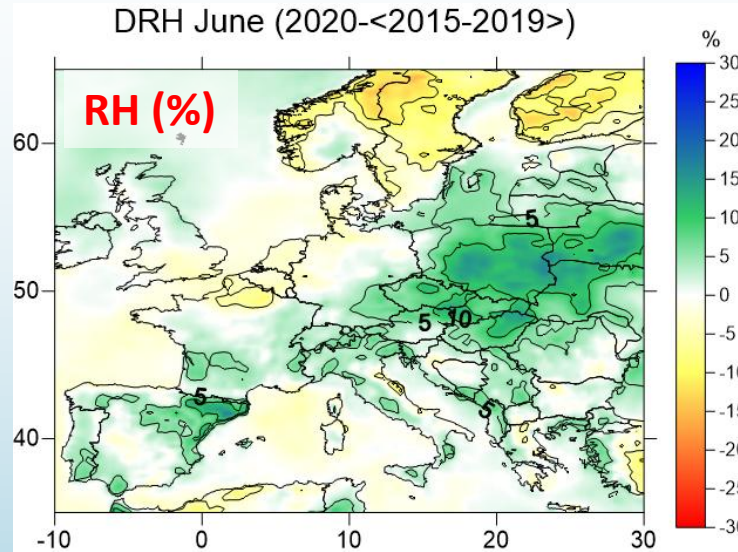
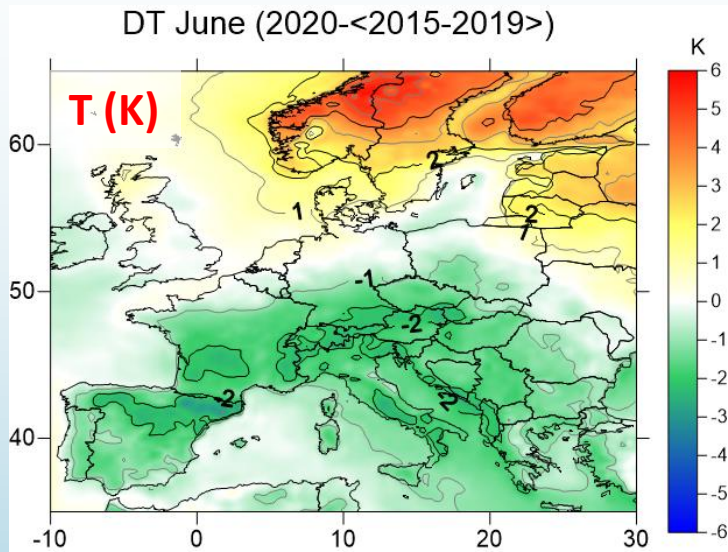
500 hPa Geopot (m2 s-2)



SLP (Pa)



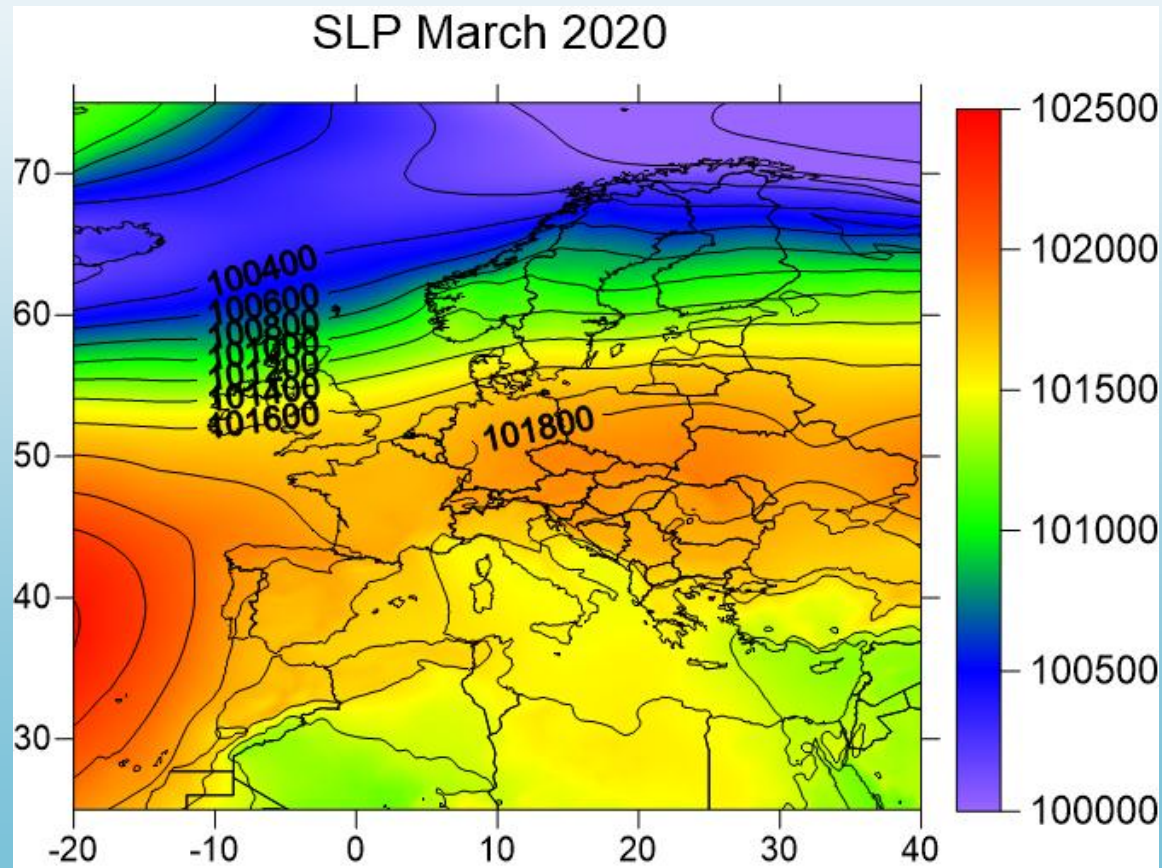
Anomalie giugno 2020 - <2015-2019>



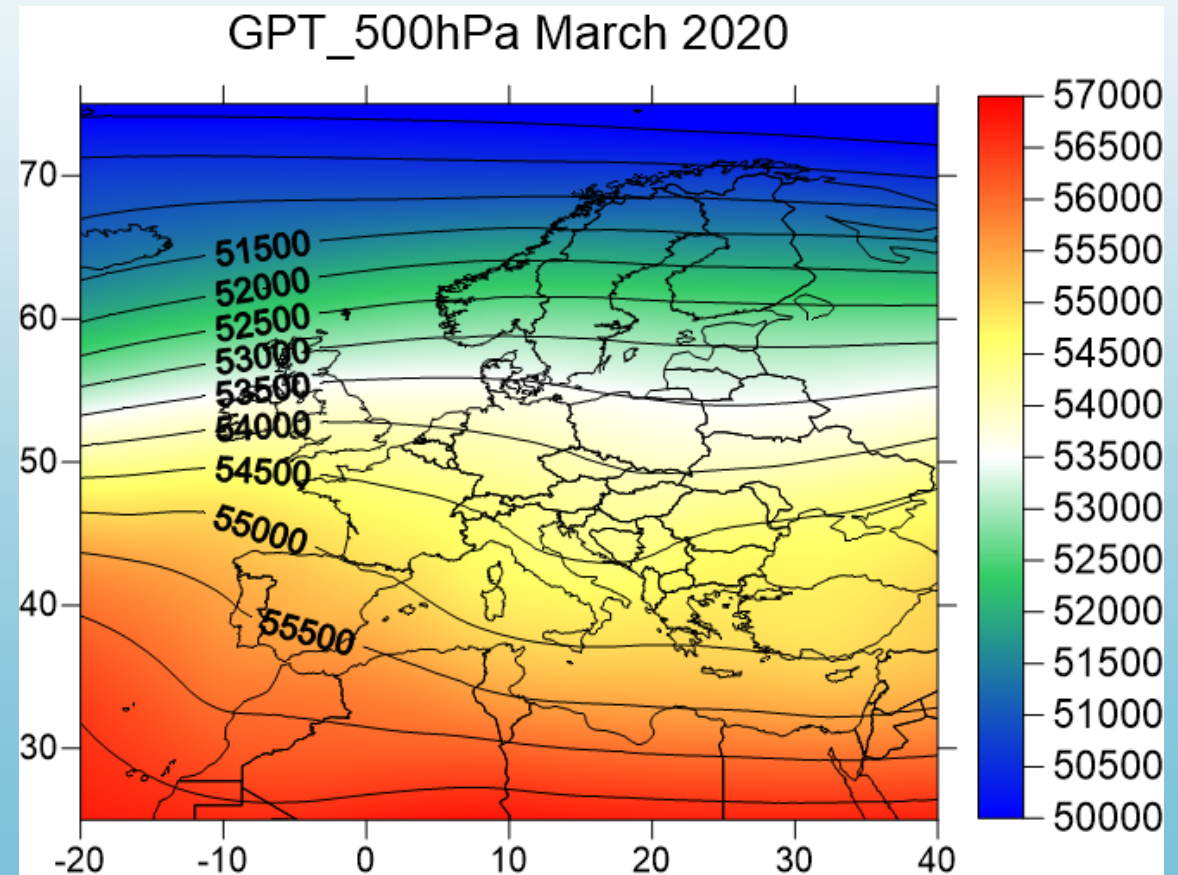
Condizioni di circolazione occorse durante **Marzo 2020**
Analisi meteorologiche ed osservazioni locali

Analisi meteorological media mensile ERA5

Pressione a livello del mare



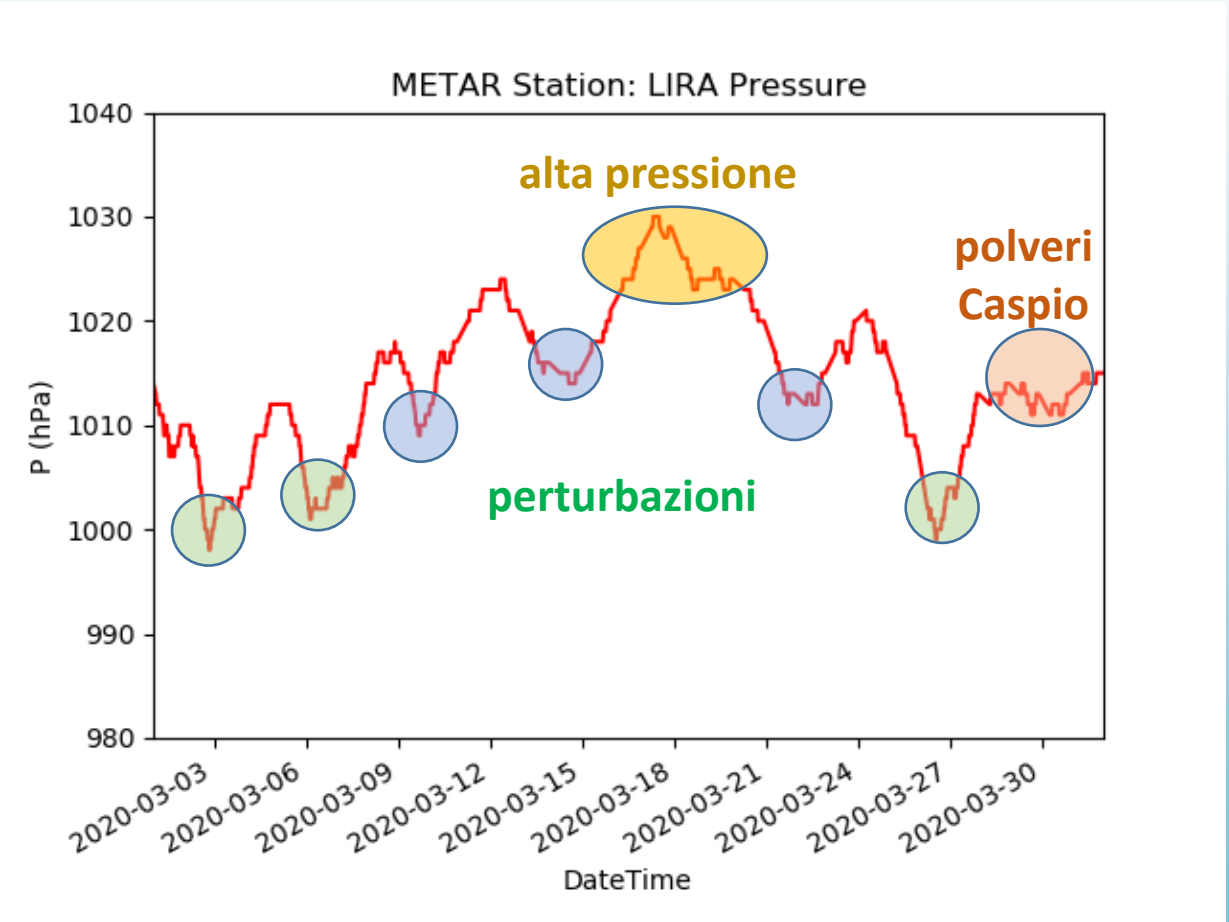
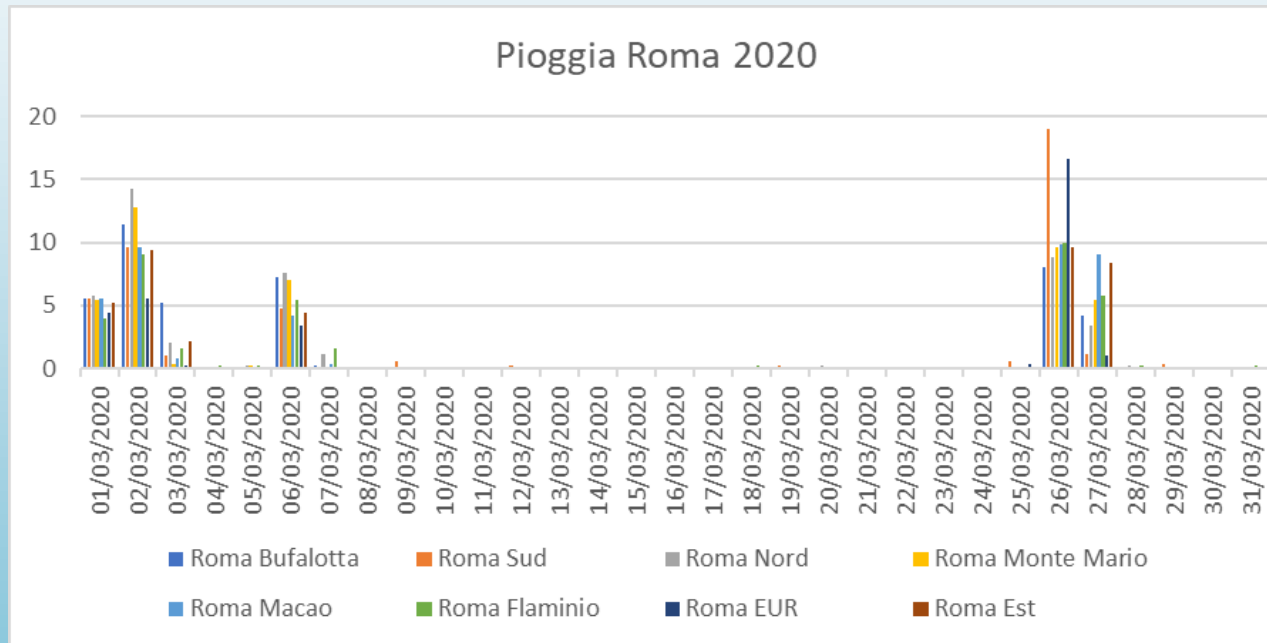
Geopotenziale 500 hPa



Marzo 2020

Ciampino: pressione

Agenzia Regionale di Protezione Civile: precipitazione

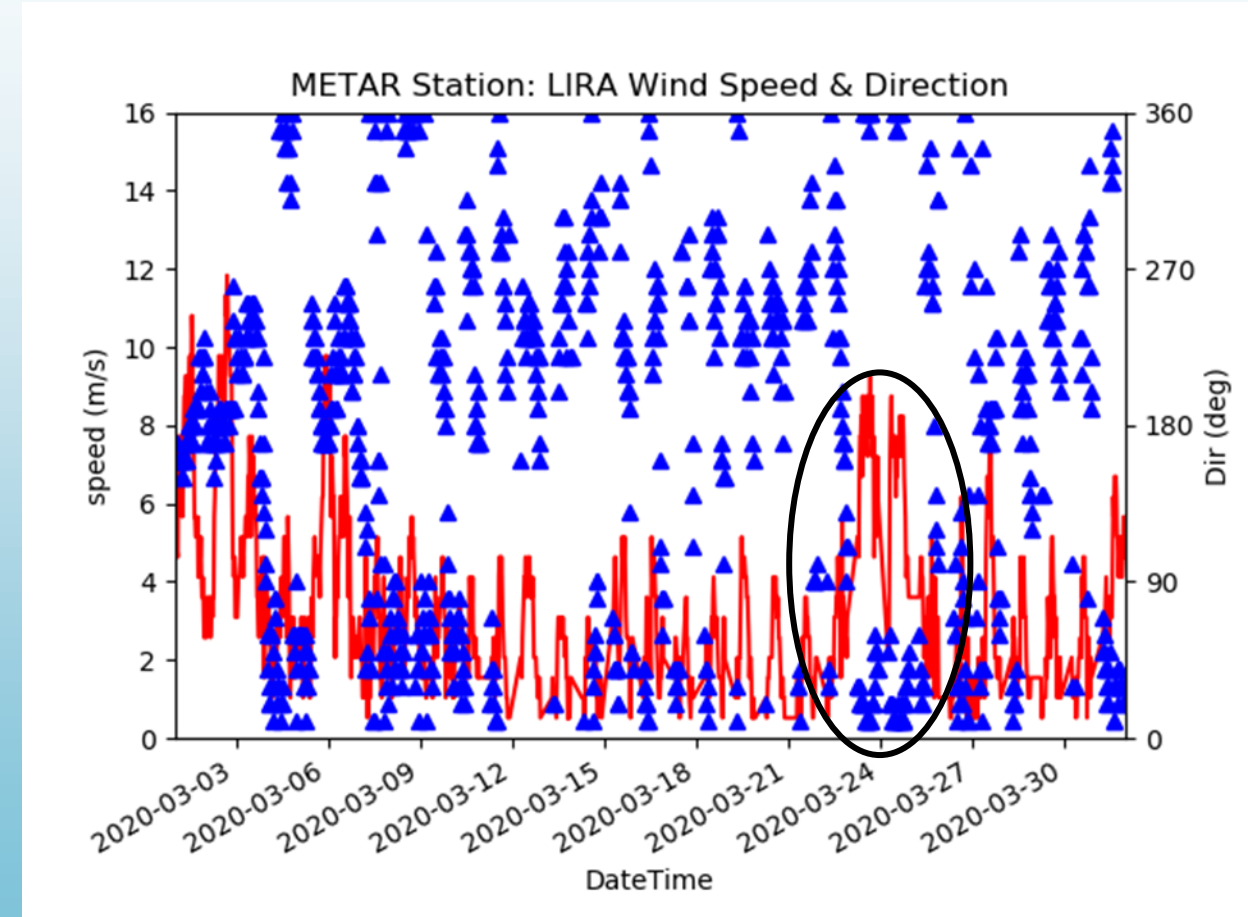
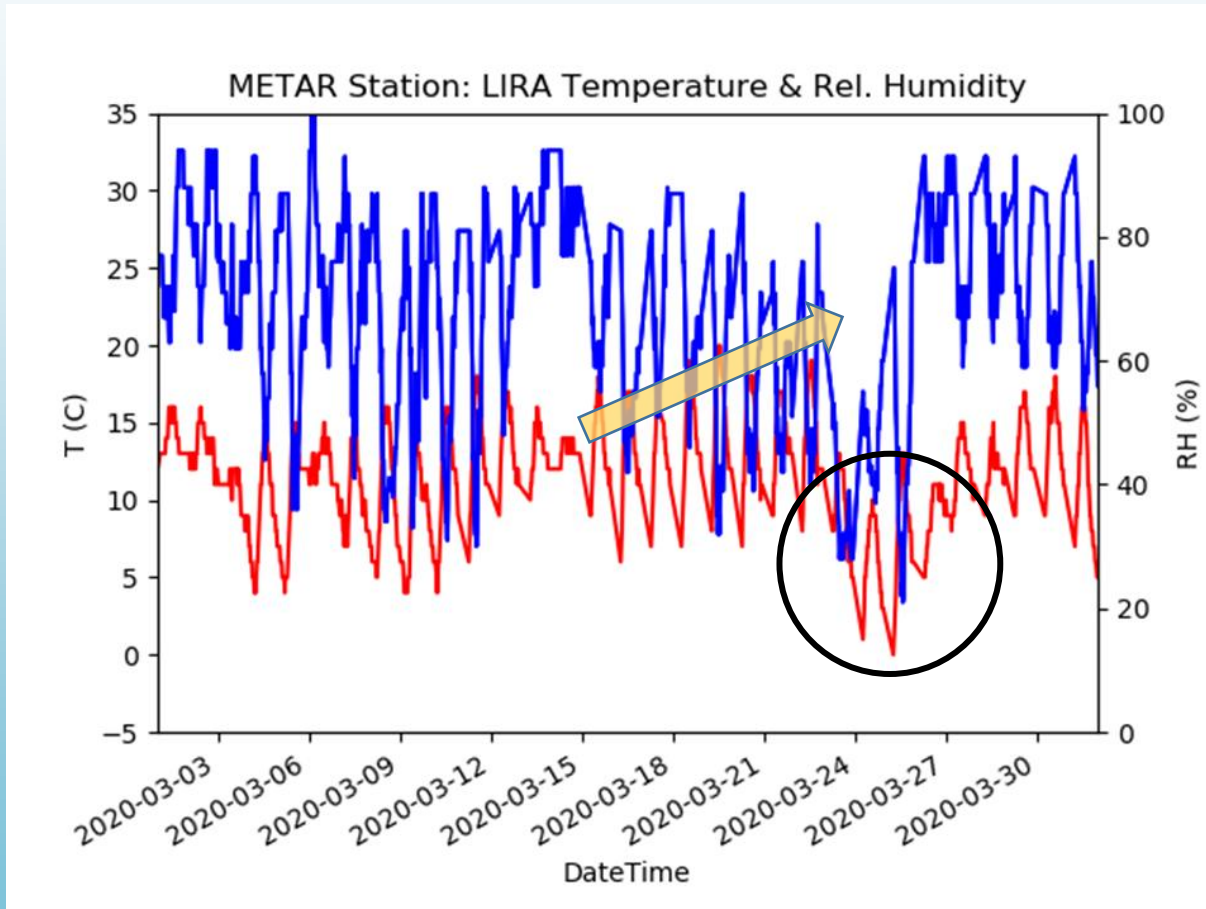


Più pioggia e giorni piovosi nel 2020 rispetto al 2019

15 Variabilità con nuvolosità e perturbazioni (1-7, 14) durante le prime due settimane, alta pressione, bel tempo, temperature sopra la media climatologica e durante la terza settimana (15-20), avvezione di aria fredda dalla Russia/Siberia (24-26) e precipitazioni (26-27) durante la quarta settimana.

Marzo 2020

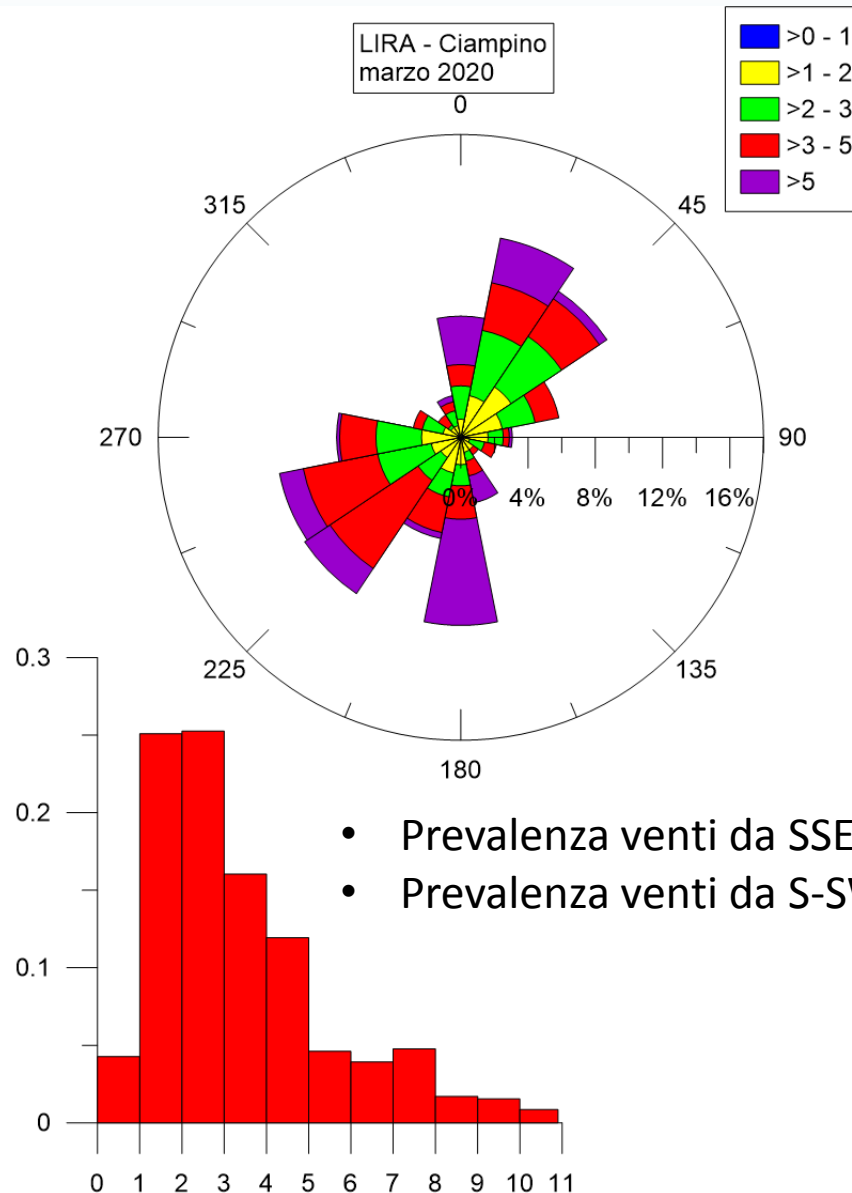
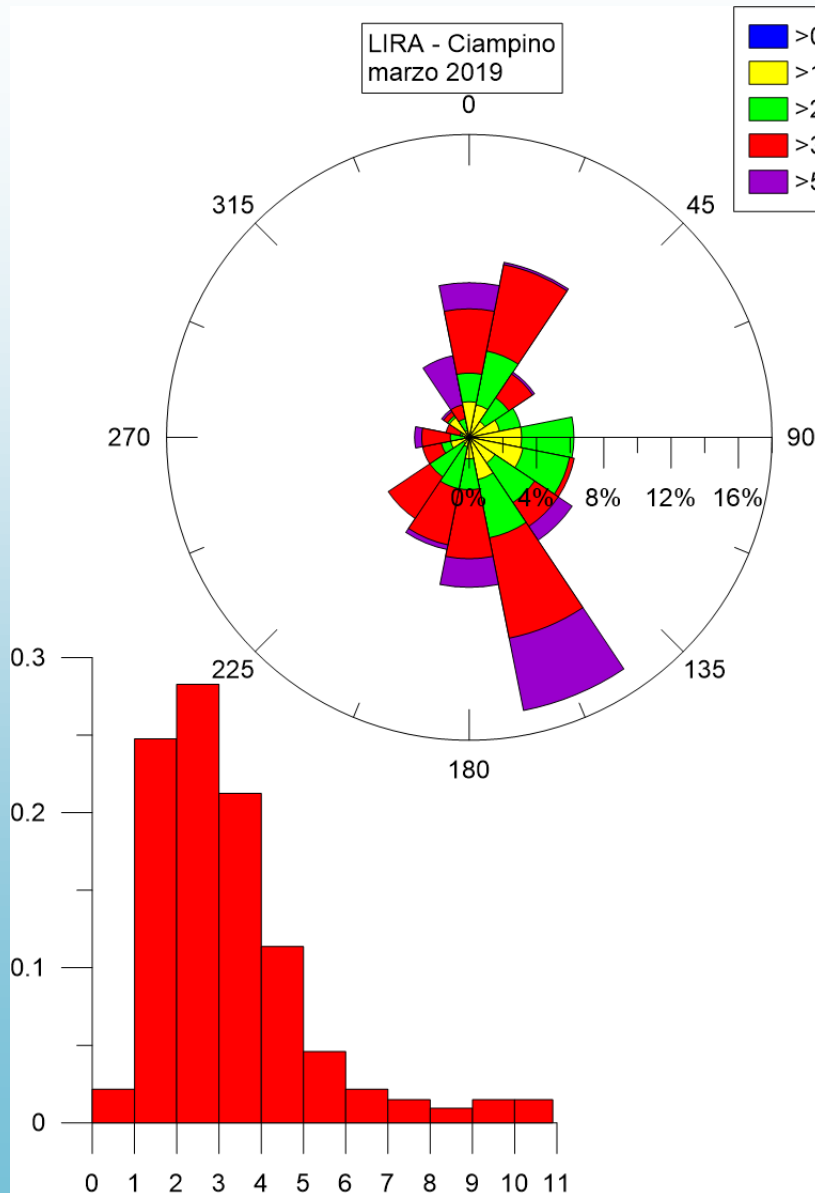
Ciampino: temperatura, umidità e vento



Crescita T e riduzione RH durante l'alta pressione persistente, caduta di T e RH con l'avvezione di aria fredda dalla Russia

Venti notturni deboli, con esclusione delle perturbazioni e dell'avvezione di aria fredda dalla Russia

Marzo 2020 & 2019: rose dei venti Ciampino

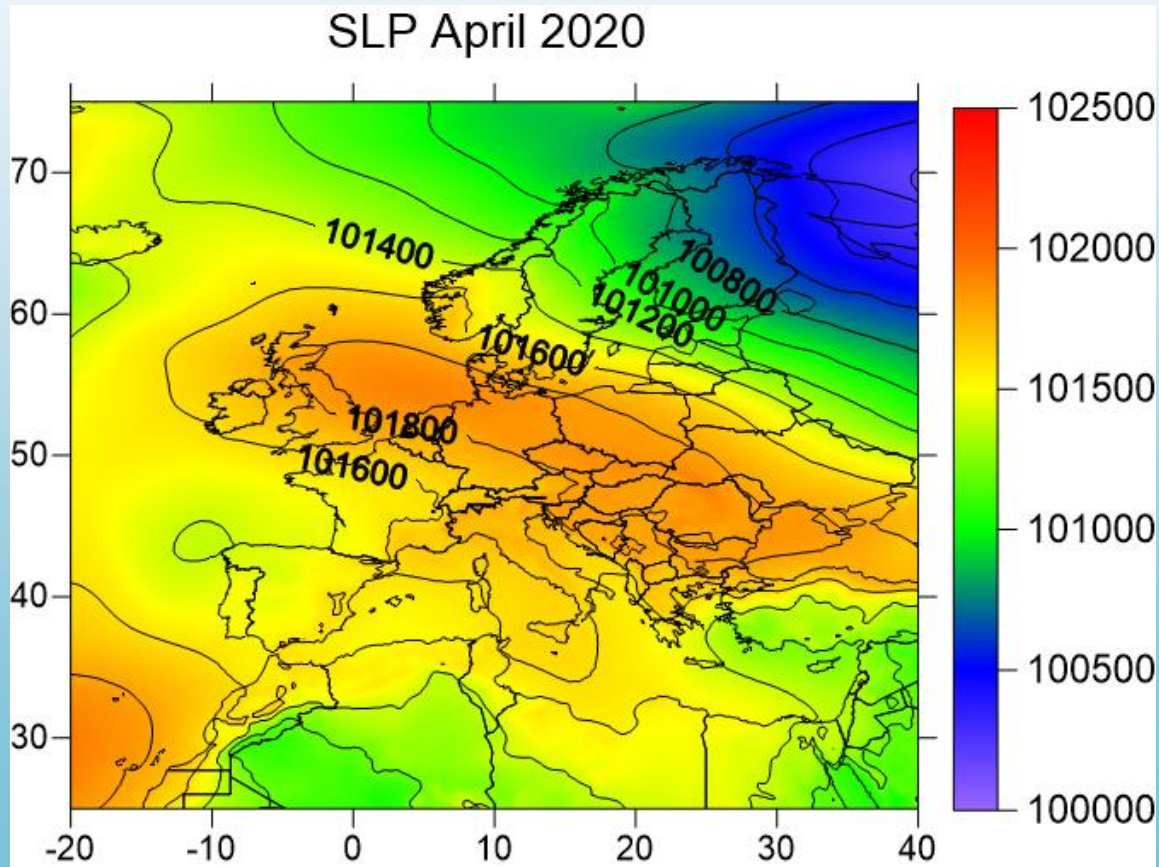


- Prevalenza venti da SSE e N nel 2019
- Prevalenza venti da S-SW e NNE nel 2020

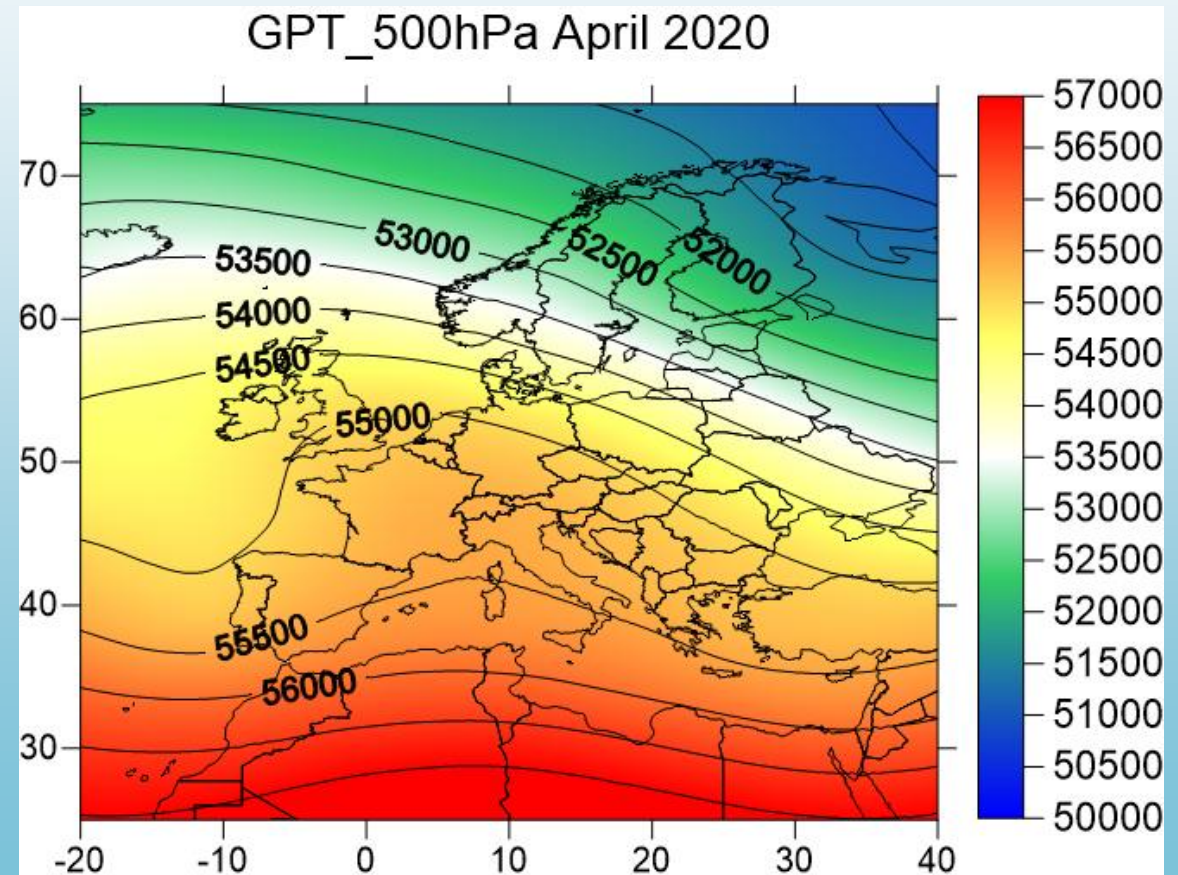
Condizioni di circolazione occorse durante **Aprile 2020**
Analisi meteorologiche ed osservazioni locali

Analisi meteorological media mensile ERA5

Pressione a livello del mare



Geopotenziale 500 hPa

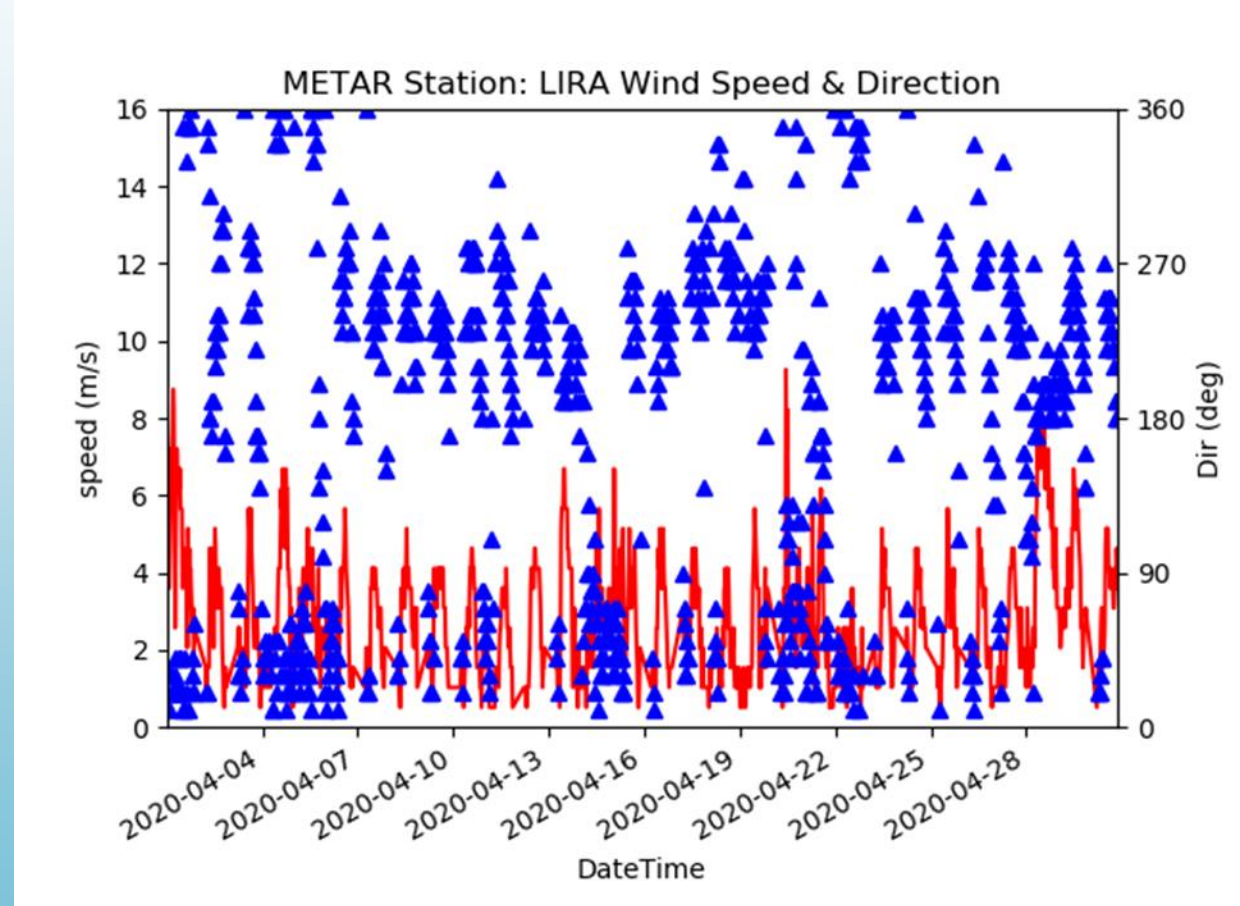
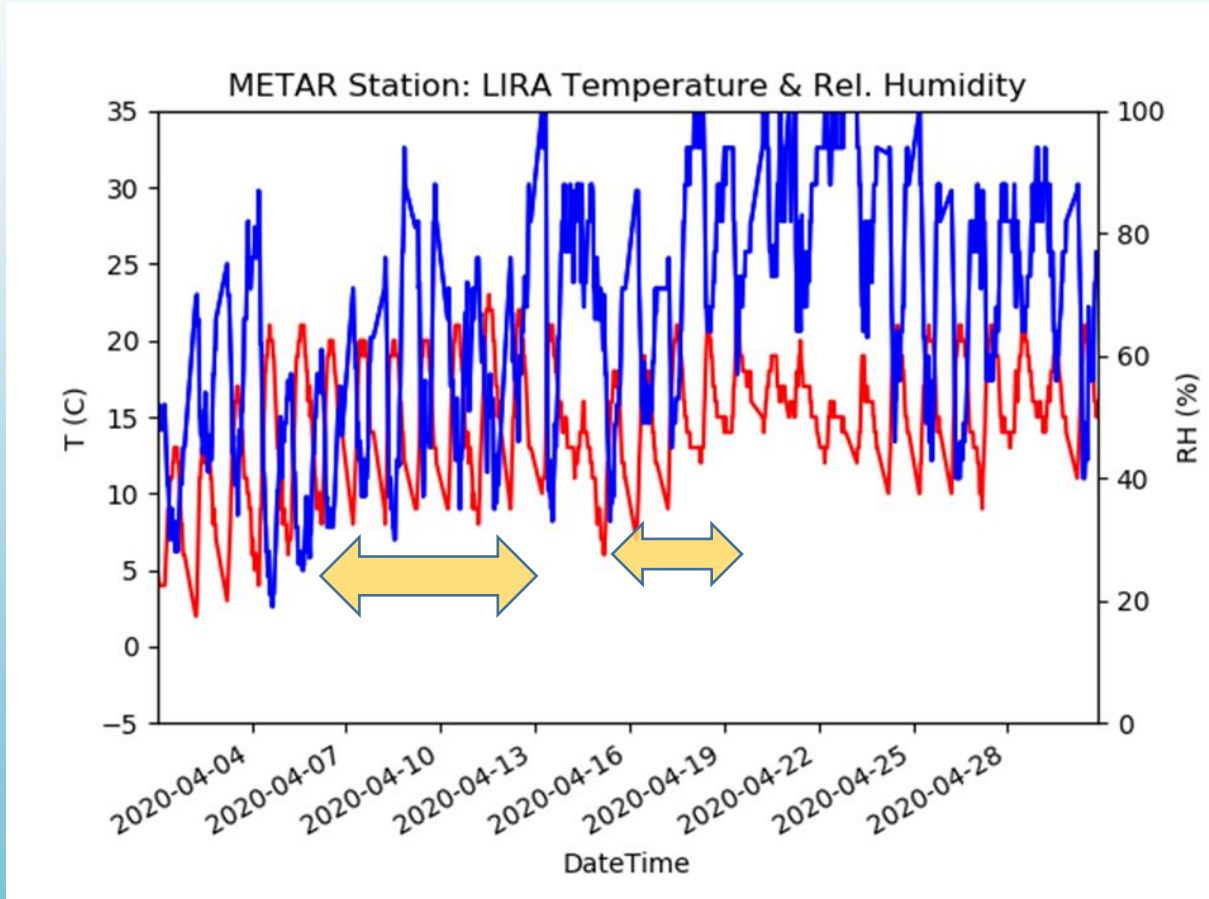


Aprile 2020

Ciampino: temperatura, umidità e vento

Colder temperature and higher humidity in 2019

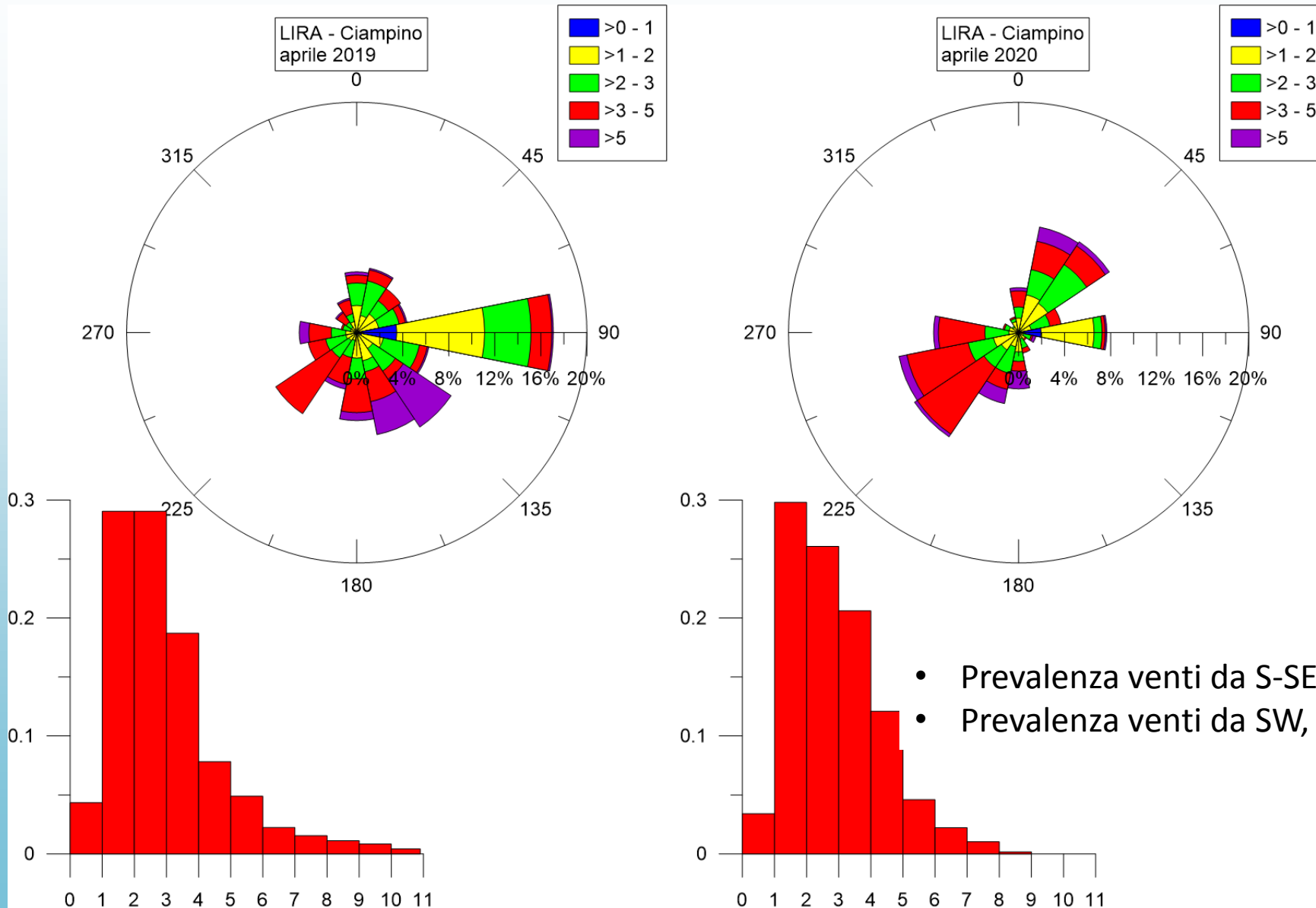
More direction variability in 2019



T basse nei primi giorni del mese, crescita T e RH durante le alte pressioni persistenti 6-13, 16-19

Venti notturni deboli durante i periodi di alta pressione, perturbazioni da E-N.

Aprile 2020 & 2019: rose dei venti Ciampino



- Prevalenza venti da S-SE e E nel 2019
- Prevalenza venti da SW, NNE e E nel 2020

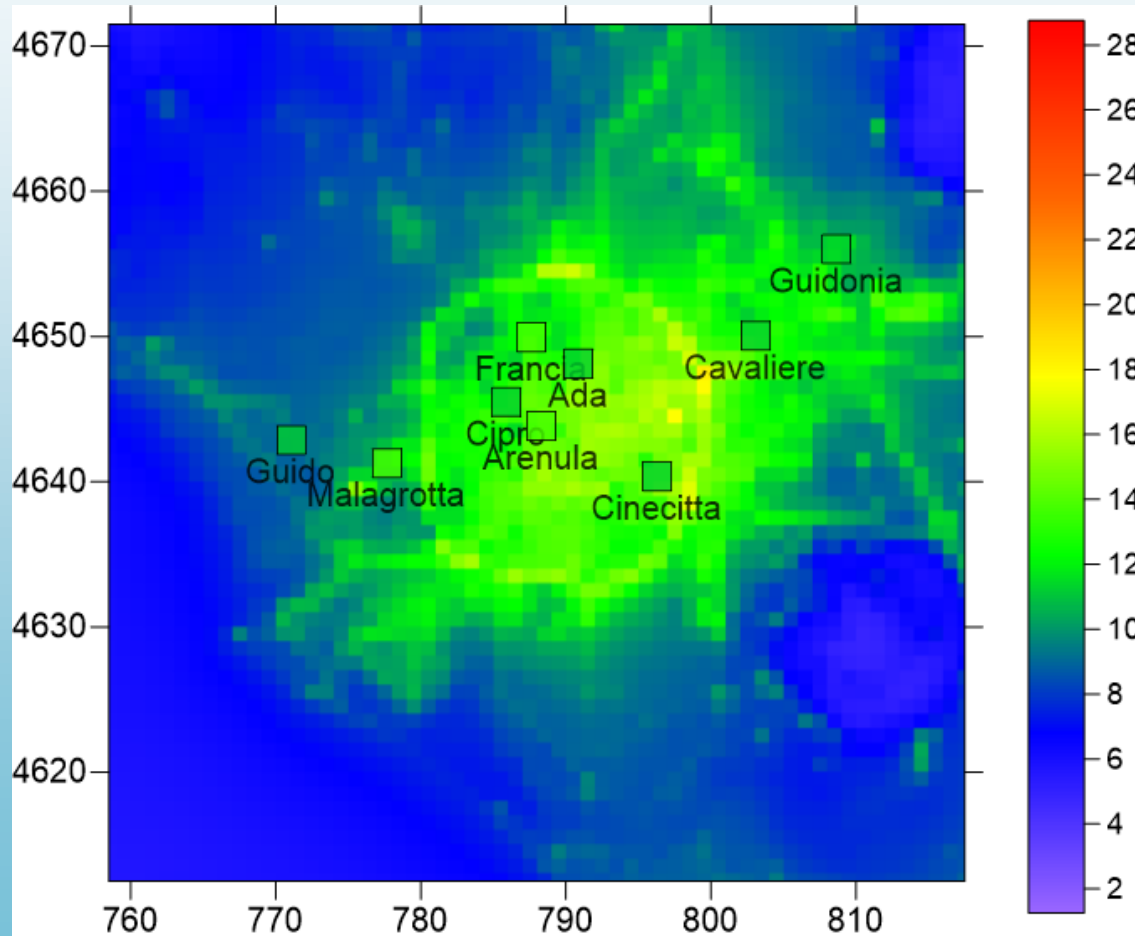
Considerazioni conclusive

- Deboli anomalie meteorologiche nei mesi di marzo e aprile 2020 rispetto al quinquennio precedente (2015-2019);
- Durante il periorodo di lockdown (15/03-03/05/2020):
 - Lieve diminuzione di temperatura, precipitazione e velocità del vento; aumento dell'umidità relativa;
 - Tendenza all'aumento delle condizioni di stagnazione;
- Marzo 2020: forte variabilità delle condizioni meteorologiche;
- Aprile 2020: Prevalenza di condizioni di alta pressione stabile, intervallata da brevi perturbazioni;
- La forzante meteorologica durante il lockdown non pare tale da compromettere il confronto con gli anni precedenti sulle medie di periodo.

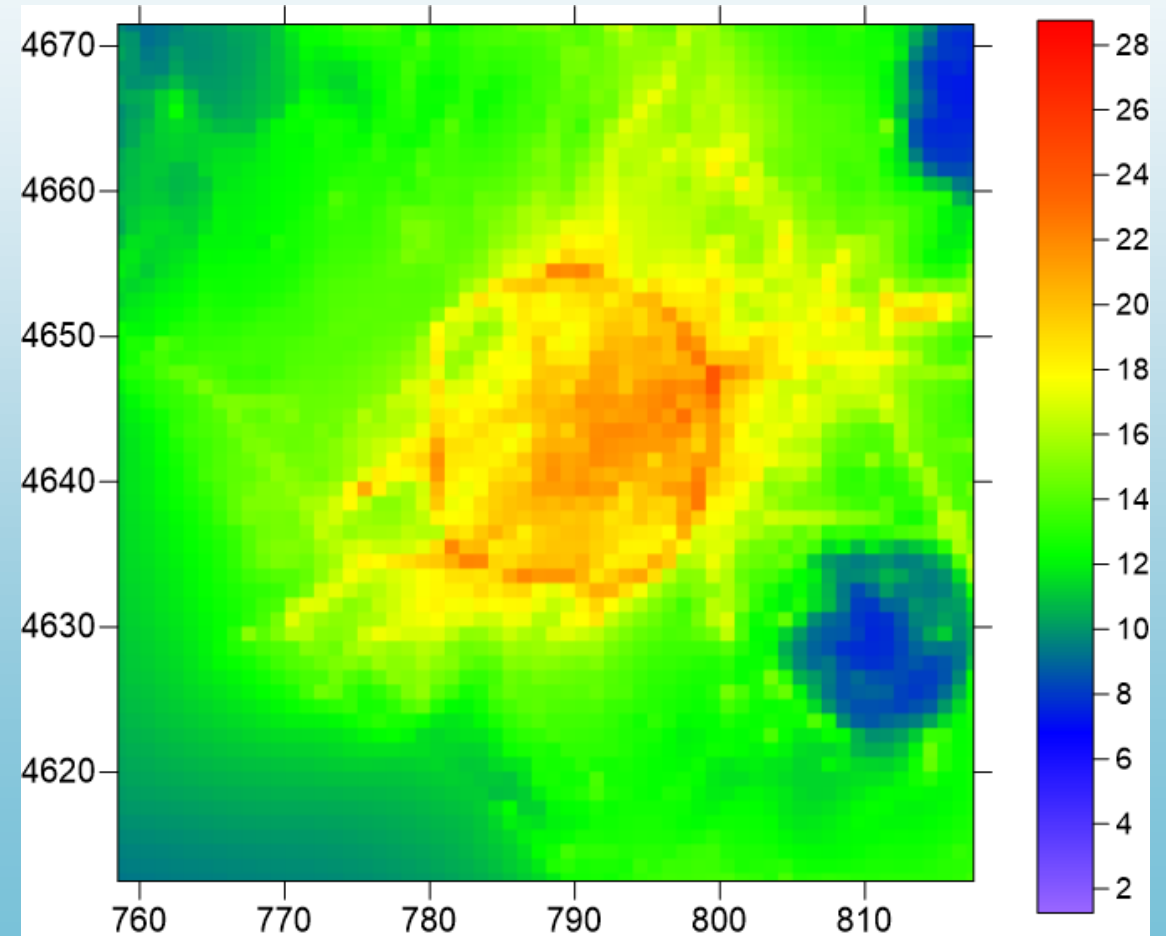
Sistema di previsione QA di ARPA Lazio

Media mensile PM2.5 di Aprile

2019



2020





Grazie per la vostra attenzione!

