



# **SOUTH EAST EUROPEAN CLIMATE OUTLOOK FORUM SEECOF-27 Online Forum**

## **MONITORING SUMMARY SEECOF-27**

**for April 2022**

**First Draft**

**Last update: 13 May 2022**

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The following SEECOF monitoring summary is based on

- Monitoring information from RA VI RCC Node-CM
- Contribution from Météo France (draft of LRF bulletin)
- Further information from various sources (BOM, NOAA-CPC)

# 1. Oceanic Analysis

## Over the Pacific Ocean: La Niña:

- Below-average sea surface temperatures (SST) persisted during April 2022 across most the central and eastern Pacific Ocean (Fig. 1.1), showing that La Niña is still present.
- Negative SST anomalies became stronger in Niño regions over the past months and they are quite strong for this time of year (Fig. 1.2)
- In the subsurface, anomalies in April were weaker than in March, but spread over a larger area.
- ENSO forecasts suggest a likely continuation of La Niña at least during summer 2022.
- For more details see:
  - [https://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/enso\\_disc.shtml](https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/enso_disc.shtml)
  - <http://www.bom.gov.au/climate/enso/index.shtml#tabs=Pacific-Ocean>

## Over the Maritime Continent and the Indian Ocean:

- Anomalies over the tropical Indian Ocean are quite weak.
- Indian Ocean Dipole (IOD) presently neutral, but a development of a strong negative dipole is forecasted for summer 2022 (Fig. 1.4)
- Very high warm anomalies close to India and the Arabic Peninsula (in April stronger than in March), and also around Australia and the maritime continent (little change compared to March)

## Over the North Atlantic:

- Mostly weak anomalies in the tropics
- Very high positive anomalies close to Western Europe and the North Sea

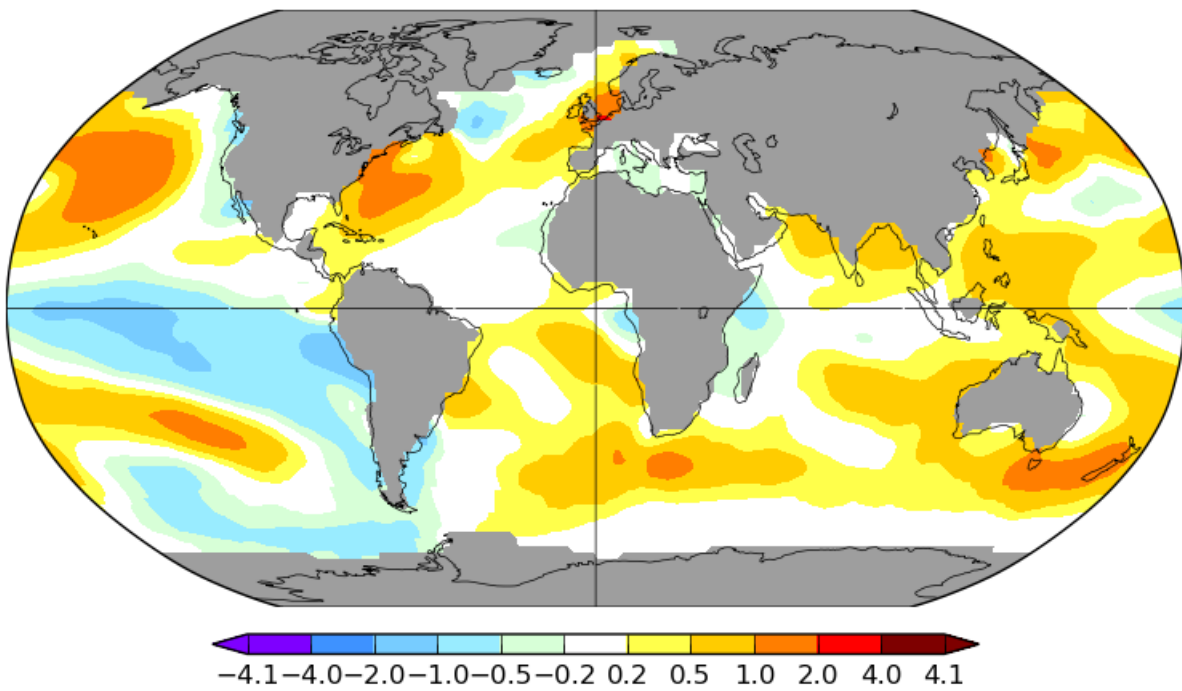
## Over the Mediterranean and Black Sea:

- Western and central Mediterranean colder than normal (1991-2020 reference!)
- Eastern Mediterranean and Black Sea close to normal SST.

March 2022

Tocn(°C) Anomaly vs 1991-2020

0.19



April 2022

Tocn(°C) Anomaly vs 1991-2020

0.17

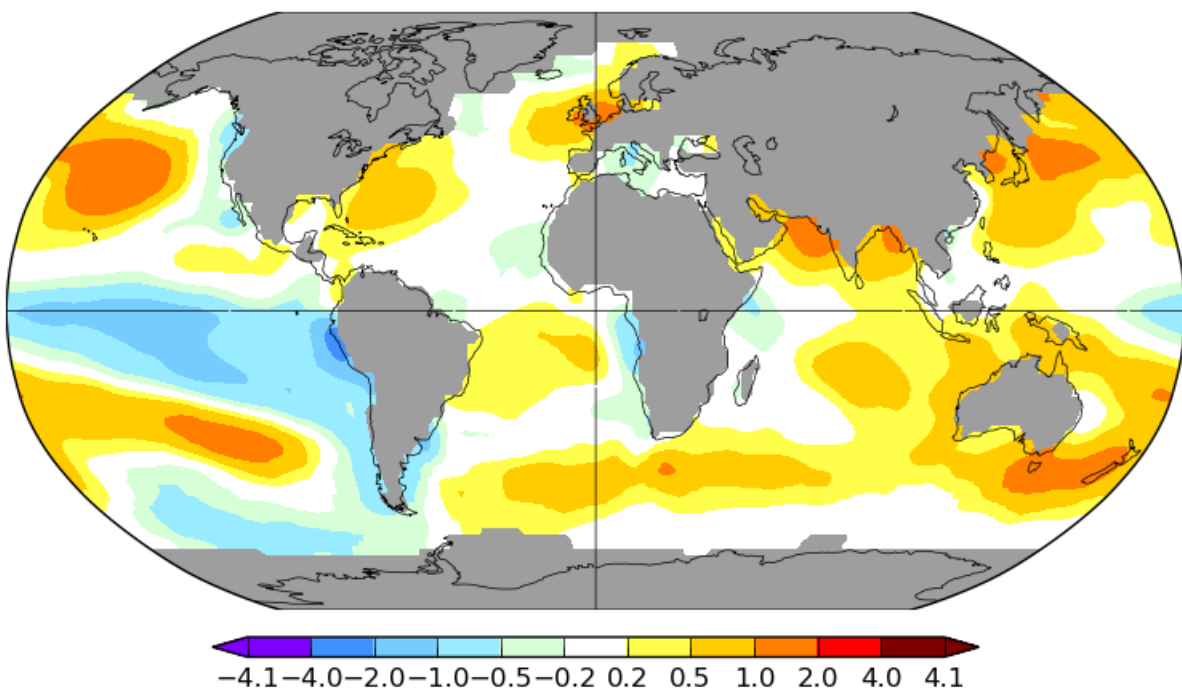


Figure 1.1: Sea surface temperature (SST) anomalies for March and April 2022, 1991-2020 reference. Source: NASA, <https://data.giss.nasa.gov/gistemp/maps/>

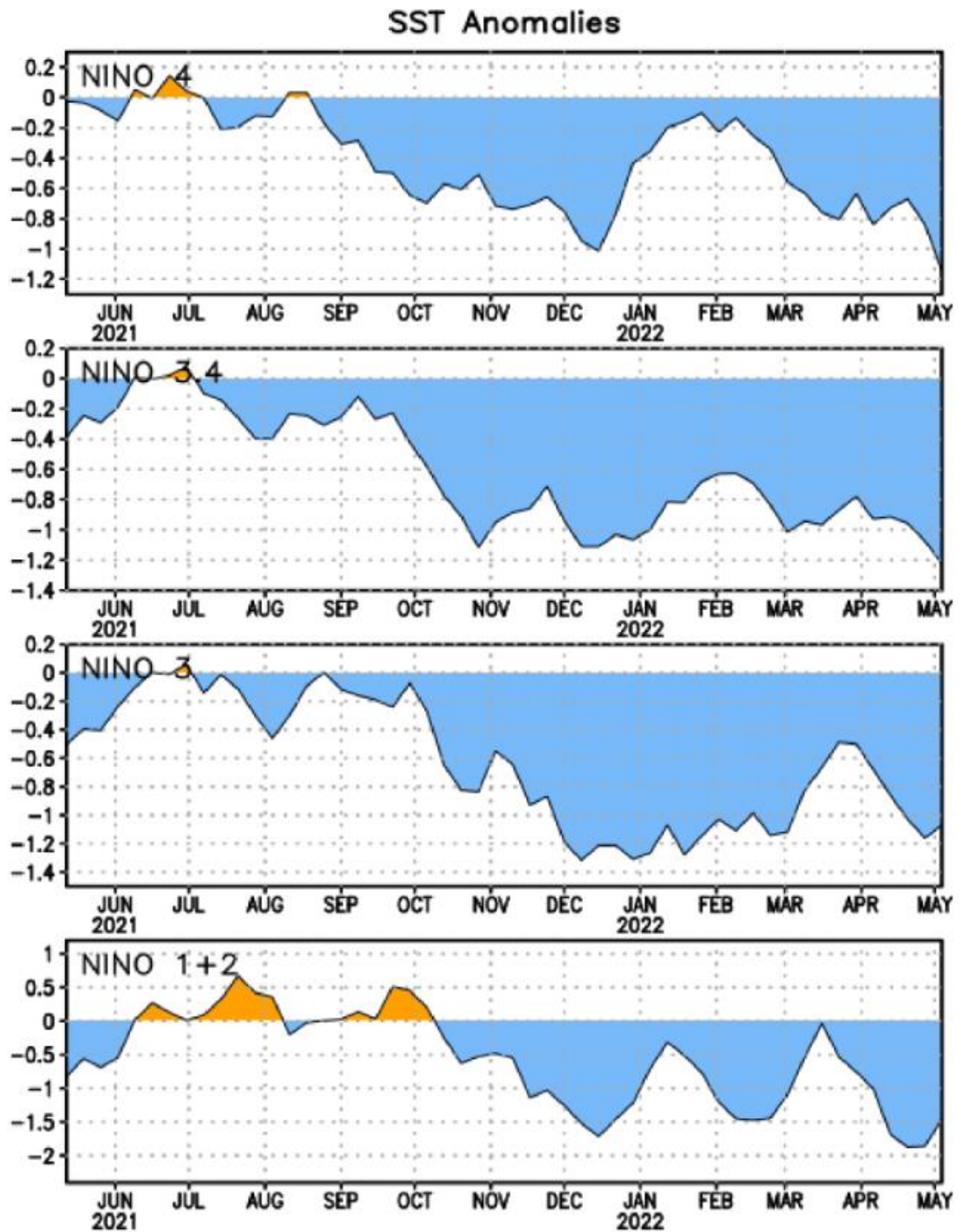


Figure 1.2: Time series of SST anomalies for various Niño regions. Source:  
[https://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory/ensodisc.shtml](https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml)

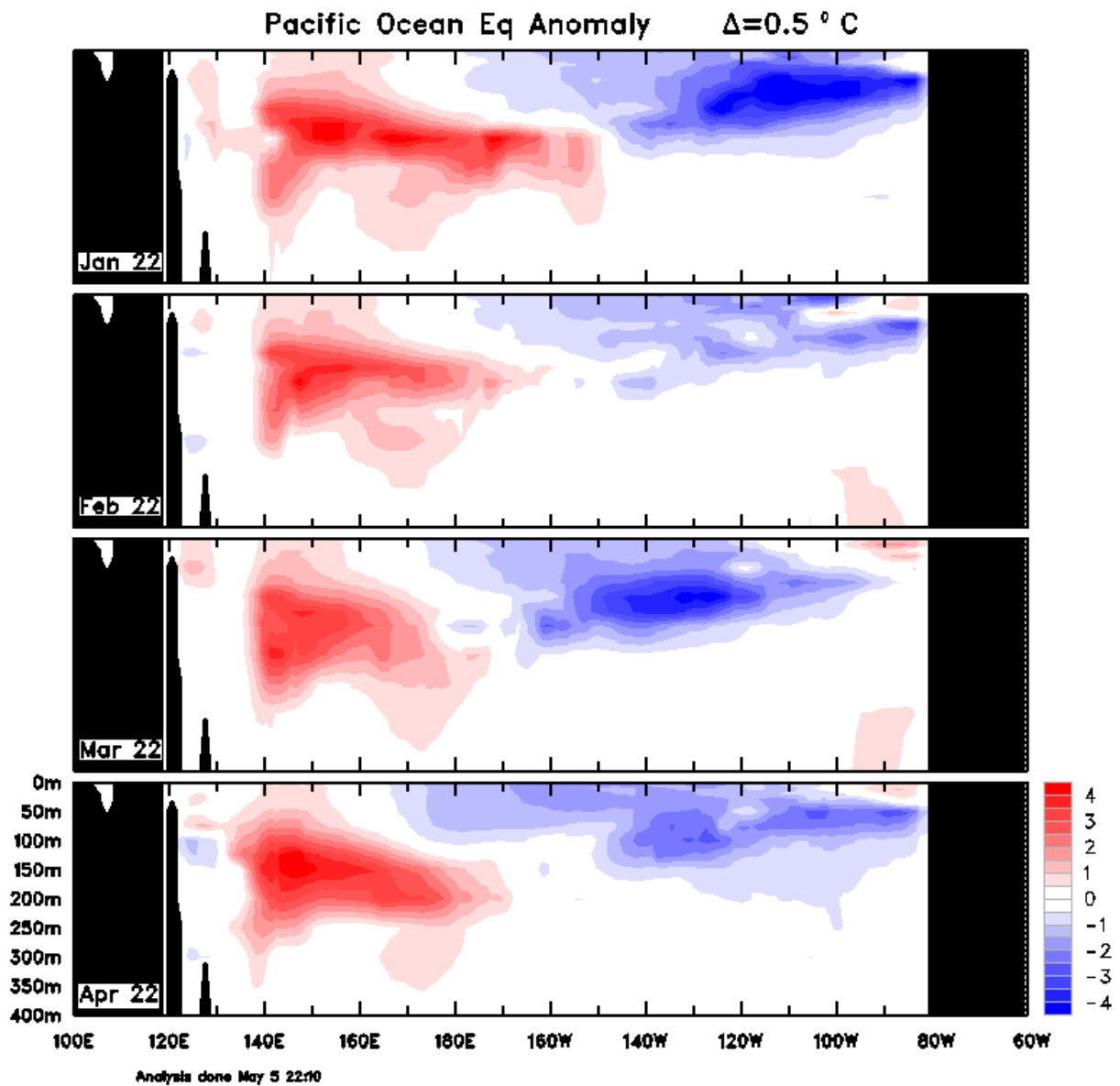
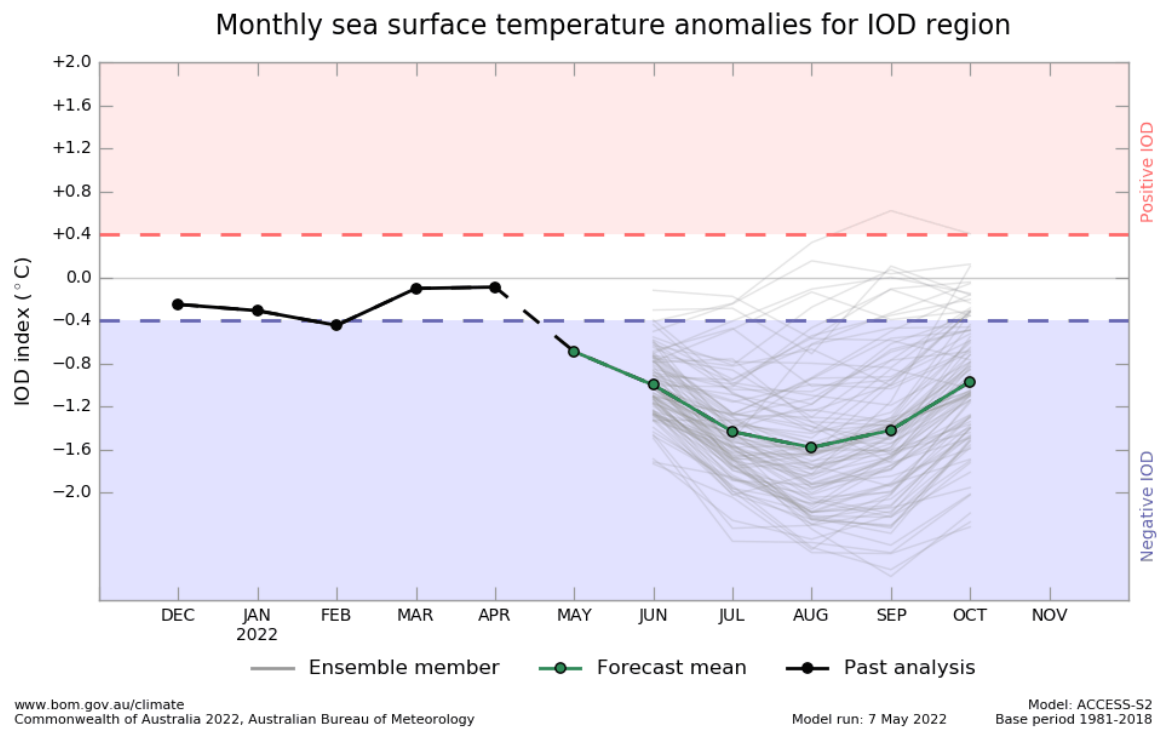


Figure 1.3: Monthly Pacific Ocean temperature anomalies in the sub-surface January-April 2022, 1900-1992 reference (Climatology after [Levitus World Ocean Atlas](https://www.bom.gov.au/climate/enso/index.shtml#tabs=Sea-sub%E2%80%93surface)). Source: BOM, <http://www.bom.gov.au/climate/enso/index.shtml#tabs=Sea-sub%E2%80%93surface>



**Figure 1.4: Times series of the Indian Ocean Dipole (IOD) Index. Source: BOM,**  
<http://www.bom.gov.au/climate/enso/index.shtml#tabs=Indian-Ocean>

## 2. Atmospheric Circulation Analysis

Velocity Potential Anomaly field in the high troposphere (fig. 2.1a – insight into Hadley-Walker circulation anomalies) and SOI:

- Upward motion anomaly over the western tropical Pacific and close to Australia and the maritime continent, downward over eastern tropical Pacific. Typical La Niña response and closely related to ocean anomalies.
- Still high positive SOI values (March +1.8, April +1.7 according to NOAA CPC, even stronger than during previous winter 2021/22)
  - <https://www.ncdc.noaa.gov/teleconnections/enso/soi>
  - <http://www.bom.gov.au/climate/enso/index.shtml#tabs=Pacific-Ocean&pacific=SOI>

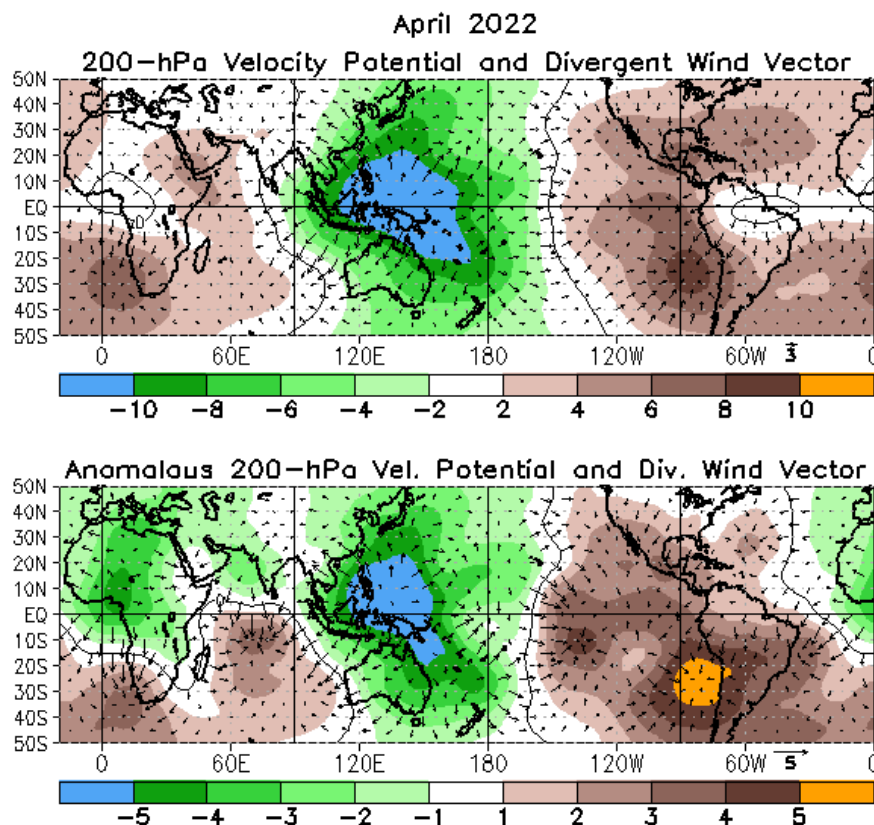


Figure 2.1.a: Velocity Potential and anomalies at 200 hPa and associated divergent circulation and anomaly for April 2022. Green (brown) indicates a divergence-upward motion/anomaly (convergence-downward motion/anomaly).

<http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt24.shtml>

MJO (fig. 2.1.b)

- MJO was weak during April 2022. Presently (mid-May 2022) it is active over the maritime continent, enhancing the Southern Oscillation upward motion.

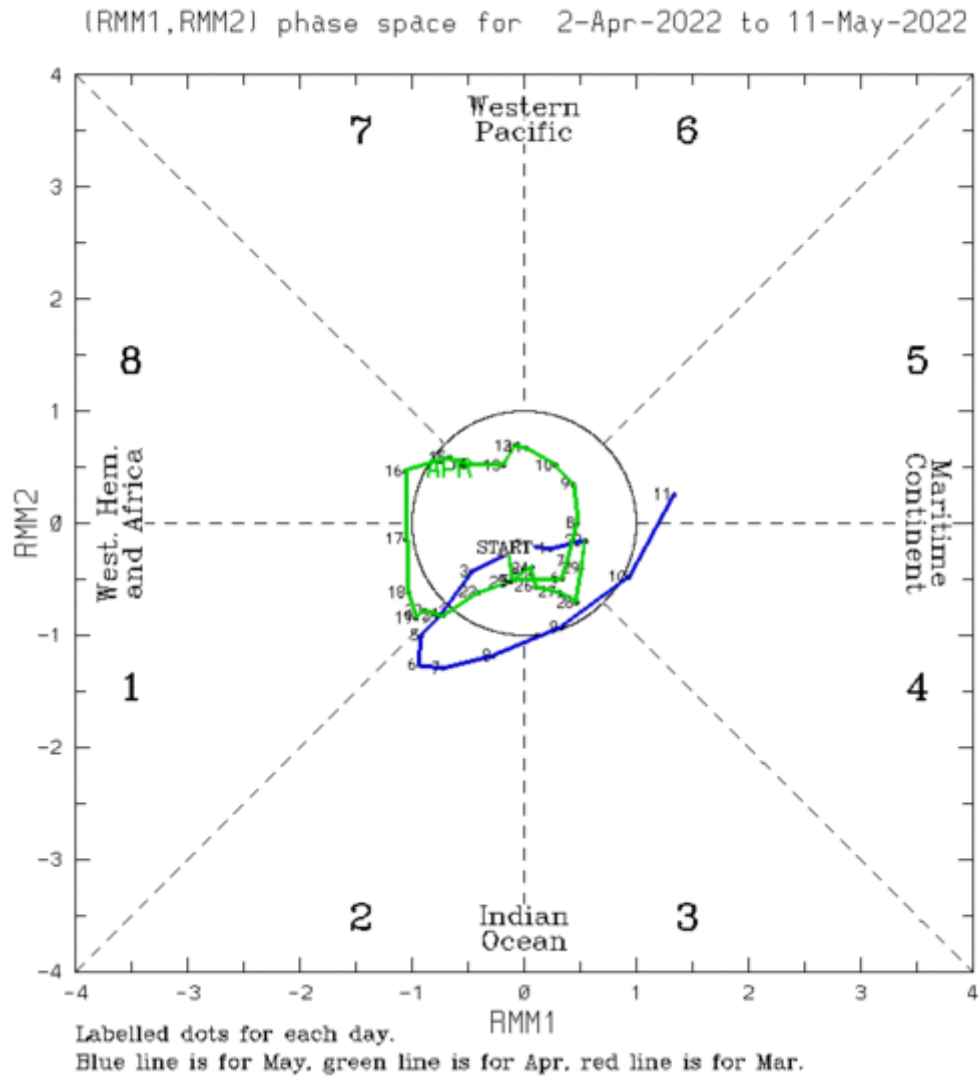


Figure 2.1.b: indices MJO

<http://www.bom.gov.au/climate/mjo/>



Stream Function anomalies in the high troposphere (fig. 2.2 – insight into teleconnection patterns tropically forced):

Over the eastern Pacific, a teleconnection pattern is visible reaching the middle latitudes in the northern hemisphere.

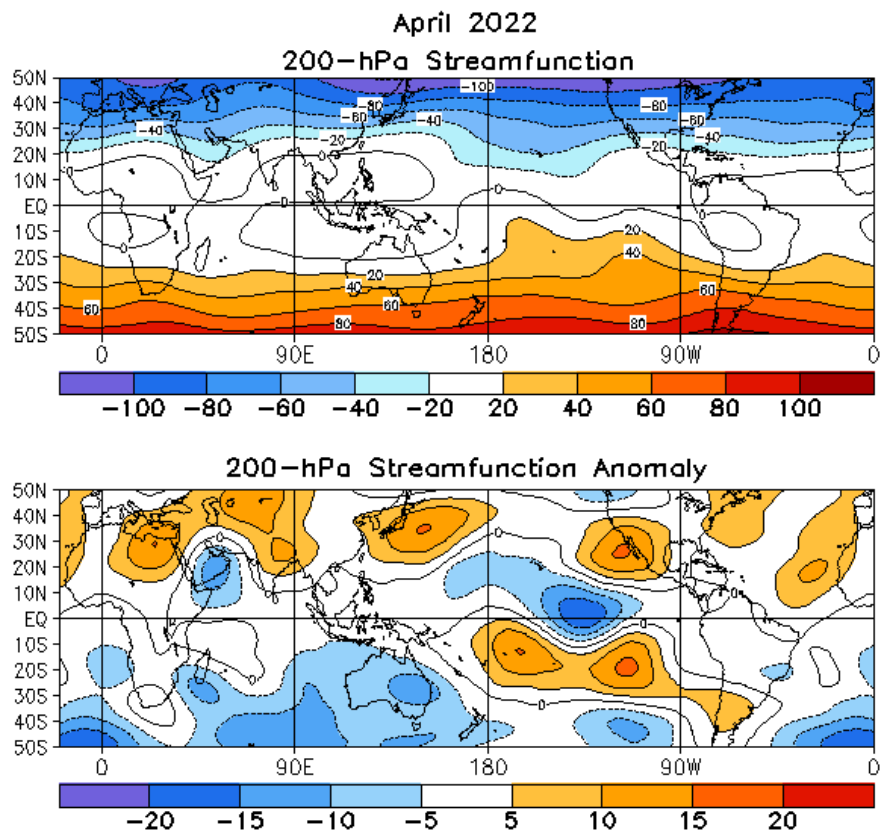


Figure 2.2: Stream Function and anomalies at 200 hPa in April 2022.

<http://www.cpc.ncep.noaa.gov/products/CDB/Tropics/figt22.shtml>

Geopotential height at 500 hPa (fig. 2.3 – insight into mid-latitude general circulation):

- Negative PNA pattern in April 2022 (PNA index -0.74 according to NOAA, <https://www.ncdc.noaa.gov/teleconnections/pna/>). The shift of the jetstream over the North Pacific can be identified (Fig. 2.3), typical La Niña response.
- Over the North Atlantic and Europe, similar quadrupole structures can be seen, suggesting a propagation of PNA anomaly wave to Europe including the Mediterranean.
- Especially over the SEECOF region negative geopotential anomalies from the northern Balkans to the Ukraine, and positive anomalies over the eastern Mediterranean.

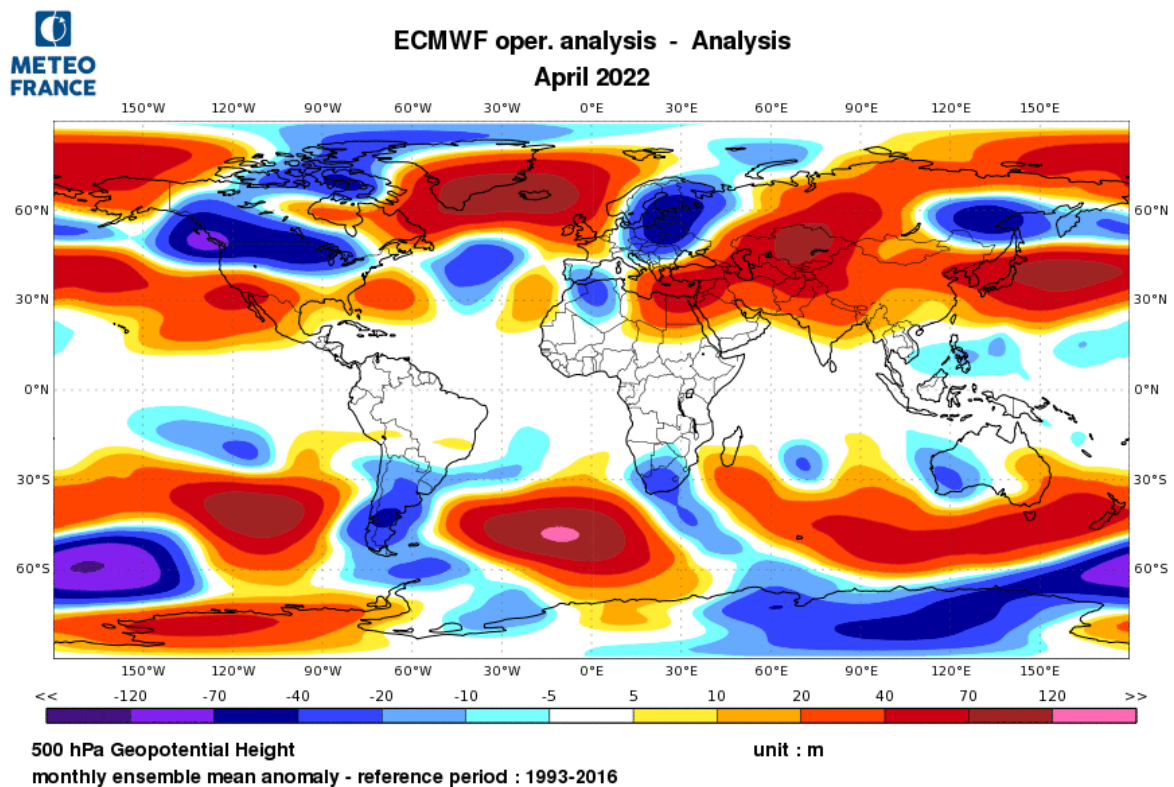


Figure 2.3: Anomalies of Geopotential height at 500hPa (ECMWF data),

Source: Météo-France, <http://seasonal.meteo.fr/content/suivi-clim-cartes-ref93-16>

### Sea level pressure (SLP) and circulation types relevant for Europe

- Rather meridional over the North Atlantic, NAO- and EA-.
- Over Europe and the Mediterranean only weak pressure differences.
- Russian High quite weak in Europe.
- SCAND- pattern brought some cold air advection to Europe
- NAO- and AO- on most days during April 2022, however, change to a positive phase in May.

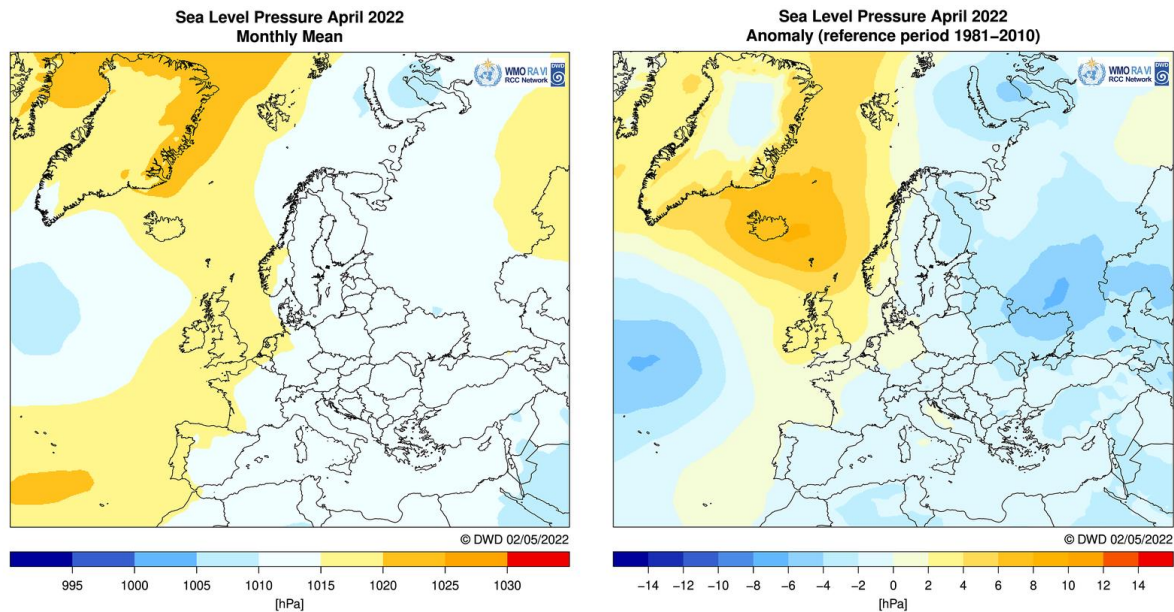


Figure 2.4: Mean sea level pressure over the North Atlantic, Europe and North Africa and 1981-2010 anomalies for April.  
Source: DWD, [https://www.dwd.de/DE/leistungen/rcccm/int/rcccm\\_int\\_ppp.html?nn=490674](https://www.dwd.de/DE/leistungen/rcccm/int/rcccm_int_ppp.html?nn=490674)

## Table of Teleconnection Indices

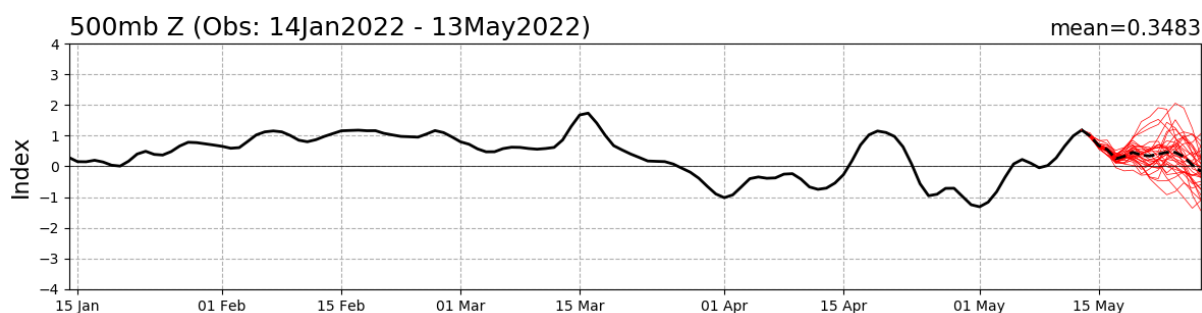
APRIL 2022

MONTH	NAO	EA	WP	EP-NP	PNA	TNH	EATL/WRUS	SCAND	POLEUR
APR 22	-0.5	-0.9	0.3	-0.7	-1.0	---	-0.1	-0.7	-1.2
MAR 22	0.4	1.5	0.6	0.3	-0.2	---	1.4	1.0	-0.5
FEB 22	1.5	0.2	-0.4	-0.9	0.6	1.8	-0.9	-2.1	-1.6
JAN 22	0.7	-1.4	-1.4	0.5	0.6	0.7	1.1	-0.9	-0.3
DEC 21	0.2	-0.1	0.5	---	-2.9	-0.3	0.0	0.3	-0.5
NOV 21	-0.3	-0.9	-0.1	0.3	0.7	---	0.0	-0.8	0.5
OCT 21	-2.0	0.9	1.7	-2.4	1.4	---	-0.6	-0.2	-0.5
SEP 21	-0.1	1.7	-0.7	-1.9	0.3	---	0.5	-0.1	-1.0
AUG 21	-0.5	1.1	-1.9	-1.8	0.9	---	-2.4	-1.4	-0.5
JUL 21	0.1	2.2	-0.4	-1.3	0.1	---	-0.5	1.5	0.8
JUN 21	1.1	1.0	-0.8	-0.3	0.8	---	-1.8	-0.1	0.9
MAY 21	-1.1	0.8	0.2	0.0	-1.1	---	-1.2	-1.1	-0.5
APR 21	-1.7	0.3	-0.1	0.8	-1.3	---	-0.4	-1.2	-0.2

Table 1: Evolution of the main atmospheric indices for the Northern Hemisphere for the last months:

<http://www.cpc.ncep.noaa.gov/products/CDB/Extratropics/table3.shtml>

### NAO Index: Observed & GEFS Forecasts



### AO Index: Observed & GEFS Forecasts

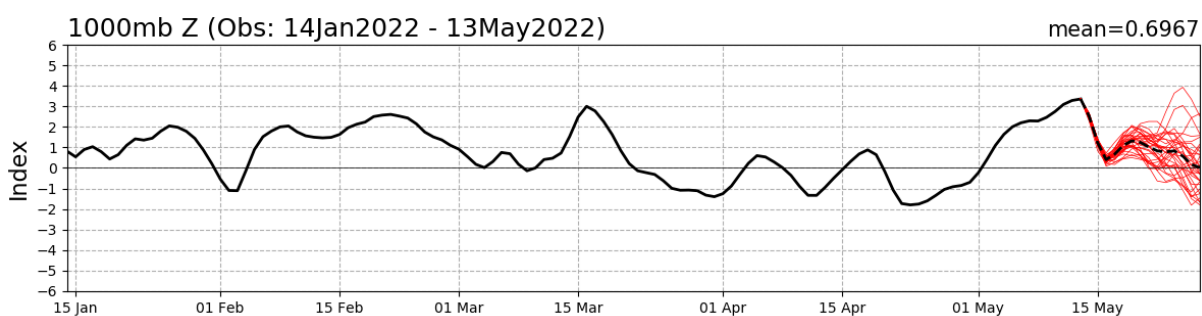


Figure 2.5: North Atlantic Oscillation (NAO) and Arctic Oscillation (AO) indices. Source: NOAA CPC, [https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily\\_ao\\_index/teleconnections.shtml](https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml)

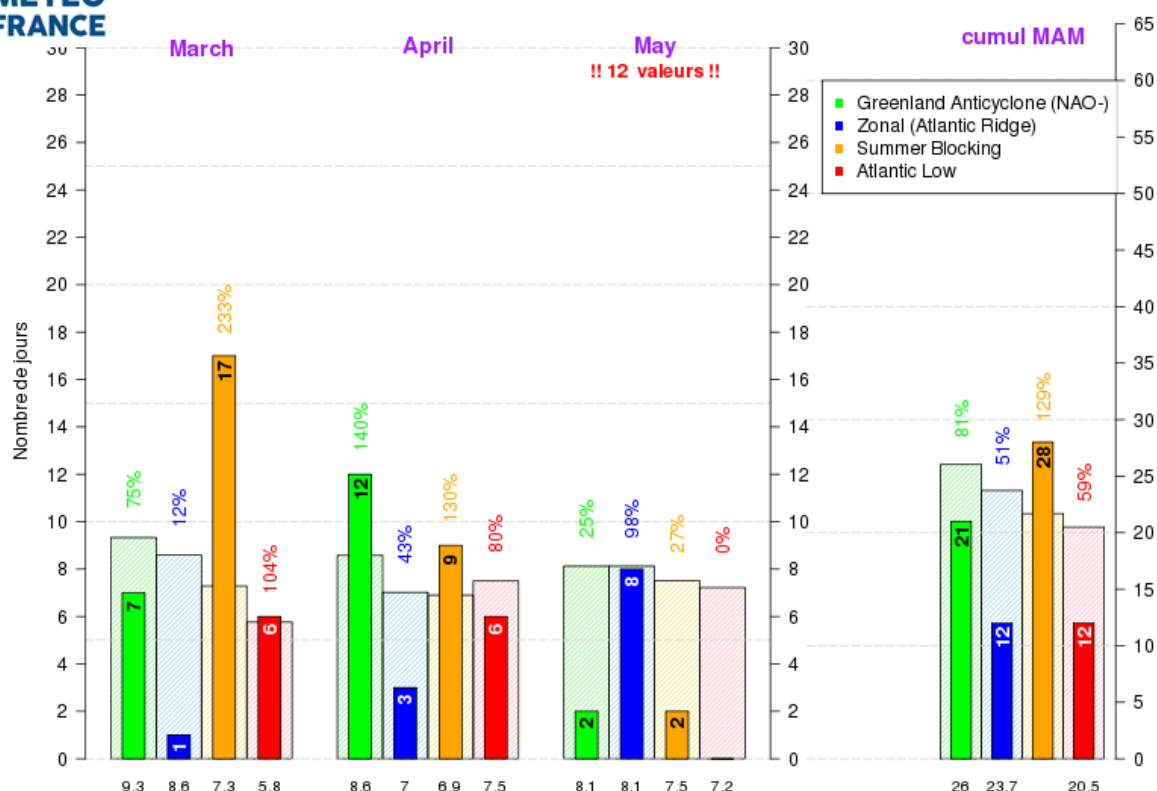


Figure 2.6: Distribution of weather types of Météo France classification (summer regime) for March-May 2022.

Source: Météo France, <http://seasonal.meteo.fr/en/content/suivi-clim-regimes-trim>

Météo France weather type classification shows NAO- and summer blocking as the most frequent types in April. Up to mid-May there was a more frequent occurrence of zonal types then.



### 3. Precipitation

Monthly precipitation in April 2022 was above normal in the Ukraine, in Moldova, Romania, northern Bulgaria and European Turkey. In the Ukraine, precipitation was even above the 90<sup>th</sup> percentile. It was below normal in the Eastern Mediterranean region, namely in southern Albania, North Macedonia, Greece, Turkey, Cyprus, South Caucasus and northern Israel, falling below the 10<sup>th</sup> percentile in some of these areas. In the other parts of the Balkans, precipitation was around normal. The precipitation distribution is much in line with the geopotential dipole (negative anomalies in the north, positive in the south, see above).

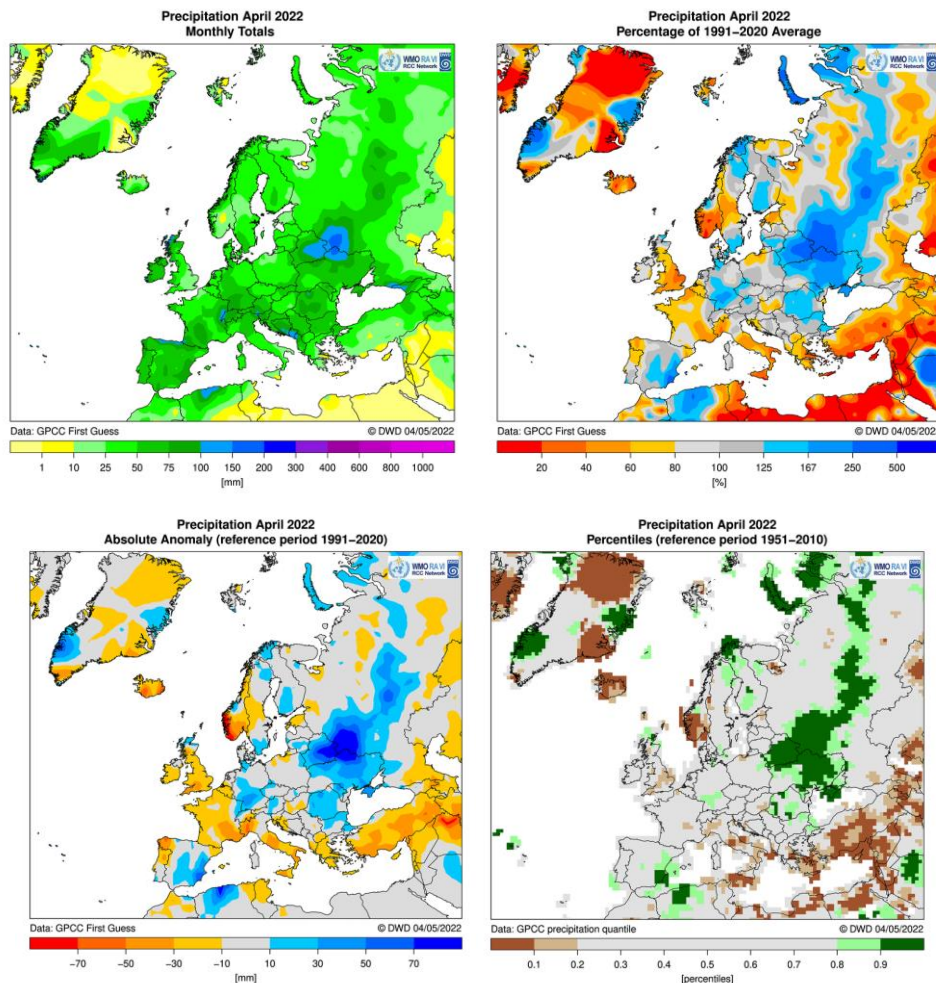


Figure 3: Monthly precipitation sum (upper left), percentage of normal (upper right), absolute anomalies (middle left), and percentiles (middle right) for April 2022 (1991-2020 reference for percentages and anomalies, 1951-2010 for percentiles) in Europe/RAVI. Data from GPCC (First Guess version). Source: DWD, [http://www.dwd.de/DE/leistungen/rcccm/int/rcccm\\_int\\_rrr.html?nn=16102](http://www.dwd.de/DE/leistungen/rcccm/int/rcccm_int_rrr.html?nn=16102)

## 4. Temperature

Monthly mean temperature in April 2022 was around normal almost throughout the Balkans, but above normal in Greece, Turkey, South Caucasus and the Middle East. The latter was mainly due to heat waves at the beginning and the end of the month.

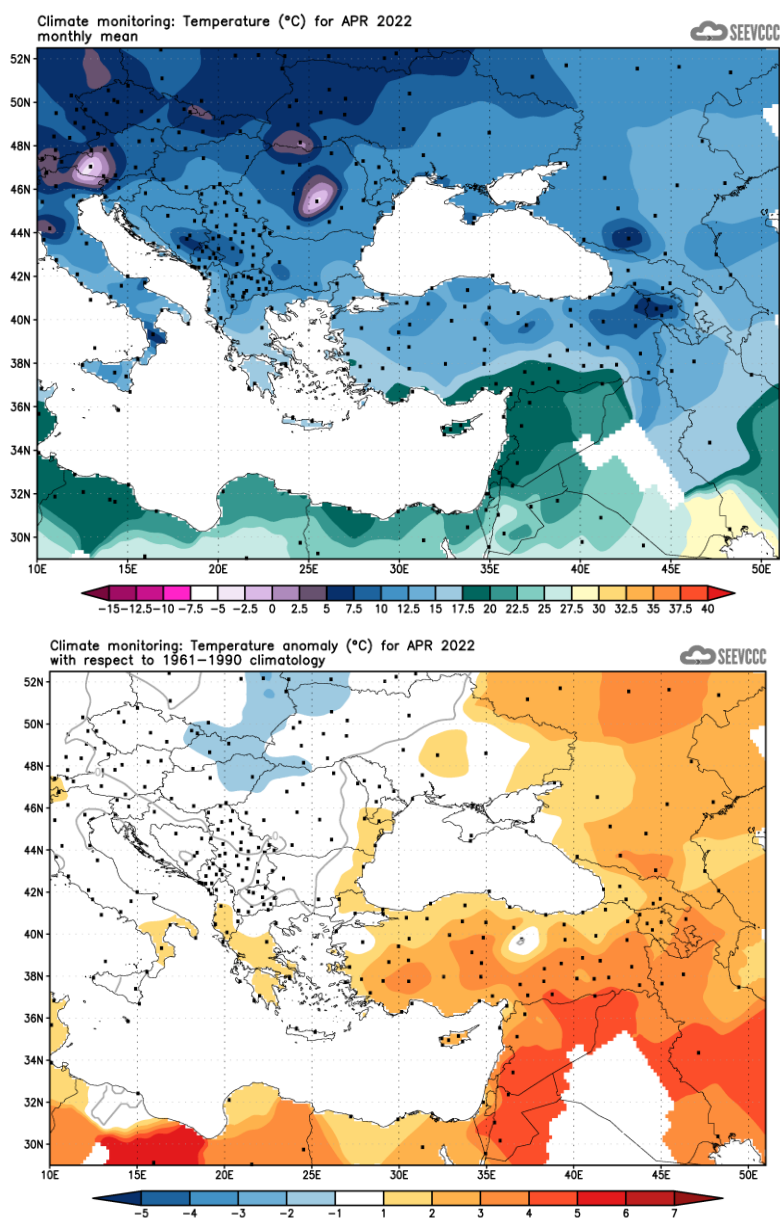


Figure 4: Mean temperature (left) and anomalies (1961-1990 reference, right) in °C in the SEECOF domain for April 2022.

Source: SEEVCCC, <http://www.seevccc.rs/?p=6>

## **5. Significant Events in April 2022 in the SEECOF region**

6 April 2022: Several heat waves occurred over large areas in northern Africa and the Arabian Peninsula that month, and this affected also the Middle East countries Israel and Jordan. Daily maxima of 42.0 °C were recorded in both countries on 6 April 2022, record heat for that time of year.

20 April 2022: Serbia was under unusual wintry conditions with frost and snow on the mountains. Fresh snow on mountains in Serbia led to significant snow depths: Kopaonik 35 cm, Karajukica Bunari 22 cm, Kukavica 20 cm.

23-26 April 2022: Another heat wave came up late in the month from 23 April 2022, affecting particularly Turkey and Cyprus with daily maxima up to above 35 °C. Adana in Turkey measured 37.8 °C that day, Lefkoniko in Cyprus 34.8 °C on 24 April.

The heat wave extended even further north up to the Caucasus region. Temperatures around or above 30 °C in these days were measured in several places in Georgia, Azerbaijan, Armenia.

25 April 2022: Several dust storms (Saharan dust) had been observed in the Mediterranean region in late April. In particular, severe dust storms were affecting parts of the Middle East. On Monday, 25 April 2022, authorities in Jordan ordered schools in the south of the kingdom to close due to the heavy spread of dust. Especially schools in the governorates of Karak, Tafila, Aqaba and Maan were closed.

### **References:**

Météo France Monthly Seasonal Forecast Bulletin and climate monitoring maps: <http://seasonal.meteo.fr> (password protected)

WMO RA VI RCC Node on Climate Monitoring Website with monitoring results: <http://www.dwd.de/rcc-cm>

GPCC: <http://gpcc.dwd.de>

South East European Virtual Climate Change Center (SEEVCCC): <http://www.seevccc.rs/>