

**National Climate Bulletin and the assessment of the SEECOF-27**  
**Climate state outlook for the 2022 summer season**

DIVISION of CLIMATOLOGY – APPLICATIONS  
HELLENIC NATIONAL METEOROLOGICAL SERVICE

A. Mamara, E. Chatziapostolou, N.Karatarakis

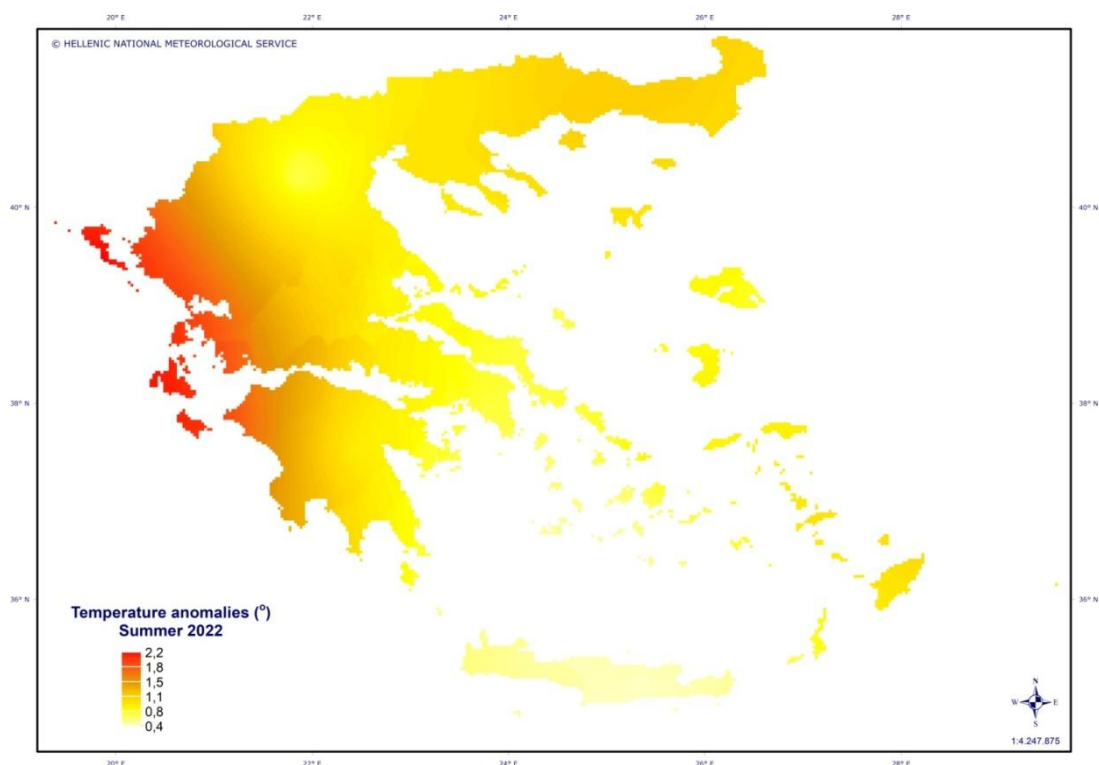
## Part A

### 1. Temperature

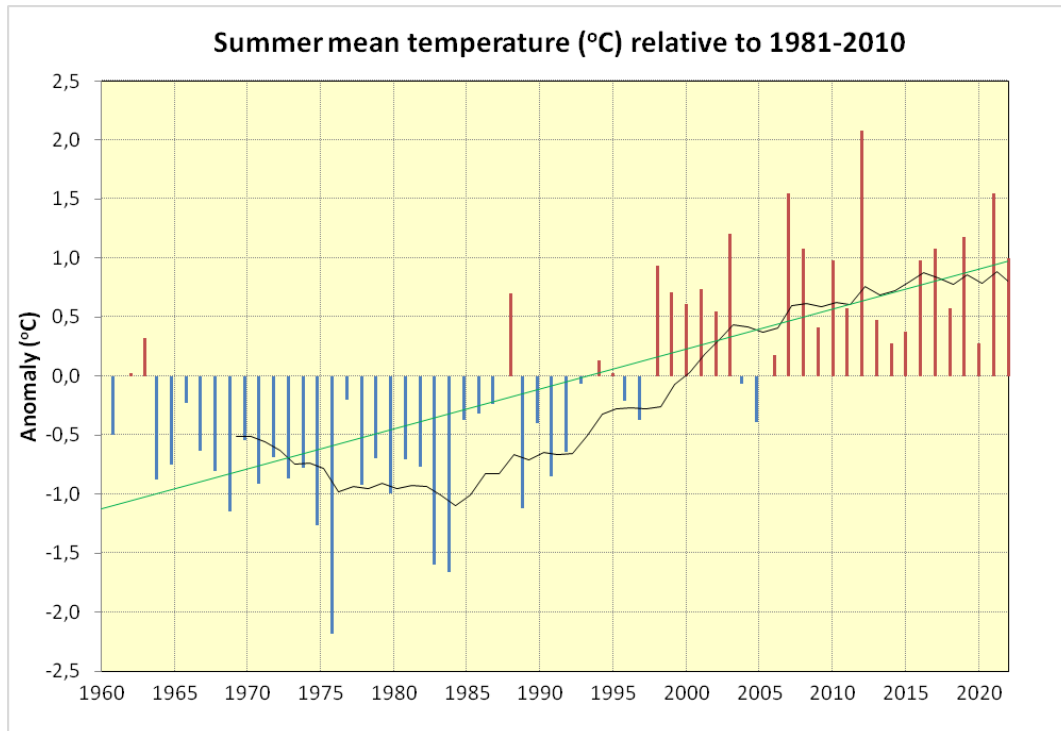
#### 1.1. Analysis of the 2022 summer air temperatures anomalies for Greece

The analysis of seasonal precipitation amounts throughout Greece is based on data from 37 meteorological stations distributed evenly in the country.

Temperatures in **summer 2022** varied considerably across Greece relative to their average values for 1981-2010 reference period. Mean temperature anomalies exceeded 2 °C over the Ionian islands and the west coastal regions and were on average 0.3 °C over Crete and south Aegean islands (Figure 1). The summer average mean temperature anomalies in Greece from 1960 to 2022 are given in Figure 2. It is noticeable that the summer mean temperature remained relative low before 1992, and then started to rise and reached a local peak in 2012 which was the warmest summer on record. Summer of 2022 and 2007 were the second warmest summers on record. In summer 2007 the average mean temperature anomaly, relative to 1981-2000 normal value, exceeded 1.5 °C for the first time over the last 63 years; three times the mean temperature anomaly reached or exceeded 1.5°C since then.

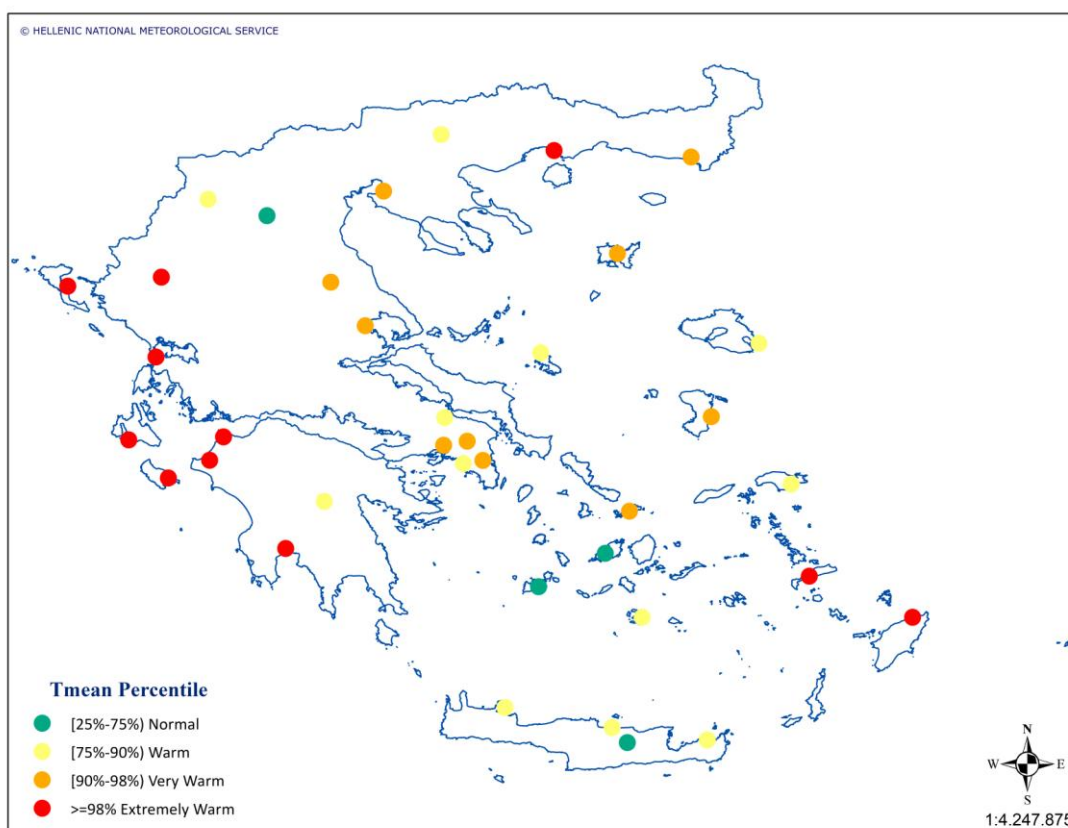


**Figure 1.** Mean temperature anomalies (°C) for summer 2022 in Greece according to the 1981-2010 climatology.



**Figure 2.** Summer 2022 (June through August) averages of mean surface air temperature anomalies for Greece (taking into account 31 stations) relative to 1981-2010 reference period. The black line indicates the ten-year moving average, and the green line indicates the long-term linear trend.

In order to quantify the observed seasonal temperatures in terms of cold, warm and normal, we have used the percentile method. The percentiles were calculated for each station and are based on homogenized mean temperature series for the period 1981-2010. According to percentile ranks (Figure 3) **extremely warm** conditions dominated over west Greece and Dodecanese islands and **warm to very warm** prevailed over central and eastern parts.



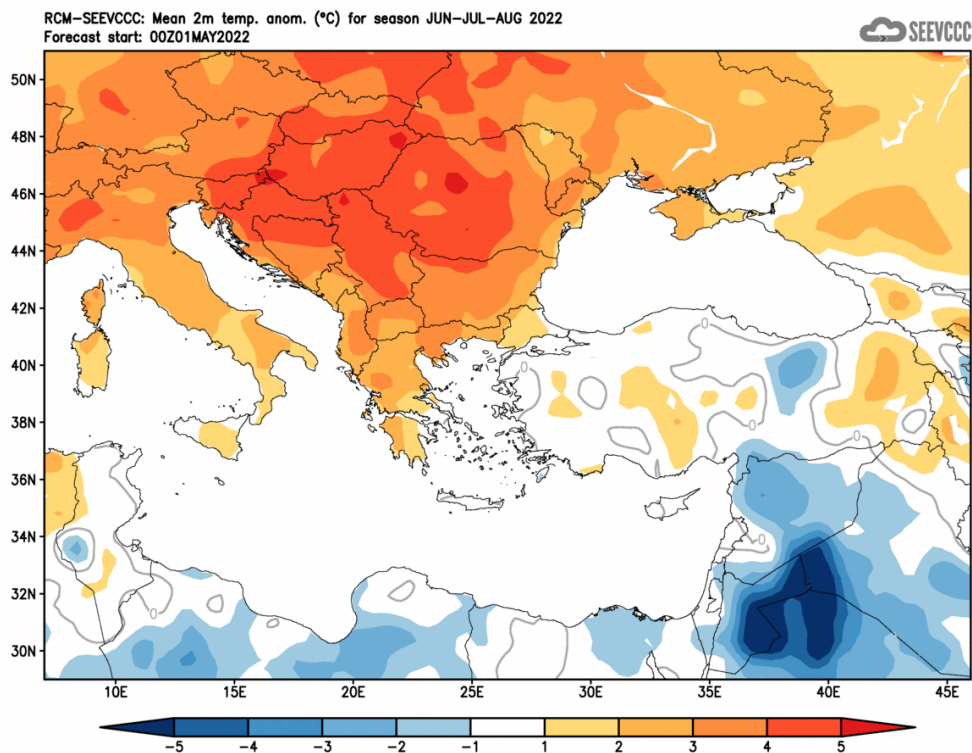
**Figure 3.** Mean temperature percentiles for summer 2022 (based period 1981-2010).

### 1.2. Verification of the SEECOF-27 summer 2022 temperature outlook for Greece

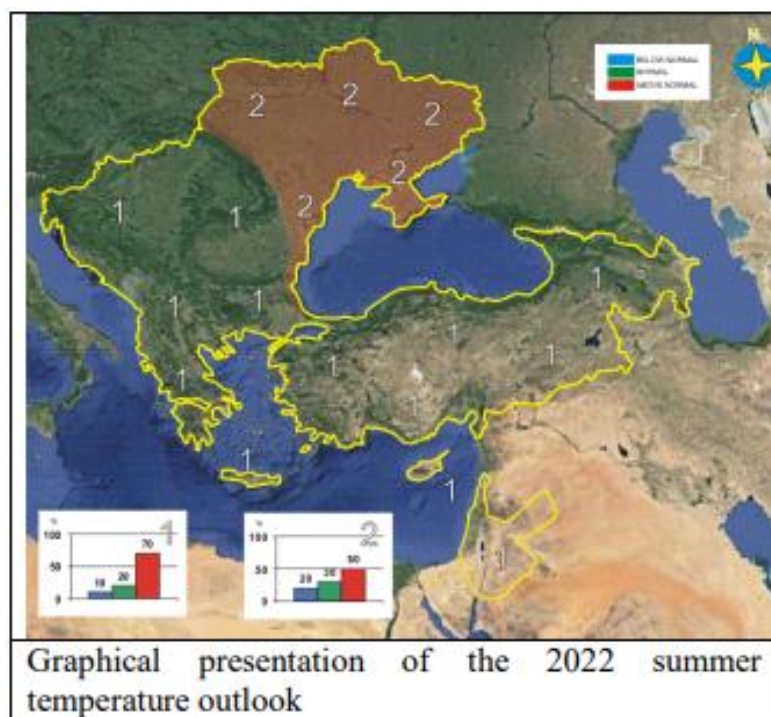
The seasonal forecast for summer suggested that the mean temperature would be above normal in mainland areas with the greatest temperature anomaly (above 2 °C) occurring in the west and north Greece (Figure 4).

The consensus statement of SEECOF-27 mentioned that in the entire Greek region, summer temperature was likely to be above-normal, with the probability 70 % (zone 1: 10% below normal, 20% around normal, 70% above normal) (Figure 5).

Verifying the seasonal forecast for summer the prediction was successful, because the summer mean temperatures varied above normal across the country.



**Figure 4.** Mean temperature anomaly (1981-2010) for summer 2022.



**Figure 5.** Graphical presentation of the 2022 summer temperature outlook.

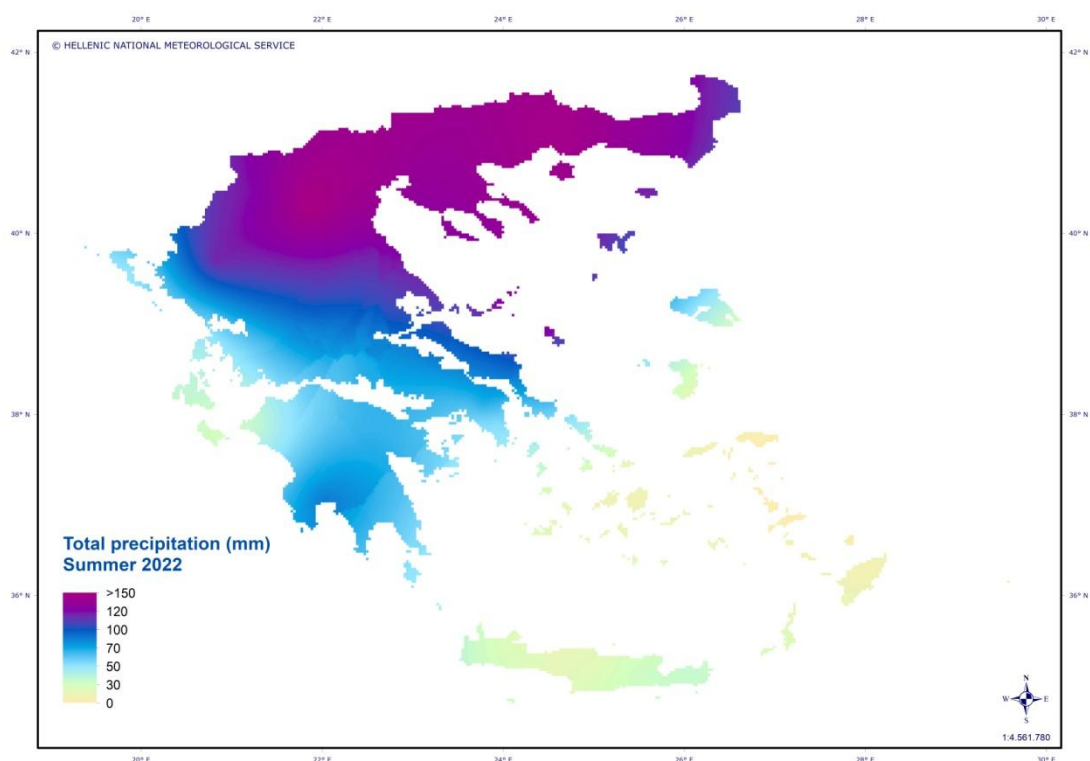
## Part B

### 2. Precipitation

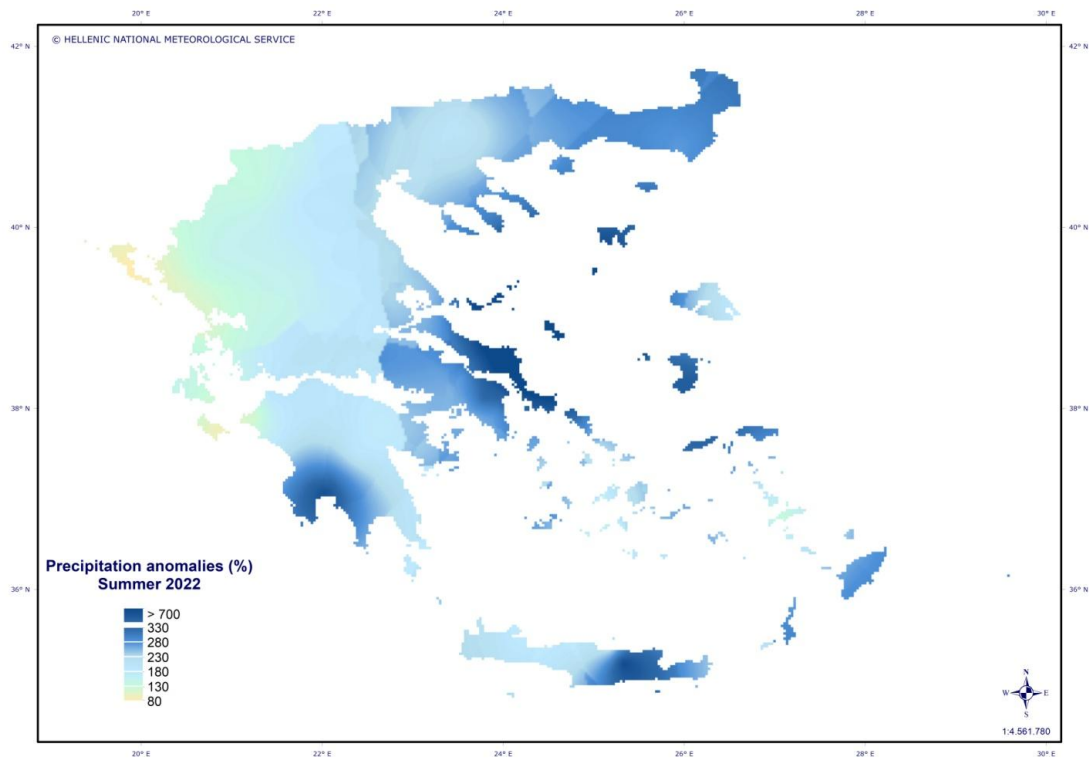
#### 2.1. Analysis of the 2022 summer precipitation anomalies in Greece

The analysis of seasonal precipitation amounts throughout Greece is based on data from 37 meteorological stations distributed evenly in the country. Figure 6 shows the total precipitation amounts in summer 2022. Northern regions of Greece received high precipitation amounts.

In **summer 2022** precipitation was higher than average over east Greece, particularly over central mainland, central and north Aegean islands and locally south Peloponnese. Some stations recorded extremely high precipitation e.g Skyros station, in central Aegean, and Kalamata station in south Peloponnese, recorded 192 mm and 134 mm total precipitation heights respectively, accounting for more than 500 % of 1981-2010 normal values (Figure 7). In some cases, heavy precipitation led to flooding.



**Figure 6.** Spatial distribution of summer 2022 precipitation totals expressed in mm.



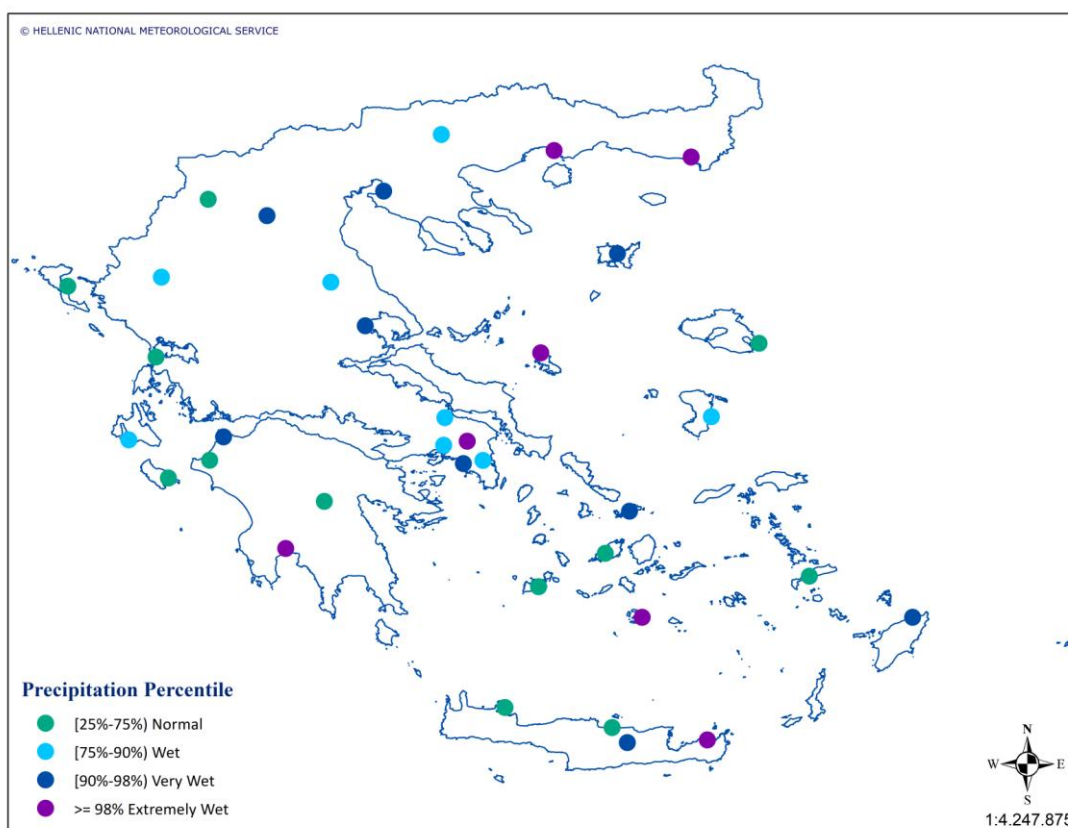
**Figure 7.** Summer 2022 precipitation anomalies (1981-2010) given in percentages.

In order to quantify the observed precipitation height in terms of wet, dry and normal we have used the percentile method. The percentiles were calculated for each station and are based on homogenized precipitation series for the period 1981-2010.

According to percentile ranks (Figure 8) precipitation amounts for summer 2022 have been described by the following categories:

- Normal conditions prevailed in 12 stations (33.3% of the examined stations).
- Wet to very wet conditions (17 stations, 47.2% of the examined stations).
- Extremely wet conditions (7stations, 19.4% of the examined stations).





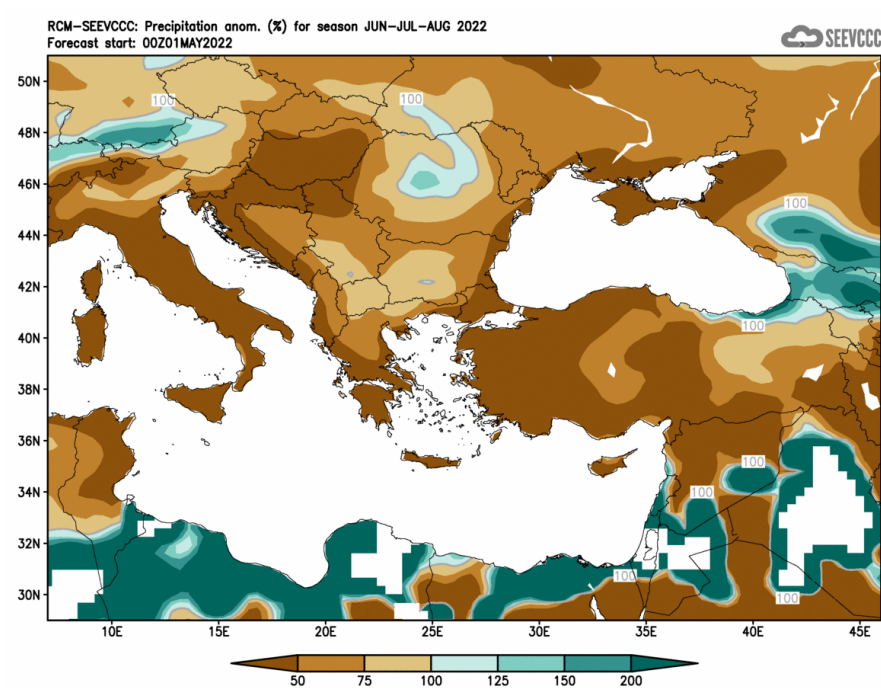
**Figure 8.** Precipitation percentiles for summer 2022 (based period 1981-2010).

## 2.2. Verification of the SEECOF-27 summer 2022 precipitation outlook for Greece

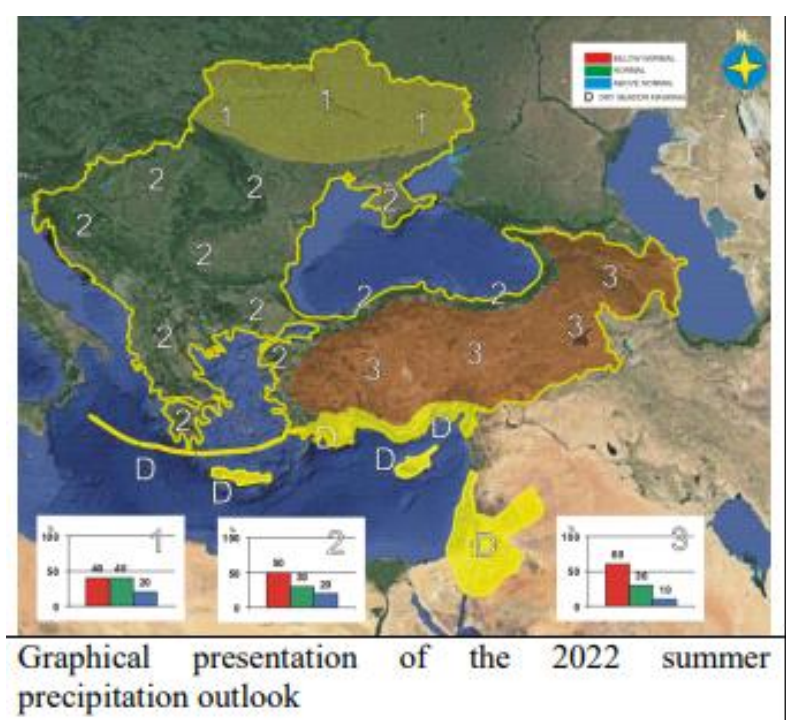
The seasonal forecast for precipitation predicted a dry summer for the whole country with total precipitation accounting less than 50 % of normal values over central and south Greece (Figure 9). According to SEECOF–27, there was high uncertainty regarding the summer precipitation sums. Most of the SEECOF region would receive below-normal precipitation sums with the probabilities increasing from the north-west (Zone 1 in Figure 10) towards east of the region (Zone 3 in Figure 10). However, it was mentioned that certain parts of the country, particularly mountainous regions, would receive near- or above-normal summer precipitation totals due to the episodes of enhanced convection accompanied by heavy precipitation. Most of Greece was in Zone 2, with precipitation probabilities 50% below normal, 30% around normal, 20% above normal. Due to dry season masking, was not possible to forecast summer precipitation totals along Crete, the eastern coasts of the Eastern Mediterranean, Cyprus, Israel and Jordan.



Verifying the seasonal forecast for summer, the seasonal forecast wasn't successful, since there was only 20% chance of wetter than normal conditions. On the contrary, precipitation was above average across most of Greece and some parts of the country –not only mountainous regions– received high precipitation that led to flooding.



**Figure 9.** Precipitation anomaly (1981-2010) for summer 2022.



**Figure 10.** Graphical presentation of the 2022 summer precipitation outlook.

**Table 1. Seasonal air temperature and precipitation sums - Ranks**

Summer 2022		Seasonal air temperature (°C)					Seasonal precipitation sums (mm)			
Station	Rank*	33	50	67	Observed value	Rank**	33	50	67	Observed Value
Thessaloniki	2	25.6	25.9	26.3	27.7	5	50.6	63.7	87.95	130
Helliniko	9	26.8	27.2	27.7	28.0	6	6.8	14.4	20.95	39.5
Souda	7	25.7	26.0	26.4	26.7	16	0.1	1.4	3.9	7
Argostoli	1	25.1	25.4	25.7	27.9	13	11.25	15.1	25.9	44.2

\*Rank: period 1960-2010 (warmest season)

\*\*Rank: period 1960-2010 (highest seasonal precipitation)

**Table 2. Verification of the SEECOF-25 Climate Outlook in Greece for Summer 2022.**

Country	Seasonal temperature		Seasonal precipitation		High Impact Events
	Observed	SEECOF-27 climate outlook for temperature	Observed	SEECOF-27 climate outlook for precipitation	
Greece	Above normal for the whole area of the country.	Above normal for the whole area of Greece.	Wetter than normal conditions prevailed in most of Greece	Probabilities for below-, near- or above-average conditions are approximately equal (zone 2, 50% below normal, 30% around normal, 20% above normal).	<p>On <b>8 to 9 July 2022</b> a barometric low-pressure system brought severe thunderstorms to the north and central parts of Greece. Skyros island was declared in a state of emergency after significant damage, including the collapse of two bridges in the north of the island and flooding in areas to the west and south.</p> <p>During <b>21 to 25 August 2022</b> a cut-off low that remained above Greece for almost a week, combined with thermal instability and caused thunderstorms accompanied by a high frequency of lightning, heavy rainfall and hail. Intense weather phenomena affected most of the country,</p>

					<p>mainly the continental Greece and the Aegean islands. Tatoi station, in the northern suburbs of Athens, recorded a 5-day total precipitation 94.8 mm while its monthly total precipitation of 30-year (1981-2010) historical average is 7.4 mm. Flooding roads and homes were reported in Macedonia, Attica and East Sterea. Hailstorm hit thousands of acres with crops; landslides and damages to the road network were reported in Kalavryta, Trikala and Santorini island.</p>
--	--	--	--	--	---

**Contact details**

HELLENIC NATIONAL METEOROLOGICAL SERVICE

Division of Climatology - Applications

14 E. Venizelou Str.,

GR - 16777 Hellinikon, Greece

Phone: +302109699030, fax: +302109628952

<http://www.hnms.gr> ,

emails: 1. anna.mamara@hnms.gr

2. eleni.chatziapostolou@hnms.gr

3. karatarakis@hnms.gr