

**VERIFICATION of the SEECOF-22 WINTER 2019/2020**  
**CLIMATE OUTLOOK FOR GREECE**

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## Introduction

This report consists of two parts. In part A, an analysis of the observed mean temperature for Winter 2019/20 as well as an assessment - verification of SEECOF-22 temperature outlook for Winter 2019/20 were performed, first on monthly basis and then for the whole Winter 2019/20 season. The reference period for comparison/verification was the base period of 1971-2000.

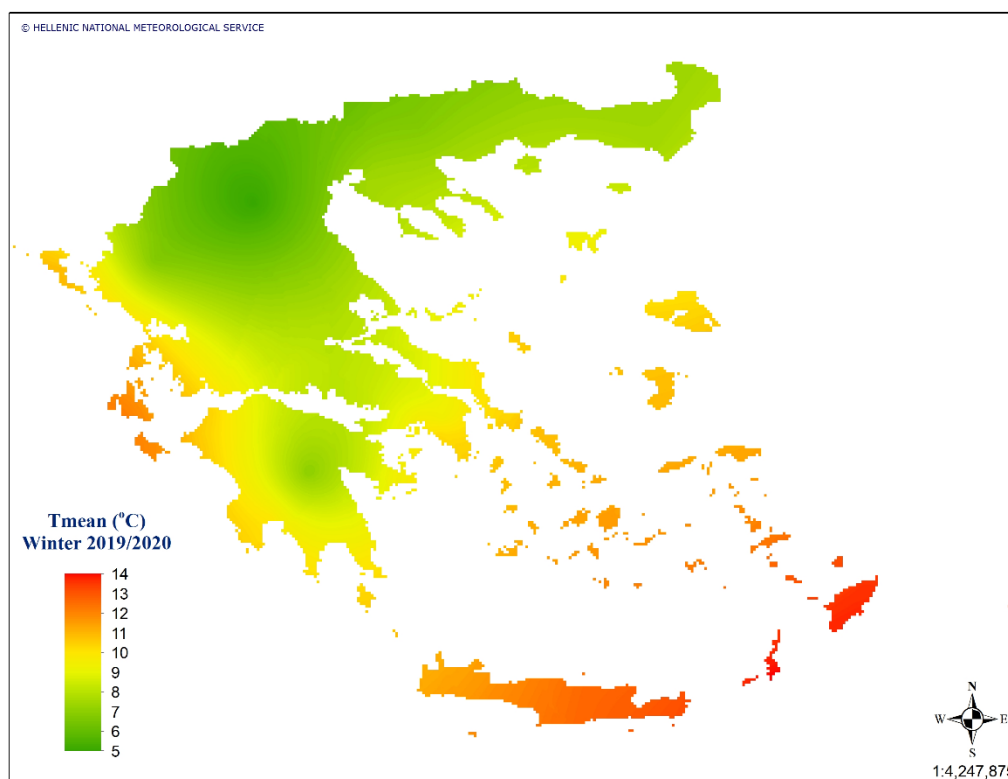
In part B, an analysis of the observed precipitation for Winter 2019/20 as well as an assessment - verification of SEECOF-22 precipitation outlook for Winter 2019/20 were performed, first on monthly basis and then for the whole Winter 2019/20 season. The reference period for comparison/verification was the base period of 1971-2000.

## Part A

### 1. Temperature

#### 1.1. Seasonal analysis of the Winter 2019/20 air temperatures anomalies in Greece

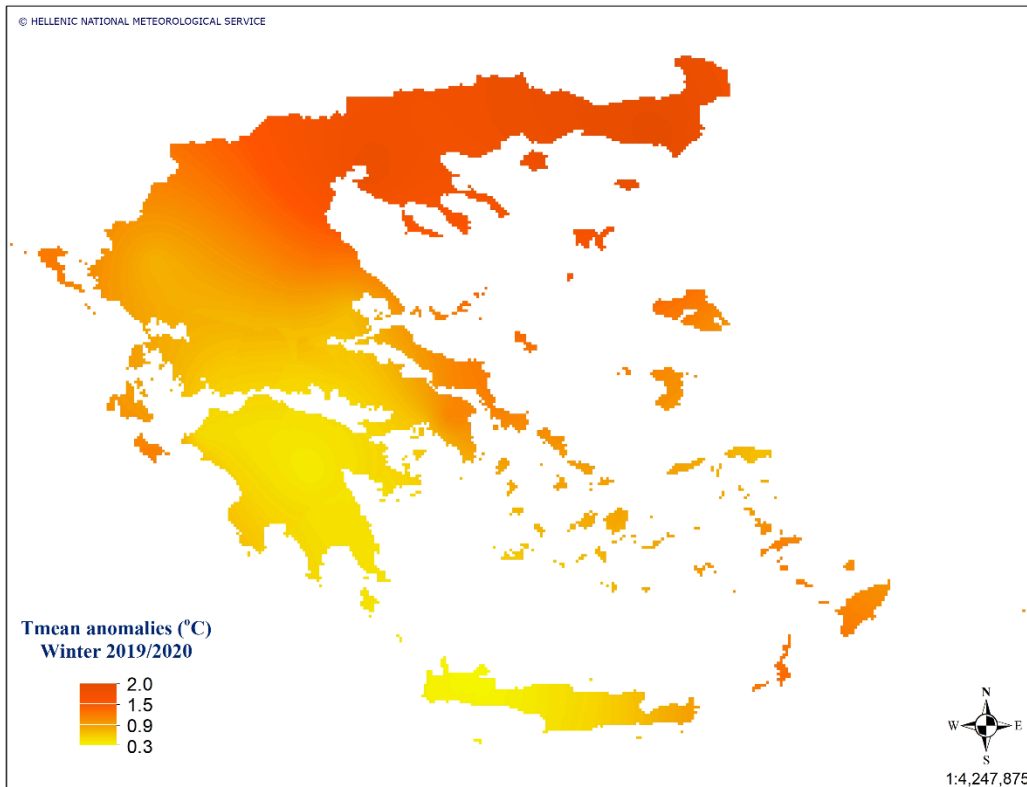
The analysis of seasonal mean air temperatures in Greece is based on data from 31 meteorological stations distributed evenly in the country. The seasonal air temperature in winter ranged from 4.7 °C to +14.5 °C (Figure 1).



**Figure 1.** Mean temperature (°C) in Winter 2019/20

The greatest mean temperature values were recorded over southeast areas (east Crete, Karpathos, and Rhodes islands) and the lowest ones over northwest mainland (Figure 1).

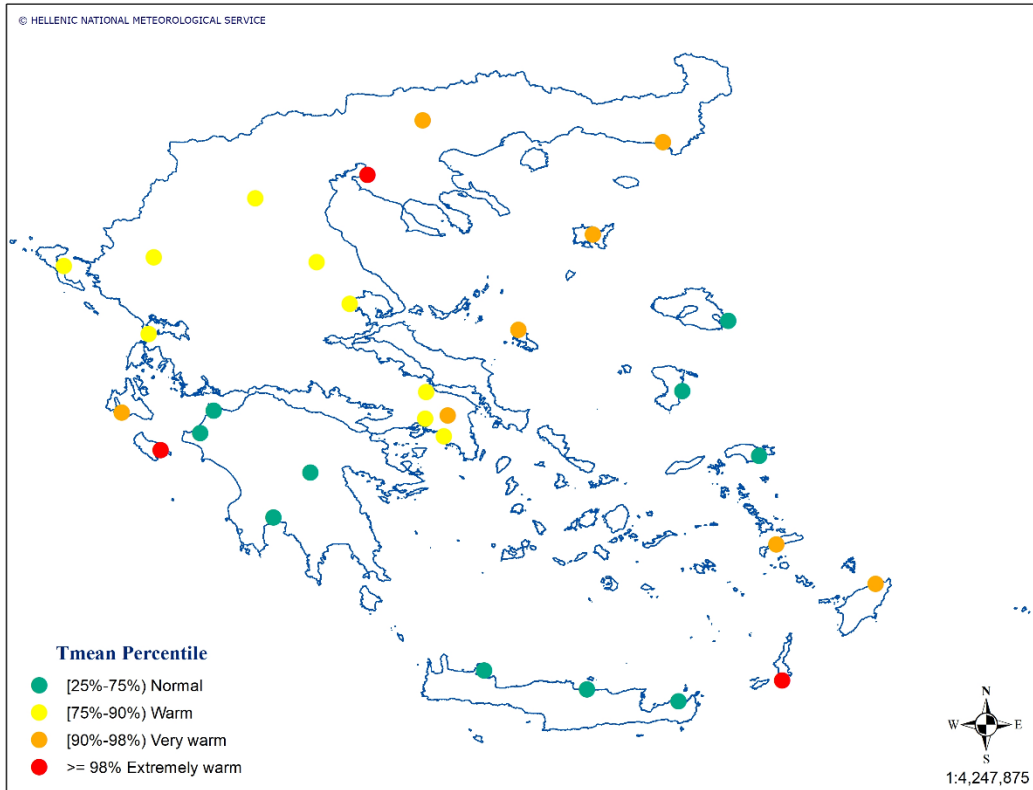
Temperature in winter 2019/20 in Greece was above normal values compared to the 1971-2000 climatology. The departure of mean air temperature from the normal values (1971-2000), in this winter ranged from 0.3 °C to + 2.0 °C, with the greatest positive anomalies occurring in the northeastern parts of the country, including the prefectures of central and eastern Macedonia, Thrace and the north Aegean islands (Figure 2).



**Figure 2.** Mean temperature anomalies (°C) for Winter 2019/20 in Greece according to the 1971-2000 climatology.

In order to quantify the observed seasonal temperatures in winter 2019/20 in terms of cold, warm, and normal, the percentile method was applied. The percentiles were calculated for each station and are based on homogenized mean temperature series for the period 1960-2004.

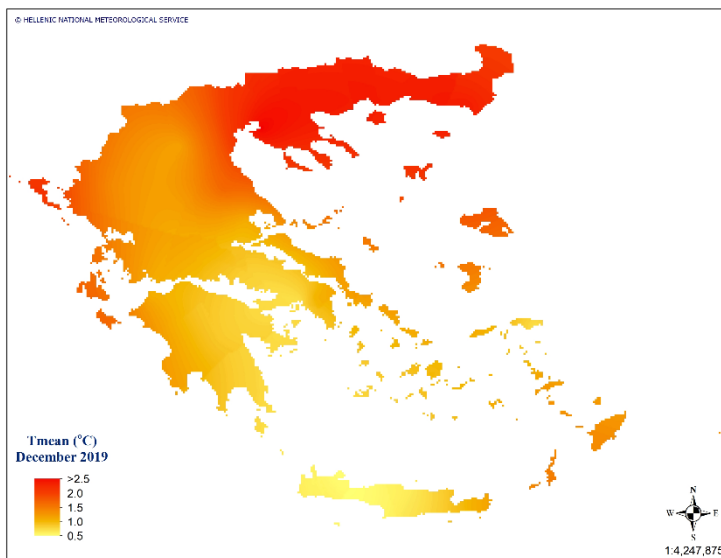
According to percentile ranks (Figure 3) warm to extremely warm conditions dominated in Greece during winter 2019/20 (66.7 % of the examined stations) and normal conditions prevailed in Peloponnese, northeast Aegean islands and Crete (33.3 % of the examined stations).



**Figure 3.** Mean temperature percentiles for winter 2019/20.

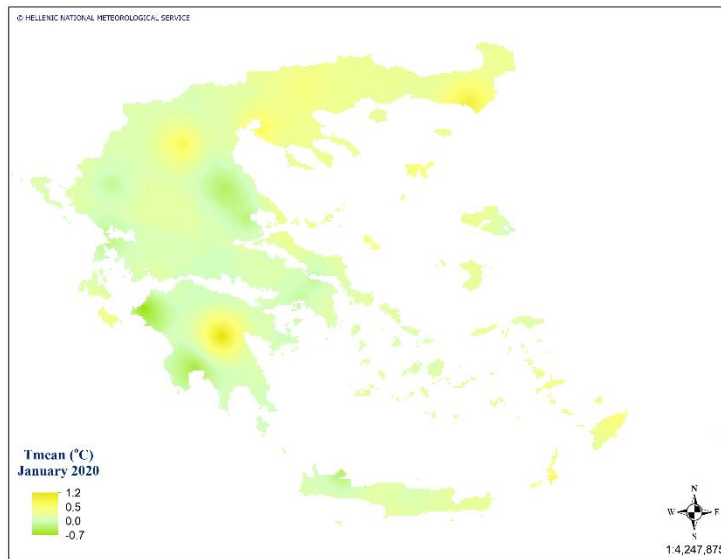
### 1.2. Monthly analysis of the air temperatures anomalies in Greece

Mean temperatures in **December 2019** ranged above normal values for the whole Greek territory. The departures of mean monthly air temperature from the normal values 1971-2000 ranged from nearly 0.5 °C to nearly 2.8 °C. The greatest positive anomalies were recorded over central and east Macedonia and Thrace.



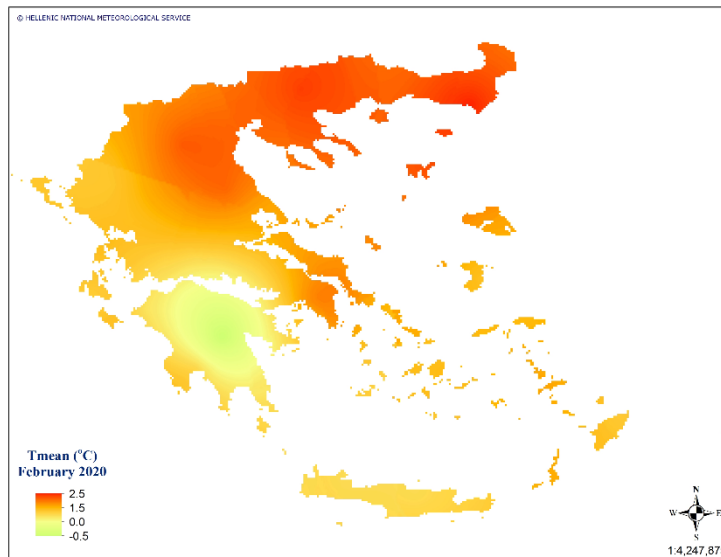
**Figure 4.** Mean temperature anomalies (°C) in December 2019 according to the 1971-2000 climatology.

Temperatures in **January 2020** were near to normal values (1971-2000) over most of Greece. Particularly, they were on average slightly below normal values over central mainland and west Peloponnese and slightly above normal values mainly over



northeast mainland and east Aegean islands (Figure 5).

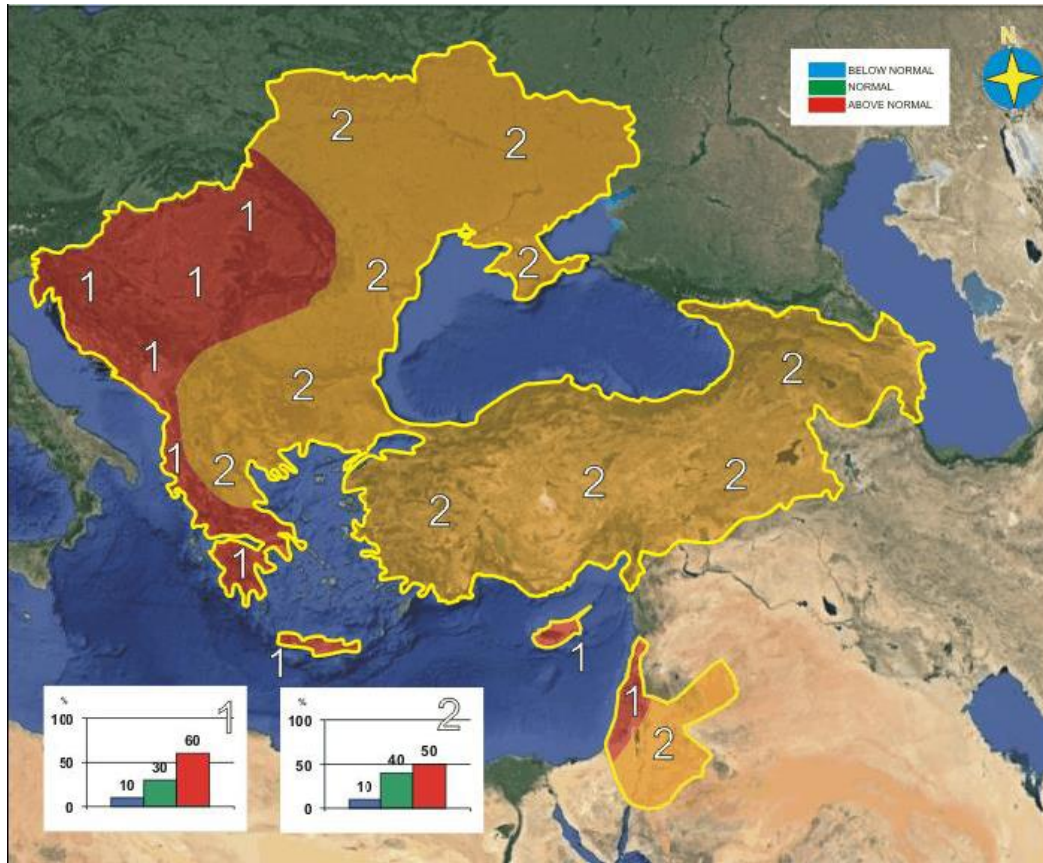
Temperatures in **February 2020** were above the 1971-2000 average over almost of Greece. The greatest positive departures from normal, ranging from 1.5 °C to 2.5 °C, were noted mainly in the north and northeastern mainland.



**Figure 5. Mean temperature anomalies (°C) in January (above) and February 2020 (bottom) according to the 1971-2000 climatology.**

### 1.3. Verification of the SEECOF-22 Winter 2019/20 temperature outlook for Greece

The consensus statement of SEECOF-22 Winter 2019/2020 temperature outlook mentioned that above normal thermal anomalies were likely to dominate the whole SEECOF region in the winter 2019/20. The probabilities were 10% below normal, 30% around normal and 60% above normal (zone 1) in the southern, central and western parts and 10% below normal, 40% around normal and 50% above normal (zone 2) in the eastern and northern parts of Greece (Figure 6).



**Figure 6.** Graphical presentation of the 2019/20 winter temperature outlook.

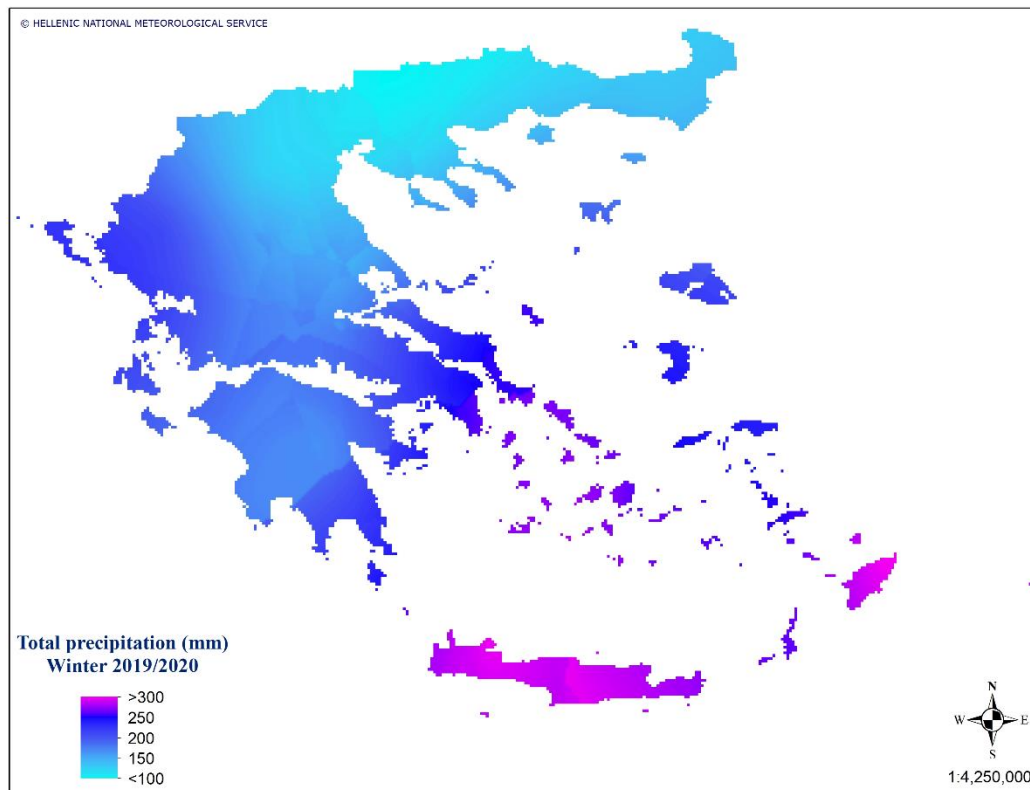
Verifying the SEECOF's temperature outlook (although this is relative to the 1981-2010 normal values): the SEECOF's prediction can be considered partially successful, since winter temperatures in the whole Greece were above normal values; however, the greatest positive anomalies were noted in the northeastern parts (zone 2).

## Part B

### 2. Precipitation

#### 2.1. Seasonal analysis of the Winter 2019/20 precipitation anomalies in Greece

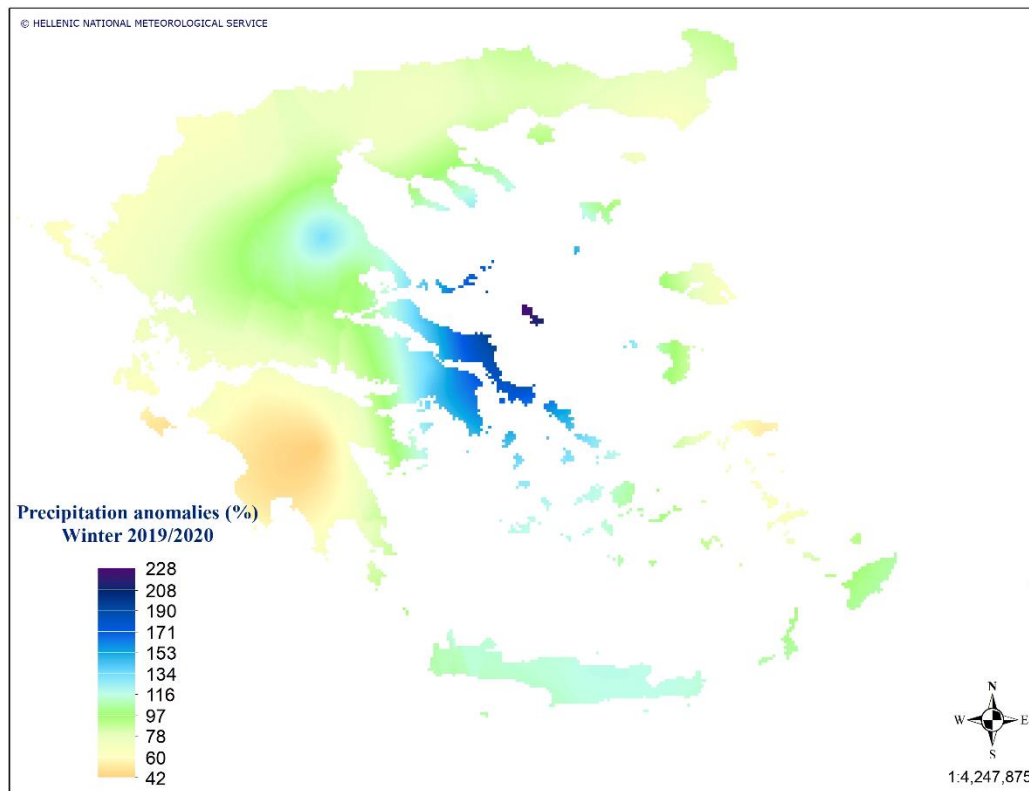
The analysis of seasonal precipitation amounts throughout Greece is based on data from 31 meteorological stations distributed evenly in the country. Winter precipitation totals ranged from 60.0 mm up to nearly 380.0 mm. The lower rainfall heights were recorded in north and central mainland, while the higher ones in the southern regions and west Crete (Figure 7).



**Figure 7.** Spatial distribution of Winter 2019/20 precipitation totals expressed in mm.

The winter 2019/20 precipitation ratios to the normal values (1971-2000) (the normal values are based on homogenized data series) were computed and are given in percentages in Figure 8. The analysis showed that in winter 2019/20 drier than normal conditions prevailed in west and north areas, as well as in the east Aegean islands, while the central and eastern mainland and the north Aegean islands experienced wetter than normal conditions. Around normal conditions prevailed in Crete and the south Aegean islands. The winter 2019/20 precipitation anomalies ranged from 40 % to

230 % with the greatest anomalies occurring in Thessaly, Sporades islands, Attica, and Evvoia and less in Crete.

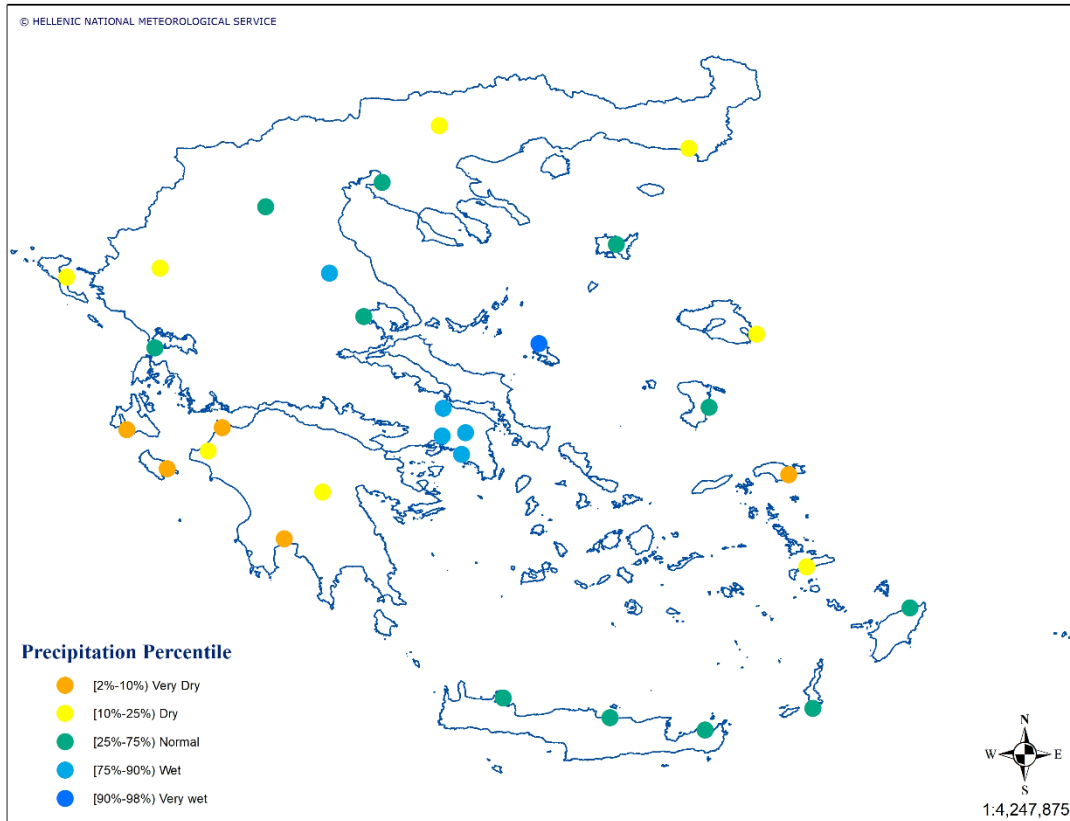


**Figure 8.** Winter 2019/20 precipitation anomalies (compared to 1971-2000 climatology) given in percentages.

In order to quantify the observed precipitation height in terms of wet, dry, and normal the percentile method was applied. The percentiles were calculated for each station and are based on homogenized precipitation series for the period 1970-2004. According to percentile ranks (Figure 9) accumulated precipitation for winter 2019/20 has been described by the following categories in the whole country:

- Very dry to dry conditions were found in 13 stations located in west Greece, east Macedonia and Trace and in east Aegean islands (43.3 % of the examined stations).
- Normal conditions were found in 11 stations (36.7 % of the examined stations).
- Wet to very wet conditions were found only in Attica region and locally in Thessaly and Sporades islands (20 % of the examined stations).

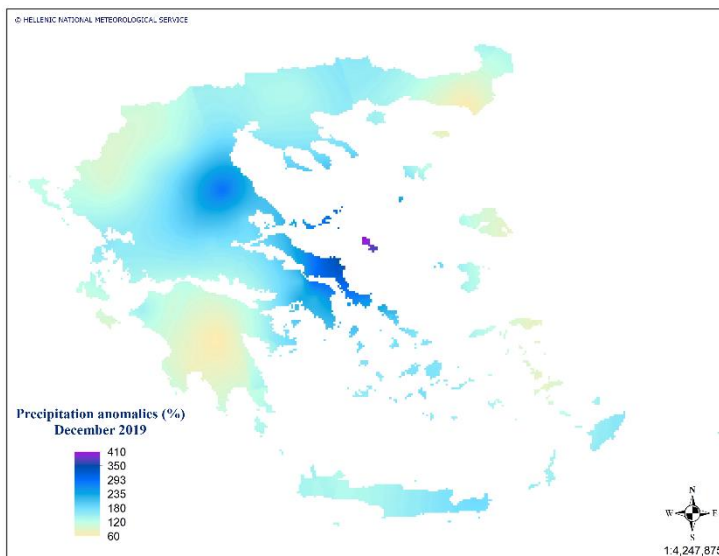




**Figure 9.** Precipitation percentiles for Winter 2019/20.

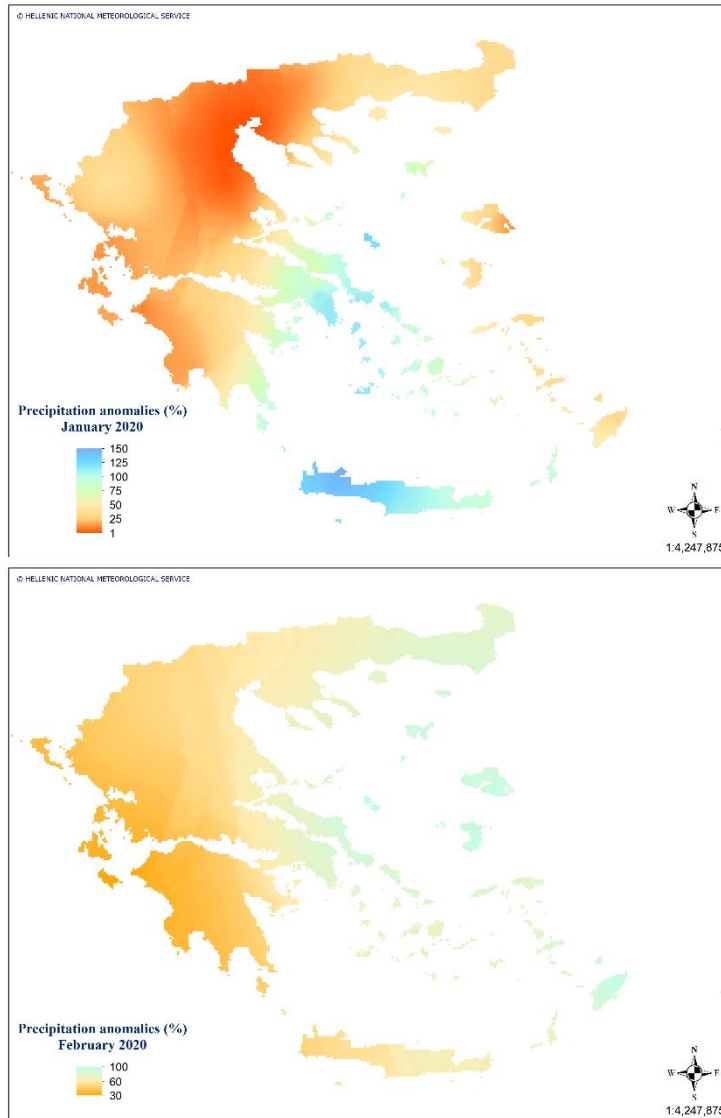
## 2.2. Monthly analysis of precipitation anomalies in Greece

In **December 2019** wetter than average conditions dominated in central areas, including Thessaly, east Sterea and Sporades islands, where total precipitation accounted for more than 180 % of normal values 1971-2000 (Figure 10).



**Figure 10.** Precipitation anomalies (%) in December 2019 according to the 1971-2000 climatology.

In **January 2020** Greece was generally drier than 1971-2000 average, with notable exceptions a few regions that experienced slightly above average rainfall. Very dry conditions dominated in the west, central and northern areas as well as in the east Aegean islands, where the accumulated monthly precipitation accounted for less than 50 % of normal values 1971-2000. (Figure 11).



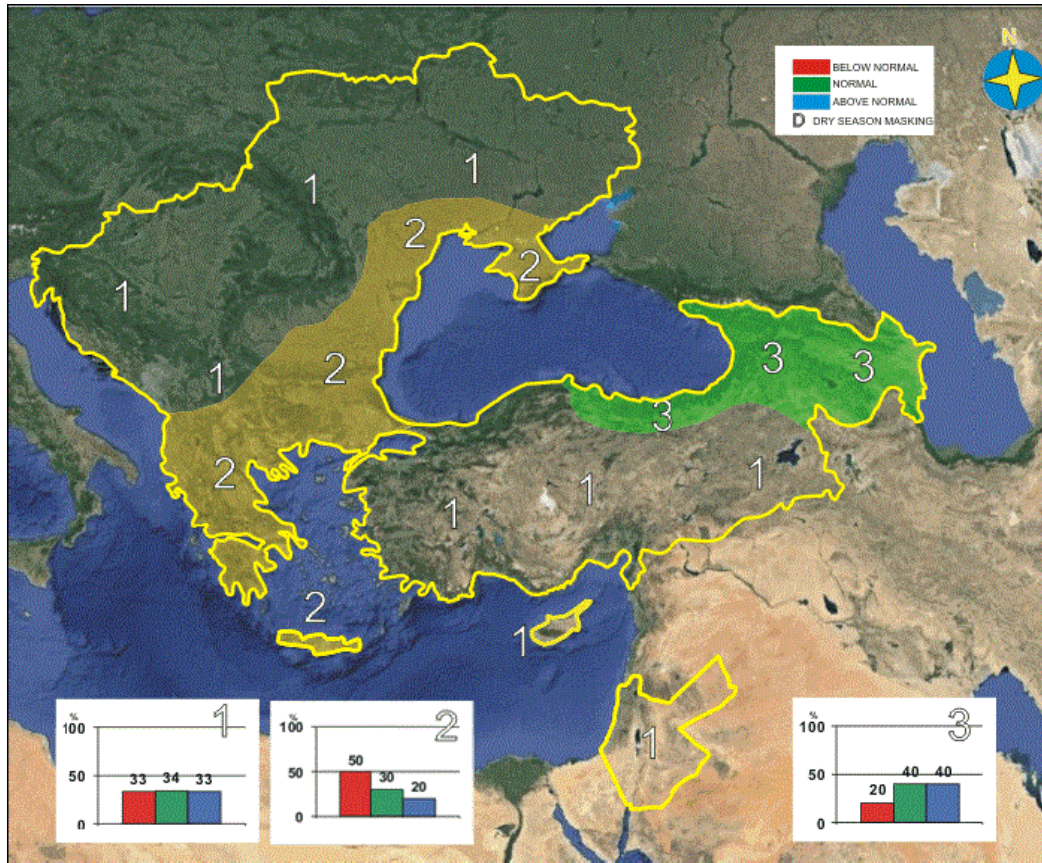
conditions dominated in the west, central and northern areas as well as in the east Aegean islands, where the accumulated monthly precipitation accounted for less than 50 % of normal values 1971-2000. (Figure 11).

In **February 2020** most of Greece and mainly the western areas experienced much drier than average conditions, where the accumulated monthly precipitation accounted for less than 40 % of normal values 1971-2000 (Figure 11).

**Figure 11. Precipitation anomalies (%) in January (above) and February 2020 (bottom) according to the 1971-2000 climatology.**

### 2.3. Verification of the SEECOF-22 Winter 2019/20 precipitation outlook for Greece

The consensus statement of SEECOF-22 Winter 2019/20 precipitation outlook mentioned that winter precipitation totals are likely to be below normal in the area of Greece. The probabilities were 50% for below normal, 30% for around normal and 20% for above normal in Greece (zone 2) (Figure 12).



**Figure 12.** Graphical presentation of the 2019/20 winter precipitation outlook.

Verifying the SEECOF-22 Winter 2019/2020 precipitation outlook (although this is relative to the 1981-2010 normal values): the SEECOF's prediction can be considered partially successful since winter precipitation was below normal values for most of Greece and especially in the western and northern regions; however, failed to predict the above normal values that prevailed mainly in central parts, including east Sterea area, Attica, Evvoia, Thessaly and Sporades islands.

Finally, Table 1 follows, referring to Seasonal air temperature and precipitation sums – Ranks and the report closes with an overall synoptic assessment / evaluation of SEECOF-22 Climate Outlook

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

Winter 2019/20	Station	Seasonal air temperature (°C)				Observed value	Rank**	Seasonal precipitation sums (mm)			
		33	50	66	Observed Value			33	50	66	Observed Value
	Thessaloniki	2	5.7	6.0	6.8	8.2	24	90.8	116.1	136.8	88.7
	Helliniko	4	10.3	10.8	11.0	11.5	5	121.9	151.6	177.1	221.0
	Souda	9	11.3	11.5	11.8	11.7	15	274.2	341.6	372.2	366.0
	Zakynthos	1	10.9	11.2	11.5	12.2	30	323.1	378.5	406.1	173.0

\*Rank – 1971-2000 period (warmest season)

\*\*Rank – 1971-2000 period (highest seasonal precipitation)

Country	Seasonal temperature		Seasonal precipitation		High Impact Events*
	Observed	SEECOF-22 climate outlook for temperature	Observed	SEECOF-22 climate outlook for precipitation	
Greece	Above normal	Above normal in the southern, central, and western parts of Greece (10% below normal, 30% around normal 60% above normal). Above normal in the eastern and northern parts of Greece (10% below normal, 40% around normal and 50% above normal)	Below normal in most of parts, mainly in the west and north areas, and the east Aegean islands.  Above normal in the central and eastern areas, including Thessaly, Sporades islands, Attica, and Evvoia.	20 % Above normal  30% Normal  50% Below normal	No high impact events

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