

**VERIFICATION of the SEECOF-24 WINTER 2020/2021**  
**CLIMATE OUTLOOK FOR GREECE**

DIVISION of CLIMATOLOGY – APPLICATIONS  
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## Introduction

This report consists of two parts. In part A, an analysis of the observed mean temperature for Winter 2020/21 as well as an assessment - verification of SEECOF-24 temperature outlook for Winter 2020/21 were performed, first on monthly basis and then for the whole Winter 2020/21 season. The reference period for comparison/verification was the base period of 1971-2000.

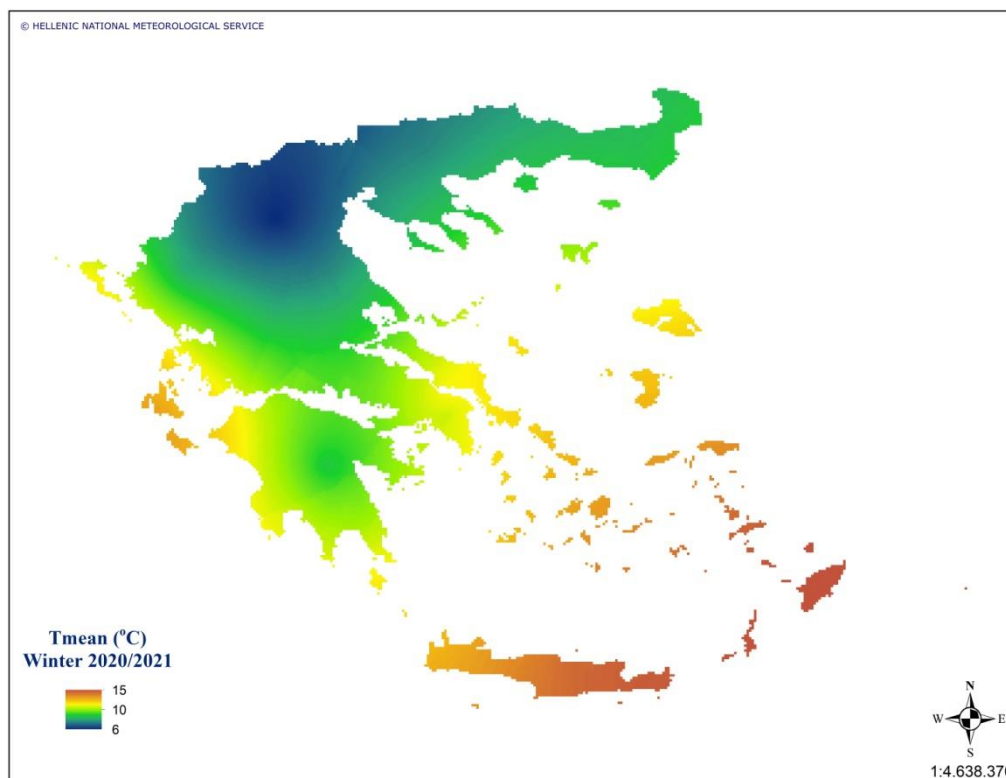
In part B, an analysis of the observed precipitation for Winter 2020/21 as well as an assessment - verification of SEECOF-24 precipitation outlook for Winter 2020/21 were performed, first on monthly basis and then for the whole Winter 2020/21 season. The reference period for comparison/verification was the base period of 1971-2000.

## Part A

### 1. Temperature

#### 1.1. Seasonal analysis of the Winter 2020/21 air temperatures anomalies in Greece

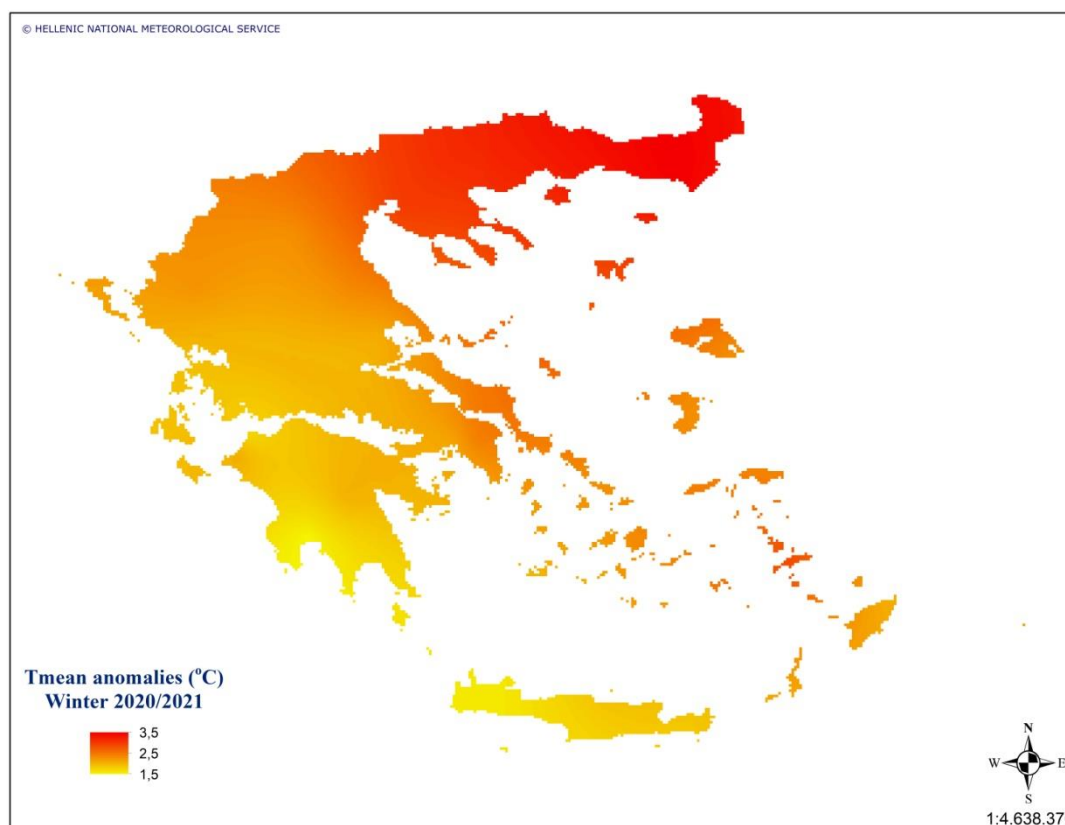
The analysis of seasonal mean air temperatures in Greece is based on data from 31 meteorological stations distributed evenly in the country. The seasonal air temperature in winter ranged from +5.6 °C to +15.0 °C (Figure 1).



**Figure 1.** Mean temperature (°C) in Winter 2020/21

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

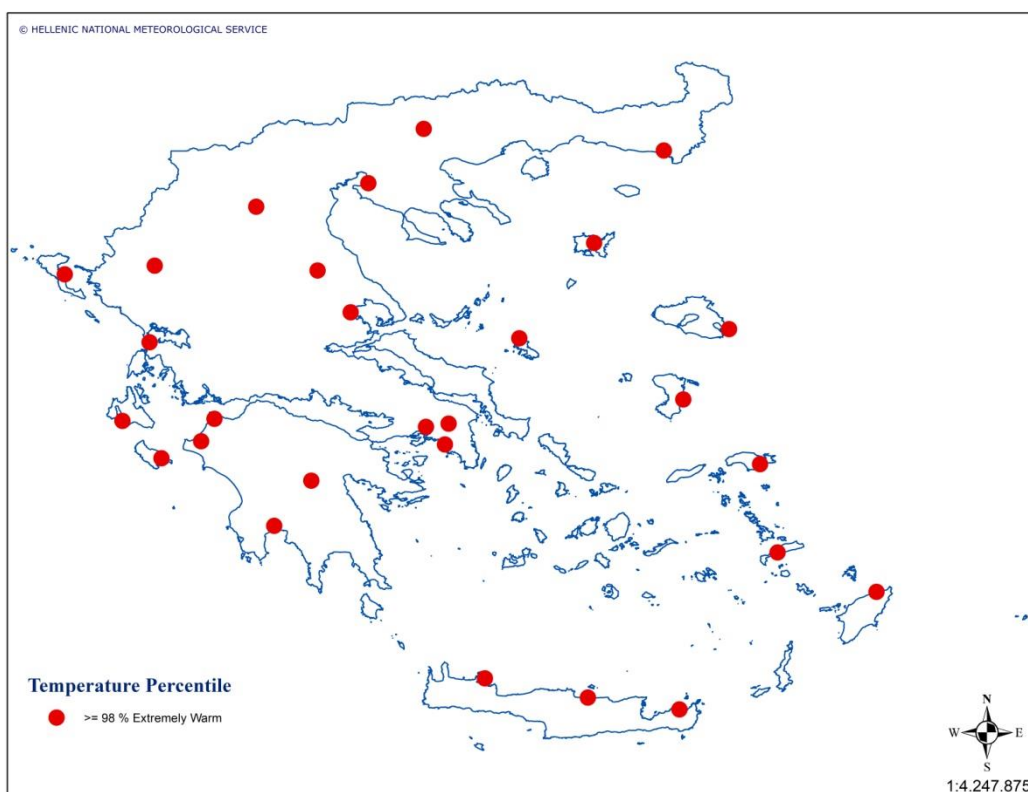
Temperature in winter 2020/21 in Greece was above normal values compared to the 1971-2000 climatology. The departure of mean air temperature from the normal values (1971-2000), in this winter ranged from 1.5 °C to + 3.5 °C, with the greatest positive anomalies occurring mainly in the northeastern parts of the country (Figure 2).



**Figure 2.** Mean temperature anomalies (°C) for Winter 2020/21 in Greece according to the 1971-2000 climatology.

In order to quantify the observed seasonal temperatures in winter 2020/21 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.

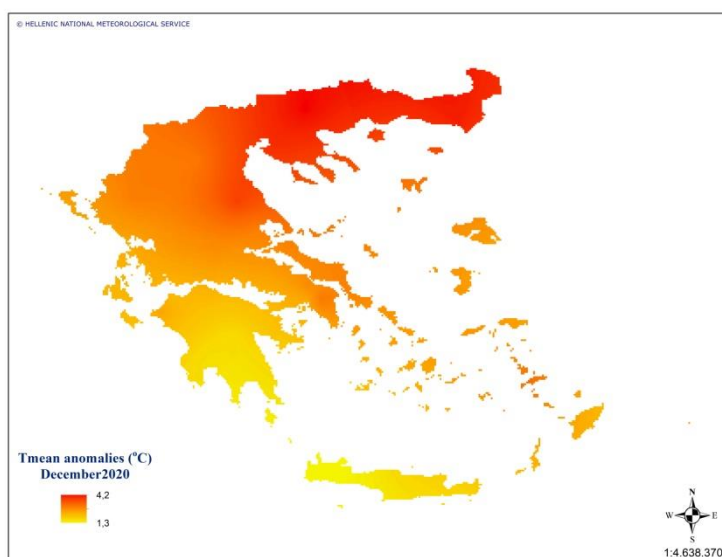
According to percentile ranks (Figure 3) all stations presented extremely warm conditions.



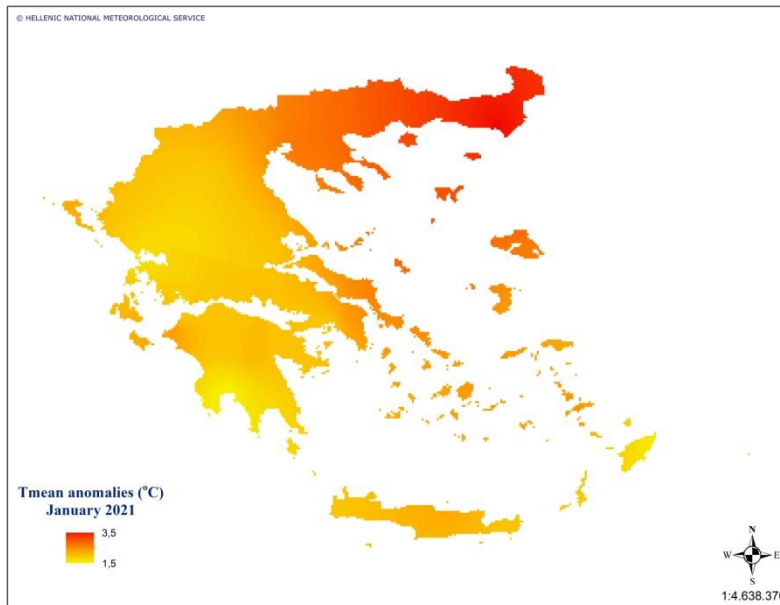
**Figure 3.** Mean temperature percentiles for winter 2020/21.

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

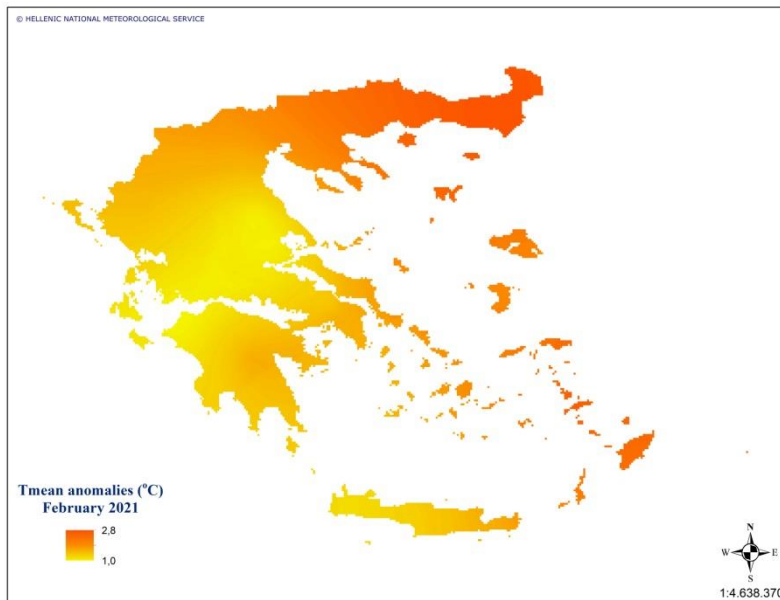
Mean temperatures in **December 2020** ranged above normal values for the whole Greek territory. The departures of mean monthly air temperature from the normal values 1971-2000 ranged from 1.3 °C to nearly 4.2 °C. The greatest positive anomalies ( $\geq 4$  °C) were recorded mainly over the areas of Thessaly and east Macedonia and Thrace.



**Figure 4.** Mean temperature anomalies (°C) in December 2020 according to the 1971-2000 climatology.



Temperature anomalies in **January 2021** were above normal values (1971-2000) ranging from 1.4 to 3.5 °C. The greatest anomalies occurred over the northeast mainland and the northeast Aegean islands (Figure 5).

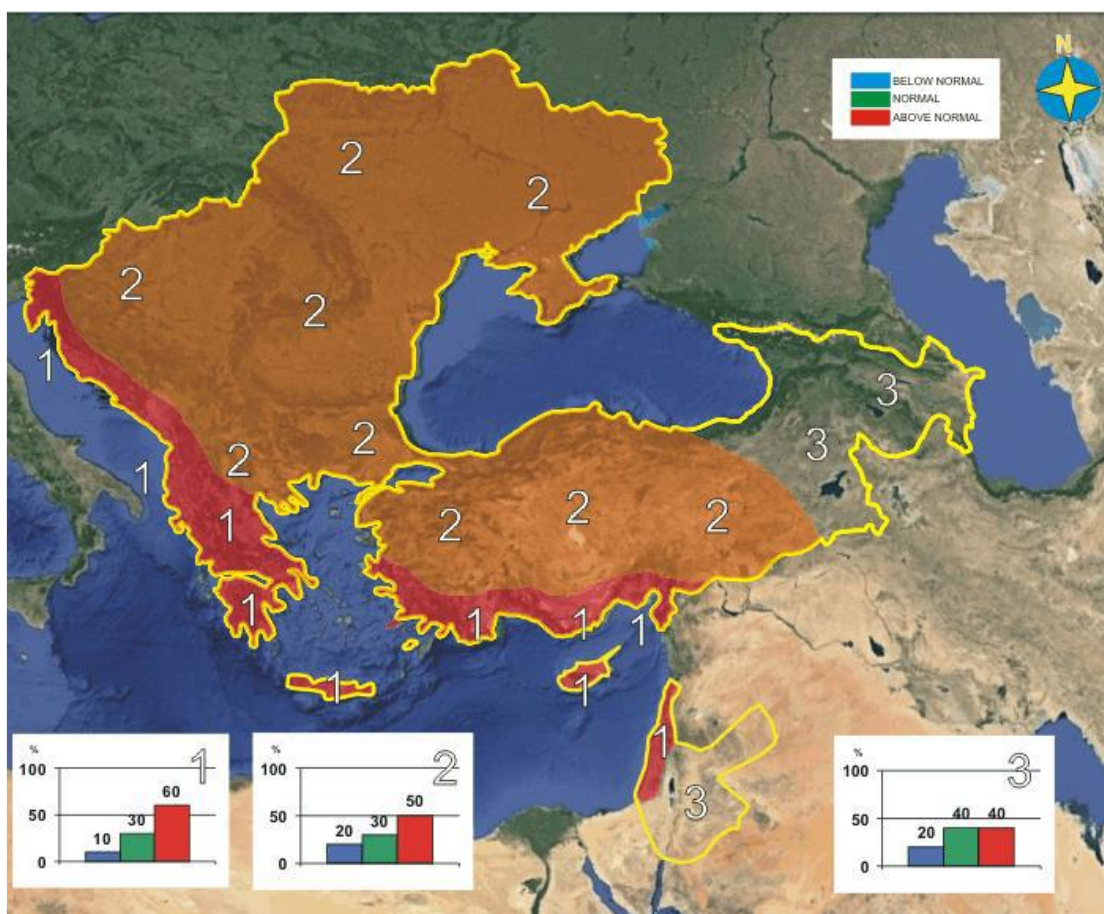


Temperatures in **February 2021** were above the 1971-2000 average over the whole country. The mean temperature departures from normal values ranged from 1.0 °C to 2.8 °C and the greatest positive anomalies were noted mainly in the northeastern mainland and east Aegean islands.

**Figure 5.** Mean temperature anomalies (°C) in January (above) and February 2021 (bottom) according to the 1971-2000 climatology.

### 1.3. Verification of the SEECOF-24 Winter 2020/21 temperature outlook for Greece

The consensus statement of SEECOF-24 Winter 2020/2021 temperature outlook mentioned that winter temperature was likely to be above normal in the whole SEECOF region with probabilities decreasing from western toward eastern parts of the SEECOF region. The probabilities for above-normal temperature in Greece were 10% below normal, 30% around normal and 60% above normal (zone 1) in the southern, central and western parts and 20% below normal, 30% around normal and 50% above normal (zone 2) in the north northeastern parts of Greece (Figure 6).



**Figure 6.** Graphical presentation of the 2020/21 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 Greece were above normal values; however, the greatest positive anomalies were noted in northeastern parts.

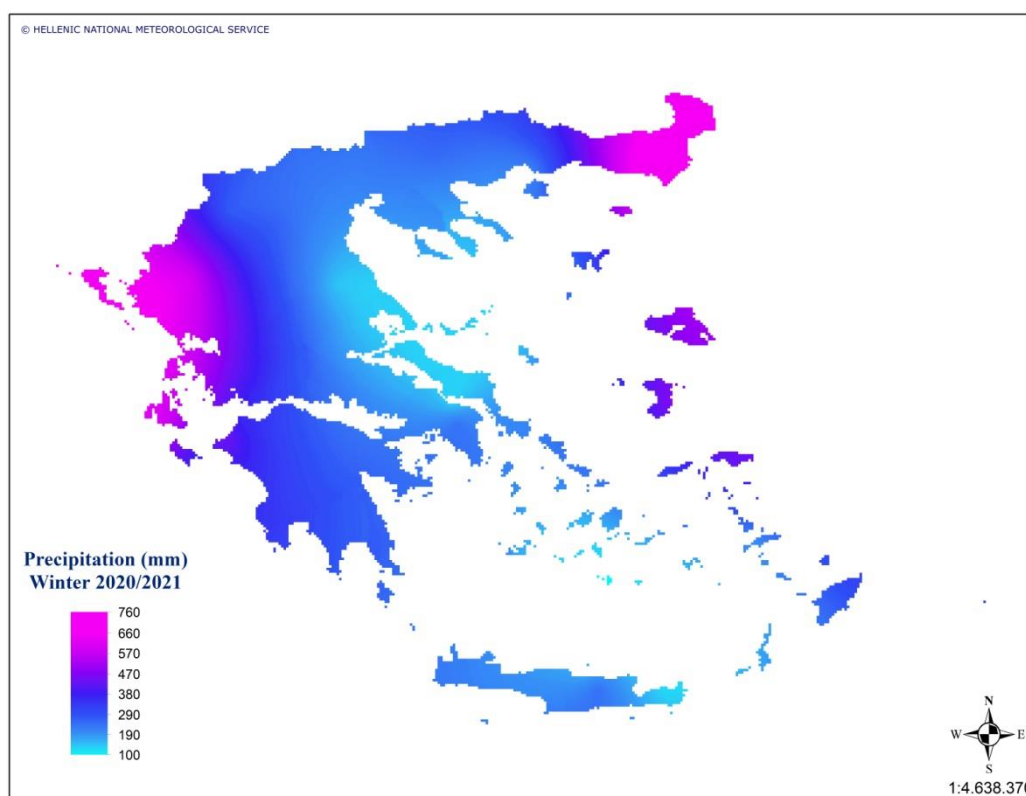


## Part B

### 2. Precipitation

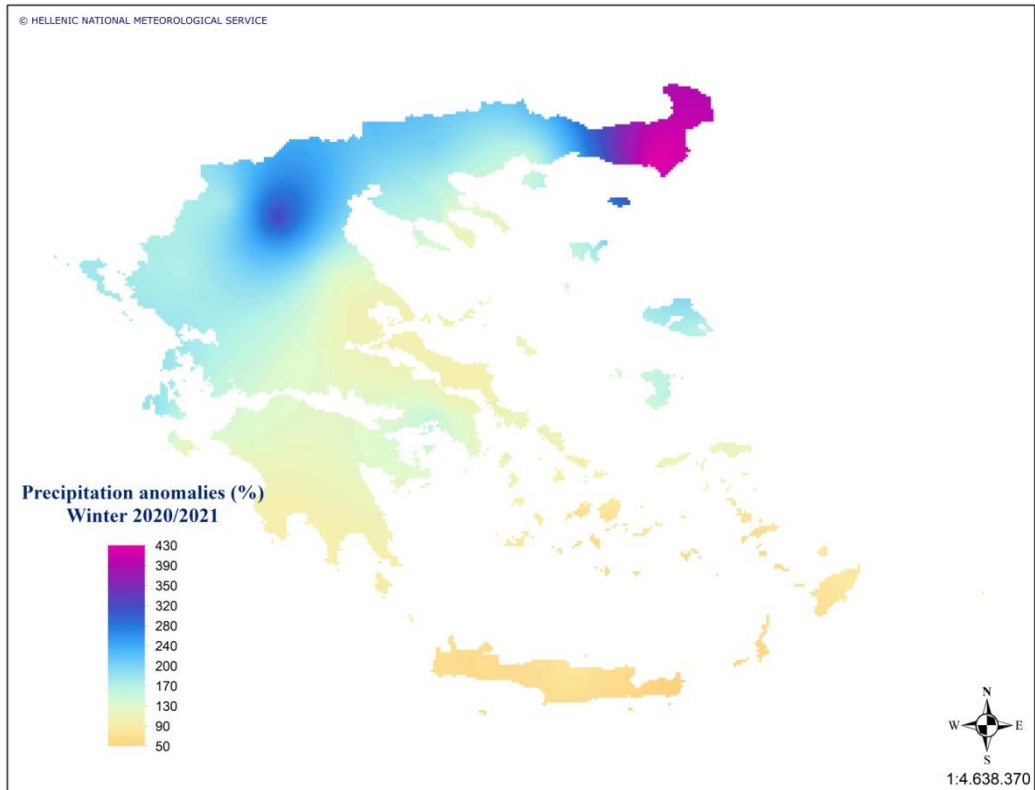
#### 2.1. Seasonal analysis of the Winter 2020/21 precipitation anomalies in Greece

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 124.0 mm up to nearly 760.0 mm. The lower rainfall heights were recorded in central mainland and in eastern Crete, while the higher ones in the west and northeastern parts of the country (Figure 7).



**Figure 7.** Spatial distribution of Winter 2020/21 precipitation totals expressed in mm.

The winter 2020/21 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 2020/21 drier than normal conditions prevailed in the southern areas and especially in Crete and Dodecanese islands, while the west, north and northeast regions experienced wetter than normal conditions. The winter 2020/21 precipitation anomalies ranged from 50% to 430 % with the greatest anomalies occurring in the areas of Thrace and central Macedonia.

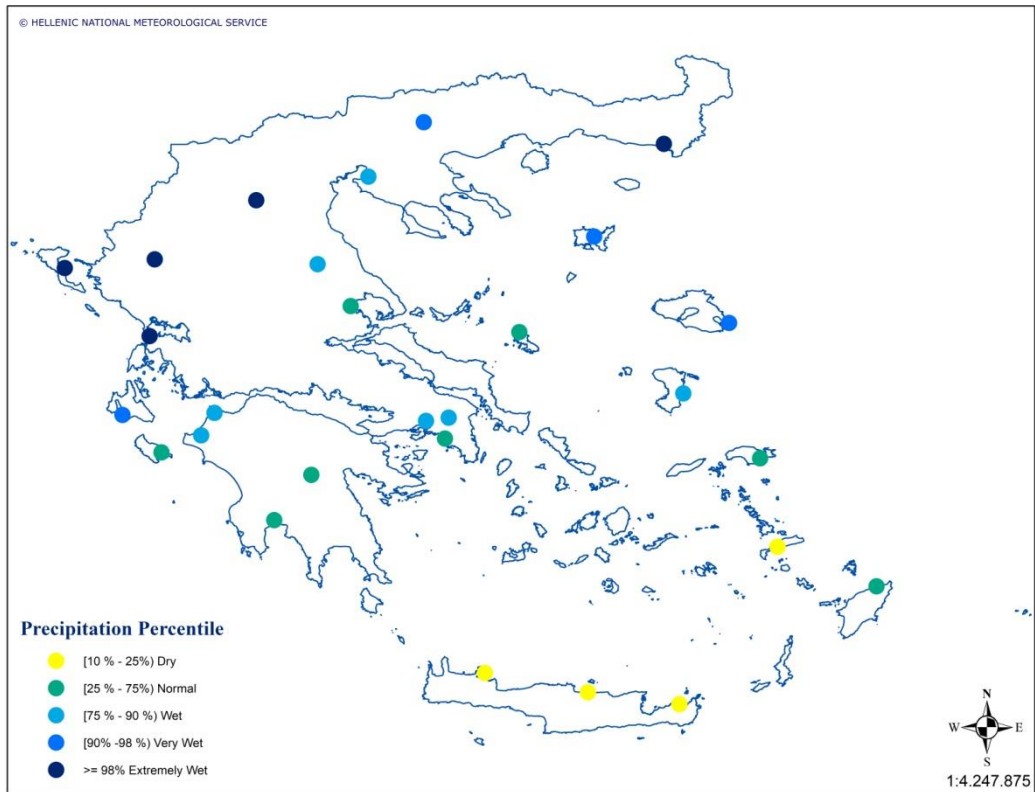


**Figure 8.** Winter 2020/21 precipitation anomalies (compared to 1971-2000 climatology) given in percentages.

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 2020/21 has been described by the following categories in the whole country:

- Dry conditions were found in 4 stations located in Crete and Kos islands (14.3% of the examined stations).
- Normal conditions prevailed in 8 stations (28.6 % of the examined stations).
- Wet conditions were found in 7 stations (25 % of the examined stations).
- Very wet to extremely wet conditions were observed in 9 stations mainly in the northern parts of Greece (32.1 % of the examined stations).

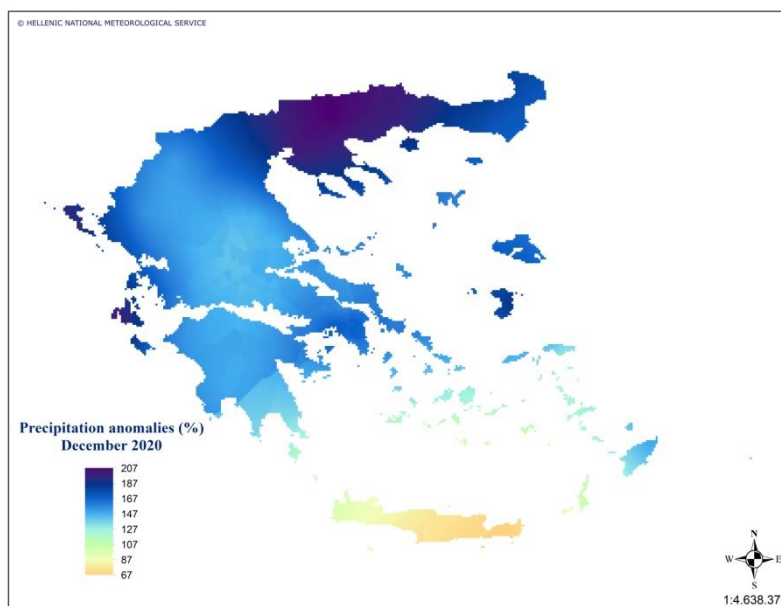




**Figure 9.** Precipitation percentiles for Winter 2020/21.

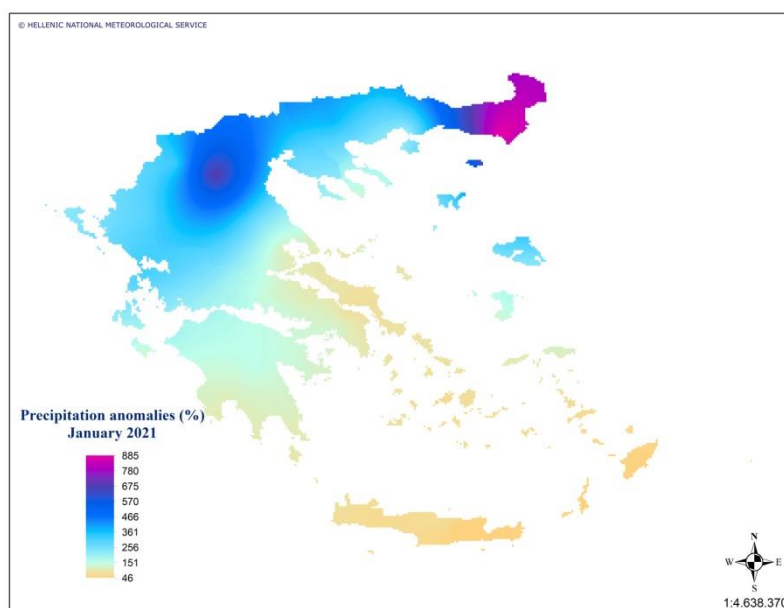
## 2.2. Monthly analysis of precipitation anomalies in Greece

In **December 2020** wetter than average conditions dominated in most parts of the country with the exception of the island of Crete, where drier than normal conditions prevailed (Figure 10).

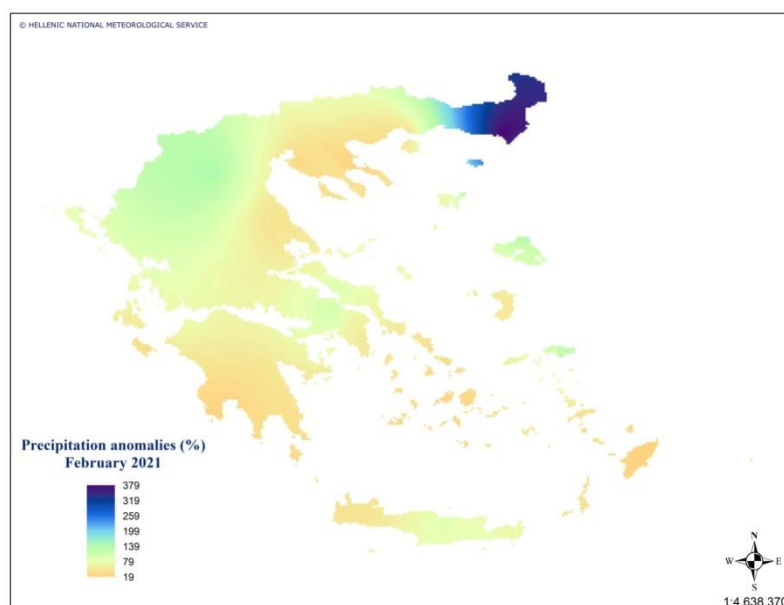


**Figure 10.** Precipitation anomalies (%) in December 2020 according to the 1971-2000 climatology.

In **January 2021** Greece was wetter than 1971-2000 average in the western, central, north & northeastern parts. The greater precipitation anomalies occurred in the area of Thrace where the station of Alexandroupoli recorded monthly total precipitation 408.5mm i.e 9 times above its normal value (1971-2000).



On the contrary, drier than normal conditions prevailed in the southern parts especially in the islands of south Aegean Sea.

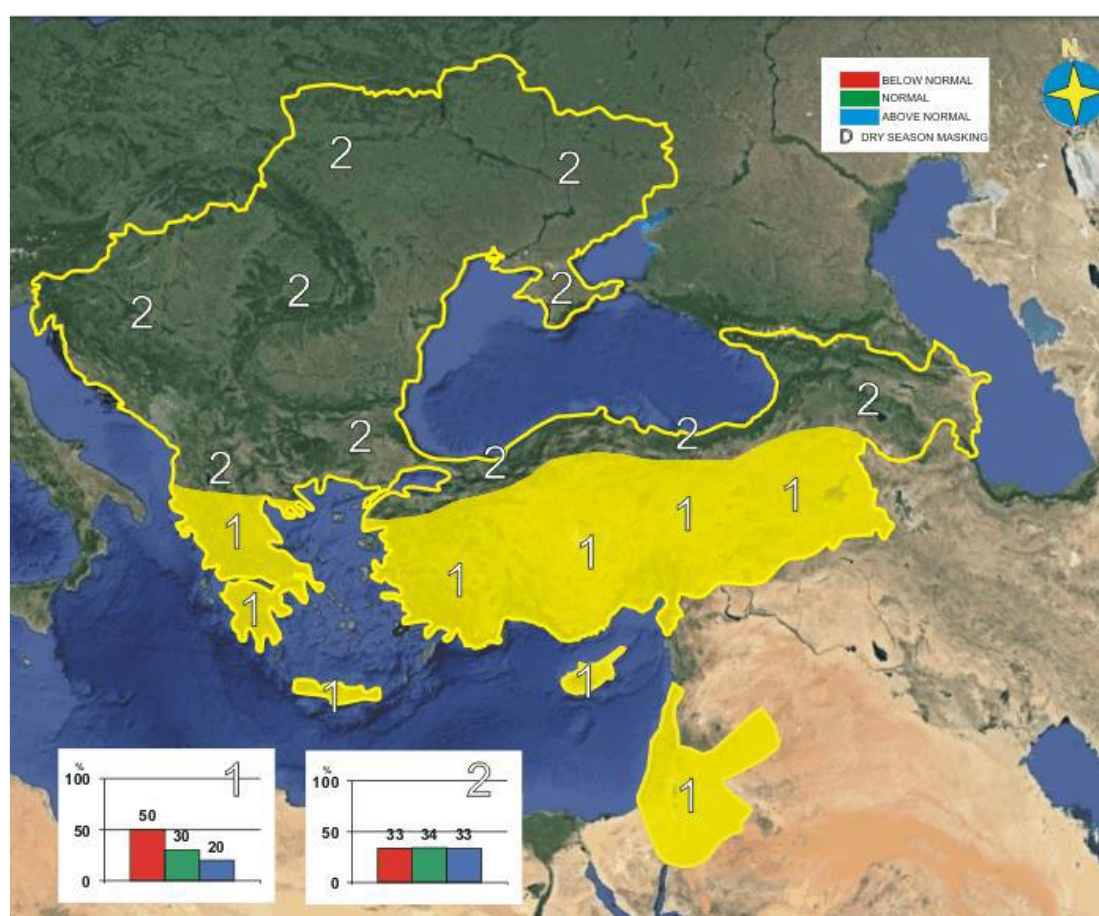


In **February 2021** most parts of Greece experienced much drier than normal conditions, with the exception of the area of Thrace where wetter than normal conditions prevailed (Figure 11).

**Figure 11.** Precipitation anomalies (%) in January (above) and February 2021 (bottom) according to the 1971-2000 climatology.

### 2.3. Verification of the SEECOF-24 Winter 2020/21 precipitation outlook for Greece

The consensus statement of SEECOF-24 Winter 2020/2021 precipitation outlook mentioned that winter precipitation totals are likely to be below normal in the area of Greece (50% below normal, 30% around normal and 20% above-normal) (zone 1), except of the northern northeastern parts where the uncertainty is high, with equal probabilities for below, near- or above-average conditions of winter precipitations (zone 2) (Figure 12).



**Figure 12.** Graphical presentation of the 2020/21 winter precipitation outlook.

Verifying the SEECOF-24 Winter 2020/2021 precipitation outlook (although this is relative to the 1981-2010 normal values): the SEECOF's prediction cannot be considered successful since it failed to predict the above normal values that prevailed in west, north and northeastern regions. However, it was successful only for the southern parts of Greece (mainly the island of Crete and Dodecanese islands), where winter precipitation was below normal values.

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

| Winter<br>2020/21 |       | Seasonal air temperature (°C) |      |      |                   |        | Seasonal precipitation sums (mm) |       |       |                   |
|-------------------|-------|-------------------------------|------|------|-------------------|--------|----------------------------------|-------|-------|-------------------|
| Station           | Rank* | 33%                           | 50%  | 66%  | Observed<br>value | Rank** | 33%                              | 50%   | 66%   | Observed<br>value |
| Thessaloniki      | 1     | 5.7                           | 6.0  | 6.8  | 9.3               | 4      | 90.8                             | 116.1 | 136.8 | 209               |
| Helliniko         | 1     | 10.3                          | 10.8 | 11.0 | 13.1              | 17     | 121.9                            | 151.6 | 177.1 | 140               |
| Souda             | 1     | 11.3                          | 11.5 | 11.8 | 13.0              | 28     | 274.2                            | 341.6 | 372.2 | 207               |
| Zakynthos         | 1     | 10.9                          | 11.2 | 11.5 | 13.0              | 15     | 323.1                            | 378.5 | 406.1 | 386               |

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

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

**Table 2. Brief assessment of SEECOF-24 climate outlook**

| Country | Seasonal temperature |  | Seasonal precipitation   |  | High Impact Events*   |
|---------|----------------------|--|--|--|---|
|         | Observed             | SEECOF-24<br>climate outlook<br>for temperature  | Observed   | SEECOF-24<br>climate outlook<br>for precipitation  |   |
| Greece  | Above<br>normal      | Above normal<br><br>10% below<br>normal, 30%<br>around normal<br>and 60% above<br>normal in the<br>southern, central<br>and western parts<br>of Greece and<br>20% below<br>normal, 30%<br>around normal<br>and 50% above<br>normal in the<br>north,<br>northeastern parts<br>of Greece | Below normal<br>in the southern<br>areas and<br>especially in<br>Crete and<br>Dodecanese<br>islands, while<br>the west, north<br>and northeast<br>regions<br>experienced<br>wetter than<br>normal<br>conditions. | Below normal in<br>the area of Greece<br>(50% below<br>normal, 30%<br>around normal<br>and 20% above-<br>normal) (zone 1),<br>except of the<br>northern<br>northeastern parts<br>where the<br>uncertainty is<br>high, with equal<br>probabilities for<br>below, near- or<br>above-average<br>conditions of<br>winter<br>precipitations | During 13 to 17 February 2021 heavy snowfall hit most parts of Greece. With the exception of the Ionian Islands and the west coast, it even snowed in coastal areas of mainland, the Aegean islands and Crete, where it rarely snows. The total duration of snowfall in Attica was 36 hours, with the strongest intensity in the center of Athens. The storm disrupted most public transportation in the country. Thousands of households were left without electricity due to downed trees, especially in Attica and the island of Evia. Three human lives were lost (2 in Evia and 1 in Crete). Based on the historical data of HNMS, the snowfall is classified as one of the most intense in the last 40 years. |

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