



HELLENIC NATIONAL
METEOROLOGICAL
SERVICE
ΕΘΝΙΚΗ ΜΕΤΕΩΡΟΛΟΓΙΚΗ ΥΠΗΡΕΣΙΑ

VERIFICATION of the SEECOF-17 SUMMER 2017
CLIMATE OUTLOOK FOR GREECE

DIVISION of CLIMATOLOGY – APPLICATIONS
HELLENIC NATIONAL METEOROLOGICAL SERVICE

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Introduction

This report consists of two parts. In part A, an analysis of the observed mean temperature for Summer 2017 as well as an assessment - verification of SEECOF-17 temperature outlook for Summer 2017 were performed, first on monthly basis and then for the whole Summer 2017 season. The reference period for comparison was the base period of 1971-2000.

In part B, an analysis of the observed precipitation for Summer 2017 as well as an assessment - verification of SEECOF-17 precipitation outlook for Summer 2017 were performed, first on monthly basis and then for the whole Summer 2017 season. The reference period for comparison was the base period of 1971-2000.

Part A

1. Temperature

1.1. Analysis of the 2017 summer air temperatures anomalies for Greece

The analysis of seasonal mean air temperatures in Greece is based on data from 22 meteorological stations distributed evenly in the country.

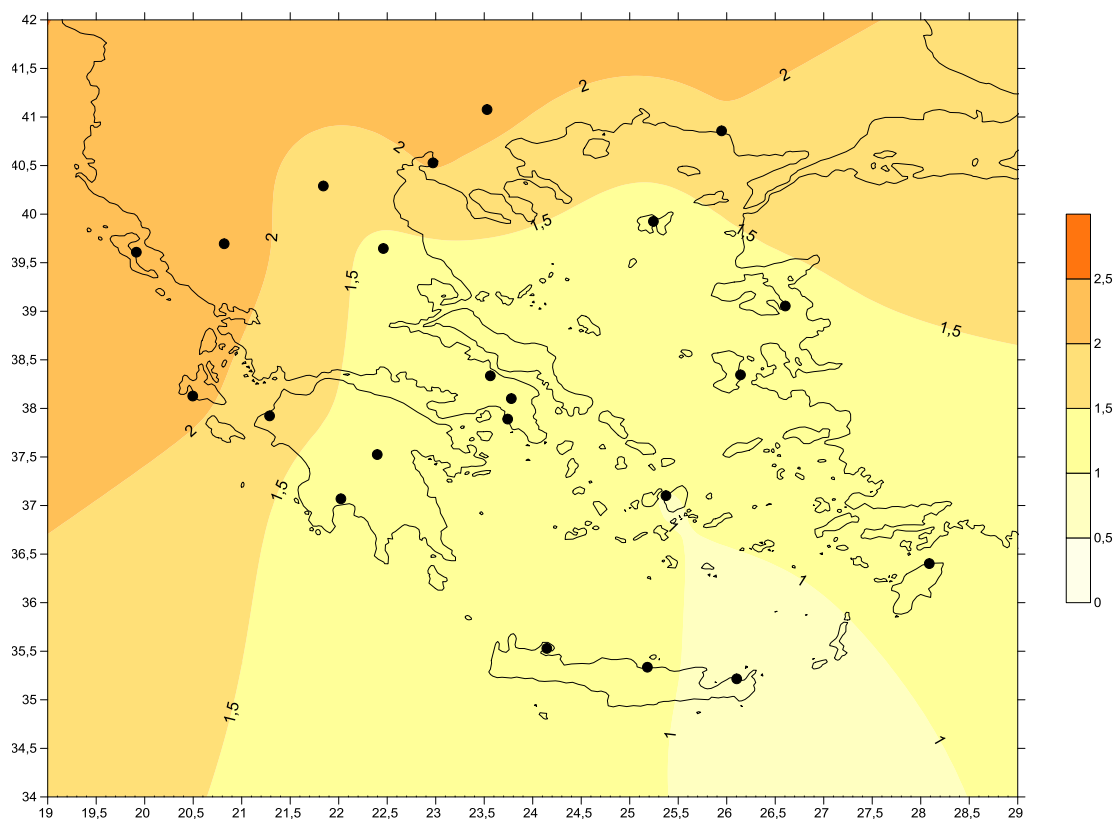


Figure 1. Mean temperature anomalies ($^{\circ}\text{C}$) for summer 2017 in Greece according to the 1971-2000 climatology.

Mean air temperatures in summer 2017 throughout Greece were above the normal values 1971 - 2000 (the normal values are based on homogenized data series). In general, mean air temperature anomalies for summer (June, July, and August) 2017 were within the range from 0.7°C to 2.4°C (Figure 1). The greatest positive differences were detected in the northern part of the country while the smallest ones were recorded in the southeast part of the Aegean Sea islands.

June of 2017 was in general a warmer than average month and the departures of mean monthly temperature from the normal values 1971-2000 ranged from nearly 0.5 to 2.3°C. The main characteristic of June was the gradual increase of temperature during the last ten days with the maximum air temperature finally exceeding the 40 °C on the 29th and 30th of June in several regions (e.g. On 30th of June the stations Elefsis (airport) and Larissa (airport) recorded a maximum daily temperature of 44.8°C and 42.6 °C respectively). On the 26th of June the Hellenic National Meteorological Centre issued a weather warning concerning high temperatures.

July of 2017 was also a warmer than average month comparing to the normal values 1971-2000. The highest air temperatures recorded during the first ten days of July since the heat wave that started at the end of June, continued into the beginning of July. Moreover after the heat wave in the first week of July, Greece experienced a second heat wave with similar weather conditions between 11 and 13 July. The departures of mean monthly temperature from the normal values 1971-2000 ranged from nearly 0.9 to 2.3°C.

August of 2017 was characterized both by high temperatures compared to normal values 1971-2000 and strong northerly winds. As a consequence, destructive forest fires occurred in the northeast Attica during 13 and 16 of August. The highest positive departures from the normal values (2 - 3 °C) occurred in the northern Greece and the lowest ones in the southern Aegean islands.

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 1960-2004.

According to percentile ranks (Figure 2) **very warm** conditions prevailed in Greece (73% of the examined stations) during summer 2017 while **extremely warm** conditions prevailed in three stations located in the northern Greece. It is also obvious that there was no normal or below normal mean temperature values reported in the area of Greece.

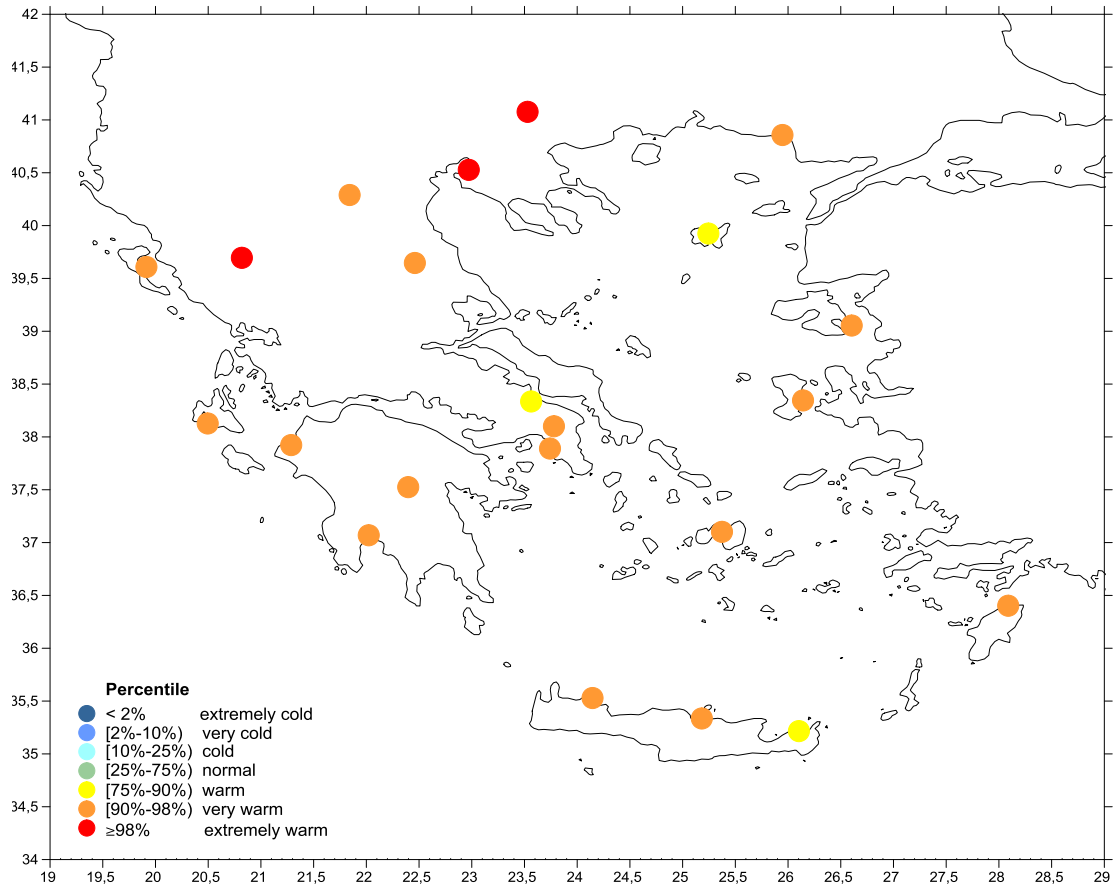


Figure 2. Mean temperature percentiles.

1.2. Verification of the SEECOF-17 summer 2017 temperature outlook for Greece

The seasonal forecast for summer suggested that the mean temperature would be above normal in mainland with the greatest temperature anomaly (2-3 °C) occurring in the north Greece and in some parts of west and central Greece (Figure 3).

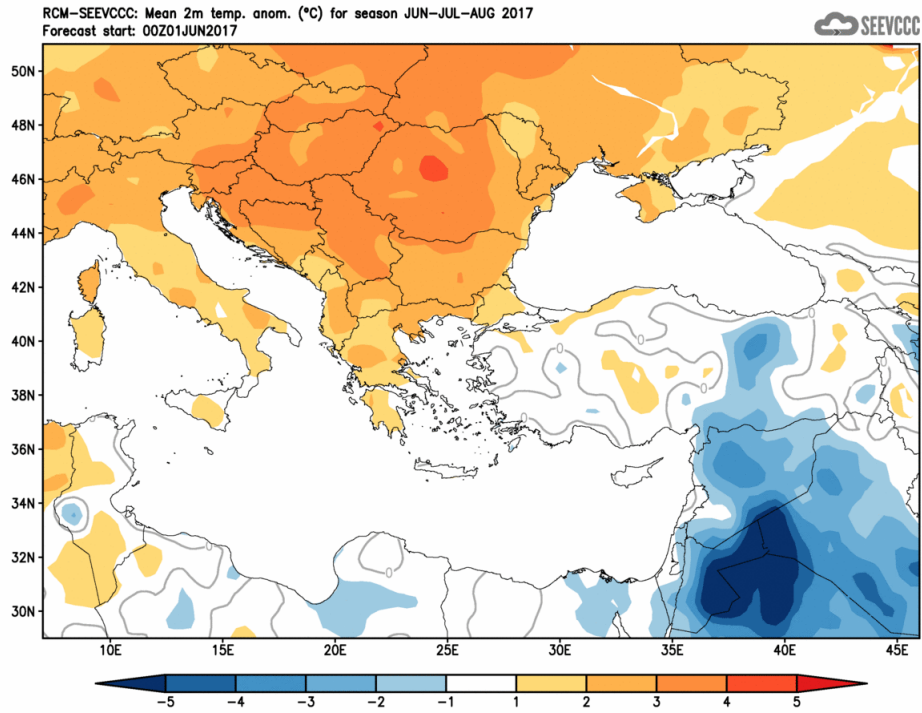


Figure 3. Mean temperature anomaly (1981-2010) for summer.

Verifying the seasonal forecast for summer (although this is relative to the 1981-2010 normal values): in general, the prediction was successful.

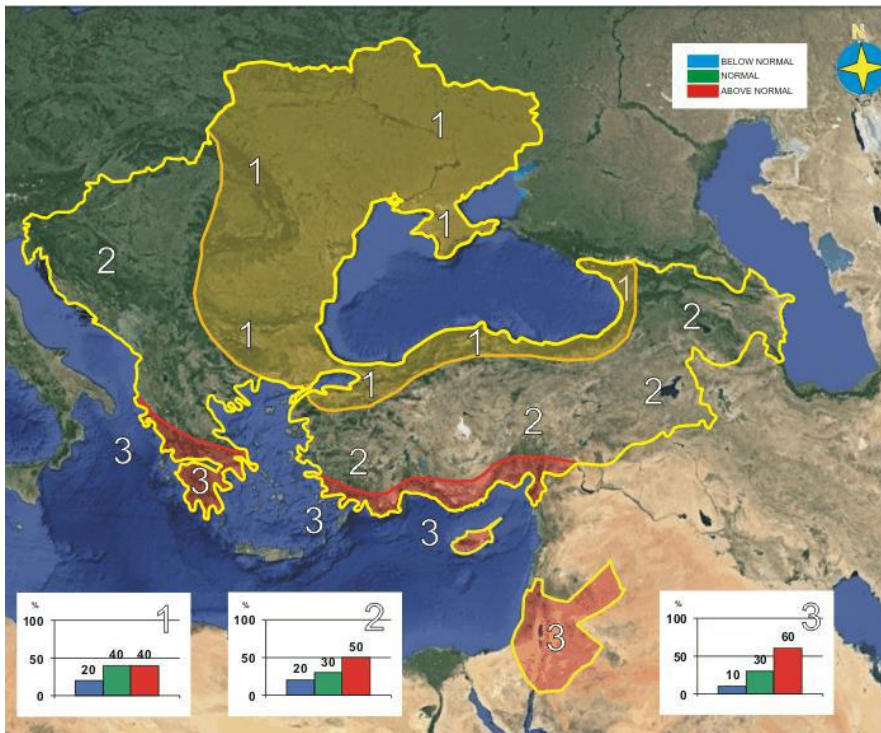


Figure 4. Graphical presentation of the 2017 summer temperature outlook.

The consensus statement of SEECOF-17 mentioned that the area of Greece was likely to experience above average summer temperatures {zone 3 (10% below normal, 30% around normal, 60% above normal) for Southern Greece, zone 2 (20% below normal, 30% around normal, 50% above normal) for Central and Northern Greece and zone 1 (20% below normal, 40% around normal, 40% above normal) for Northeastern Greece in Figure 4} relative to the period 1981-2010.

Verifying the SEECOF's temperature outlook (although this is relative to the 1981-2010 normal values): the SEECOF's prediction can be considered as successful, although the greatest positive temperature anomalies were recorded in the northern part of the country which is included in the SEECOF's zone 2.

Part B

2. Precipitation

2.1. Analysis of the 2017 summer precipitation anomalies in Greece

The analysis of seasonal precipitation amounts throughout Greece is based on data from 25 meteorological stations distributed evenly in the country. The summer 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 5. The analysis showed that summer of 2017 was wetter for the southwestern and central Greece as well as for the north Aegean islands while it was drier for the southeastern Aegean islands. The summer precipitation anomalies were within the range of 100 % to 570 % for the greatest part of Greece and only in Kerkyra (airport) and Ioannina (airport) stations (northwest), in Crete and in southeastern Aegean islands the amount of summer precipitation was below normal values.

June of 2017 was in general a wet month for central Greece but dry for the western and northeastern parts and for the eastern Aegean islands. Moderate to heavy rainfall occurred during the first 15-17 days of the month mainly over the eastern regions of central Greece (including Attica). On the 4th of June Athens experienced heavy rainfall and hailstorm. As a result some roads in the centre of Athens closed due to flooding. On the 2th of June the appropriate weather warnings were issued by the Hellenic National Meteorological Center. The precipitation amounts for June 2017 varied from 120-788 % of normal values (1971-2000) for the largest part of the central Greece and for some islands of Cyclades while in the western Greece

(including Ionian islands), in the eastern Crete, in the eastern Aegean islands and in some areas in the northeastern Greece the total monthly precipitation was below normal values.

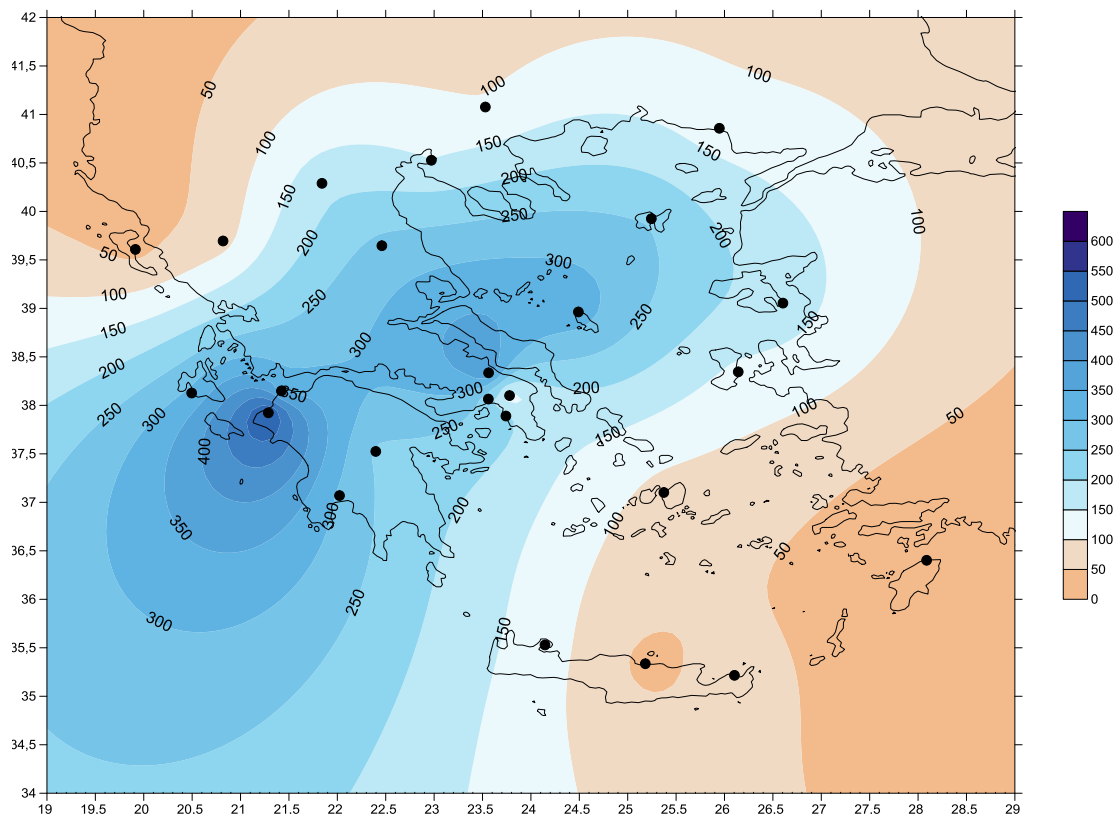


Figure 5. Summer precipitation anomalies (1971-2000) given in percentages.

July of 2017 was a wet month for the southwestern and central parts of Greece as well as for the north Aegean islands. The second ten days of July were characterized by moderate to heavy rainfall for the greatest part of the country. More specifically the southwestern, the central and northern parts of Greece experienced severe weather phenomena (intense rainfall and flooding) during the 16th and 17th of July as a result of the cold air masses movement in the upper troposphere from the North Europe to our region. It is worth mentioning that Tanagra (airport) station (located in the central Greece) reported its wettest July since 1957 with 68.0 mm while its mean monthly precipitation in July for the normal period 1971-2000 is about 8.26 mm (about 8 times above normal). On the 14th of July the Hellenic National Meteorological Center issued the appropriate weather warning concerning heavy rainfall, hailstorms and thunderstorms. Also EMMA warnings with red awareness were issued.

In contrast to July, August of 2017 was a dry month for the entire country, since the accumulated monthly precipitation was below the normal values. The accumulated

monthly precipitation accounted for less than 10 % to 86 % of normal values 1971-2000 for almost the entire country.

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 1970-2004.

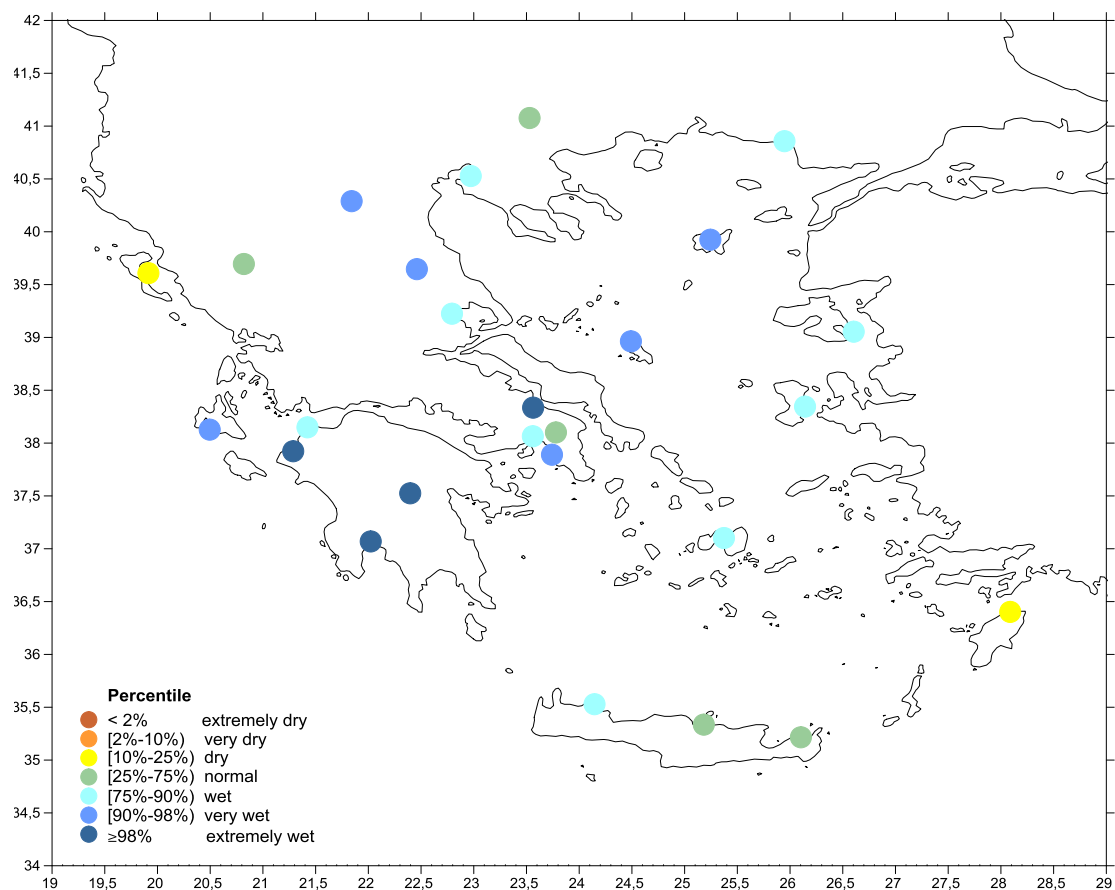


Figure 6. Precipitation percentiles.

According to percentile ranks (Figure 6) precipitation amounts for summer 2017 have been described by the following categories:

- dry conditions (only 2 stations: Kerkyra (airport) and Rhodes (airport), an Ionian and a Dodecanese island respectively),
- normal conditions (4 stations: Herakleion (airport) and Sitia, located in the eastern Crete; Tatoi, located in the greater Athens area; and Ioannina (airport) and Serrai, located in the northern part of Greece),
- wet to extremely wet conditions (the remaining 19 stations covering the greatest part of the country).

2.2. Verification of the SEECOF-17 summer 2017 precipitation outlook for Greece

The seasonal forecast for precipitation predicted a dry summer for almost the whole country, with accumulated precipitation below 75% of normal values, except the northern part of the country where the precipitation ranges from normal to 125% of normal (Figure 7).

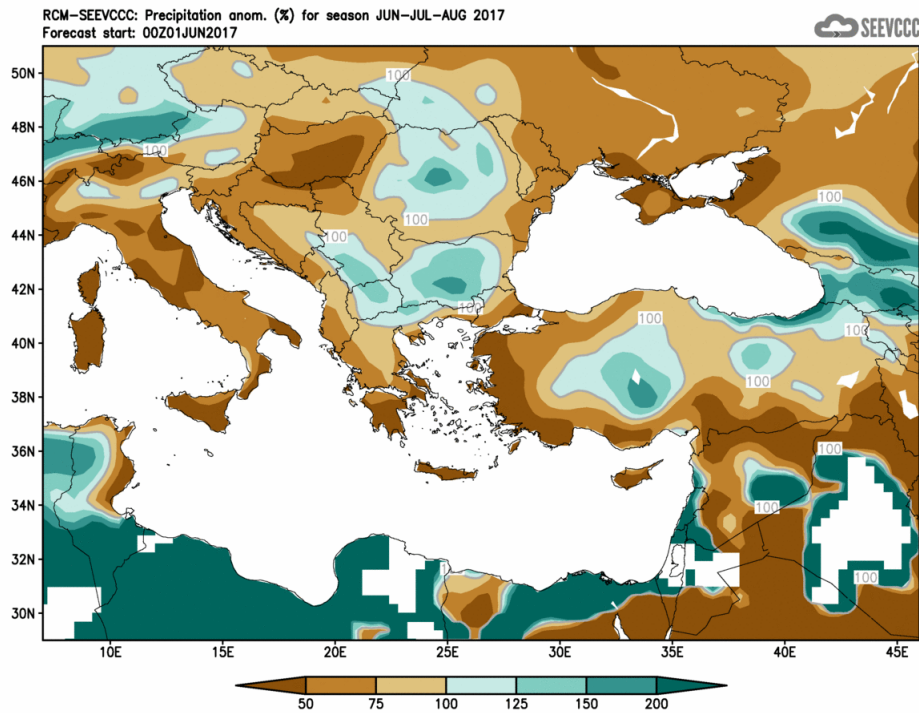


Figure 7. Precipitation anomaly (1981-2010) for summer 2017.

As presented above the summer was wetter in southwestern and central parts of Greece and in north Aegean islands (Figures 5 and 6). It is evident that the model did not perform well, since it completely failed to predict the observed accumulated precipitation anomalies.

The SEECOF-17 climate outlook indicated equal probabilities for below (33%), near (34%) and above (33%) normal conditions for Greece. The island of Crete is included at the dry summer season area (SEECOF's D-zone) (Figure 8).

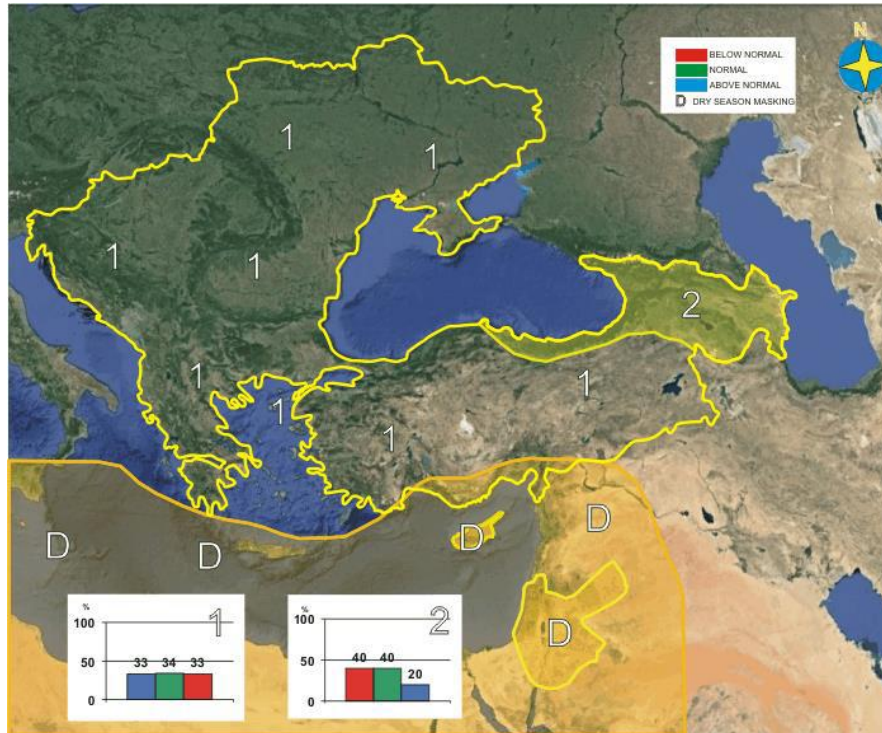


Figure 8. Graphical presentation of the 2017 summer precipitation outlook.

Verifying the SEECOF-17 precipitation outlook (although this is relative to the 1981-2010 normal values): the prediction failed, since this outlook did not forecast the wetter than climate averages season although there was not a clear pattern of the regional distribution of the below-equal-above terciles (33 % below, 34 % normal, 33 % above).

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