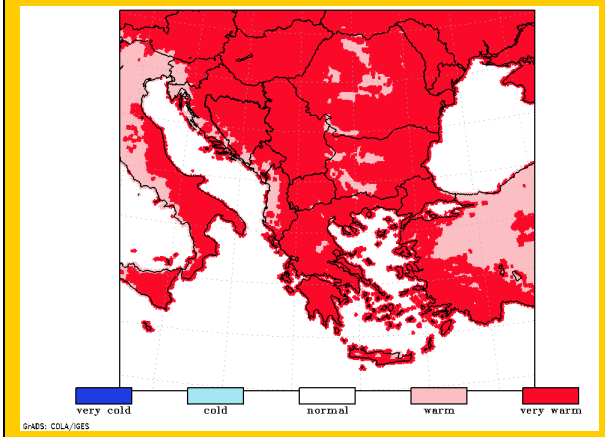
DROUGHT MONITORING BULLETIN

April 2024

HOT SPOT

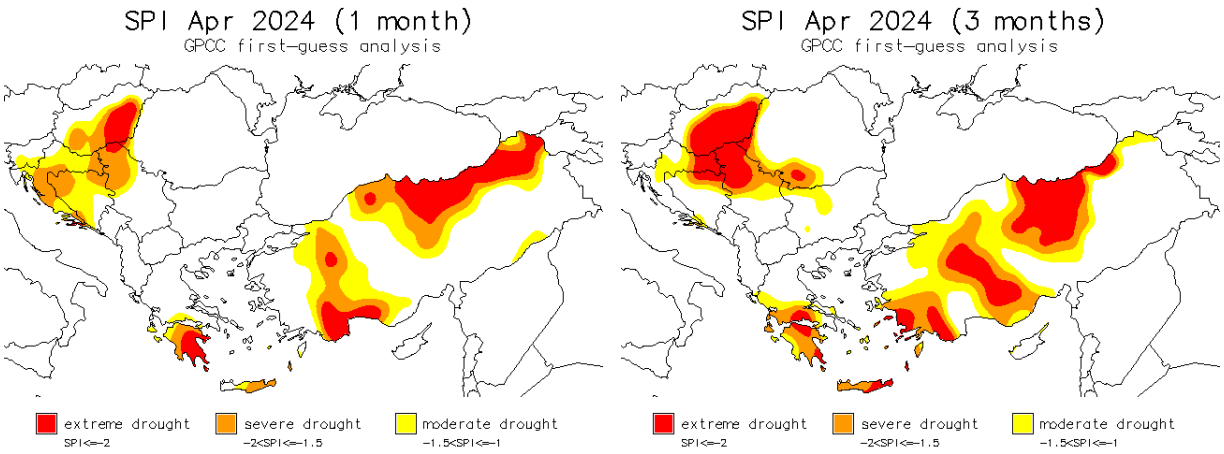


Early April was characterised by unusually warm weather that spread across the entire region. Daily air temperature maximums ranged up to and about 25 °C for consecutive run of days, with first 30 °C marks also broken in various areas before mid-April. Dekadal mean was 6–7 °C above the long-term average, in coastal regions along the south and west up to 5 °C, and as seen on the figure showing **mean air temperature of the first dekad of April 2024 in percentile classes**, it was one of the warmest early Aprils of the 1991–2020 period.

STANDARDIZED PRECIPITATION INDEX

Drought situation with regard to precipitation level is presented by Standardized Precipitation Index (SPI). The SPI calculation is based on the distribution of precipitation over long time periods (at least 30 years) and can be calculated at various time scales that reflect the impact of drought on the availability of water resources. The long-term precipitation record is fit to a probability distribution, which is then normalised so that the mean (average) SPI for any place and time period is zero. SPI values above zero indicate wetter periods and values less than zero indicate drier periods. Only the dry part of the extreme anomalies is presented on the maps.

Standardized precipitation index for **April 2024** is shown in figures below. SPI for a one-month period indicates possible drought conditions which can have impact on vegetation, while SPI for a three-month period can be indicative also for surface water status.



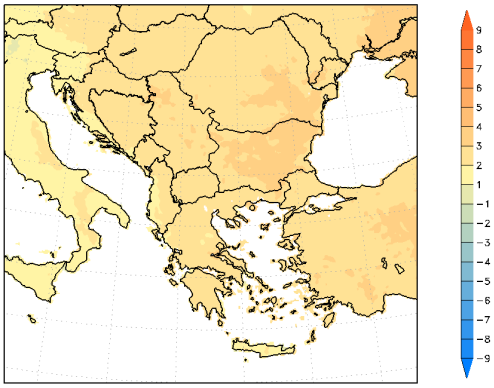
Precipitation wise, April was a dry to very dry month over Balkan Peninsula's north-western quarter, southern Greece and across wider northeastern, northern and southwestern Turkey. Monthly precipitation amount fell noticeably short of its usual levels, indicating severely to extremely dry conditions over much of these regions in April, slightly less intense was the lack of the rain over Croatia, Bosnia and Herzegovina.

Similar parts of the region experienced severe to extreme lack of precipitation also in February, at that time including wider central to eastern belt of Balkan Peninsula as well as western thid of Turkey. Altogether, two dry months with March bringing some relief in between resulted in 3-monthly SPI for the February to April period showing greater extent of extremely dry precipitation conditions across central-northern Balkan Peninsula, southern Greece and across much of Turkey with the exception of its far eastern and southeastern areas.

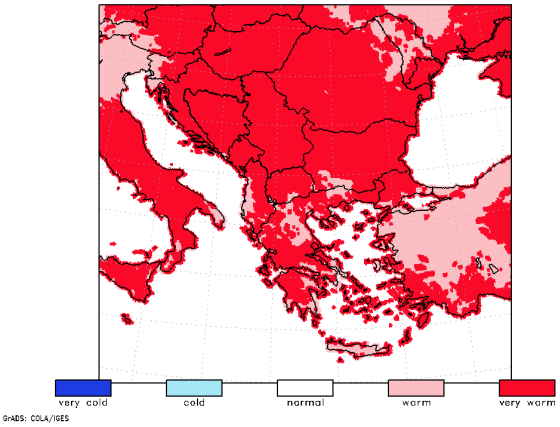
AIR TEMPERATURE AND SURFACE WATER BALANCE

Figures in this section show anomalies of the mean air temperature and accumulated surface water balance as well as their absolute values in percentile classes for the 60-day period between 2 March and 30 April 2024.

AVERAGE AIR TEMPERATURE ANOMALY (°C)
2 MARCH – 30 APRIL 2024

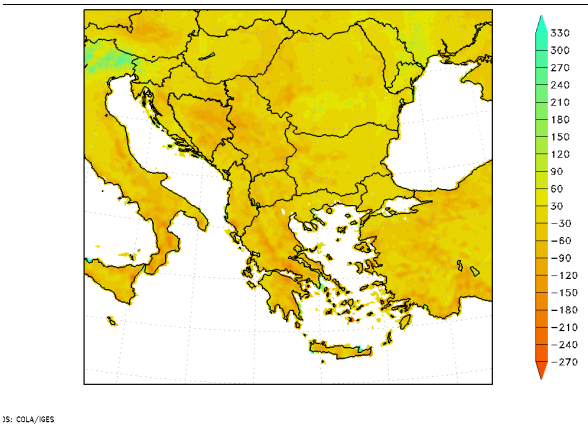


AVERAGE AIR TEMPERATURE PERCENTILE CLASSES
2 MARCH – 30 APRIL 2024

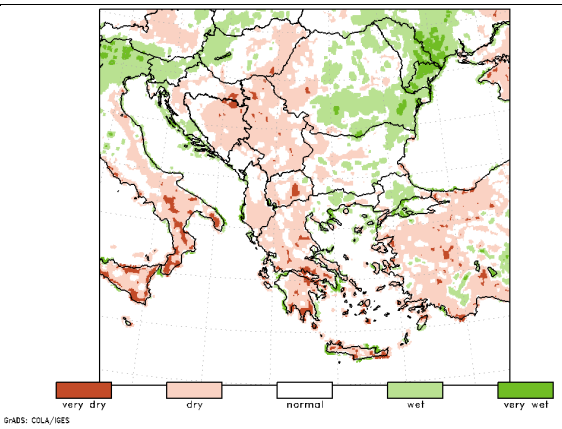


Dekadal mean air temperatures were throughout March up until mid-April consistently higher than normal across the region, as vast part of the land especially continental areas experienced air temperatures 3–5 °C higher than the long-term average. The above-average air temperatures intensified in last dekad of March and first dekad of April, they were especially warm for this time of year and classified among the warmest 5 % of the local 1991–2020 records. In last dekad of April, unusually cold spell came into the region from the north-west and spread well under-average air temperatures as far into the region as western half of Romania, far western Bulgaria and northern Greece. In Slovenia, mean air temperature in last dekad of April dropped to among the coldest 5 % of the local 1991–2020 records. Meanwhile, above-average air temperatures continued over coastal parts of Romania, Bulgaria, Aegean Greece and Turkey, with very warm conditions persisting over central and eastern parts of Turkey. The 60-day mean air temperature of the March-April period thus confirms it was a much warmer than normal time of the year, with mean air temperature mostly up to 3–4 °C above the long-term average, especially over Bulgaria, southeastern Romania and central Turkey, and up to 2 °C warmer across Slovenia, southern Croatia and coastal Albania.

ACCUMULATED WATER BALANCE ANOMALY (mm)
2 MARCH – 30 APRIL 2024



ACCUMULATED WATER BALANCE PERCENTILE CLASSES
2 MARCH – 30 APRIL 2024



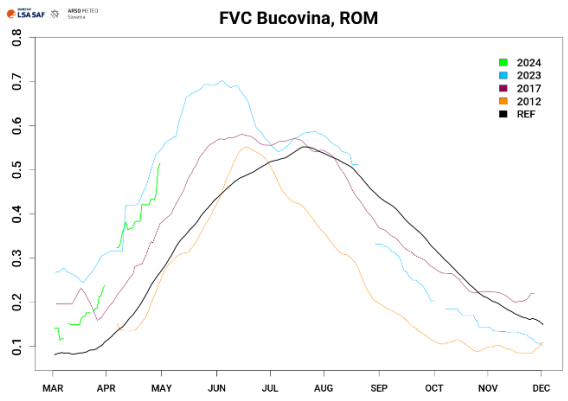
The spread of high and low precipitation levels across the region were very similar in March as well as April. Sufficient precipitation levels neutralised the higher evapotranspiration in areas along the Adriatic Sea from Slovenia to northern Albania, along the east from Moldova to Bulgaria and in southeastern Turkey, resulting in average or slightly higher than normal surface water balance levels for this time of year. On the other hand, during the March-April period, lack of rain combined with higher-than-usual evapotranspiration accumulated between 60 and 120 mm of surface water balance deficit across a wider belt from eastern Hungary, over Serbia, western Bulgaria, Bosnia and Herzegovina to Greece as well as western Turkey, in small localised areas in southwestern Turkey, central Greece and central Bosnia and Herzegovina the accumulated deficit reached up to 150 mm.

REMOTE SENSING - FRACTION OF VEGETATION COVER

Fraction of vegetation cover (FVC) *is a vegetation index based on multi-channel remote sensing measurements (data from EUMETSAT's LSA SAF data base is used for products in this bulletin). FVC shows fraction of the total pixel area that is covered by green vegetation, which is relevant for applications in agriculture, forestry, environmental management and land use, it has also proved to be useful for drought monitoring. Values vary according to the vegetation stage and to the damages of possible natural disasters, including drought. FVC values are in general low at the beginning of the growth season, the highest at full vegetation development, then FVC slowly drops with vegetation senescence. Line shape depends on the sort of vegetation at the given location.*

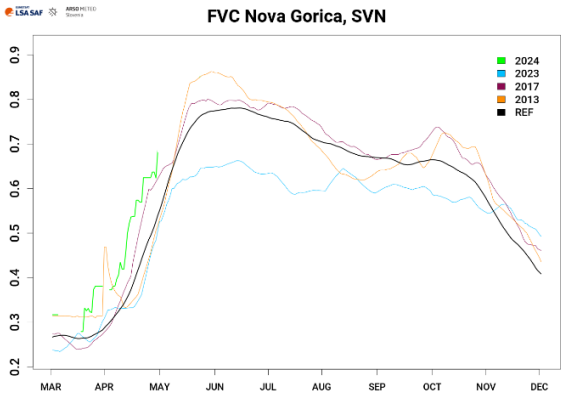
Graphs below present the **vegetation situation** as recorded **on 30 April 2024** at selected locations across southeastern Europe. FVC values for year 2024 are presented as a green line. Graphs also include reference line (2004–2023) in black, and lines in light blue (year 2023), magenta (year 2017) and orange (year 2012, or 2013 for Slovenia) for comparison. Missing values or their sharp decline can be linked to prolonged cloudy weather, extreme weather events, snow blanket, human intervention or changes to product by the product provider.

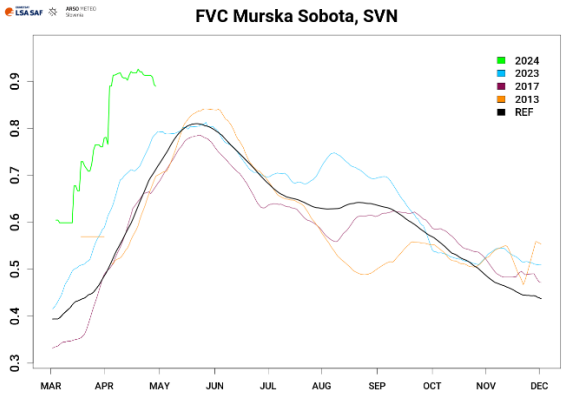
ROMANIA



The level of cover with green vegetation was in Bucovina, Romania at the beginning of March was slightly higher than normal. Vegetation growth began approximately three weeks earlier than normal, in early March already and progressed well throughout March and April. By the end of April, the total fraction of vegetation cover was about 50 %, approximately double the usual level of cover it reached by that time of the year.

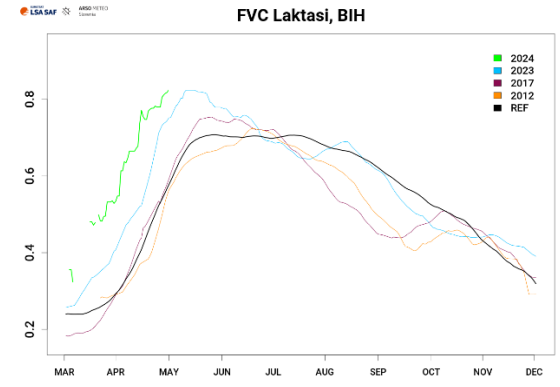
SLOVENIA

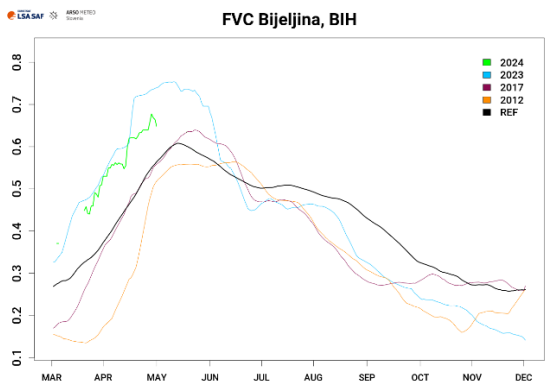


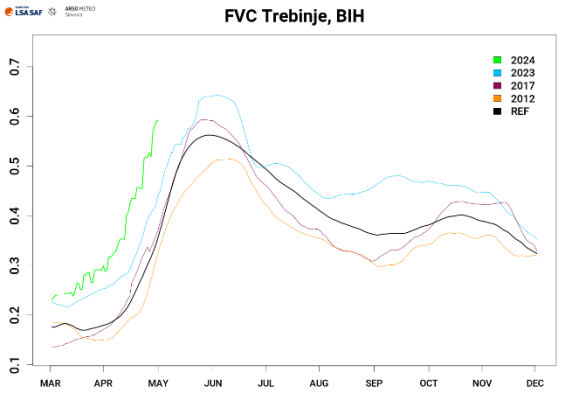


Vegetation season in Nova Gorica, western Slovenia began approximately two weeks earlier than usual and early spring weather conditions continued to support its regular growth rate, meaning the fraction of cover with green vegetation remained up to two weeks ahead of its usual time throught the rest of March and April. In Murska Sobota, northeastern Slovenia, much higher than usual FVC values at the beginning of March suggest well earlier than normal onset of vegetation season. The rate of growth remained high throughout March and April, resulting in reaching the cover of over 90 % by mid-April, more than 10 % higher than seasonal peak usually reached in mid-May.

BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)

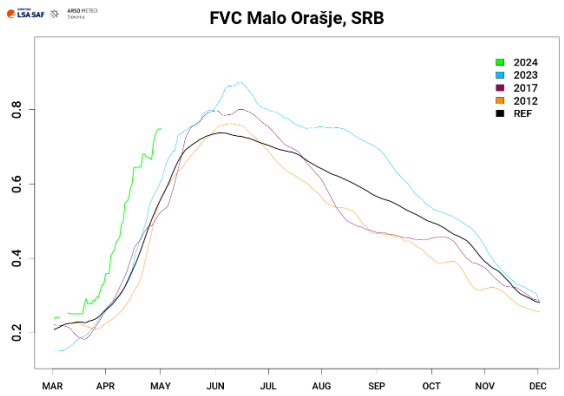


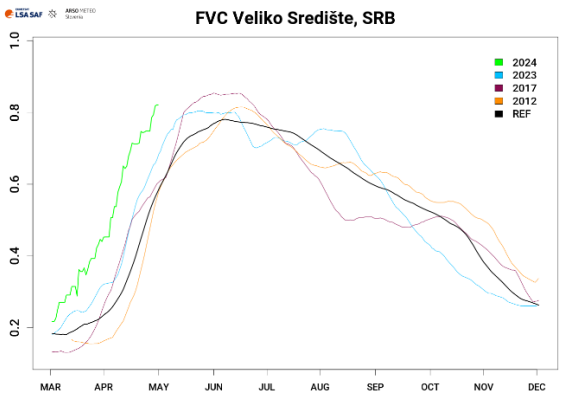




Vegetation season began early in Laktasi and Bijeljina along northern Bosnia and Herzegovina, with FVC values about 10 % higher than normal in early March. Spring weather supported early vegetation growth, in Laktasi about a month ahead of its time and in Bijeljina neraly three weeks earlier. Vegetation development continued at usual growing rates throughout March and April, which continued the ahead-of-time levels of vegetation cover. In Trebinje, southern Bosnia and Herzegovina, vegetation season also began almost a month earlier than normal although its initial rate of growth in this first month was moderate. From early April onward, vegetation development progressed at its regular rate for late spring, resulting in FVC levels about 2–3 weeks ahead of their usual onset.

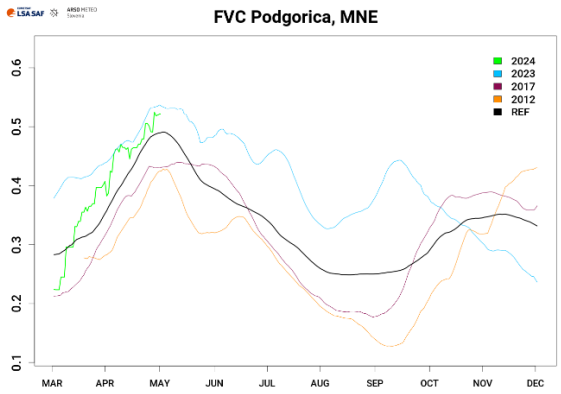
SERBIA





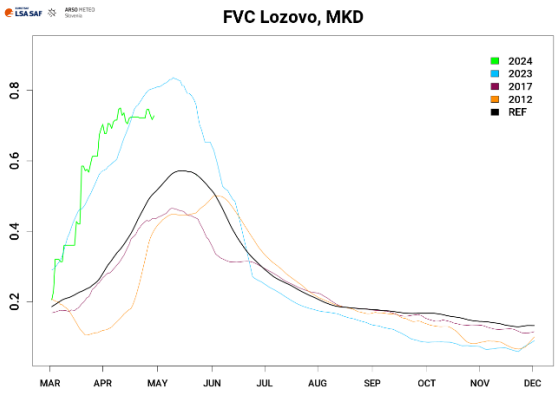
Vegetation development in Malo Orasje, central Serbia began in mid-March, approximately two weeks earlier than usual, and progressed at its regular growing rate throughout April. Due to the earlier start of the season, the fraction of cover with green vegetation reached its average seasonal peak level by the end of April. In Veliko Srediste too, northeastern Serbia, spring weather conditions boosted vegetation season into an earlier start, after which vegetation growth progressed at the high rate, otherwise usual for the second half of spring, without its usual slow onset. As a result, level of cover with green vegetation was 3–4 weeks ahead of its time throughout April and also exceeded the average seasonal peak levels, usually reached in early June, by the end of April already.

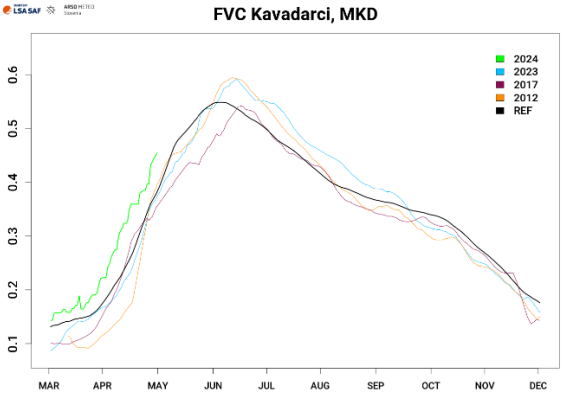
MONTENEGRO



After approximately 10 % lower than usual vegetation cover at the end of winter, vegetation in Podgorica, southern Montenegro boosted into growth in early March. With the initial growing rate well higher than usual, the regular level of cover was caught up by mid-March and continued on, exceeding the regular level by up to 10 % before the end of March. Vegetation growth continued well throughout April, resulting in continuously above-average FVC values, also at its peak time in late April.

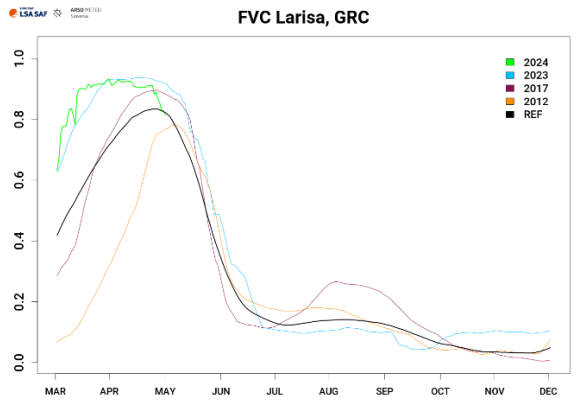
NORTH MACEDONIA

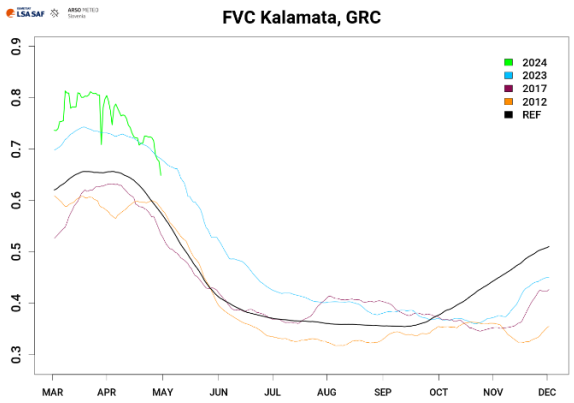




Spring weather conditions proved favourable for early and abundant start to the vegetation season in Lozovo, central North Macedonia. Vegetation boosted into growth in early March, approximately a month earlier than normal, and progressed at the rate of development much higher than normal, resulting in exceeding the level of cover usually, reached at its peak time in mid-May, before mid-March already. Vegetation growth continued even afterwards until mid-April, when fraction of cover with green vegetation normalised at about 70 %, that is 15 % higher than at its regular seasonal peak. In Kavadarci, southern North Macedonia, vegetation season began slightly earlier than normal and on the base of a higher level of cover at the end of winter. As a result, the relevant level of vegetation cover continued to be reached about 1-2 weeks earlier than usual throughout March and April.

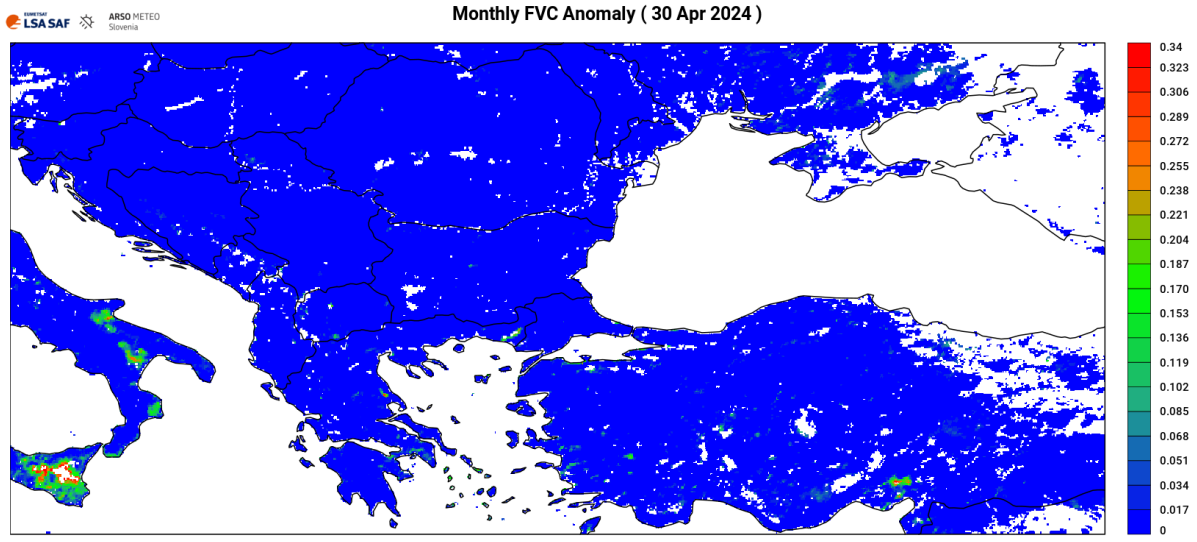
GREECE





Weather conditions supported abundant vegetation development in Larisa, central Greece, with vegetation covering between 20 and 30 % greater fraction of unit than usual throughout March and April, similarly as the year before. Seasonal peak was reached in mid-March already, a month and a half earlier than normal, and at the coverage with green vegetation of about 90 %, which is nearly 10 % higher than normal. According to the FVC, late April saw the onset of the senescence phase. Vegetation cover was this spring abundant also in Kalamata, southern Greece. During the peak period of the season, March to April, vegetation cover was more or less 15 % above the average for this time of the year. Senescence phase began at its regular time in early April and followed its ordinary rate, meaning that due to exceeded seasonal peak cover, FVC values remained 10–15 % above the long-term average

Figure below shows negative anomaly of **accumulated 30-day FVC values** as recorded **on 30 April 2024** in comparison to the past 20 years (2004–2023), and is used experimentally.



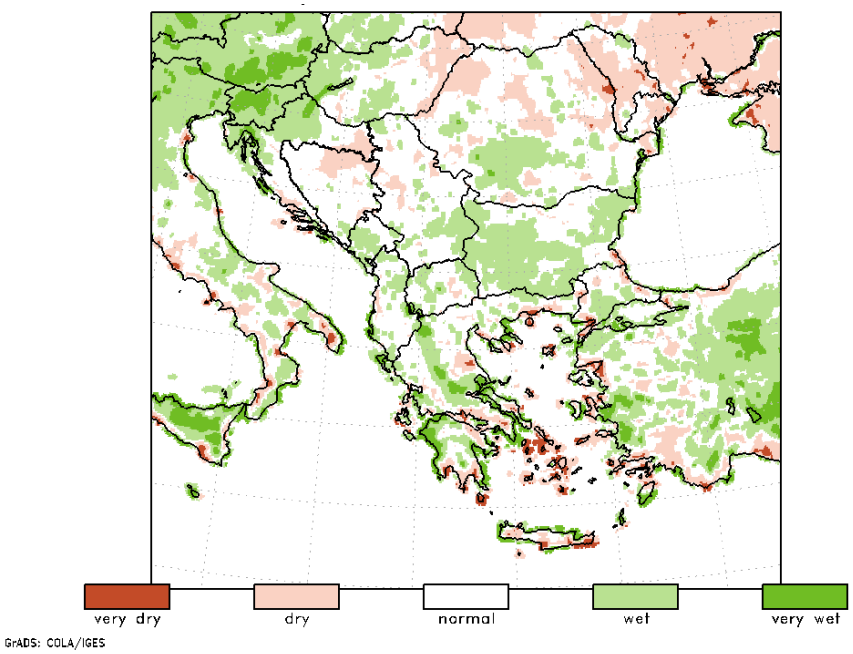
Vegetation cover was average or higher than normal across the region by the end of April, as no great negative anomalies from the usual were detected. Only in localised area in southern Turkey, level of cover with green vegetation was 10–30 % behind its usual level at the end of April.

DROUGHT IMPACT REPORTS

No drought impacts on the environment were found across the region.

OUTLOOK

Figure below shows model simulations of the **60-day accumulated surface water balance** in historical percentile classes for the time period **between 11 April and 9 June 2024**.



Wetter than normal surface water balance conditions are expected to prevail across most of the region, in localised areas in Slovenia, central Greece and in central and western Turkey where surface water balance conditions will be one of the wettest of the last decades. This presents noticeable change from drier to wetter than normal surface water balance compared to the March-April period. Meanwhile, in parts of central-western Balkan Peninsula and over the border area between Hungary and Romania drier than normal surface water balance conditions will continue to last, and they will spread over the rest of northern half of Romania and Moldova as well, replacing previously experienced wetter conditions.

Methodology

DMCSEE Drought monitoring bulletin is based on numerical weather prediction (NWP) model simulations over SE Europe, SPI index calculations, remote sensing product and public media drought impact reports. Precipitation data is provided by Global Precipitation Climatology Centre (GPCC; https://www.dwd.de/EN/ourservices/gpcc/gpcc.html) shown against the average of the 1961–1990 time period. NWP simulations are performed with Non-hydrostatical Mesoscale Model at ~7 km spatial resolution (NMM;

http://www.dtcenter.org/wrf-nmm/users/). Historical model climatology in terms of air temperature and surface water balance is computed with NMM on the base of 1 January 1991 to 31 December 2020 time period, using European Centre for Medium Range Weather Forecast (ECMWF) ERA5 dataset (http://www.ecmwf.int/en/forecasts/datasets/reanalyses-datasets/era5) as input for simulations. Long-term averages (1991–2020), used for comparison of current weather conditions, are obtained from simulated dataset. Comparison of current values against long-term average or in percentile classes (the two extreme classes have a 5-percent range, and each of the middle three classes has a 30-percent range) provides a signal on potentially ongoing drought. Remote-sensing product in the bulletin is based on the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Land SAF MSG Daily Fraction of Vegetation Cover product (https://landsaf.ipma.pt/en/products/vegetation/fvc/), presented for the checked and confirmed locations and using long-term averages from 2004 to the last full year (currently to 2023). Information on drought impacts are obtained from freely available online reports of national authorities and media newspapers.