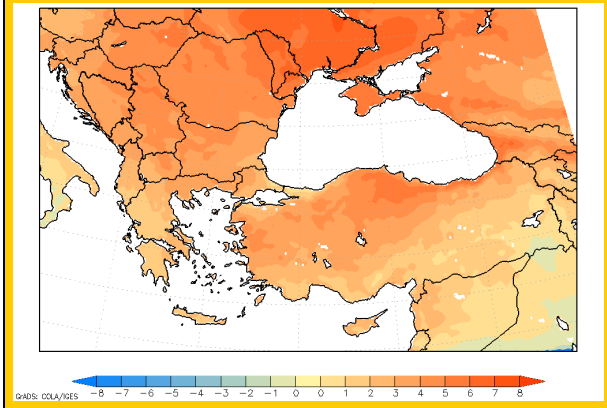
DROUGHT MONITORING BULLETIN

14th June 2018

HOT SPOT

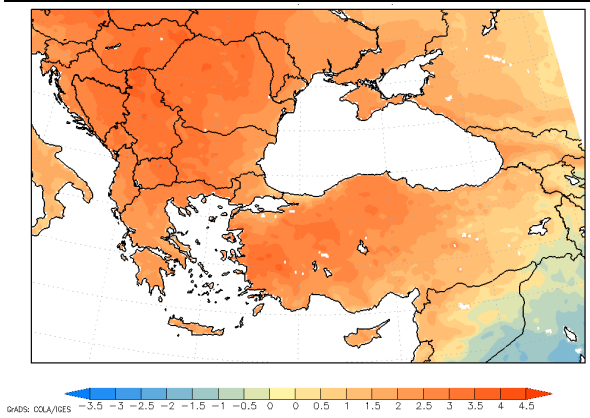


Air temperatures well above the average that persisted throughout April continued into May as well. Figure on the left shows **air temperature anomalies** for **1st-10th May 2018**, the warmest decade of the month. As air temperatures over northern half of Balkan Peninsula and Aegean Sea exceeded the average for 4–7 °C in first days of May, it left parts of Slovenia, Croatia, Hungary, Romania, Moldova, Bulgaria and many Greek islands experiencing air temperatures of warmest 5% of the record for 3 decades consecutively.

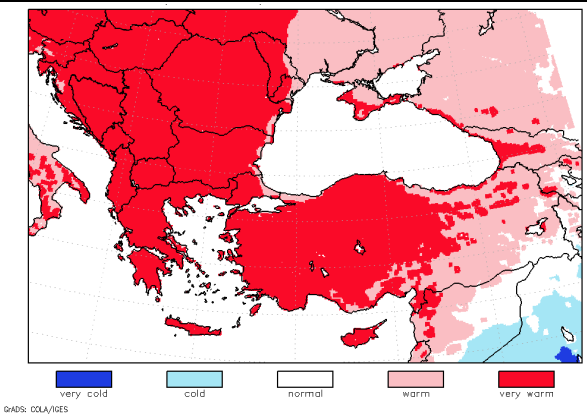
AIR TEMPERATURES AND SURFACE WATER BALANCE

*Figures in this section present anomalies of the average air temperature and accumulated water balance as well as classified values of the average **air temperature** and **surface water balance** in percentile classes for 60–day period **from 1st April to 30th May 2018**.*

AVERAGE AIR TEMPERATURE ANOMALY (°C)
1st APRIL – 30th MAY 2018



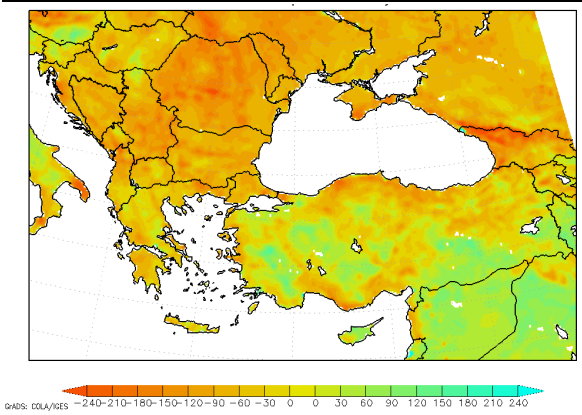
AVERAGE AIR TEMPERATURE PERCENTILE CLASSES
1st APRIL – 30th MAY 2018



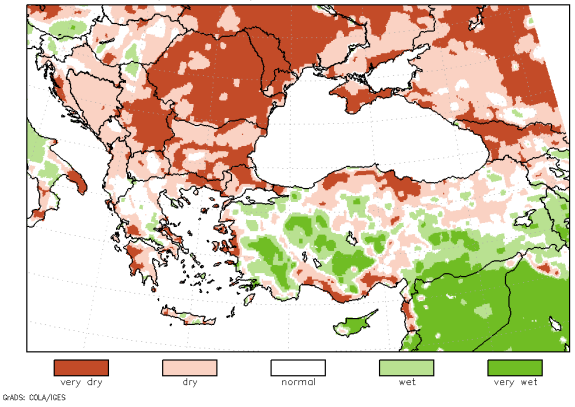
Similar to last decade of April, also beginning of May was warmer than usual across entire region. Air temperature anomalies were smallest in southeastern Turkey and area along Ionian Sea where they ranged between 1–2 °C. Values of air temperature anomalies gradually increased from western Greece towards northeastern part of Balkan Peninsula and from southeastern Turkey towards northern and western part of Turkey where they exceeded the average for up to 5 °C. Locally in eastern Hungary, northern Serbia, northern Romania and

major part of Moldova, air temperatures were even 6–7 °C higher than usually. While in southern half of Balkan Peninsula and Turkey air temperatures remained relatively constant also through mid-May, countries of northern, central and eastern Balkan Peninsula experienced slight drop of air temperatures which were more common for this time of year. Notably above-average air temperatures in mid-May were present in Bulgaria, continental Greece and western half of Turkey with positive anomalies of up to 2 °C, over Aegean Sea up to 3 °C. Last decade of May was again warmer than usual across the region as air temperatures deviated from the average for up to 4 °C in Hungary, Croatia, Bosnia and Herzegovina and northern part of Serbia while the rest of the region experienced anomalies ranging mainly between 2–3 °C.

ACCUMULATED WATER BALANCE ANOMALY (mm)
1st APRIL – 30th MAY 2018



ACCUMULATED WATER BALANCE PERCENTILE CLASSES
1st APRIL – 30th MAY 2018



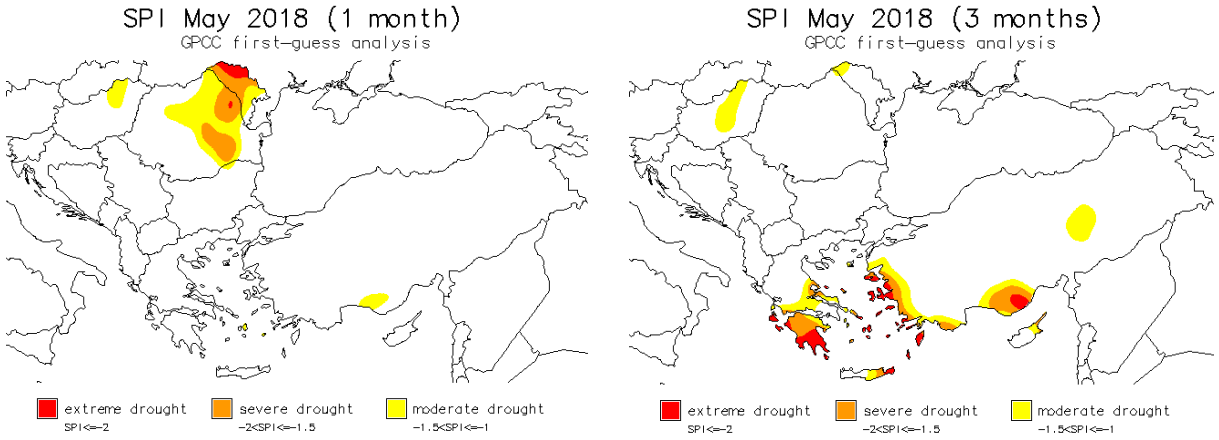
In comparison to water balance situation of March-April period, figures above show major worsening over most of Balkan Peninsula. While Slovenia and border area between Hungary and Serbia remained in wet conditions where values of water balance exceeded the average for up to 60 mm, the rest of Balkan Peninsula experienced dry to very dry conditions. Areas with highest water balance deficit, ranging between –120 mm and –180 mm, were along the Adriatic Sea, central and southern Serbia, eastern Greece, western Bulgaria, most of Romania and Moldova. Locally over the Carpathians, water balance deficit reached –210 mm. At the same time, negative water balance anomalies between 60 mm and 120 mm were present over northern part of the region, also in central and southern Greece where water balance values remained negative although dry conditions were less intense than in previous 60-day period. Meanwhile, water balance has improved over vast area across continental Turkey. Surplus of 60–150 mm from the average brought very wet conditions to western, southern and southeastern parts of the country. Except for areas along northern and southern coastlines where water balance deficit worsened to reach values as high as –210 mm and –180 mm respectively, the rest of the Turkey continued to experience water balance deficit of –60 mm to –120 mm.

STANDARDIZED PRECIPITATION INDEX

The drought situation with regard to the precipitation accumulation is presented by Standardized Precipitation Index (SPI). The SPI calculation is based on the distribution of precipitation over long time periods (30 years, in our case long–term average 1961–1990 was used). The SPI can be calculated at various time scales which reflect the impact of the 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.

Moderate to severe drought conditions in May, according to SPI1, were detected in eastern Romania while drought conditions in Moldova intensified to extreme level at the north of the country. Moderate drought in northeastern Hungary was noticed as well.
SPI for three-month period shows moderate lack of precipitation in central and northeastern Hungary and northern Moldova. Outstanding rain deficit was detected in southern Greece on Peloponnesus, on islands in Aegean Sea and along Turkey's western coast where dry conditions were classified from moderate to extreme, indicated through SPI3. Dry areas were present also in southern Turkey and central eastern part of the country.



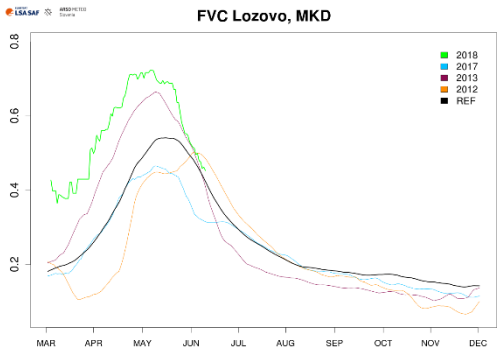
REMOTE SENSING – FRACTION OF VEGETATION COVER

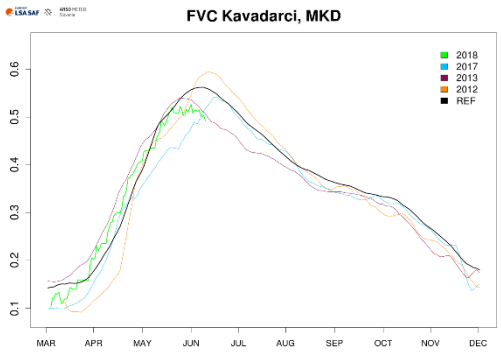
Fraction of vegetation cover (FVC) is vegetation index, based on multi–channel remote sensing measurements (data from Eumetsat's LSA SAF data base is used for products in this bulletin). FVC shows fraction of the total pixel area that is covered by green vegetation, which is relevant for applications 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 of course to the damages of possible natural disasters (including drought). FVC values are lower at the beginning of the growth season, the highest at the full vegetation development and then FVC slowly drops with vegetation senescence. Line shape depends on sort of the vegetation.

Graphs below present the **vegetation situation** as recorded **on 4th June 2018** in some regions of Southeastern Europe. FVC values for year 2018 are presented as green line. Graphs also include reference line (2004–2017) in black, and lines in light blue (year 2017), magenta (year 2013) and orange (year 2012) for comparison.

Possible missing values or sharp decline of values could be result of a prolonged cloudy weather or snow blanket.

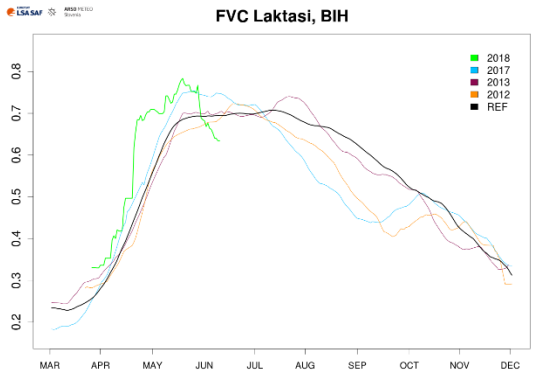
FYR MACEDONIA

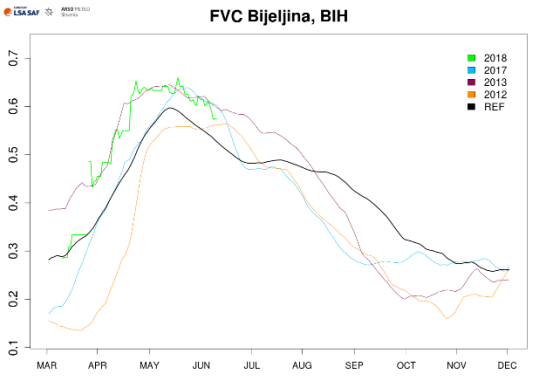


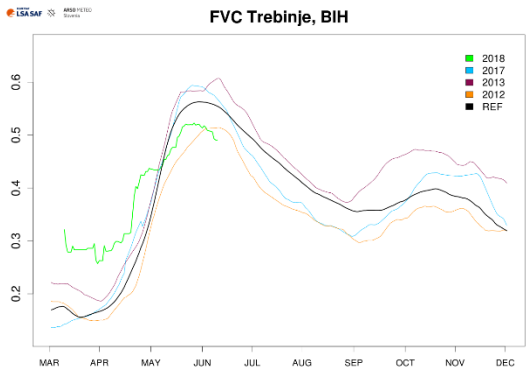


Vegetation in Kavadarci in southern FYR Macedonia was developing as expected in first months of vegetation season. Meanwhile vegetation state according to FVC index in Lozovo in central Macedonia exceeded the expected values for about 20 % till the second half of May when FVC values dropped and were slowly approaching reference line.

BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)



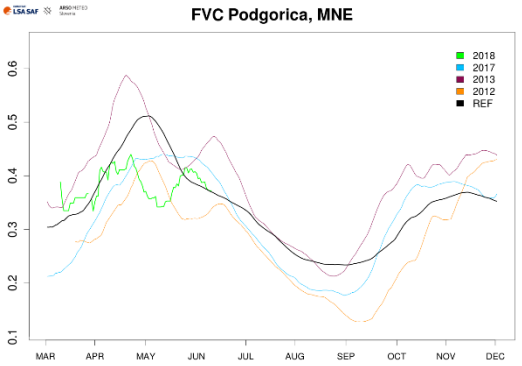




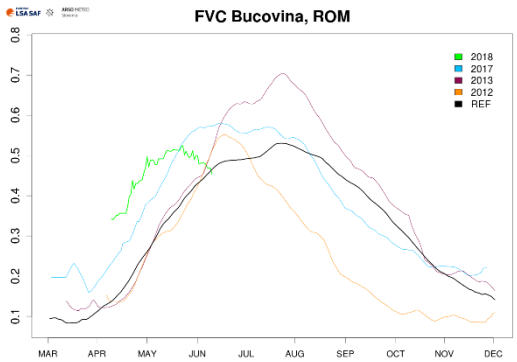
Vegetation development at the north of the country (Laktaši and Bijeljina) is advanced in comparison to the average development. FVC values enhanced at the end of April in Laktaši while in Bijeljina values were higher since the beginning of April. Conditions in the south of Bosnia and Herzegovina were slightly different. Rapid vegetation development in Trebinje was noticed in first half of spring when, although still increasing, values started dropping below the reference line. It seems that first peak of the season has been already reached, with values comparable to the year 2012.

MONTENEGRO

Vegetation state in Podgorica does not follow usual course of plant development. The situation is completely different from its normal path when FVC values increase around this time of year and also approaching the peak. From the beginning of the season FVC values have ranged between 0.3 and 0.4, currently standing around approximately 0.38, with no evident increase.

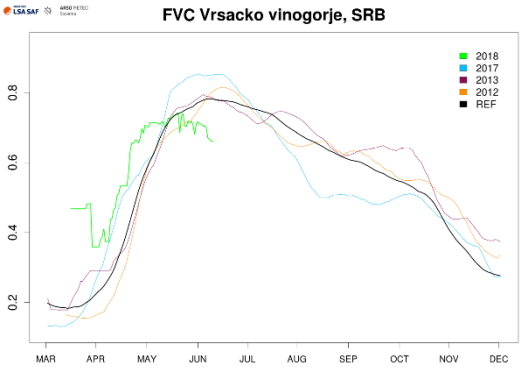


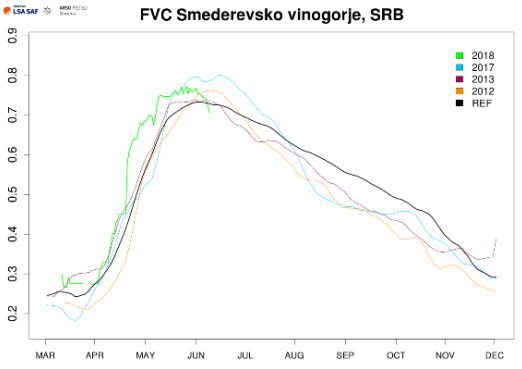
ROMANIA



Data for Bucovina are available only from beginning of April but from then on vegetation development has been exceeding the average conditions. FVC values remained well above the reference line for throughout entire April and May.

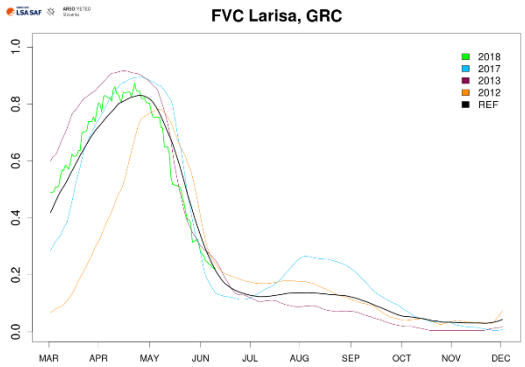
REPUBLIC OF SERBIA

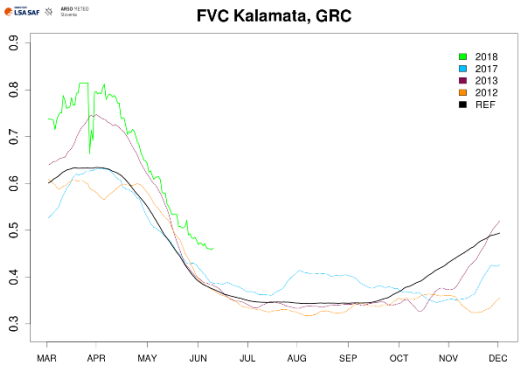




According to FVC, vegetation development followed ordinary development in Smederevsko vinogorje and has reached values that usually present the peak of the season. Meanwhile, development in Vrsacko vinogorje has been exceeding the average conditions since the beginning of vegetation season till second half of May when it apparently reached the peak of the season and has slowly been declining since then.

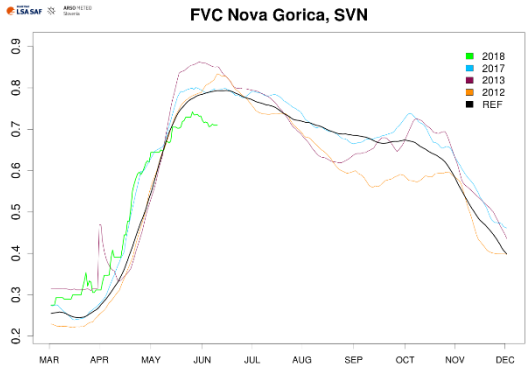
GREECE

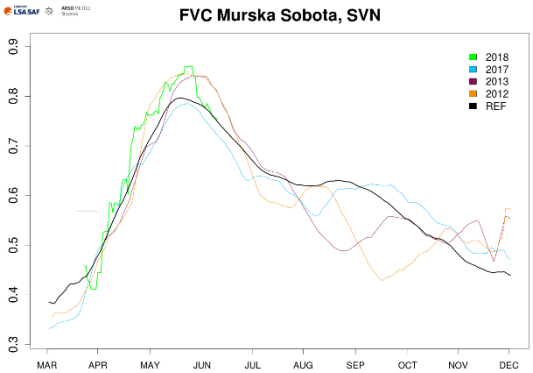




Vegetation development in Larisa followed reference line with no significant deviations. Meanwhile, a good start of vegetation growth was detected in Kalamata. FVC values were above reference for more than 10 % in first half of spring. Since then, difference between actual FVC and reference values is slowly getting smaller but actual FVC values remains above-average.

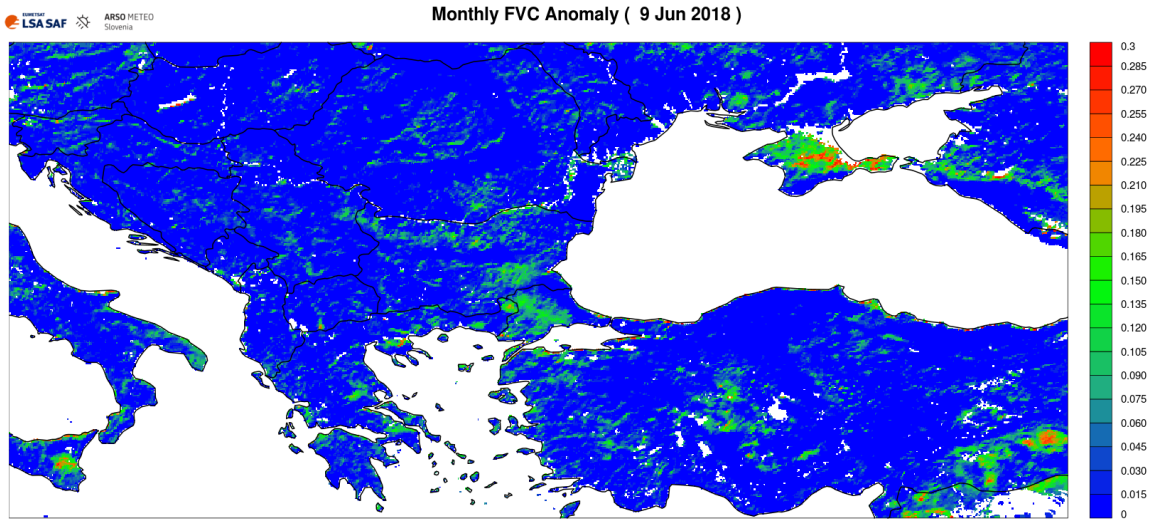
SLOVENIA





FVC index shows that vegetation is developing as expected and following well the values of reference period for both Nova Gorica and Murska Sobota.

Figure below shows negative anomaly of **accumulated 30–day FVC** recorded on **11th June 2018** in comparison with the past 14 years (2004–2017) and is used experimentally.



Monthly accumulations of FVC index show smaller deviations, up to 13 %, scattered all over the region. More noticeable, in terms of wider areas, are anomalies in parts of western and southeastern Turkey, over southern Greece and in northern and southeastern Bulgaria.

IMPACT REPORTS

In Romania, drought impacts were reported mainly across eastern half of the country. In Iasi County in northeastern Romania, irrigation has started a month earlier than usually in order to save the crops but concern was raised over future state of crops that are already affected on fields with no irrigation systems. Also, cracks in the ground as can usually be seen in July have already appeared [1]. Ground has begun cracking also in Bozau Country in central eastern Romania where it has not rained properly since early April. Effects of lack of rain are seen mostly on wheat crops that have begun to dry, also wine is affected as rain deficit has come in time when wine is in blooming phase [2]. In Constanta Country by the Black Sea, drought that started in April and continued in May affected mostly grain crops, drought situation continued into May. Also markets have responded to lasting drought conditions as wheat prices are already rising in the big Black Sea ports [3].

[1] http://stiri.tvr.ro/lipsa-ploilor-a-uscat-pamantul-iar-culturile-de-cereale-sunt-in-pericol_831018.html
[2] http://stiri.tvr.ro/seceta-a-crapat-pamantul---i-a-uscat-culturile-din-jude--ul-buzau_831126.html#view
[3]http://stiri.tvr.ro/meteorologii-centrului-european-pentru-prognoze-anun--a-cea-mai-calduroasa-vara-dupa-1981--temeri-pentru-recolte_830856.html

OUTLOOK

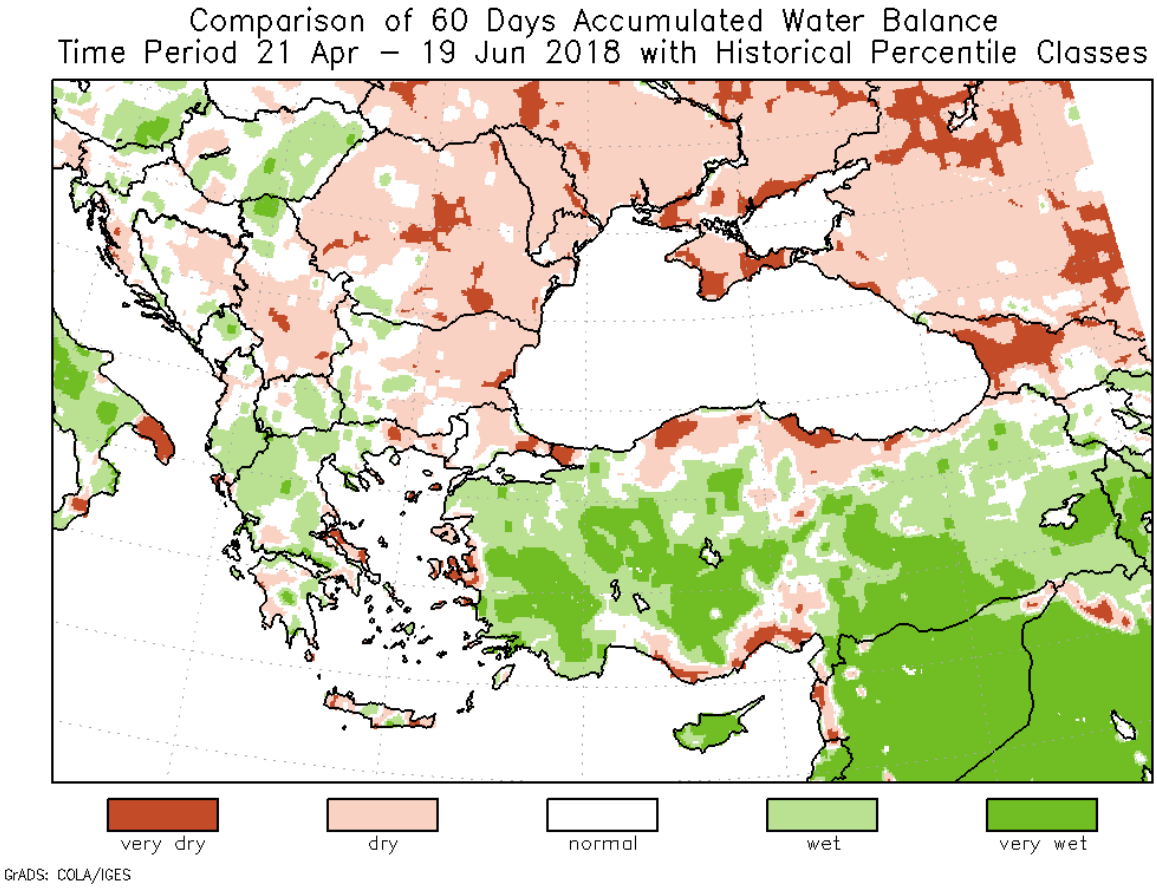


Figure presents the model simulations of the **60-days water balance anomaly** (percentile) for the time period from **21st April to 19th June 2018**. Water balance outlook shows more favorable conditions according to the last known state on 9th June almost all over the region. Western Balkan Peninsula is classified mainly from normal to wetter-than-normal, meanwhile central and eastern Balkan Peninsula remain dry, but not as dry anymore. Wetter than normal or even very wetter is state across majority of Turkey. Only areas along Black Sea and Mediterranean coast remain dry to very dry.

Methodology

Drought monitoring bulletin is based on numerical weather prediction (NWP) model simulations over SE Europe, SPI index calculations and remote sensing. Precipitation data is provided by Global Precipitation data Centre (GPCC; gpcc.dwd.de). NWP simulations are performed with Non–hydrostatical Meso–scale Model (NMM, see: http://www.dtcenter.org/wrf–nmm/users/). Historical DMCSEE model climatology was computed with NMM model for time period between 1st January 1979 and 31st December 2016. European Centre for Medium Range Weather Forecast (ECMWF) ERA–Interim data set (see: http://www.ecmwf.int/en/research/climate–reanalysis/era–interim) was used as input for simulations. Long term averages (1979–2016), used for comparison of current weather conditions, are obtained from simulated data set. Comparison of current values to long term averages provides signal on potential ongoing drought severity.