

DROUGHT MONITORING BULLETIN

21st August 2018

HOT SPOT

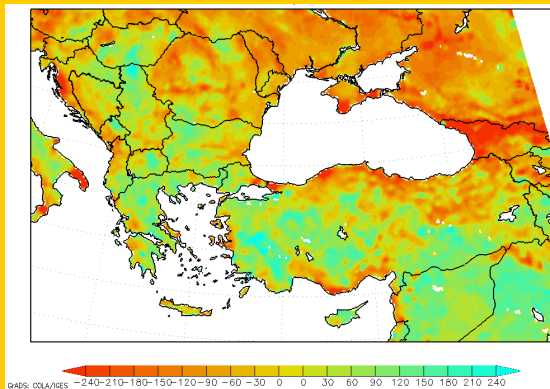
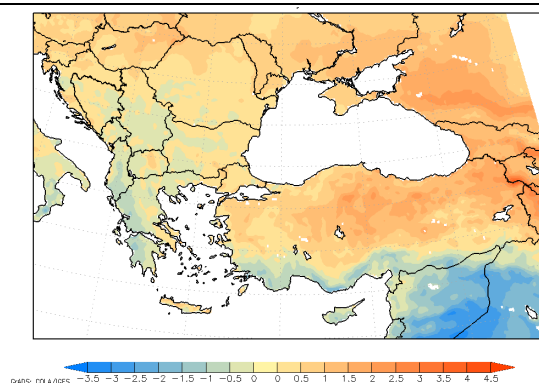


Figure on the left shows **accumulated surface water balance between 1st April and 29th July**. In comparison to accumulation from April to June, areas with positive surface water balance intensified and widened. Larger drier-than-normal areas persisted across northeastern Turkey and along the coasts in north and south of the country. Drier parts of Balkan Peninsula in this 4-month period are noticed in Romania and Moldova, along Adriatic coast from Croatia to northern Albania and in some smaller isolated parts in Hungary, Serbia, Bulgaria and Greece.

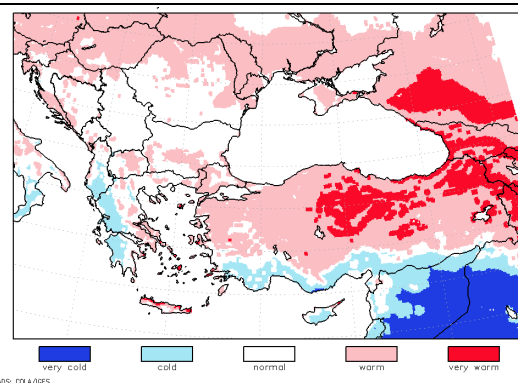
AIR TEMPERATURES AND SURFACE WATER BALANCE

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 31st May to 29th July 2018.

AVERAGE AIR TEMPERATURE
ANOMALY (°C)
31st MAY – 29th JULY 2018



AVERAGE AIR TEMPERATURE
PERCENTILE CLASSES
31st MAY – 29th JULY 2018

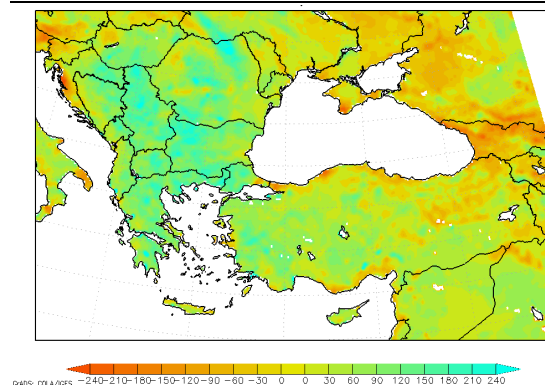


First decade of July was determined by warmer-than-usual at the south of the region where significant anomalies were noticed in eastern Turkey with deviations mainly from 2 to 4 °C and classified in the warmest 5 % of their record. Meanwhile northern part of Balkan Peninsula experienced air temperatures lower than average up to -2 °C in western Pannonian Basin and majority of Romania. Average decade air temperature in second July mainly ranged between

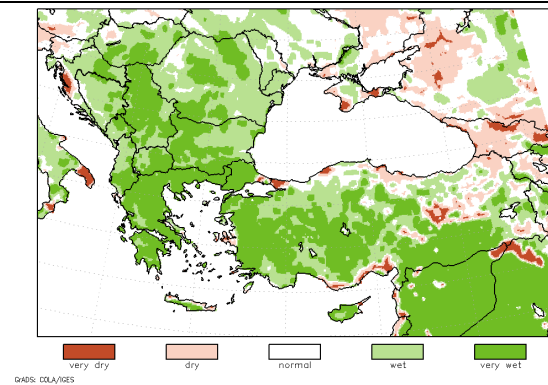
-1 and 1 °C in Balkan Peninsula. The largest anomalies were detected in southeastern Greece, up to 2 °C above the long-term average. Warm conditions persisted in Turkey with anomalies up to 2 °C at the northwest, in central part of the country and at the east where anomalies even increased. More spatially dynamic were third decade, with positive anomalies from 1 to 2 °C at the northwest of Balkan Peninsula and at northwestern Turkey and up to 3 °C in central and eastern Turkey. Meanwhile negative anomalies up to -2 °C prevailed in Albania, western Greece and across majority of southern belt of Turkey.

Occasionally colder air mass retention reflected in colder-than-usual temperature conditions within 60-day time period in belt across southern Albania and western Greece as well as along Turkish Mediterranean coastline. Negative anomalies reached values up to -1 °C, in some areas up to 1.5 °C. Warmer parts of Balkan Peninsula for up to 1 °C were at the north, in Slovenia, Hungary, northern Romania and Moldova, in northeastern Hungary up to 1.5 °C. Major part of Turkey was warmer than the long-term average, with mentioned exception on the south. In central, northeastern and eastern Turkey positive anomalies ranged from 1 to 2 °C, in some scattered parts up to 2.5 °C.

ACCUMULATED WATER BALANCE
ANOMALY (mm)
31st MAY – 29th JULY 2018



ACCUMULATED WATER BALANCE
PERCENTILE CLASSES
31st MAY – 29th JULY 2018

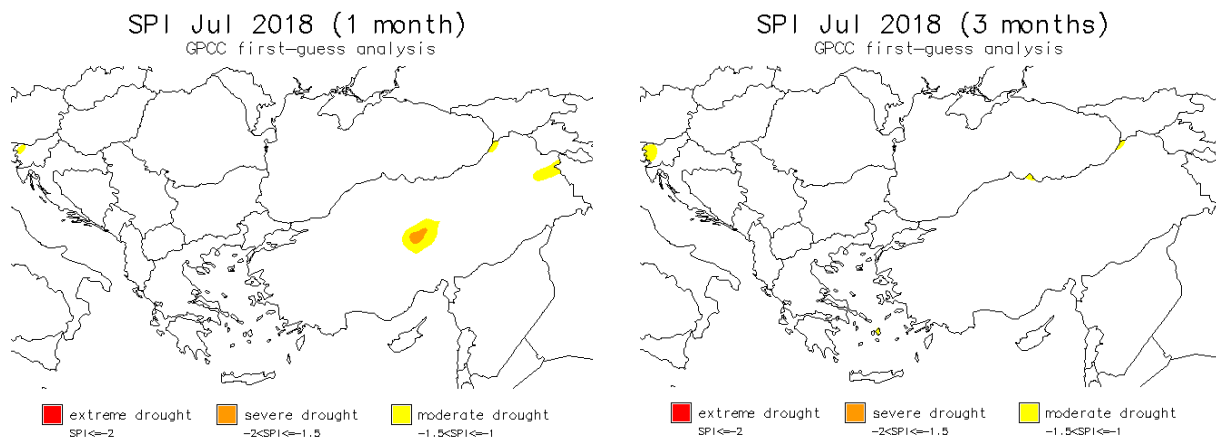


Major part of the region in two months' period (June and July) can be described as very wet. Water balance values in larger parts of Hungary, Romania, Croatia, Bulgaria, Bosnia and Herzegovina, Montenegro, FYR Macedonia, Albania and over almost entire Greece are classified in top 5 % wettest years of their record. Comparable is situation in Turkey, the wettest June and July according to the water balance were noticed in major part of the country with exception of northeastern part and Mediterranean and Black Sea coastal lines. In mentioned very wet areas in Balkan Peninsula, water balance anomalies on many places reached more than 210 mm. Drier regions are noticeable only in Slovenia and northwestern Hungary where water balance was up to 90 mm below the average, and Kvarner and northern Dalmatia where negative anomalies were even larger than 200 mm. In drier parts in Turkey, water balance anomalies reached mainly -90 mm, in certain parts up to -120 mm. Anomalies in the wettest parts were not so large as in Balkan Peninsula. However, the highest anomalies went up to 180 mm, in the most affected places above 210 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.

Lack of precipitation which reflected in low SPI values was detected mainly of moderate intensity. On monthly time scale, it appeared in parts of central Turkey and smaller parts at the very east of the country, and also in northwestern Slovenia. Dry conditions over the three-month period were noticed only in western Slovenia.



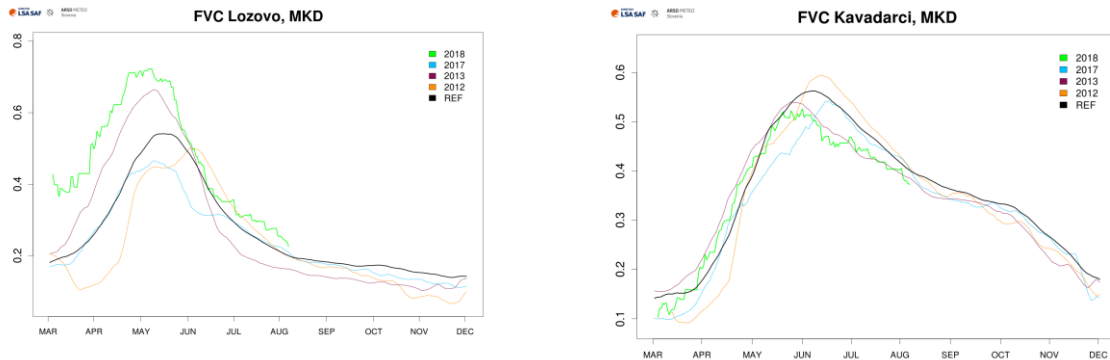
REMOTE SENSING – FRACTION OF VEGETATION COVER

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 **6th August 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.

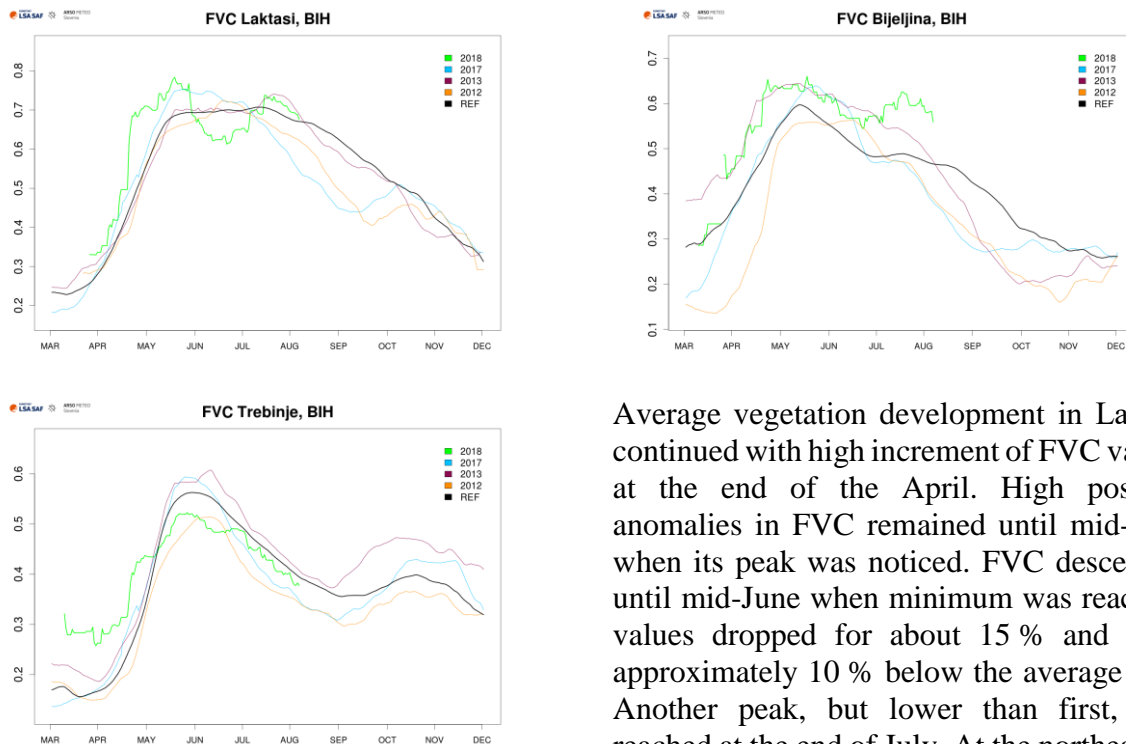
Possible missing values or sharp decline of values could be result of a prolonged cloudy weather, extreme weather events or snow blanket.

FYR MACEDONIA



After an early start of vegetation season as indicated by fraction of vegetation cover index for Lozovo in central FYR Macedonia, the peak of the season was reached approximately 2 weeks earlier compared to the reference values. Decreasing FVC values reached reference line at the beginning of June and followed it with some positive deviation. Vegetation development in southern Macedonia, represented by conditions in Kavadarci, was noticed until beginning of May when it reached its peak, in reference range. FVC peak of the season occurred earlier than usually and with lower values. FVC values dropped below the average and remained below it. This year's FVC line is comparable to those in year 2013.

BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)



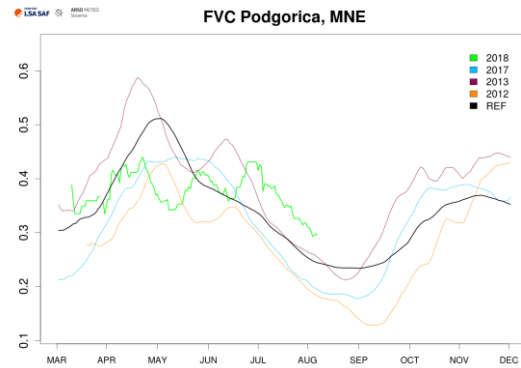
Average vegetation development in Laktaši continued with high increment of FVC values at the end of the April. High positive anomalies in FVC remained until mid-May when its peak was noticed. FVC descended until mid-June when minimum was reached, values dropped for about 15 % and were approximately 10 % below the average line. Another peak, but lower than first, was reached at the end of July. At the northeast of the country, in Bijeljina, FVC values remain

higher than normal since April, for about 5–10 %. Vegetation development followed the shape of the reference line until July when values ascended and reached second peak of the season, which was not expected according to the reference line or in comparison to the chosen years. In Trebinje, early vegetation development at the beginning of the season turned into

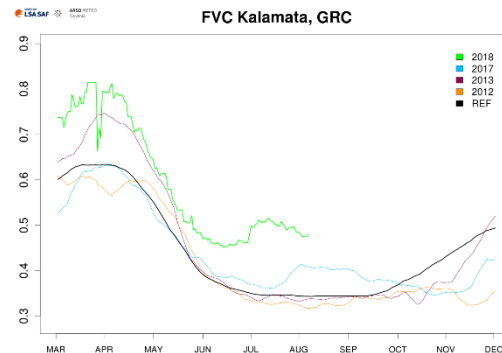
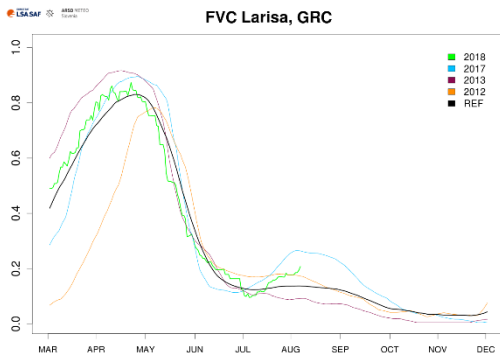
normal condition according to the reference line at the beginning of May. But since then, FVC values are constantly below the average. Its peak, which was not so explicit, was reached in mid-May. Since the end of June, FVC follows the shape of the reference line although with slight negative anomaly.

MONTENEGRO

Unfavorable start of the vegetation season was caused by extremely hot and dry situation in April. This extreme situation reflected in unordinary vegetation development presented by FVC index. FVC values ranged approximately between 0.35 and 0.45 since the beginning of the season, with many increases and decreases. Values were around reference line in March, and then significantly below the average in April and May. Constant decrease, with above average values for that time of year, is evident since the end of June.



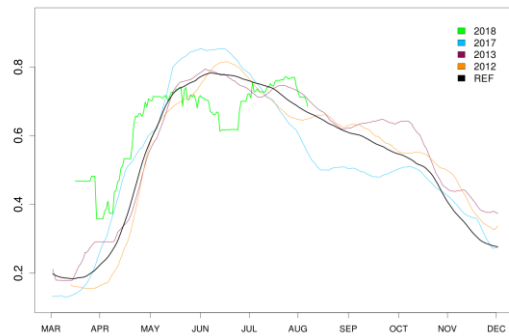
GREECE



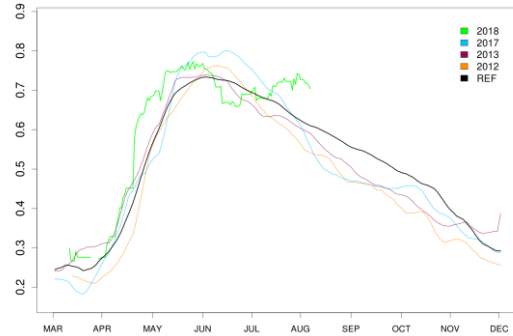
Vegetation development in Larisa, as shown through FVC index, was comparable to the reference line for the entire season until mid-July when it started slightly increasing, similar to year 2017. FVC values in Kalamata remain high above the reference line since the beginning of the observations of this year. From July on, it is expected to maintain constant value at least for two months in comparison to the reference line, although this year's development resulted in another minor peak at the beginning of July.

REPUBLIC OF SERBIA

FVC Vrsacko vinogorje, SRB



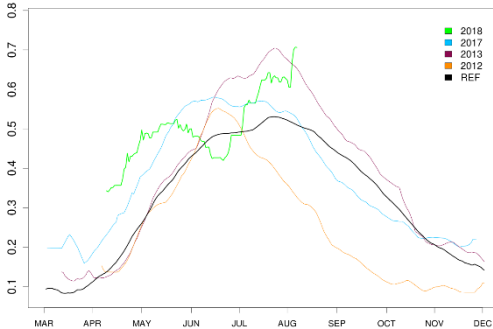
FVC Smederevsko vinogorje, SRB



Vrsacko vinogorje in northeast of Serbia experienced early start of vegetation season. FVC values approached the reference values in May, then dropped below it for about 15 % with temporary minimum detected in June. Vegetation development improved and reached second peak at the end of July, which is not expected according to the reference line. Vegetation development was mainly ordinary in Smederevsko vinogorje in central Serbia. Slightly above-average values persisted until June when it decreased and reached minimum in mid-July. Since then, vegetation conditions show slight improvement, according to FVC.

ROMANIA

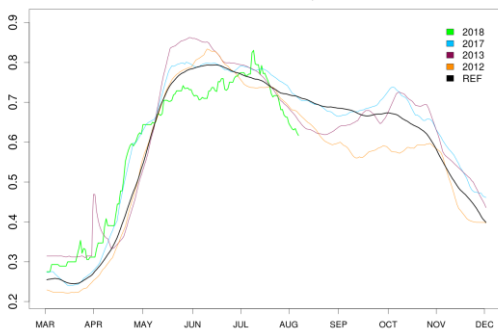
FVC Bucovina, ROM



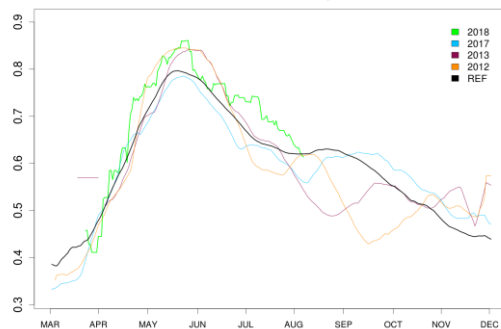
At the beginning of April, when FVC began being observed in Bucovina, values were well above the reference line until mid-May when it slightly decreased. In mid-June it again started ascending significantly above the average. It seems that another peak, which is more than 20 % higher than first, was reached at the beginning of August.

SLOVENIA

FVC Nova Gorica, SVN

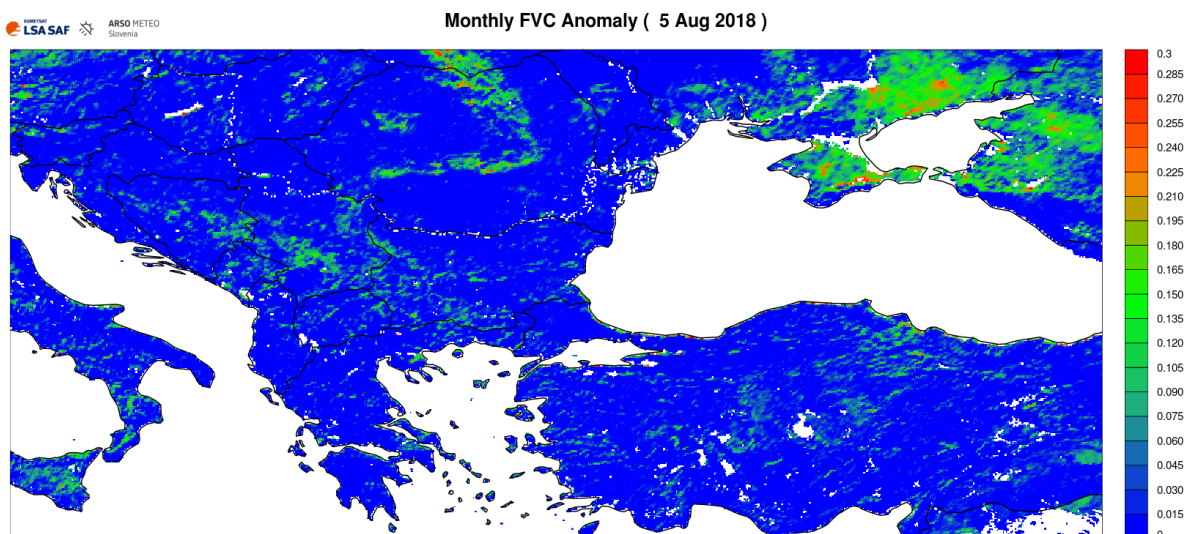
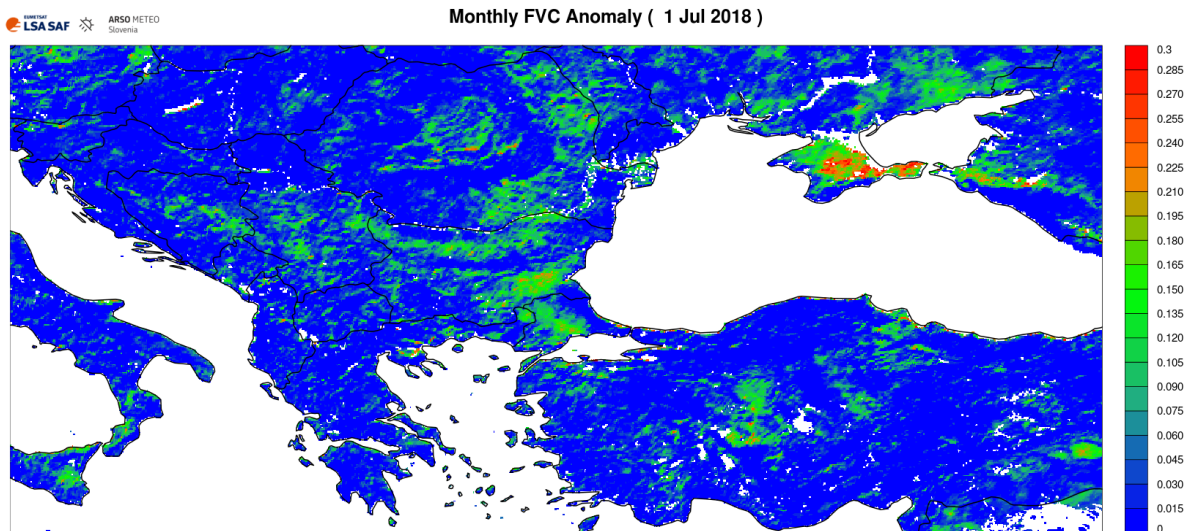


FVC Murska Sobota, SVN



Vegetation development is favourable in Murska Sobota in northeastern Slovenia with positive deviations persisting since May in comparison to the average and chosen years. In Nova Gorica in western Slovenia, at first slightly exceeded vegetation development turned into lower vegetation cover in mid-May. FVC reached highest values at the beginning of July but has since then steadily declined and stood at about 10 % below the average at the end of July.

Figures below show negative anomaly of **accumulated 30-day FVC** recorded on **1st July and 5th August 2018** in comparison to the past 14 years (2004–2017) and are used experimentally.



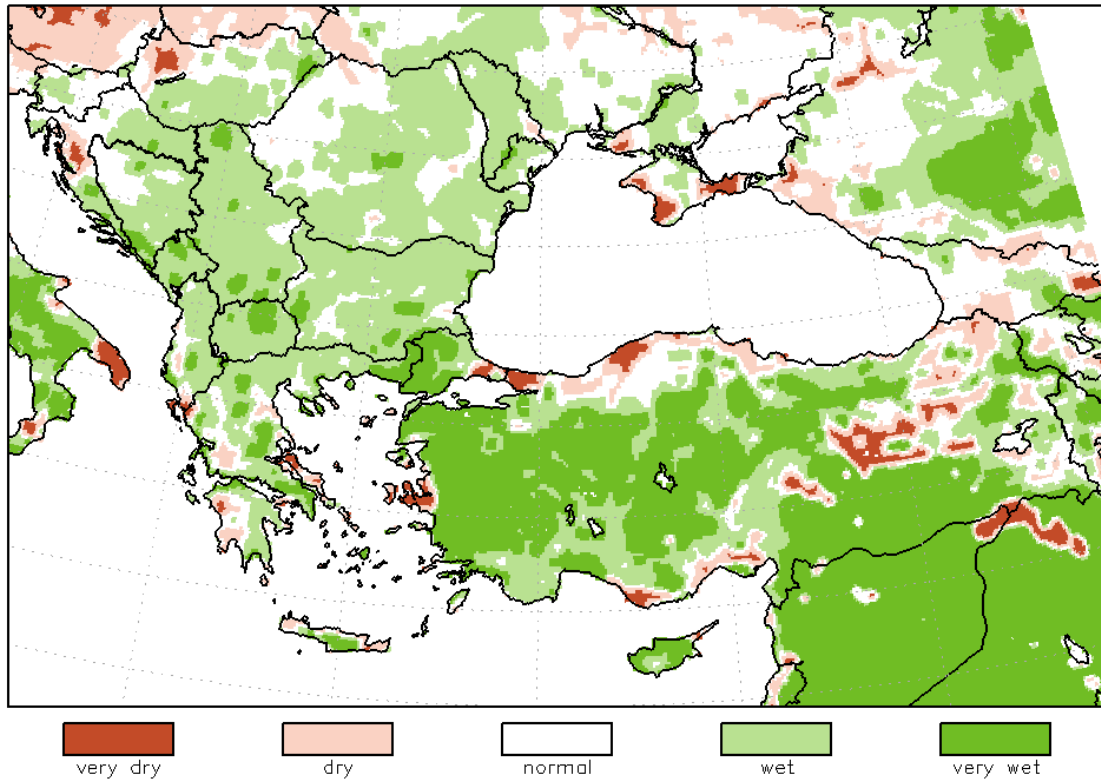
According to the monthly accumulations of FVC, vegetation should be in better conditions almost all over the region at the beginning of August, compared to the state on 1st July. Negative FVC anomalies decreased during August although are still noticeable in scattered parts of central Balkan Peninsula and in Turkey. Conditions in Romania improved in central, eastern and southern part but worsened over the Carpathians.

IMPACT REPORTS

No drought impacts on environment were reported across the region.

OUTLOOK

Comparison of 60 Days Accumulated Water Balance
Time Period 30 Jun – 28 Aug 2018 with Historical Percentile Classes



GRADS: COLA/IGES

Figure above presents the model simulations of the **60-days water balance anomaly** (percentile) for the time period **from 30th June to 28th August 2018**. 60-days water balance at Balkan Peninsula supposed to move towards normal state but persist in wet range comparing to the long term average. Drier areas are visible only in northwestern Hungary, part of western Croatia and in parts of western Greece. There will be no major difference in Turkey due to the state on 18th August, with exceptions of Black Sea and eastern Mediterranean coastline where dry conditions will intensified.

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.