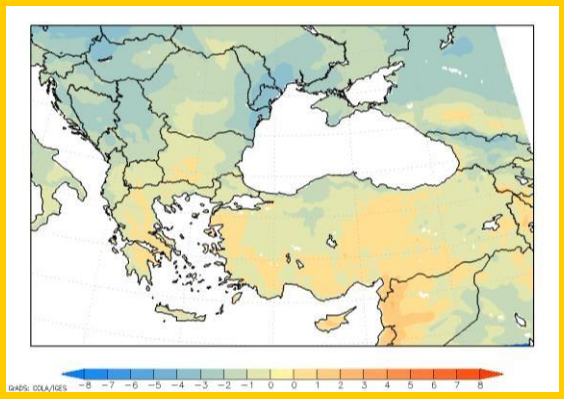
DROUGHT MONITORING BULLETIN

12th May 2017

HOT SPOT

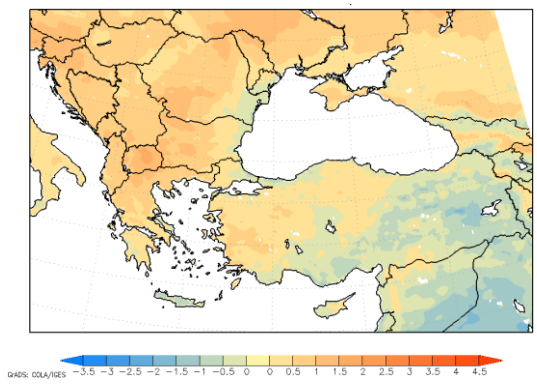


Warm start of spring recorded in March continued into April as well with air temperatures well above the average in first 10 days of April over most of north-western Balkan Peninsula. But as month progressed, sudden decrease of air temperatures was recorded over northern Balkan Peninsula with values reaching up to 4 °C below the average by the end of the month. Figure on the left shows 10-day anomalies of the mean air temperatures from 21st to 30th April 2017 where areas experiencing air temperatures around 3-4 °C below the average can be seen.

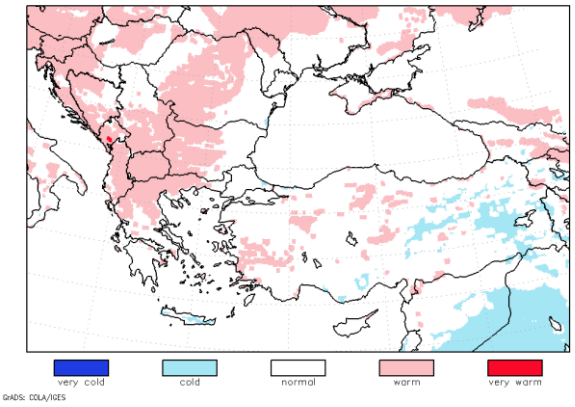
AIR TEMPERATURES AND SURFACE WATER BALANCE

*Figures in this section present anomalies of the average air temperature and accumulated water balance and classified values of average **air temperature** and **water balance** in percentile classes for 60-day period **from 2nd March to 30th April 2017**.*

AVERAGE AIR TEMPERATURE ANOMALY (°C)
2nd MARCH – 30th APRIL 2017



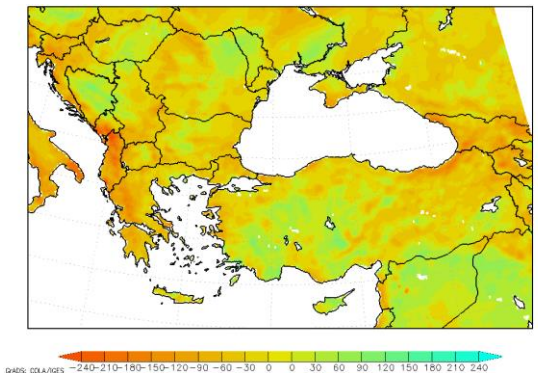
AVERAGE AIR TEMPERATURE PERCENTILE CLASSES
2nd MARCH – 30th APRIL 2017



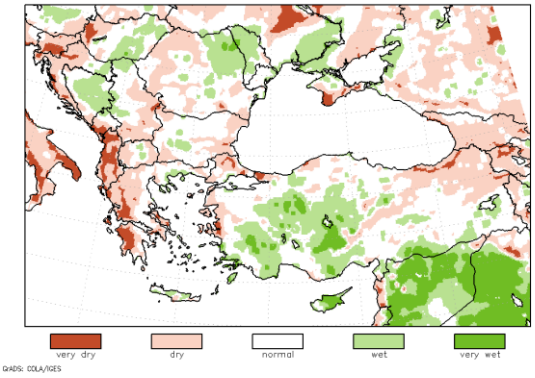
First half of April was very warm over the entire Balkan region where air temperatures reached values up to 4 °C above the normal conditions over wide area around Black Sea and up to 5 °C above the average over north-eastern Romania and Moldova. By that time eastern Turkey already experienced cold period when air temperatures dropped to around 3 °C below the average. Second half of April brought cold period also to areas in north-western Balkan

Peninsula and eastern Romania where air temperatures dropped to 3-4 °C below the average values for that time of year. The 60-day overview of the air temperature situation in the region resulted in values of anomalies ranging between 1.5 °C above normal conditions in north-western and central Balkan Peninsula to 1 °C below the average in eastern Turkey as seen on the figures above. Western Turkey, northern and southern Balkan Peninsula and areas around the Black Sea experienced no significant deviation of air temperatures from normal conditions over the last two months.

ACCUMULATED WATER BALANCE ANOMALY (mm)
2nd MARCH – 30th APRIL 2017



ACCUMULATED WATER BALANCE PERCENTILE CLASSES
2nd MARCH – 30th APRIL 2017



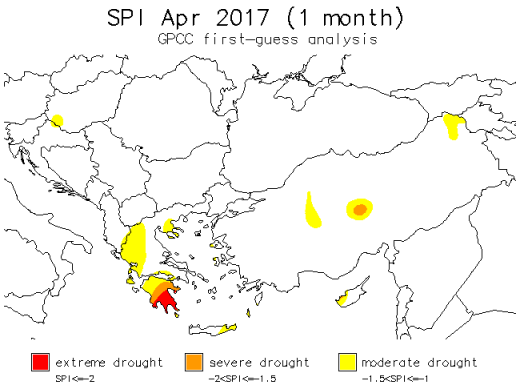
As figures above show, rainfall was spread unevenly over the region. There was positive anomaly of accumulated water balance in most of Bosnia and Herzegovina, eastern Hungary, north-eastern Balkan Peninsula and western Turkey. Water balance in those areas exceeded the long-term average for up to 90mm, some small parts even up to 120mm, being classified under the wettest 5% of the record for that area. On the contrary, north-western, central and southern Balkan Peninsula as well as north-eastern area of Turkey experienced negative water balance over the 60-day period from 2nd March to 30th April 2017 despite some rainy periods occurring in April. Countries along the western coastline of Balkan Peninsula were among the ones affected the most by the lack of rain. Detected water deficit of 150-180mm, locally even more than 210mm, in several parts of the belt stretching from Slovenia to Greece along the Adriatic Sea classifies the measures among the driest 5% of the record for that time of year.

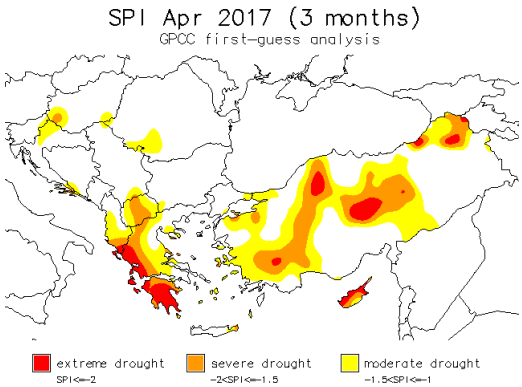
STANDARDIZED PRECIPITATION INDEX

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.

Standardized precipitation index for April (SPI 1 month) showed drought conditions present over most of Greece in the past month. While north part of the country experienced moderate drought conditions, values of SPI1 stretched below -2 for southern Greece, indicating extreme

drought conditions in that part of the country. Standardized precipitation index for the past 3-month period showed wider extend of drought conditions present in southern areas of the region, mainly due to warm and dry March. Severe to extreme drought conditions for that time period were recorded over central Turkey, northern Cyprus as well as over the entire western and southern Greece. Macedonia and parts of Turkey experienced moderate to severe drought conditions, especially areas in Turkey stretching from northeast to southwest of the country.



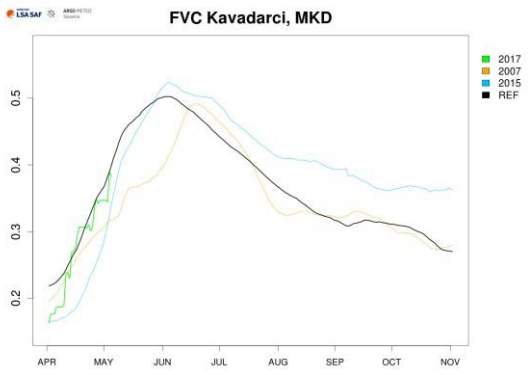


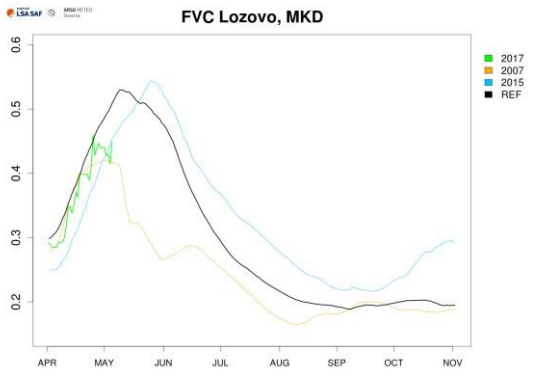
REMOTE SENSING – FRACTION OF VEGETATION COVER

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 3rd May** in some regions of South-eastern Europe. FVC values for year 2017 are presented as green line. Graphs also include reference line (2007–2016) in black and lines in blue (year 2015) and yellow (year 2007) for comparison.

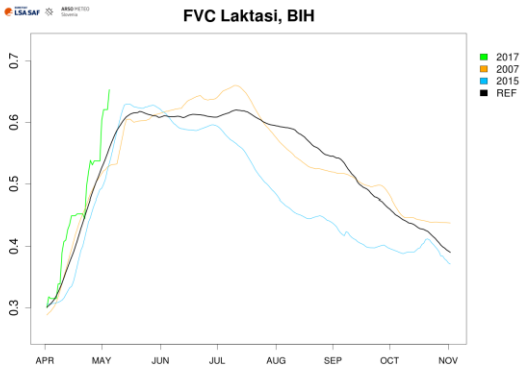
FYR MACEDONIA

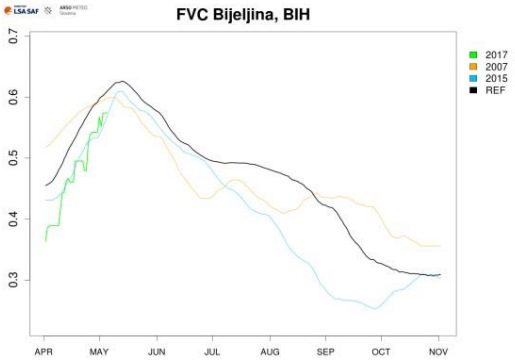


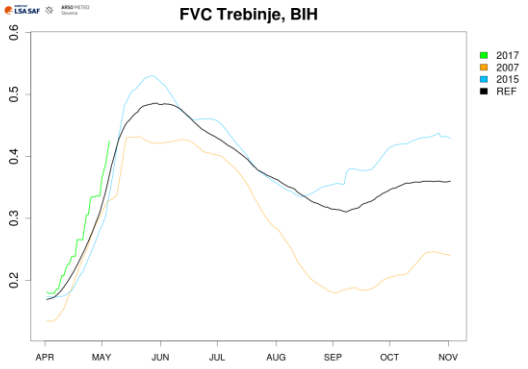


Dry conditions in first 10 days of April resulted in late vegetation development in Tikveš region (Kavadarci) compared to the long-term average. Some rainy periods later in month boosted vegetation growth and soon reached the expected level for that time of year. According to values of FVC index vegetation in Ovče Pole region (Lozovo) overall developed well this spring.

BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)



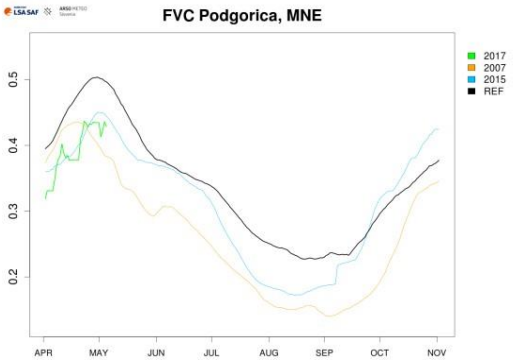




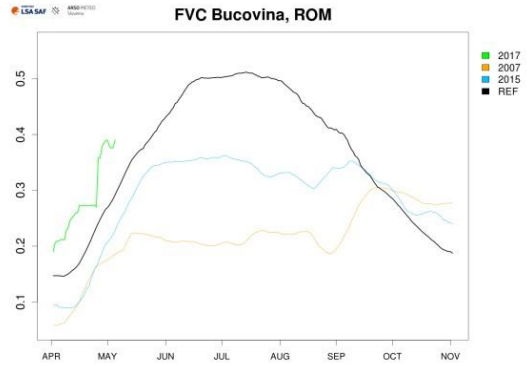
Values of FVC index for Lijevče polje region (Laktaši) and Trebinje in Bosnia and Herzegovina followed the pattern of normal conditions. Vegetation in Bijeljina seemed to develop well as month progressed and followed closely the values from 2015 in that part of north-eastern Bosnia and Herzegovina.

MONTENEGRO

Throughout the entire April vegetation developed slower than expected for Podgorica area according to fraction of vegetation cover index. Values of FVC recorded for Podgorica this year reached similar values as they did in 2015.

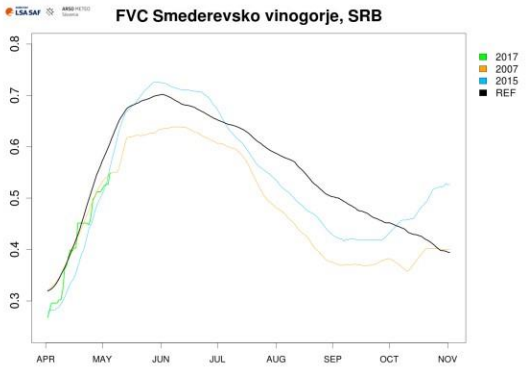


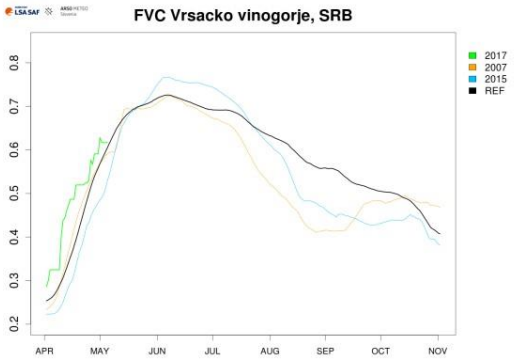
ROMANIA



Vegetation growth continued to exceed the expected level for Bucovina in north-eastern Romania. FVC values remained well above the reference line the entire month with a sudden boost of vegetation cover recorded in late April due to positive water balance conditions in north-eastern Balkan Peninsula.

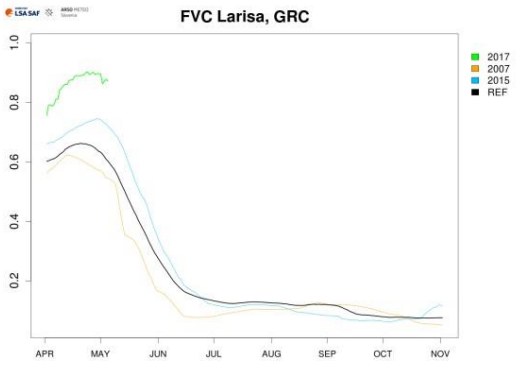
REPUBLIC OF SERBIA

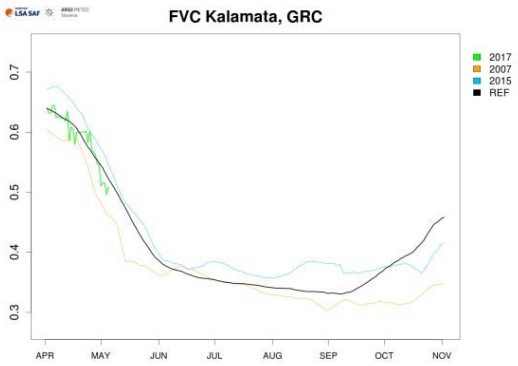




Vegetation development in regions of Smederevsko vinogorje and Vršacko vinogorje in Serbia progressed well at the beginning of this year's vegetation season according to FVC index. Values for both areas ranged around the reference values and mainly followed the pattern of normal conditions.

GREECE

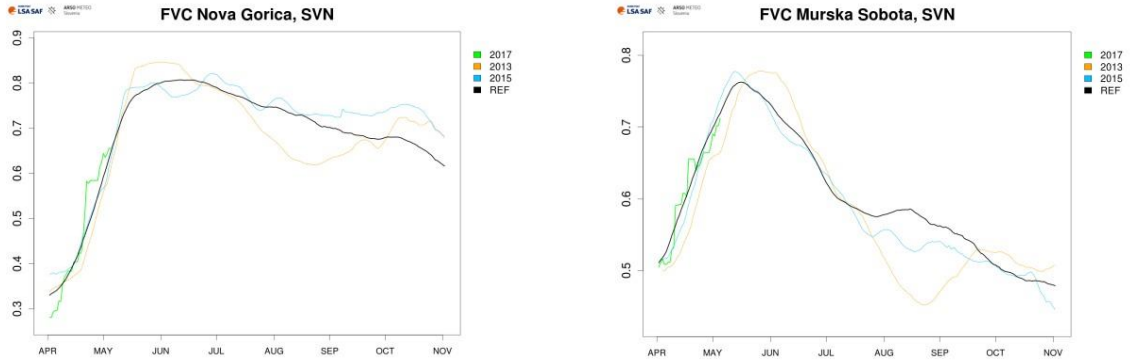




Graph for Larisa region in eastern Greece showed high boost of vegetation development into this year's vegetation season. FVC index for Larisa showed surplus of around 20% of

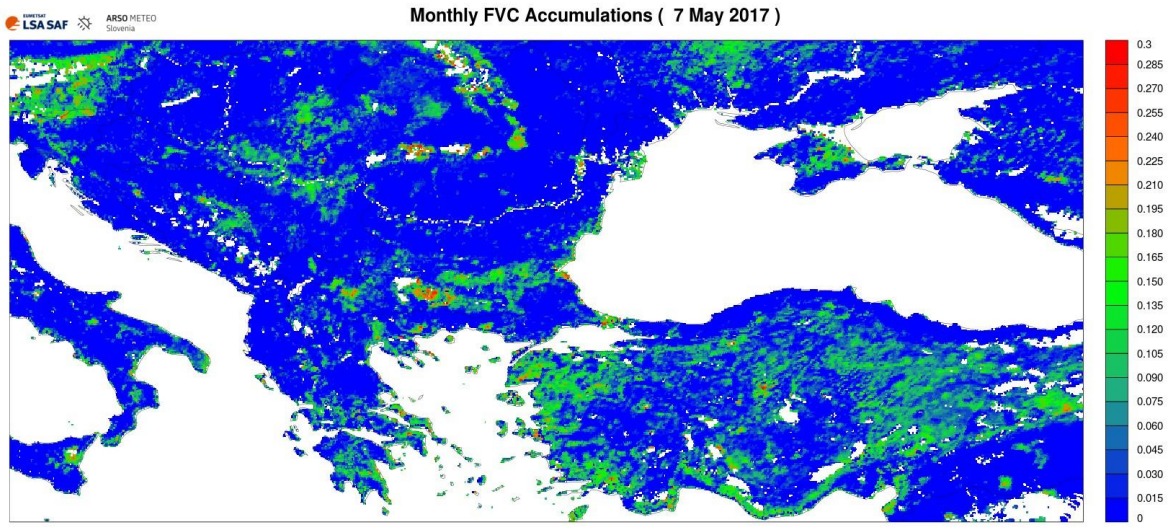
vegetation cover compared to long-term reference values. In region of Kalamata in southern Greece vegetation developed as expected and followed closely the reference line.

SLOVENIA



Values of FVC index for this year's vegetation season follow the expected values for areas of Nova Gorica in western Slovenia as well as for Murska Sobota in north-eastern Slovenia.

Figure below shows anomaly of **accumulated 30-day FVC** recorded on 7th May 2017 in comparison with the past ten years (2007-2016) and is used experimentally.



Monthly FVC index shows negative deviation of up to 18% across most of Turkey, southern Bulgaria and central and north-western Balkan Peninsula. Small scattered parts in Turkey, Carpathians and mostly in south-western Bulgaria show strong decline of vegetation cover compared to the long-term average with negative anomaly of FVC index ranging between 22-25%.

IMPACT REPORTS

No drought impacts on environment were reported around the region. Possible damage of vegetation is due to snow and frost occurring in late April over wide area of northern Balkan Peninsula.

OUTLOOK

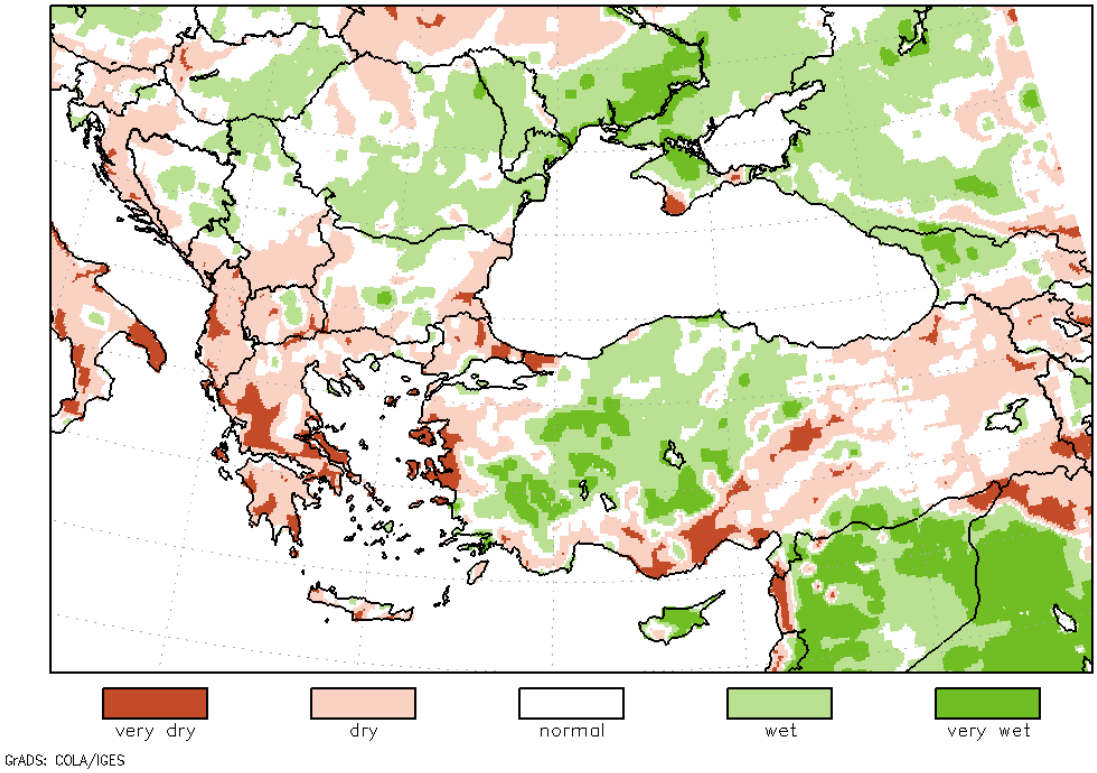


Figure presents the model simulations of the **60-day water balance anomaly** (mm) for the time period from **22nd March** to **20th May.** North-western Balkan Peninsula and north-eastern Turkey are expected to have dry conditions while southern Balkan Peninsula and southern Turkey are expected to face intense drought conditions. Wet conditions will be present in eastern Turkey as well as in northern and eastern Balkan Peninsula.

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.