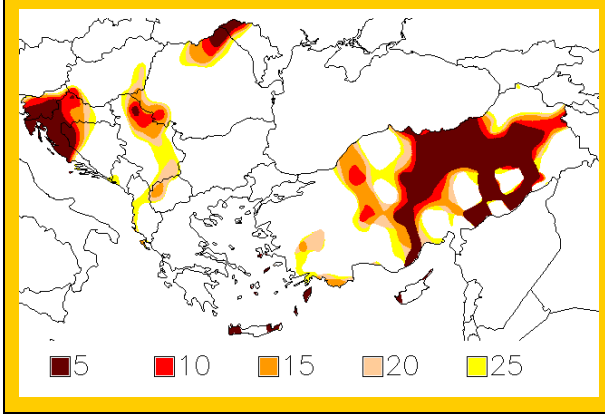
DROUGHT MONITORING BULLETIN

21st August 2017

HOT SPOT

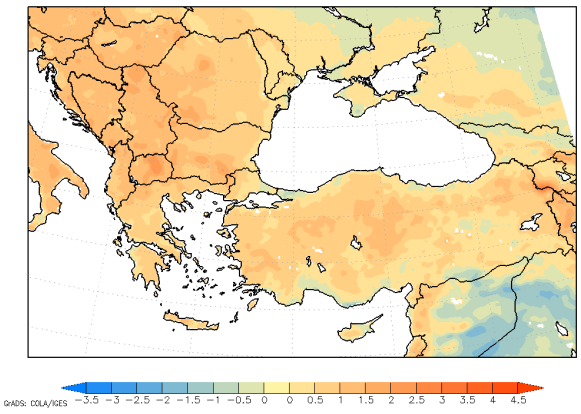


July was characterized by heat waves striking in all countries of the region. Accompanied extreme weather conditions brought air temperatures as high as 44.8 °C (Elefsina, Greece) and 46.8 °C (Bodrum, Turkey) and damaging thunderstorms in between lasting periods of hot and dry weather. Figure on the left shows **precipitation percentiles for July 2017.** Precipitation level in extensive part of eastern Turkey, Croatia and Slovenia as well as in northern Romania, Moldova and northern Serbia classifies in lowest 5th percentile in respective country.

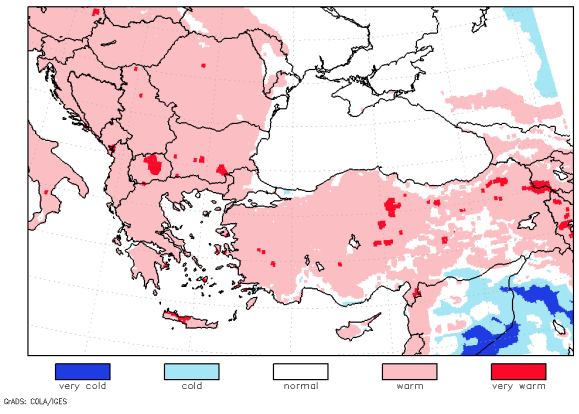
AIR TEMPERATURES AND SURFACE WATER BALANCE

*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 29thJuly 2017**.*

AVERAGE AIR TEMPERATURE ANOMALY (°C)
31st MAY – 29th JULY 2017



AVERAGE AIR TEMPERATURE PERCENTILE CLASSES
31st MAY – 29th JULY 2017

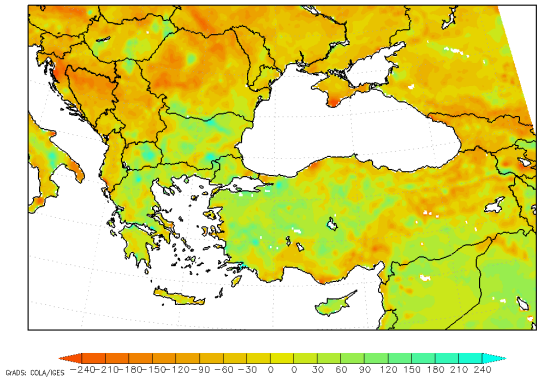


Highest air temperatures of the month were reached in its first week across the region, persisting mainly between 37–42 °C. Mean air temperatures of first decade of July were above-average in all parts of the region: from around 2–3 °C over most of Balkan Peninsula to around 4 °C above the average in parts of central Macedonia and southern Bulgaria. Slight refreshment arrived after first heat wave with mean air temperatures of second decade of July ranging from –1 °C below the average in northeastern Balkan Peninsula to 1 °C above the average over the rest of Balkan Peninsula and coastal Turkey. On the other hand, air temperatures in areas around

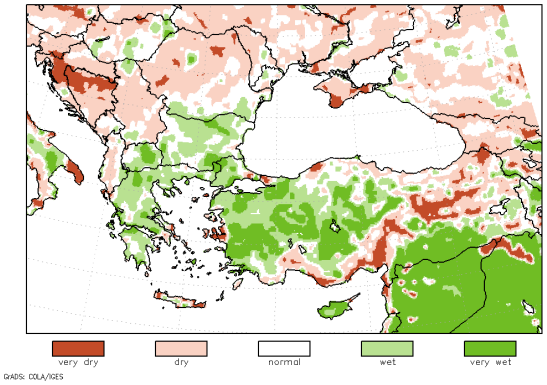
Strait of Otranto and scattered areas in continental Turkey remained between 2–3 °C above the average in mid-July. While air temperatures across Hungary, Greece, Turkey and countries along the Adriatic Sea persisted around average values in third decade of July, central and northeastern Balkan Peninsula experienced warmer period with air temperatures 1–2 °C higher than usual.

The 60-day overview of air temperatures shows almost entire region was experiencing air temperatures higher than usual for this time of year. They were up to 1 °C above the average over most of Turkey, Greece and eastern Balkan Peninsula and between 1.5–2 °C above the average in central and northwestern Balkan Peninsula and central Turkey.

ACCUMULATED WATER BALANCE ANOMALY (mm)
31st MAY – 29th JULY 2017



ACCUMULATED WATER BALANCE PERCENTILE CLASSES
31st MAY – 29th JULY 2017



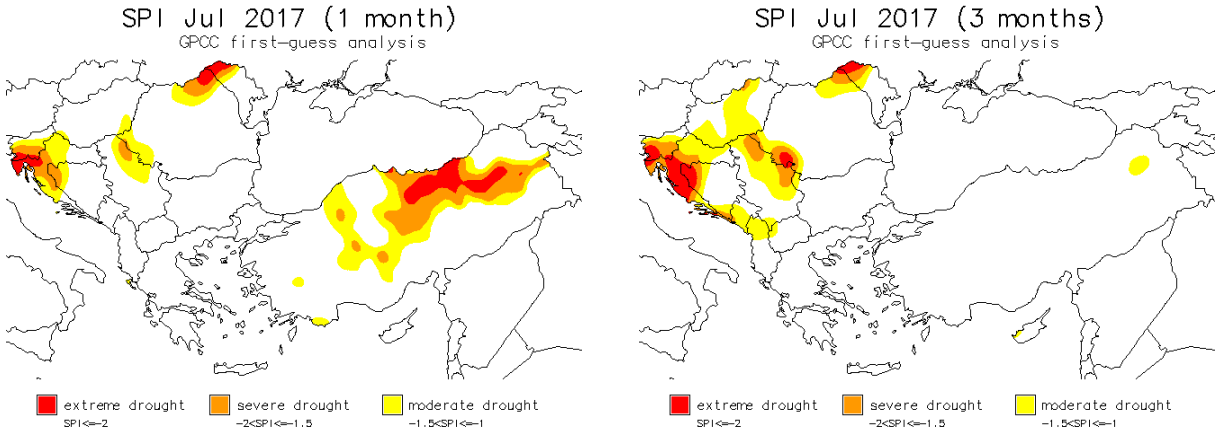
Overall surface water balance situation in June-July period did not change much in comparison to May-June period. Most precipitation in July appeared through occasional but strong thunderstorms, causing a lot of damage to infrastructure and vegetation in several countries of the region. In monthly total, least precipitation fell over Slovenia, Croatia, far northern Romania and Moldova and eastern half of Turkey. Combined with high evapotranspiration, areas of northern half of Balkan Peninsula experienced negative water balance anomaly of around 150 mm, locally even up to 180 mm. Negative water balance situation persisted also in area from southern to northeastern Turkey where water balance deficit ranged between 90–120 mm. Positive surface water balance levels were present in areas of Macedonia, Bulgaria, Greece and western Turkey where above-average rainfall rate in July was recorded, mainly through extreme local precipitations.

Accumulated water balance over the past 60 days was around the average levels in southern Balkan Peninsula and western half of Turkey. Most parts of these areas experienced water balance anomalies ranging between –30 mm to 60 mm although locally in these countries water balance surplus reached values of even up to 150 mm. Other countries in the region remained in negative water balance levels, persisting since late April. Water balance deficit ranged mainly between 60–120 mm in those countries although northern Bosnia and Herzegovina and northwestern Romania with Carpathians experienced water balance deficit of up to 210 mm, locally in Croatia even beyond 240 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.

Due to low precipitation level in July, severe to extreme drought conditions were present in small areas in far northwestern and northeastern parts of Balkan Peninsula and over wide areas in northeastern Turkey. Moderate drought conditions were present also in northern Serbia and central Turkey. The 3-month overview of SPI index shows wider extent of drought conditions over Balkan Peninsula: even though in May most of the region was not exposed to dry conditions, June and July brought drought mostly to Slovenia, Croatia, Bosnia and Herzegovina, Serbia and eastern Turkey and also in parts of Hungary, Montenegro, Albania and northern Romania and Moldova.



REMOTE SENSING – FRACTION OF VEGETATION COVER

Remote sensing products are currently not available.

IMPACT REPORTS

Hellenic National Meteorological Service issued heat wave alert in late June (29th June to 3rd July), available in pdf online, for the first heat wave this summer. General Secretariat for Civil Protection in Greece issued additional daily heat wave alerts [2, 3] as well as several extreme fire risk alerts over the month [3]. One death was reported due to extreme heat stress. Indirect consequence of hot and dry weather in Greece this July were several wildfires that hit extensive areas of coastal Greece and its islands [4].

Wildfire hit also southeastern coastline of Adriatic Sea and spread across southern Croatia and Montenegro [5-8].

In mid-July, Hungarian Meteorological Service reported that heat wave fattened the areas already experiencing drought conditions, especially its northern and northwestern part and the Great Plain have been severely to heavily affected by drought [9].

Agricultural drought in Slovenia whose roots go back to March this year, worsened over June and July as reported by Slovenian Environment Agency in mid-July [10]. Most affected were regions of northeastern and southern half of Slovenia where maize has completely stopped in growth and dry stream discharge was recorded on several rivers, described in Agency's Hydrometeorological report as of 20th July [11].

Reports on moderate to extreme drought conditions come from Serbia as well. According to Republic Hydrometeorological Institute, water levels of Tisa, Sava, Velika Morava and Danube rivers were in mid-low to low values as stated in Institute's weekly meteorological bulletins in July [12-15].

[1] http://civilprotection.gr/el/πολύ-υψηλός-κίνδυνος-πυρκαγιάς-κατηγορία-κινδύνου-4-για-αύριο-κυριακή-02-ιουλίου-2017
[2] http://civilprotection.gr/el/σταδιακή-άνοδος-της-θερμοκρασίας-τις-επόμενες-ημέρες
[3] http://civilprotection.gr/el/πολύ-υψηλός-κίνδυνος-πυρκαγιάς-κατηγορία-κινδύνου-4-για-αύριο-τετάρτη-26-ιουλίου-2017-0
[4] http://www.keeptalkinggreece.com/2017/07/07/wildfires-greece-warning/
[5] http://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2017_07/20170725_OPS-EADRCC-2017-0166.pdf
[6] http://www.mup.gov.me/rubrike/vanredne-situacije/174691/Izvjestaj-o-stanju-pozara-u-13-casova.html
[7] http://reliefweb.int/report/croatia/croatia-montenegro-and-italy-forest-fires-information-bulletin-no-1
[8] http://www.reuters.com/article/us-croatia-wildfire-idUSKBN1A21IB
[9] http://www.met.hu/idojaras/agrometeorologia/elemzes/index.php?id=1939&hir=Meleg,_valtozekony_hetvege
[10] http://www.arso.gov.si/o%20agenciji/novice/arhiv.html
[11] http://www.arso.gov.si/novice/datoteke/037977-Hidrometeorolo%C5%A1ke%20razmere%202007%202017.pdf
[12]http://www.hidmet.gov.rs/podaci/meteorologija/bilten_rana_najava/Bilten%20rane%20najave%20klimatskih%20ekstremnih%20pojava%20i%20anomalija%208.7.2017.pdf
[13]http://www.hidmet.gov.rs/podaci/meteorologija/bilten_rana_najava/Bilten%20rane%20najave%20klimatskih%20ekstremnih%20pojava%20i%20anomalija%2014.7.2017.pdf
[14]http://www.hidmet.gov.rs/podaci/meteorologija/bilten_rana_najava/Bilten%20rane%20najave%20klimatskih%20ekstremnih%20pojava%20i%20anomalija%2021.7.2017.pdf
[15]http://www.hidmet.gov.rs/podaci/meteorologija/bilten_rana_najava/Bilten%20rane%20najave%20klimatskih%20ekstremnih%20pojava%20i%20anomalija%204.8.2017.pdf

OUTLOOK

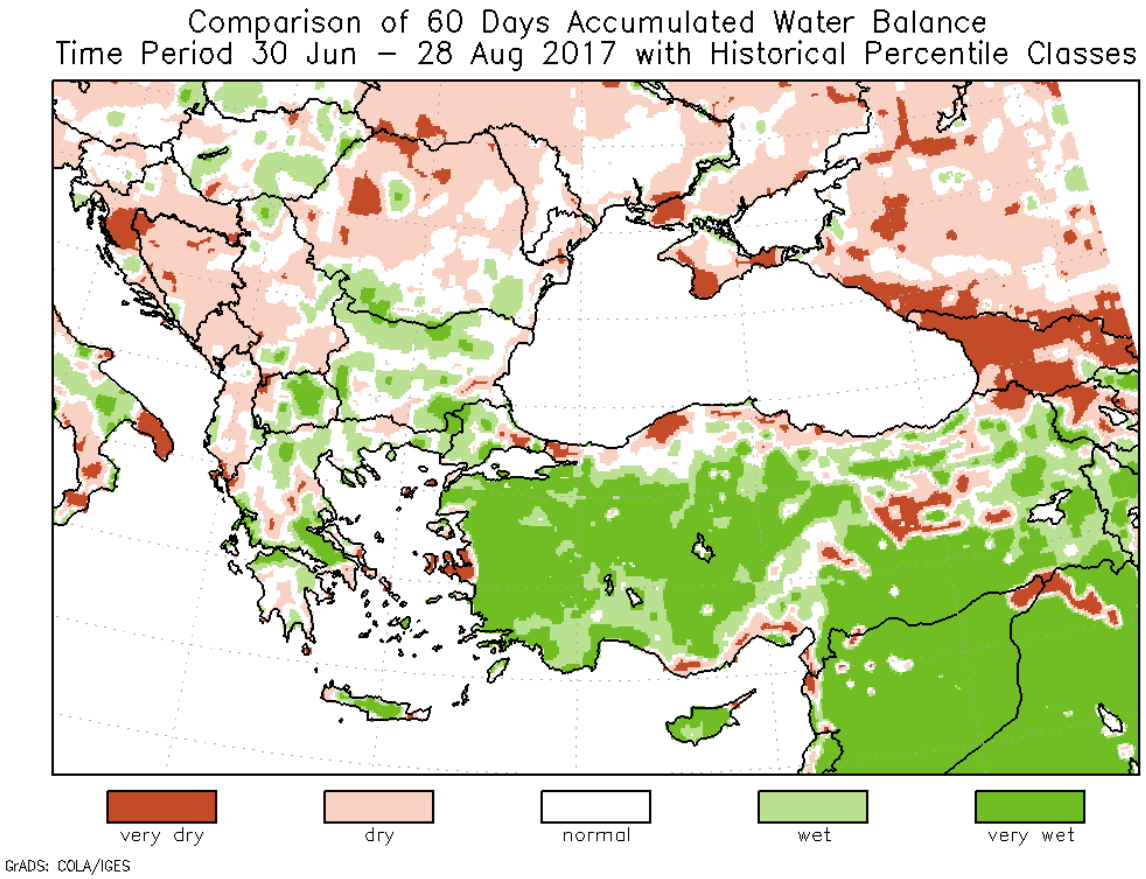


Figure presents the model simulations of the **60–day water balance anomaly** (mm) for the time period from **30th June to 28th August 2017**. Water balance conditions will improve across northern half of Balkan Peninsula: smaller extent of dry conditions will persist across this part of the region, compared to water balance situation of June-July, and several parts of Hungary, Slovenia and southern Romania all expected to experience normal water balance conditions. While less wet period is expected over Greece, Macedonia and Bulgaria, water balance conditions will get wetter across entire Turkey, meaning wider parts of the country will experience very wet conditions compared to water balance situation of previous period. Areas along its northern coastline and parts of the country from south to northeast, although now smaller than previously affected, will remain in dry conditions.

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.