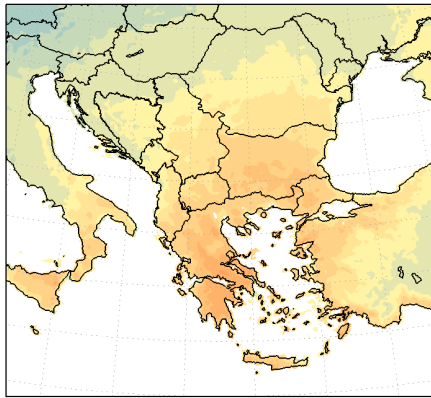


DROUGHT MONITORING BULLETIN

August 2021

HOT SPOT

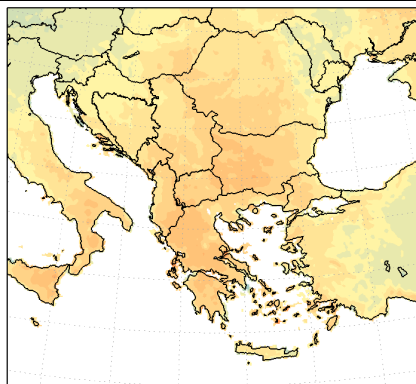


Early August was unusually warm across southern half of the region. In many places across Albania, North Macedonia, Bulgaria, Greece and Turkey, daily air temperatures reached 40-42 °C, in central Greece they stretched as high as 44 °C. The Aegean Sea area was also the one with the highest anomalies of a 10-day mean air temperature between 30 July and 8 August 2021 in the region where it exceeded the long-term average for 4-6 °C, as seen on figure on the left.

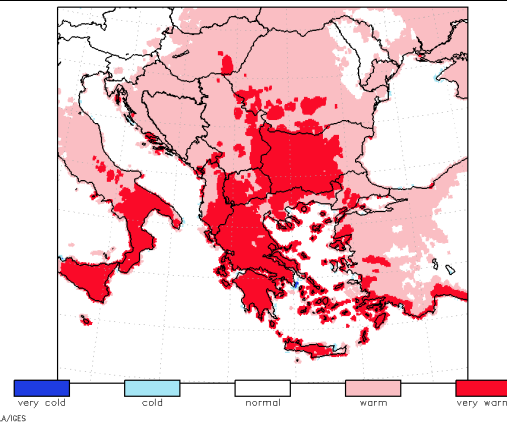
AIR TEMPERATURE AND SURFACE WATER BALANCE

Figures in this section present anomalies of the average air temperature and accumulated surface water balance as well as classified values of the average air temperature and surface water balance in percentile classes for 60-day period from 30 June to 28 August 2021.

AVERAGE AIR TEMPERATURE
ANOMALY (°C)
30 JUNE – 28 AUGUST 2021



AVERAGE AIR TEMPERATURE
PERCENTILE CLASSES
30 JUNE – 28 AUGUST 2021

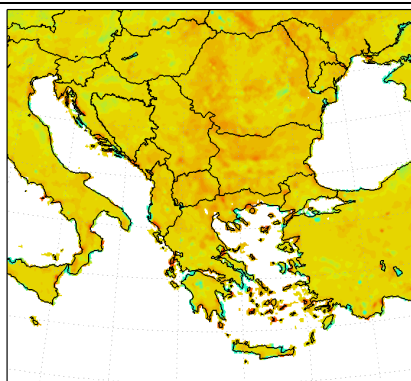


August mean air temperature shows clear north-south gradient as August was colder than normal over northern half of Balkan Peninsula, especially over Slovenia, Hungary, northernmost Romania and Moldova where monthly air temperature mean was 1-1.5 °C lower

than normal, while countries in southern half of the region noted August 1.5-2 °C warmer than usual, in Greece even up to 3 °C. Unusually warm were especially first days of the month during which air temperatures in southern half of Balkan Peninsula and northwestern Turkey stretched 4-6 °C above the average for this time of year. They remained above-average over Balkan Peninsula also during mid-August days when vast part of the region was experiencing 2-4 °C higher air temperatures than normal. Turkey, in the meantime, was already caught in colder air temperatures, they were below their long-term average for up to 3 °C, especially across its central third. The situation shifted in last days of August when air temperatures in Turkey again rose slightly above the average and countries in southern half of Balkan Peninsula did not experience any greater deviation, but countries in its northern half, especially Slovenia, Hungary, Croatia, Bosnia and Herzegovina but also northern Serbia were faced with air temperatures 2-4 °C colder than used to.

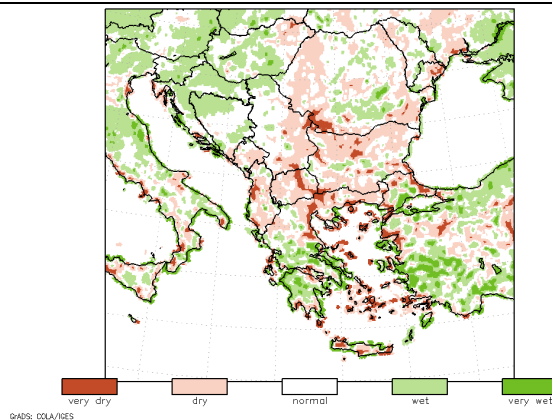
Taking into account also July air temperatures which were well above-average across the entire region, 60-day mean air temperature covering July and August reveals nearly all countries in the region experienced 1-2 °C warmer past two months than usual. Even more unusually warm was over Greece and southwestern Bulgaria where 60-day mean exceeded the average for up to 2.5 °C. On average, July and August air temperature balanced out to more or less normal values only across Slovenia, western Hungary, Moldova and central Turkey.

ACCUMULATED WATER BALANCE
ANOMALY (mm)
30 JUNE – 28 AUGUST 2021



©ADS: COLAVIES

ACCUMULATED WATER BALANCE
PERCENTILE CLASSES
30 JUNE – 28 AUGUST 2021



©ADS: COLAVIES

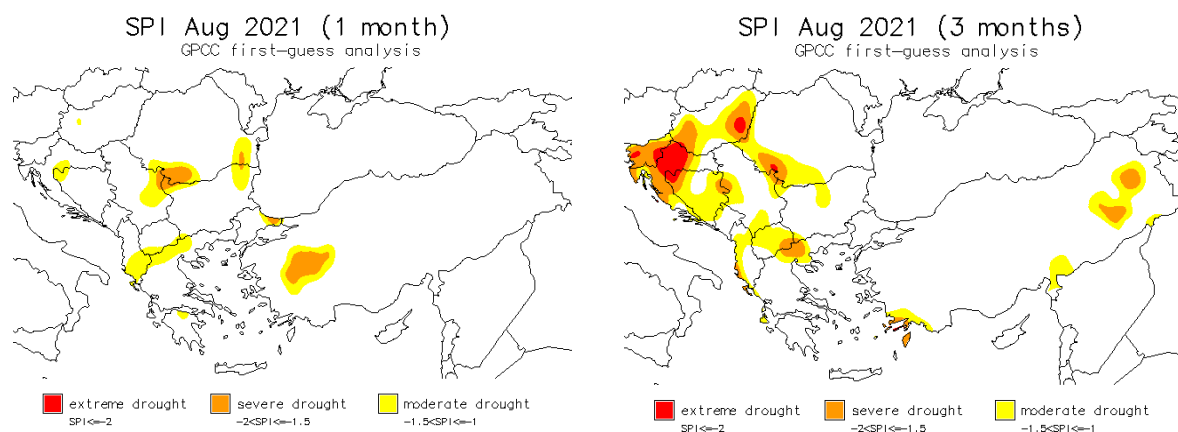
Also precipitation-wise August was mild and favourable across northern and eastern part of the region, from Slovenia, Hungary, most of Romania to Moldova but also over most of Bulgaria. Even areas along southern Adriatic Sea received slightly higher than normal precipitation amount. However, central and southern part of Balkan Peninsula encountered dry to very dry August, while on the other hand August brought unusually high amount of precipitation to central Turkey. Together with July, which too also very dry across great part of southern and eastern Balkan Peninsula, the 60-day surface water balance conditions show greatest deficit, of up to 150 mm, in a belt across the central part of the region, from northeastern Greece, North Macedonia, western Bulgaria to northwestern Romania. Not much lower was the deficit in central Greece and Moldova, of up to 120 mm. Other areas encountering noticeable surface water balance deficit over the July-August area include eastern Hungary, Montenegro, eastern Romania and parts of Albania with water balance deficit of up to 60 mm. Elsewhere in the region, surface water balance ranged about the average values although continental Croatia, northwestern Bosnia and Herzegovina, scattered areas in southern Greece and southwestern

Turkey recorded higher surface water balance surplus, between 60-120 mm, locally in southern Greece even over 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.

Standardized precipitation index for **August 2021** 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.



Most of the region received more or less average or above-average precipitation amount in August, according to SPI1. However, lower-than-usual precipitation amount in some localised areas indicates moderate drought conditions across a central belt of Balkan Peninsula, including border area between Croatia and northwestern Bosnia and Herzegovina, area along southern Albania and northern Greece, southeastern Serbia and over the coastal areas of Romania and Bulgaria. Additionally, southwestern Romania and over central-western Turkey experienced August precipitation deficit as high as to indicate severe drought conditions that month.

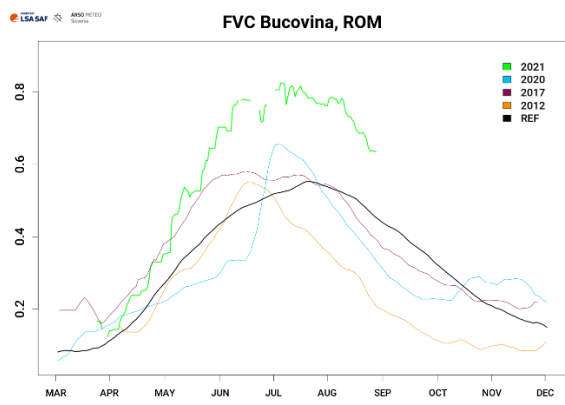
Over the 3-month period, accumulated precipitation amount remains well below the average, indicating severe to extreme drought, mostly across scattered areas in northwestern quarter of the region as well as northeastern Turkey, mostly on the account of extremely dry June, meaning accumulated precipitation level in July and August over those areas could not even up the June deficit. Severe drought conditions over the summer months, according to SPI3, were present also in North Macedonia and northern Greece as well as along southern Romania, which seem to develop on the account of extremely dry conditions in July, which in moderate to severe level persisted into August.

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 lower at the beginning of the growth season, the highest at the full vegetation development, then FVC slowly drops with vegetation senescence. Line shape depends on sort of the vegetation.

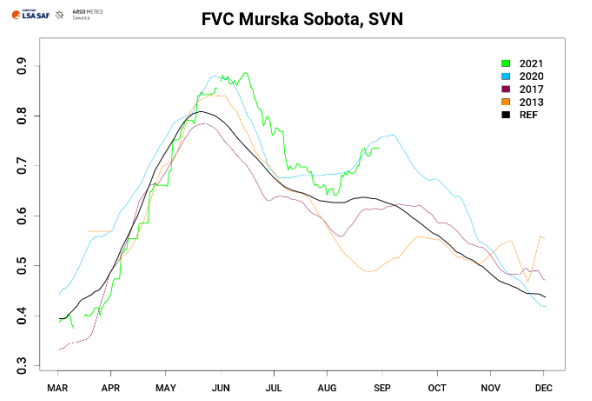
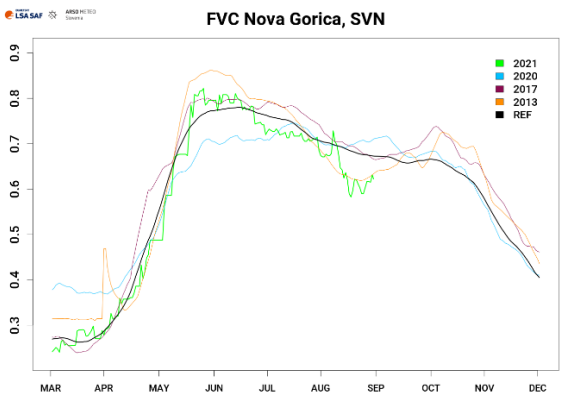
Graphs below present the **vegetation situation** as recorded on **31 August 2021** in some regions of Southeastern Europe. FVC values for year 2021 are presented as a green line. Graphs also include reference line (2004–2020) in black, and lines in light blue (year 2020), magenta (year 2017) and orange (year 2012, or 2013 for Slovenia) for comparison. Possible missing values or sharp decline of values could be a result of prolonged cloudy weather, extreme weather events or snow blanket.

ROMANIA



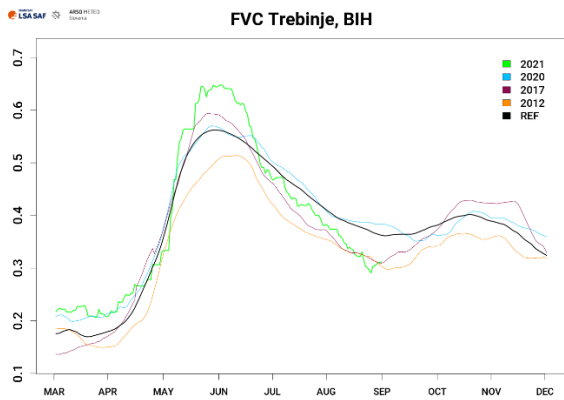
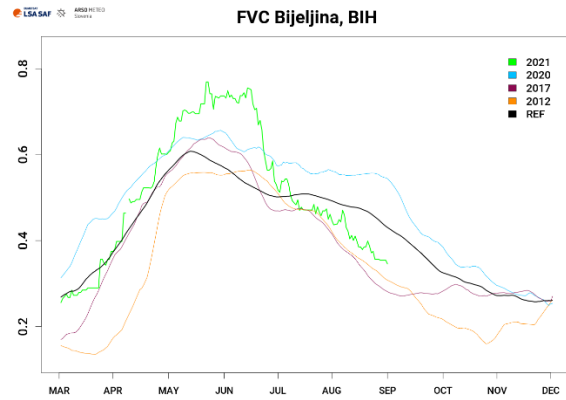
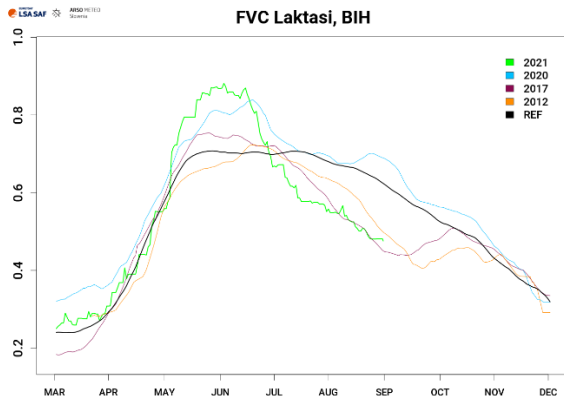
Vegetation in Bucovina, northern Romania has had a favourable season, according to FVC values which have continuously been exceeding the usual values throughout this year. During the peak phase of its development, vegetation coverage was approximately 25 % higher than normal. August was mostly characterized by vegetation senescence which was occurring at a slightly higher rate than usual, although the coverage with green vegetation remain above-average, for about 20 %.

SLOVENIA



Throughout summer months, vegetation development in Nova Gorica, western Slovenia was more or less following its regular pattern although FVC values in late June and July indicate vegetation was not experiencing favourable conditions for its development. Early August saw a rapid decline in coverage with green vegetation which remained up to 10 % lower than normal until the end of the month. In Murska Sobota, northeastern Slovenia, vegetation has had a regular-to-favourable season, as FVC values followed well its usual pattern of development in first months of the season, then continuously exceeded the average for up to 15 % since mid-May. Also August, which normally encourages a subtle second peak, saw a noticeable increase in vegetation cover this year, much greater than normal and similar to a year before.

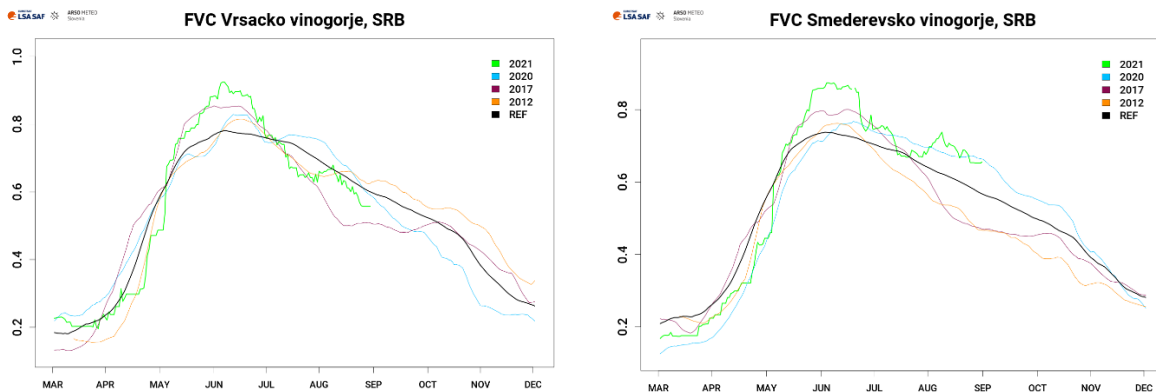
BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)



Throughout August, fraction of cover with green vegetation fell deeper below the average at all three location in Bosnia and Herzegovina. After a reasonably average first months of the season, and a boost in vegetation growth in May and first half of June, vegetation development in Laktasi and Bijeljina along the northern border as well as in Trebinje in the south of the country experienced a period of progressive decline. At the end of August, FVC values at the three locations are approximately 20 % below the

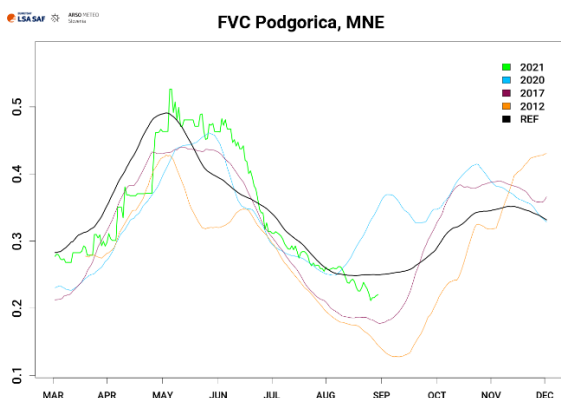
average in Laktasi, and approximately 10 % below the usual values in Bijeljina and Trebinje, with a pattern of vegetation development similar as experienced in a drought year 2017.

REPUBLIC OF SERBIA



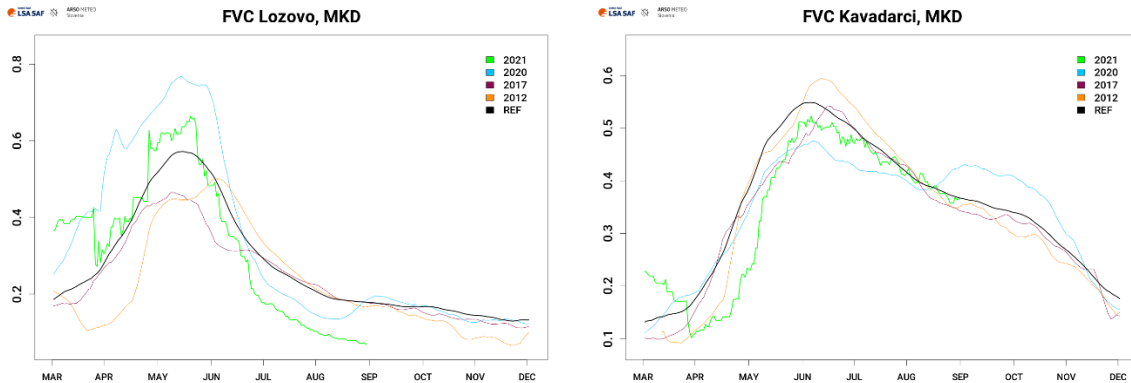
Vegetation development in Vrsacko vinogorje, northeastern Serbia and in Smederevsko vinogorje, central Serbia was slightly delayed in March and April, according to FVC, followed by a boost in vegetation growth in peak time of vegetation development from mid-May to mid-June. Graphs for both location reveal noticeable decline of vegetation cover after mid-June as initially up to 15 % higher-than-normal FVC values dropped to average at the rate much higher than normal, and reached average values in early days of July in Vrsacko vinogorje, and by mid-July in Smederevsko vinogorje. Vegetation in Vrsacko vinogorje continued to experience unfavourable conditions, as reflected in a steady drop in FVC values until early August when temporal relief is indicated by a short-lasting increase in coverage with green vegetation. Then, under-average FVC values continued until the end of August. Even more noticeable is a short-lasting increase of FVC values in early August at Smederevsko vinogorje, indicating temporal vegetation recovery to above-average vegetation cover, before senescence continued throughout the rest of the month.

MONTENEGRO



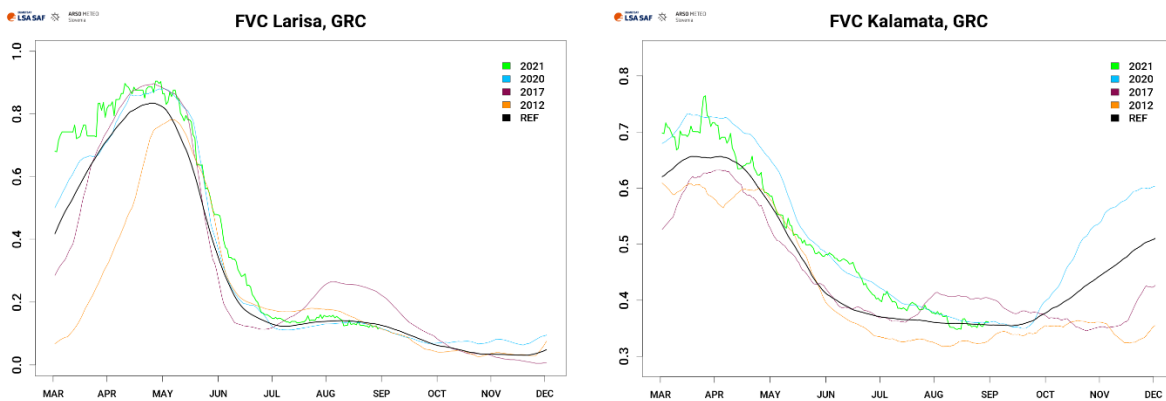
Vegetation development in Podgorica, southern Montenegro began later than usual, but favourable weather conditions in late spring resulted in reaching peak values at the usual time in the season, and which lasted almost a month longer than normally observed. From mid-June onward, decrease of above-average FVC values can be seen on the graph, indicating unfavourable summer weather conditions, which saw FVC drop to below-average values by the end of June already. Since then, vegetation senescence seem to progress at its usual rate although August saw further decline despite flattening of the senescence curve would be expected.

NORTH MACEDONIA



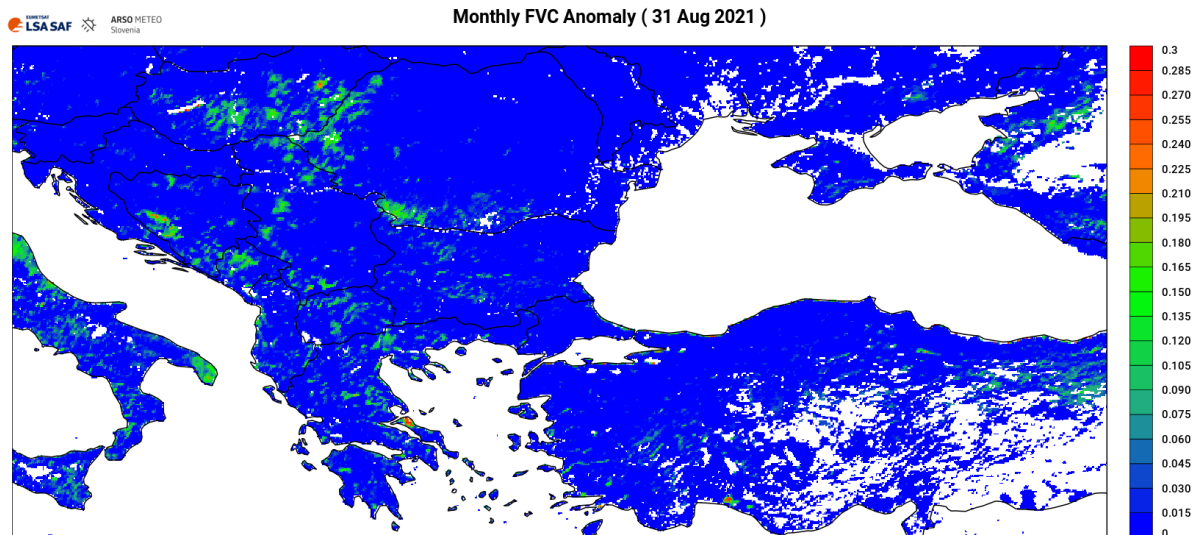
FVC graphs for both locations in North Macedonia reveal vegetation experienced very different development paths this season. In Kavadarci in the south, vegetation growth began later than normal, consequently the coverage with green vegetation at its peak time was slightly lower than usual, but senescence phase that followed was progressing at its usual rate, leaving vegetation cover at the end of August at its average level. On the other hand, vegetation in Lozovo, central North Macedonia had been experiencing highly unfavourable weather conditions since late May onward. After the peak time in mid-May, vegetation senescence progressed at the higher rate than normally, bringing the coverage with green vegetation from approximately 55 % at its peak time down to less than 20 % by early July, and to approximately 5 % by the end of August. FVC values at the end of August were not as low even in year 2020 which brought unfavourable weather conditions in summer months.

GREECE



Vegetation at both locations in Greece does not appear to experience stressful periods this season. In Larisa, central Greece, vegetation cover was close to its peak level at the beginning of March already, indicating favourable weather conditions for vegetation growth in spring months. Peak value slightly exceeded the usual level expected for late April, and vegetation senescence that followed progressed at its regular rate, resulting in no major deviations from the average. Also in Kalamata, southern Greece, vegetation cover in early spring months was higher than normal. After a regular rate of vegetation senescence from early April to mid-May, much slower than normal rate of FVC decline from mid-May onward indicate summer weather conditions supported a mild rate of vegetation senescence, resulting in above-average level of vegetation cover throughout all summer months until early August.

Figure below shows negative anomaly of **accumulated 30-day FVC values** as recorded on **31 August 2021** in comparison to the past 17 years (2004-2020), and is used experimentally.



August accumulation of FVC anomalies shows greatest deficit in a wider area across Pannonian Basin, along southern Romania especially in its south-east, and over the southern Adriatic Sea belt from western Bosnia and Herzegovina to North Macedonia, where monthly accumulation of vegetation cover was between 15 % and 25 % lower than normally for this time of year. In addition, monthly deficit of vegetation cover, although to a smaller extent, can be observed in many local areas scattered across the south part of the region, namely Montenegro, Albania, Greece and Bulgaria but also across northeastern Turkey. Meanwhile, vegetation cover appear to be unaffected across the northwestern and northeastern part of the region, namely northern half of Croatia, Slovenia, most of Romania and Moldova.

DROUGHT IMPACT REPORTS

CROATIA

Drought in early summer and accompanied strong heatwaves gradually dried up the topsoil layer, and plants with a shallow root system were suffering from water shortages. In the last three months, drought in Istria peninsula has been persistent and accompanied with maximum air temperature above 30 °C over the period of 50 days. In the area of city of Pula, this summer was one of the driest in the last 30 years ^[1, 2]. The soil was completely dry, resembling a desert. Drought occurrence in Istria substantially reduced crop yield. The drying of vegetation in Dalmatia created the conditions for forest fires ^[3]. Significant drought impacts on agriculture were recorded at the southern Adriatic coast (Dubrovnik and Hvar) where only 6.4 mm of precipitation amount was recorded in more than three months ^[4]. The leaves of vegetables, fruit trees and olives withered and shriveled. Fruits fall off could be expected upon further rainless conditions, while best scenario foresaw the average yield. Due to the absence of the necessary precipitation during June and July, great losses occurred in the entire agricultural production. Farmers in many counties expect reduced crop yield, likely to significantly or even substantially

[3, 4]. Vegetable production and citrus trees were damaged. Lemon tree veined due to not enough water for irrigation, and in addition due to the high prices of water. It altogether resulted in increasing green market prices. A state of natural disaster due to drought was declared in most of the Bjelovar-Bilogora County in the northeastern Croatia [3].

In the Neretva River valley, which was experiencing reduced inflow of water from the Neretva, salty sea water penetrated into the canals, having an adverse effect on plants and yields as well as the whole area which became increasingly saline. In the Koprivnica stream, fish died due to drought, lack of water and lack of oxygen in the water [3].

[1] https://meteo.hr/klima.php?section=klima_pracenje¶m=spi&el=prspi

[2] https://meteo.hr/klima.php?section=klima_pracenje¶m=ocjena

[3] https://meteo.hr/proizvodi.php?section=publikacije¶m=publikacije_publicacije_dhmz&el=bilteni (publication is in preparation)

[4] https://meteo.hr/klima.php?section=klima_pracenje¶m=spi&el=karte_suse&Week=210805

BOSNIA AND HERZEGOVINA

Due to extreme heat and prolonged drought, crops have been largely damaged in Bosnia and Herzegovina and yields are expected to be drastically reduced compared to last year. The damage is most vivid on corn crops, the most important agricultural crop in terms of production volume, with yield expected to be up to 70 % lower than last year [1, 2]. Corn crops in Semberija alone, north-eastern Bosnia and Herzegovina, suffered drought damage of 30-70 % in various localities, while certain places will bear not be even 10 % of the yield [3, 4, 5]. Also fields of wheat in Semberija, Lijeve polje, Sprecko and the fields along the river Bosna and in Bosanska Posavina were nearly fully compensated [2]. According to the Association of Farmers of Tuzla Canton, the sunflower yield is reduced by up to 50% compared to last year, and an increase in the price of sunflower oil is nearly certain [6]. When it comes to food production, this is by all accounts one of the most difficult years for the country. According to the estimates of the Association of Agricultural Producers, the damage amounts to around 1.5 billion marks [7]. Livestock sector is also among those affected by drought. Highly unfavorable weather conditions reduced the yields of fodder, likely to be by more than half. Meadows, which were normally mowed three times a year, were mowed only once this year, while the rest was in great portion damaged by drought. Lack of fodder will especially affect those keeping dairy cows, bulls and pigs, which require a lot of food. The drought also affected the cattle themselves, resulting in a number of cattle death cases in the last month due to the enormous heat. The amount of fodder yield is expected not to be enough for the existing livestock, thus farmers will be forced to reduce the number of heads in livestock or even give up livestock breeding [1, 8, 9]. In addition to many farmers, cattle breeders and fruit growers, the negative impacts of drought in agriculture were felt also by buyers. Drought damage, most reflected in agriculture and the production of cereals, vegetables, fruit growing, and also livestock, resulted in consequent enormous jump in produce prices [10].

The water levels of most rivers in Republika Srpska, eastern part of Bosnia and Herzegovina, were at a minimum, which led to increase in temperature and decrease in the presence of oxygen in the water, having negative effect on the river ecosystems. The water levels on some rivers in Republika Srpska, including the Bosna River, were close to the historical minimum and smaller watercourses were drying up, which was reflected in the life of fish communities in the water. According to fishermen with decades of experience, they had almost never encountered such a situation on the rivers before [11].

[1] <https://www.politika.rs/sr/clanak/485266/Susa-i-pandemija-uticu-na-cenu-hrane>

- [2] <https://avaz.ba/vijesti/bih/674847/dramaticno-stanje-u-poljoprivredi-susa-opustosila-polja>
[3] <https://www.akta.ba/vijesti/uz-prepolovljene-padavine-i-steta-na-usjevima-od-30-do-70-posto/138807>
[4] <https://www.akta.ba/kapital/susa-spalila-i-do-70-prinosa-kukuruza-u-bih/137894>
[5] <https://www.akta.ba/vijesti/susa-ce-znatno-uticati-na-usjeve/138330>
[6] <https://www.akta.ba/kapital/susa-pokosila-suncokret-u-bih-i-jos-zagrijava-cijenu-ulja/138811>
[7] <https://www.akta.ba/vijesti/gubici-zbog-suse-veci-od-milijardu-i-po-km/138607>
[8] <https://www.akta.ba/vijesti/stocari-na-mukama-presusila-hrana-za-stoku-farmama-u-bih-prijeti-katanac/138379>
[9] <https://www.nezavisne.com/ekonomija/agarar/Prijeti-smanjenje-stocnog-fonda-i-zatvaranje-farmi-u-BiH/676631>
[10] <https://avaz.ba/vijesti/bih/674847/dramaticno-stanje-u-poljoprivredi-susa-opustosila-polja>
[11] <https://www.nezavisne.com/ekonomija/privreda/Susa-ugrozila-riblji-svijet/675685>

SERBIA

This year, drought was not of the same intensity as in previous years and it did not affect all parts of Serbia equally ^[1]. Lasting for about a month and a half in early summer, followed by extremely high temperatures, it greatly reduced vegetable yield, thus prices will continue to rise, according to the association of vegetable growers. In addition, the conditions for insect breeding were favorable to a point there were three or four generations more than usual ^[2]. When it comes to other agricultural crops, most affected were corn and soybeans due to great heat and severe drought at the time of flowering and fertilization ^[3]. Farmers of Kraljevo, central Serbia, estimated the loss of corn yield of up to 40 % compared to last year. Only farmers who have irrigation systems could count on any better yields across the country ^[4]. Reported by the Zemun Corn Institute, depending on the area, the corn yield would be 30-50 % lower than expected ^[5]. According to the Zita Srbije Association, drought negatively affected soybeans almost more than corn which is still in better condition than in previous drought years 2012, 2015 and 2017, while the prognosis for soybean yield is more unfavourable ^[1, 4]. Cattle breeders too were negatively affected, as drought and extremely high air temperatures almost destroyed all the pastures, including Vojvodina, northern Serbia. Cattle breeders were already forced to use fodder kept for winter stock, which raises concerns for autumn and winter ^[3, 6].

Prolonged drought and high, often above-average daily temperatures this summer affected the river water levels across Serbia. According to the Republic Hydrometeorological Institute, the water level of tributaries of the Morava River, the Kolubara River, smaller rivers on the Banat watercourses as well as the Jadar River in wider central belt of Serbia were worryingly low with further decline observed. Small and medium-sized rivers were already in stagnation, with practically no flow and at the biological minimum, which meant both flora and fauna were endangered due to the lack of oxygen. The water levels in upper course of the Sava River were also declining, and navigation could be suspended. Due to the extremely low water level of Rzav in western Serbia, an emergency situation was declared and restrictive measures came into force in five local governments that are supplied with water from the Rzav system - Cacak, Arilje, Pozega, Lucani and Gornji Milanovac ^[7, 8, 9]. Islands and islets were formed on the longest Serbian river, Velika Morava, through Pomoravlje. According to fishermen, in most places the water is black from decaying algae and plants, slowed down, and in some places it looked more like a pond. Due to the low water level, the remains of old wooden bridges from the Turkish era, emerged from the river near Cuprija and Svilajnac ^[10]. Worryingly low were also Sava River near Sabac and Sremska Mitrovica where water levels were up to 2,5 m lower than normal, which made river navigation difficult and a warning was issued by Republic Hydrometeorological Institute that navigation is not safe in that area. In the area of Vojvodina, northern Serbia, Moravica and Brzava almost dried up, and pumping from the Danube-Tisa-Danube canal needed to be carried out ^[11]. Mayor of Mionica municipality also reported springs were drying up and some villages did not have enough water even to feed the cattle. Drinking water needed to be provided with cisterns, a decision was made on a strict ban on the use of drinking water for irrigation and other purposes, and the inspection was ordered to intensify

supervision on the ground ^[12, 13, 14]. Due to the long-lasting drought in Nova Varos, southwestern Serbia, the town springs were at their minimum and water use restrictions came into force. Water in the tourist zone on Zlatar and the city settlements of Milanovac, Sanac, Branosevac and Razista was turned off from 10 in the evening to 5 in the morning ^[15].

[1] <http://www.tanjug.rs/full-view.aspx?izb=674779>

[2] <https://beta.rs/ekonomija/ekonomija-srbija/151009-povrce-u-srbiji-zbog-suse-sve-skuplje>

[3] <https://www.rts.rs/page/stories/sr/story/125/drustvo/4464882/banat-usevi-stanje-susa-vrucina.html>

[4] <https://www.rts.rs/page/stories/sr/story/125/drustvo/4482621/sudja-zitarice-rod-navodnjavanje.html>

[5] <https://www.glas-javnosti.rs/ekonomija/susa-obara-standard-sok-cene-za-kukuruz-secser-7388>

[6] <https://www.rts.rs/page/stories/sr/story/57/srbija-danas/4481063/zbog-suse-manje-trave-na-pasnjacima-u-vojevodni.html>

[7] <https://www.rts.rs/page/stories/sr/story/125/drustvo/4480995/susa-opadanje-reka-srbije.html>

[8] <https://www.rts.rs/page/stories/ci/story/124/drustvo/4476959/vanredna-situacija-cacak-rzav.html>

[9] <https://www.glas-javnosti.rs/drustvo/zapadna-srbija-presusila-zedna-su-ljudi-stoka-zemlja-2704>

[10] <https://www.politika.rs/sr/clanak/485531/Susa-formirala-ostrva-na-Moravi>

[11] <https://www.politika.rs/sr/clanak/486167/Suva-recna-korita-u-Srbiji>

[12] <http://www.tanjug.rs/full-view.aspx?izb=675993>

[13] <https://www.novosti.rs/srbija/vesti/1026236/vojska-poslala-cisterne-pomaze-vodosnabdevanje-ugrozenih-opstina>

[14] <https://www.novosti.rs/srbija/vesti/1027185/delu-opstine-mionica-vanredna-situacija-zbog-suse-sest-sela-bez-vode-stizu-cisterne>

[15] <https://www.novosti.rs/srbija/vesti/1024281/presusilo-nebo-suve-slavine-dok-iscekuju-padavine-novoj-varosi-prinudjeni-restrikcije-vodosnabdevanju>

MONTENEGRO

Dry taps, yellowed meadows in the mountainous areas of Zabljak and Sinjavina and dried-up springs are some of the result of a huge deficit of precipitation in the whole of Montenegro since March, as well as extremely high air temperatures this summer. Several springs in Sinjavina dried up, so cattle breeders were forced to bring water on horses from remote areas. Some rural areas too were without water for days, as there was simply not enough in the system. In Martinici, water pump functioned for an hour and a half per day as water supply from the Slatina spring was at a minimum ^[1].

[1] <https://www.vijesti.me/vijesti/drustvo/562700/susa-zatvorila-cesme-presahla-izvore-pozutjela-livade>

NORTH MACEDONIA

Agrometeorologists reported of drought damage on of corn and sunflower, as well as outdoor vegetable crops where yields are expected to be very low, and in some areas it is estimated that there will be no yield at all. Endangered due to drought were also the vines and fruits that had so far drawn water from the deeper layers ^[1].

[1] <https://republika.mk/vesti/ekonomija/ovoshkite-i-vinovata-loza-najzagrozeni-od-sushata-vo-opasnost-se-i-pchenkata-i-sonchogledot/>

GREECE

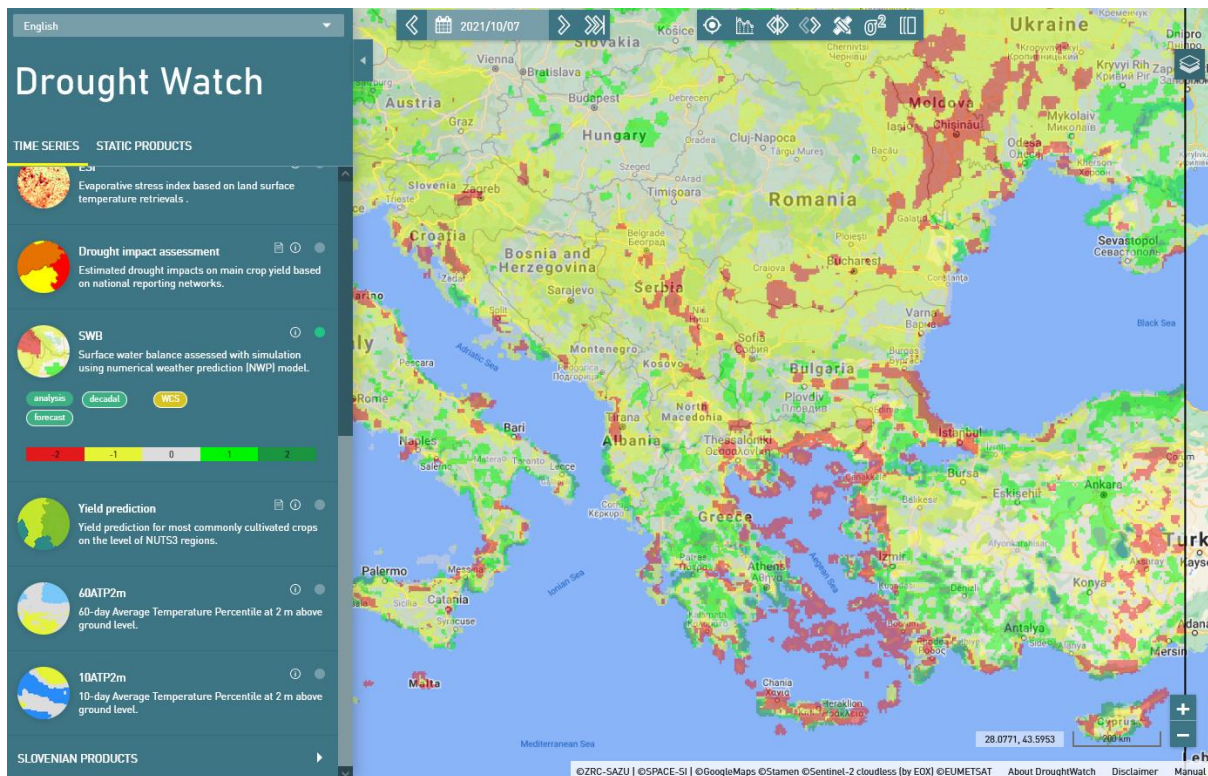
This summer in Greece was characterized by several days with high temperatures. The major heatwave that started in the last days of July and continued until the first days of August (from 28 July to 5 August) ^[1], together with a succession of several days without precipitation in most of the country, created favorable conditions for forest fires in various areas. The most extensive forest fires occurred in Attica ^[2,3], Evia ^[4] and Peloponnese ^[5], and caused significant damages in forest and agricultural areas. In the Peloponnese, the estimations show a rapid recovery of ecosystems, especially flora. However, in Evia, around 400 000 hectares might never return to their previous state, while in Attica the ecosystem will hardly recover ^[6]. Losses of livestock and losses of beehives and hives are critical. According to the president of the Federation of Beekeeping Associations of Greece, for the beekeepers of Evia, who represent half of the beekeepers in Greece and whose production accounted for 70 % of all Greek production, this is a disaster: the beehives have been reduced to ashes; thousands of bee swarms have been lost;

and the forest of North Evia will take more than 30 years to become productive to its previous levels. Losses of the famous pine honey of Evia are estimated at 5–10 000 tones. People engaged in resin harvesting from pine trees are also facing important losses [7,8]. The Insurance Agency of the Ministry of Rural Development and Food (ELGA) reported estimates according to which over 9 000 bee swarms were severely damaged by the fires [8].

- [1] http://www.hnms.gr/emy/el/pdf/heatwave_2021.pdf
- [2] <https://www.ertnews.gr/eidiseis/ellada/live-stis-floges-i-voreia-attiki-efialtiki-i-katastasi-se-afidnes-kryoneri-ippokrateio-politeia/>
- [3] <https://www.in.gr/2021/08/23/greece/vilia-mainetai-nea-fotia-ekkenonontai-oikismoi-anisyxia-gia-tous-isxyrous-anemous/>
- [4] https://www.ethnos.gr/ellada/169871_fotia-eyboia-terastia-oikologiki-katastrofi-ti-deihnoyn-ta-stoiheia-tis-ypiresias
- [5] <https://www.ertnews.gr/eidiseis/ellada/pyrina-metopa-stin-ileia-apeiloyntai-choria-stin-archaia-olympia/>
- [6] <https://www.kathimerini.gr/society/561464104/to-vary-perivallontiko-apytopoma-ton-pyrkagion-se-eyvoia-attiki-kai-peloponnisso/>
- [7] <https://www.in.gr/2021/08/13/greece/fotia-stin-eyvoia-xathikan-xiliades-smini-melisson-oloklirotiki-katastrofi/>
- [8] https://www.ethnos.gr/ellada/171733_fotia-se-apognosi-oi-melissokomoi-kaikan-9000-melissosmini-kai-hathikan-10000-tono

OUTLOOK

Figure below presents model simulations of the **60-day accumulated surface water balance anomaly** in historical percentile classes for the time period **from 9 August to 7 October 2021**, as seen in Drought Watch tool¹.



¹ <https://www.droughtwatch.eu/>

The outlook of 60-day surface water balance, accumulated for the August-September period, indicate most of the region, especially its northern half will experience unusually dry conditions. Most of the coastal Greece, Moldova and scattered areas across the central belt of Balkan Peninsula, from northern Croatia to southern Romania, will be under very dry conditions, while on the other hand central and southern continental Greece, most of western

half of Turkey, southwestern Bulgaria will experience wet, locally even very wet surface water balance. No greater deviation from the average is expected across most of the the Pannonian Basin in northern part of the region.

Methodology

DMCSEE 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; see: <https://www.dwd.de/EN/ourservices/gpcc/gpcc.html>). NWP simulations are performed with Non-hydrostatical Mesoscale Model with cca. 7 km spatial resolution (NMM; see: <http://www.dtcenter.org/wrf-nmm/users/>). Historical DMCSEE model climatology was computed with NMM model for time period between 1 January 1991 and 31 December 2020. European Centre for Medium Range Weather Forecast (ECMWF) ERA5 data set (see: <http://www.ecmwf.int/en/forecasts/datasets/reanalyses-datasets/era5>) was used as input for simulations. Long term averages (1991-2020), 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.