Chapter 2. Crop and environmental conditions in major production zones

Chapter 2 presents the same indicators—RAIN, TEMP, RADPAR, and BIOMSS— as those used in Chapter 1, and combines them with the agronomic indicators—cropped arable land fraction (CALF), maximum vegetation condition index (VCIx), and minimum vegetation health index (VHIn)— to describe crop condition in six Major Production Zones (MPZ) across all continents. For more information about these zones and methodologies used, see the quick reference guide in Annex B as well as the CropWatch bulletin online resources at ***www.cropwatch.com.cn****.*

2.1 Overview

Tables 2.1 and 2.2 present an overview of the agroclimatic (table 2.1) and agronomic (table 2.2) indicators for each of the six MPZs, comparing the indicators to their fifteen and five-year averages, respectively.

Table 2.1. April-July 2019 agro-climatic indicators by Major Production Zone, current value and departure from 15YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure (%)	Current (℃)	Departure (℃)	Current (MJ/m^2)	Departure (%)
West Africa	548	-9	27.3	0.1	1196	1
South America	342	2	17.3	0.5	761	0
North America	506	30	18.7	-0.7	1316	-2
South and SE Asia	757	-16	29.2	0.5	1275	4
Western Europe	306	-11	14.6	0.0	1265	4
C. Europe and W. Russia	296	-8	14.9	0.2	1197	2

*Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the fifteen-year average (15YA) for the same period (April-July) for 2004-2018.*

Table 2.2. April-July 2019 agronomic indicators by Major Production Zone, current season values and departure

	BIOMSS (gDM/m^2)		CALF (Cropped arable land fraction)		Maximum VCI Intensity
	Current	Departure (%)	Current	Departure (% points)	Current
West Africa	759	2	89	-1	0.9
South America	316	1	98	1	0.8
North America	644	-3	97	2	0.9
S. and SE Asia	734	6	69	-5	0.9
Western Europe	529	7	95	-1	0.9
Central Europe and W Russia	515	3	98	0	0.9

Note: See note for table 2.1, with reference value R defined as fifteen-year average (15YA) for BIOMASS, others for the five-year average (5YA) for the same period (April-July) for 2014-2018.

2.2 West Africa

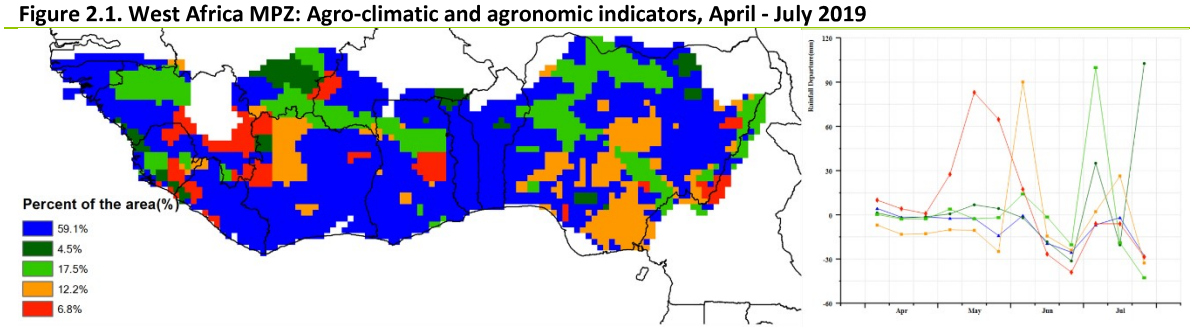
April to July in West Africa covers the main rainy season with farming activities associated with sowing of main cereals (maize, sorghum, millet, and rice) in the region. Cassava and yams are important crops across the Guinean zone, i.e. the tropical moist forest area along the coast of West Africa, especially in Sierra Leone, Ghana, Nigeria, and Côte d'Ivoire; they are still in the fields and contribute to the mapped cropped arable land.

The MPZ recorded 548 mm of rainfall over croplands, a decrease of 9% below average. The highest rainfall was recorded in Equatorial Guinea (1429 mm, +6%), Sierra Leone (1056 mm, -6%) and Liberia (941 mm, -2%). Low rainfall and negative departures were observed in Guinea Bissau (241 mm, -40%) and Burkina Faso (90 mm, -23%).

The region experienced average temperature (27.3℃, +0.1℃ above average) and sunshine (RADPAR 1196 MJ/m2, +1%) resulting in a slight increase of the biomass production potential (BIOMSS of 759 g DM/m2, +2%). The cropped arable land fraction (CALF) at 89% was down -1% compared with the average of the recent 5 years. This is also supported by the VCIx map with values larger than 0.8 in coastal to central regions and lower values in the Northern. The agronomic indicators show that Nigeria had a good share of cropped arable land in the region. Persisting civil insecurity in Northern Nigeria continues to affect agriculture production and limits access to food for vulnerable households.

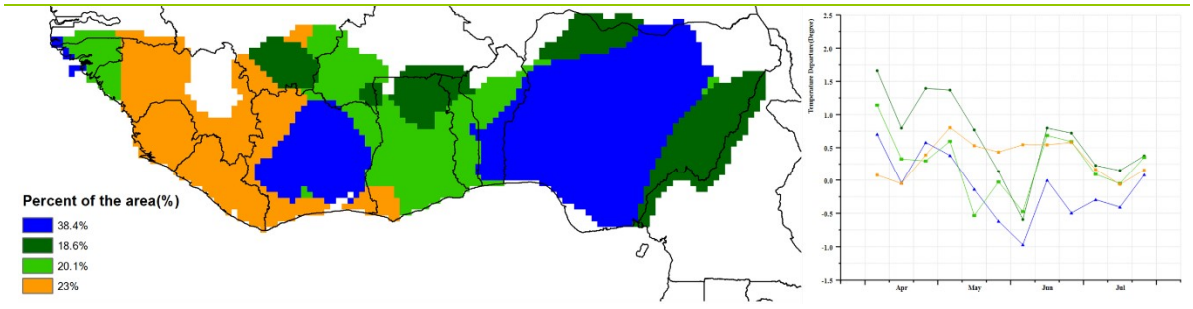
Based on VHI, there is some evidence of moderate to severe drought across the region especially the north. However, the rainy season starts around June in the northern part of the MPZ. While some areas had favorable BIOMSS departures (e.g. the north-west of Nigeria, northern Ghana and northern Guinea) the final outcome season in those areas will depend on July and later rain.

Figure 2.1. West Africa MPZ: Agro-climatic and agronomic indicators, April - July 2019



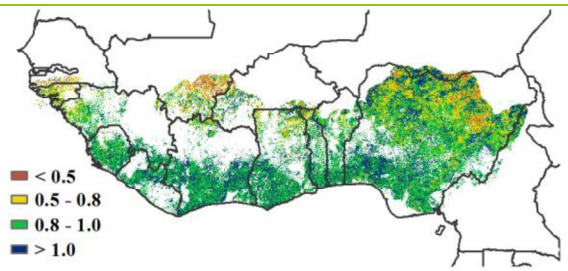
a. Spatial distribution of rainfall profiles

b. Profiles of rainfall departure from average (mm)

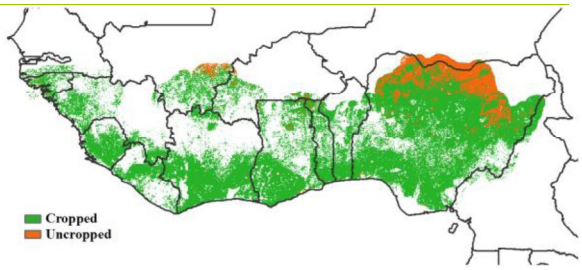


c. Spatial distribution of temperature profiles

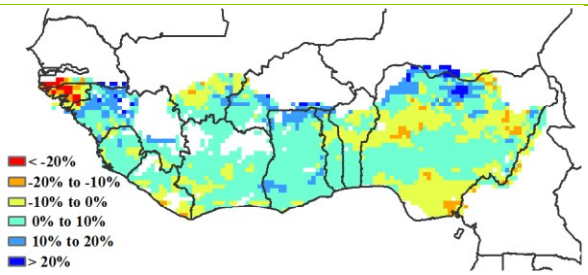
d. Profiles of temperature departure from average (℃)



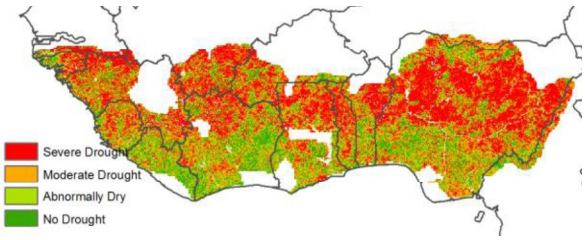
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.3 North America

The monitoring period covers the harvest of winter crops, the full cycle of spring wheat, and the early and mid-season stages of summer crops. Favorable crop condition was observed in the region from the Canadian prairie to the Great Plains, while in the eastern part of the Corn Belt suffered significantly below average crop condition.

The precipitation in North America was 30% above the average, while the temperature and radiation were 0.7℃ and 2% below the average. The Canadian prairie and northern Great Plains recorded moderate precipitation deficits in May (10 mm), at a time when the lower Mississippi had a somewhat larger deficit of 30mm. The negative precipitation and positive temperature that resulted in drought conditions in the Canadian Prairie and the Corn Belt that is well captured by the minimum vegetation health index map.

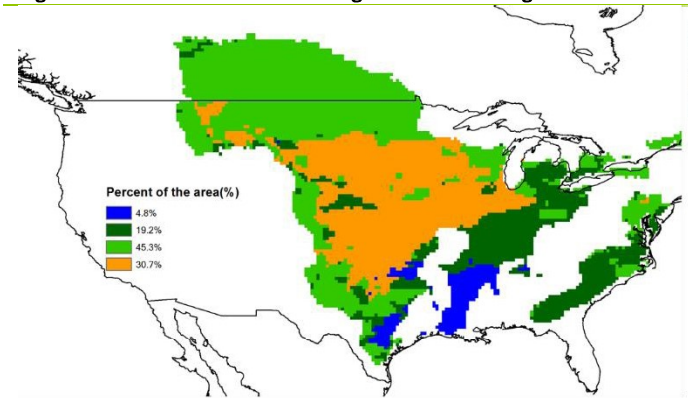
The Corn belt received abundant precipitation, especially in May, when the precipitation exceeded average by 30 mm and temperature was cooler than average by 2.0℃.

Early May is the major sowing window for summer crops. Fortunately, the precipitation recovered to above average from late May and offset the impact of the previous drought with wet and warm conditions accelerating the growth of summer crops and improving their condition in the Canadian Prairie and the northern Great Plains. Favorable crop condition also prevailed in the southern Great Plains.

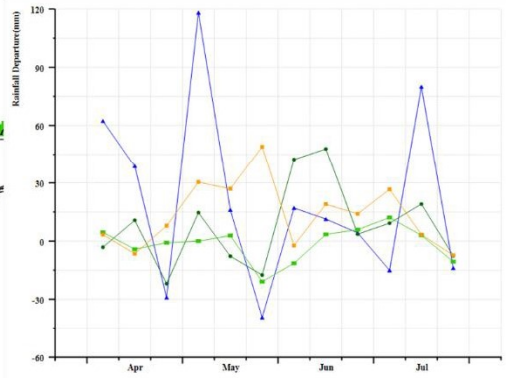
It is worth noting that the eastern Corn Belt continued presenting significantly below average crop condition even after precipitation recovered to normal from June. As a major soybean and maize producing zone, the Corn Belt will need close monitoring during the next monitoring period.

The cropped arable land fraction reached to 97% (2% above the recent average) and VCIx at 0.92 indicate mostly favorable crop condition, with the mentioned exception of the eastern Corn Belt.

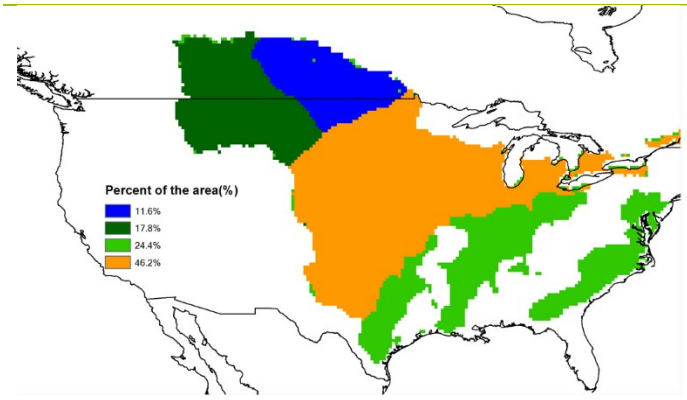
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, April - July 2019



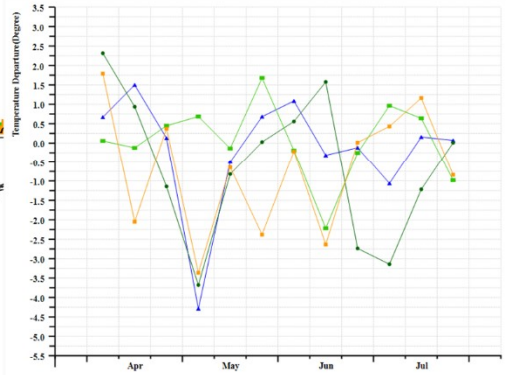
a. Spatial distribution of rainfall profiles



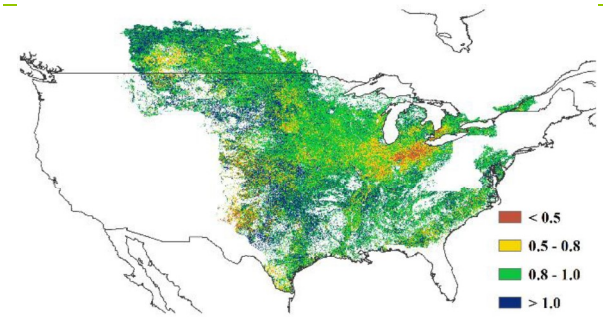
b. Profiles of rainfall departure from average (mm)



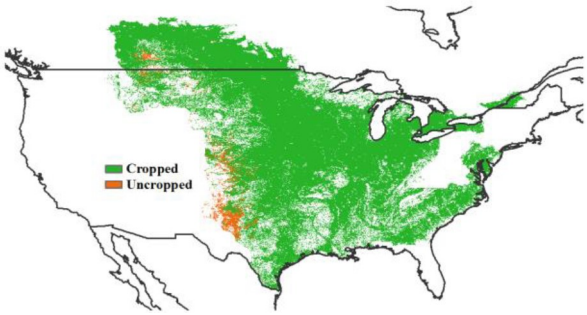
c. Spatial distribution of temperature profiles



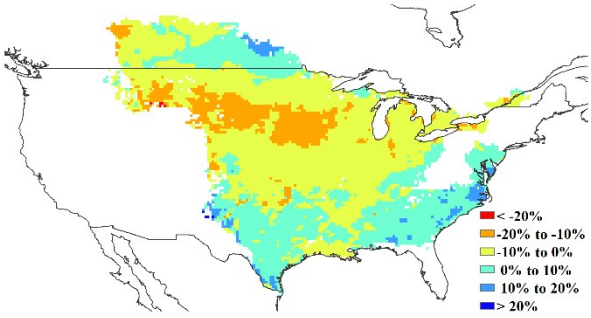
d. Profiles of temperature departure from average (℃)



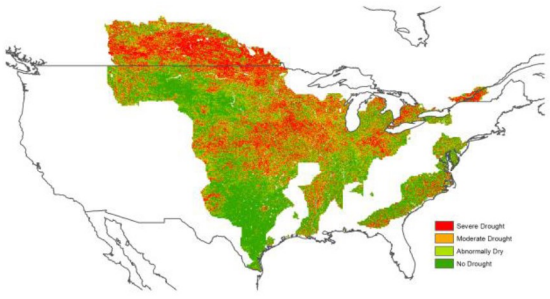
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.4 South America

Globally, the region recorded 2% above average rainfall but most areas showed almost no anomalies with total departures staying in the range of -25 mm to +25 mm. Precipitation peaks above average occurred only in Uruguay and neighboring areas; they affected North East Argentina in April, East Argentina and

Uruguay in May, part of South and North Brazilian agricultural area in June and the Southern boundary of Brazil in July.

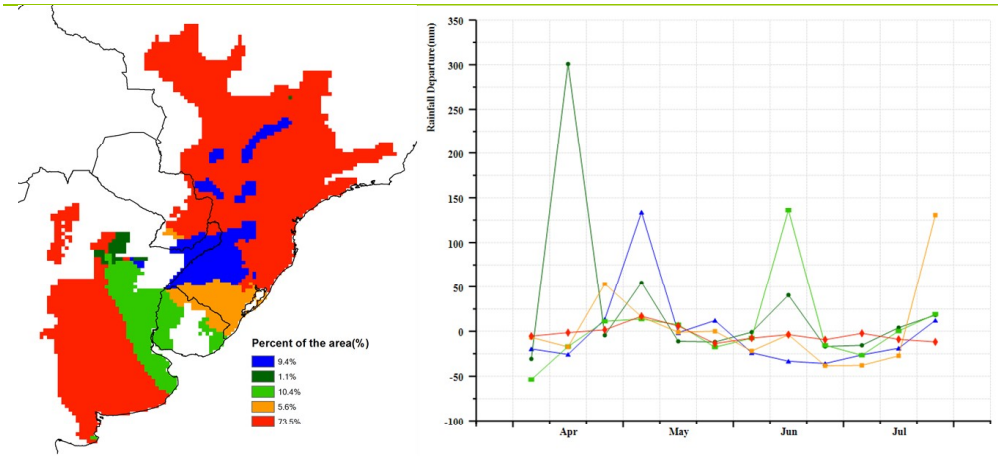
Globally, TEMP showed a minor increase of 0.5℃ above average in the MPZ. The whole MPZ showed a similar temporal pattern starting with a rise from April to early May, a drop at mid-May, and another peak in June followed by a July drop. The largest fluctuations occurred in South Brazil, eastern Paraguay and northern Uruguay in June when the peak reached heatwave proportions with an anomaly larger than 5.2℃.

BIOMSS showed an increment of 1% above average. Positive anomalies were observed in the Center and South of the Argentinian Pampas, with the exception of the extreme South of Buenos Aires province that showed negative anomalies. Negative anomalies were observed as well in the Chaco and the Subtropical highlands in Argentina. Most of the Brazilian agricultural area showed positive anomalies, with the exception of the North West.

The MPZ was almost fully cropped (CALF at 98%), a 1% increment compared to 5 years average. VCIx reached 0.76 on average. Values larger than 0.8 were observed over most of Brazil and Paraguay. Argentina experienced the lowest VCIx values, mainly in the southern and eastern Pampas. Minimum VHI showed high variability in the region with near half of the area indicating drought and the other half indicating good growing conditions. Drought values were mostly observed in the Argentinian Pampas and central and southern Brazil, with large spatial heterogeneity. It is important to consider that for this region, the reporting period correspond to the harvest of main summer crops, so that conditions with lower availability of water can no longer directly affect crop production. Low Minimum VHI values could also be associated with the maturity and harvest crops that occurred during this reporting period.

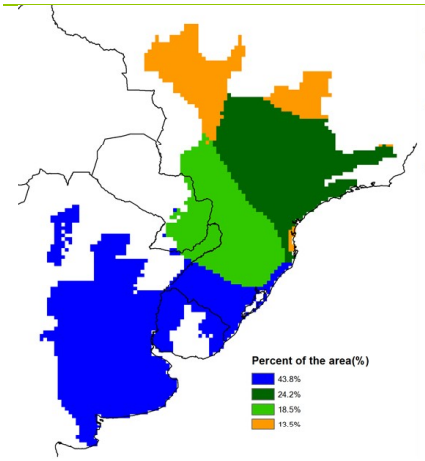
In general, crop condition in the South America MPZ was average during the monitoring period.

Figure 2.3. South America MPZ: Agro-climatic and agronomic indicators, April - July 2019

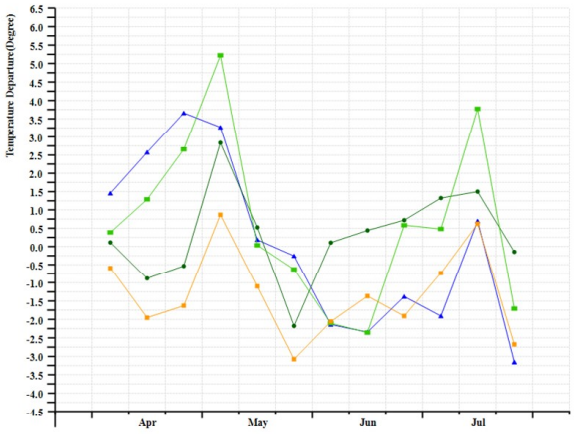


a. Spatial distribution of rainfall profiles

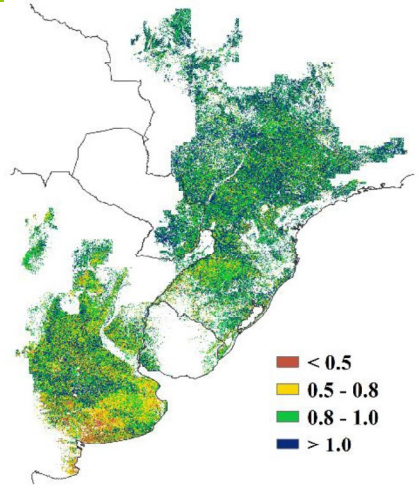
b. Profiles of rainfall departure from average (mm)



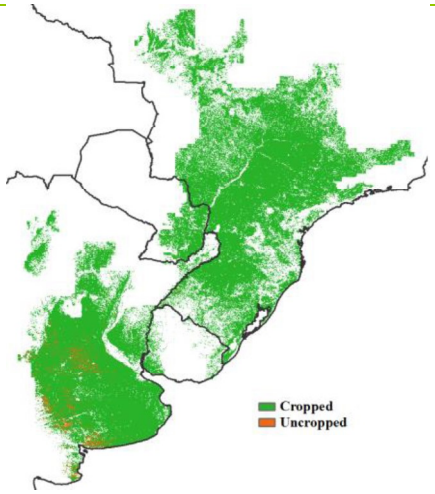
c. Spatial distribution of temperature profiles



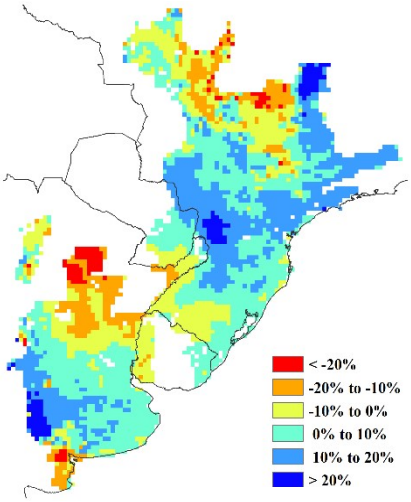
d. Profiles of temperature departure from average (℃)



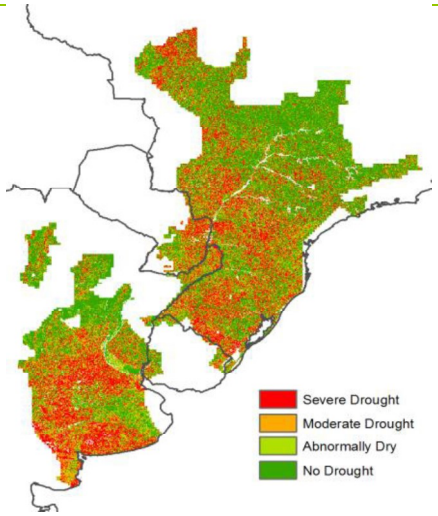
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

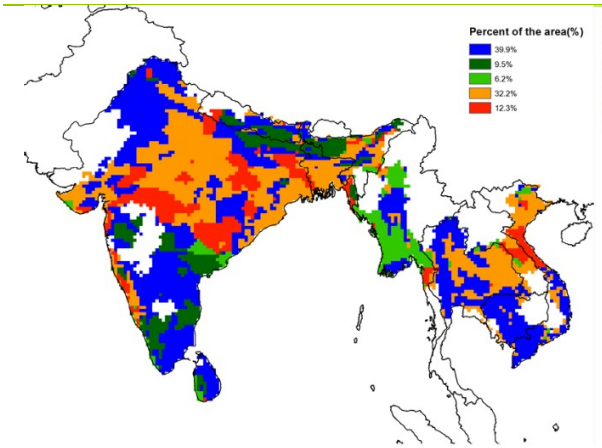
2.5 South and Southeast Asia

South and Southeast Asia is a broad region, covering India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand and Vietnam, where the common crops include rice, maize, wheat, and soybean. During the current monitoring period, temperature and sunshine were overall near average (TEMP +0.5℃, RADPAR +4%) while rainfall significantly decreased (RAIN -16%). Rainfall anomalies, however, underwent large

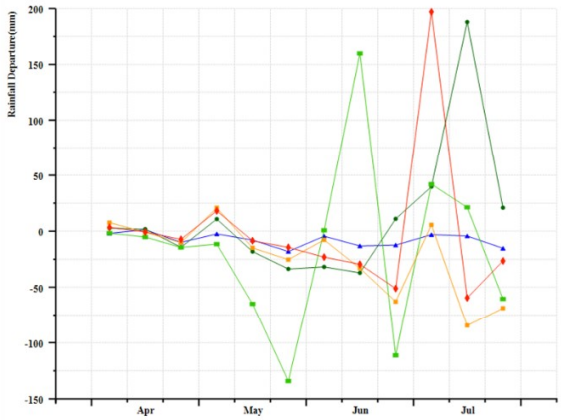
spatial and temporal variations. Rainfall increased markedly between mid-May and July, a key period of crop growth. 6.2% of cultivated areas, mainly in Myanmar, experienced significantly below-average rainfall (deficit larger than 100 mm/dekad) during mid-May and mid-June and above-average (excess larger than 150 mm/dekad) during early June. Two other rainfall peaks with excesses close to 200 mm/dekad occurred in early and mid-July. The first affected 12.3% of cropland located in central-northern India and central Vietnam; the second was of concern to 9.5% of cropland in southern India and Nepal. 6.3% of cropped areas, involving Nepal and north India, recorded consistently below-average temperature during April through July. Remaining areas (making up 93.7% of cropland) showed fluctuating but near average temperature over the most of the reporting period.

CALF reached a rather low value of 69% in the MPZ, 5% below the average of the recent five years, with VCIx at 0.87, a value describing fair crops. CALF and VCIx are high over Vietnam, Thailand, Bangladesh, Cambodia, Nepal and Sri Lanka. Uncropped areas mainly occur in south and central India and Myanmar, where they are associated with Low VCIx values below 0.5 and in the range from 0.5 to 0.8. Below-average BIOMSS occurred in central and southern India and Myanmar, which may be attributed to drought. This is confirmed by the spatial patterns of VHIn, indicating that “severe drought” also occurred in these regions. It is stressed that BIOMSS and VCIx patterns roughly agree, with a marked discrepancy in the "three-State corner" of southern Rajasthan, northern Gujarat and south-western Madhya Pradesh where VCIx mostly exceeds 1.0 while BIOMSS shows one of the largest negative anomalies (larger than 20%) in the whole MPZ. Based on the above analyses, the crop production the MPZ is expected to be below average.

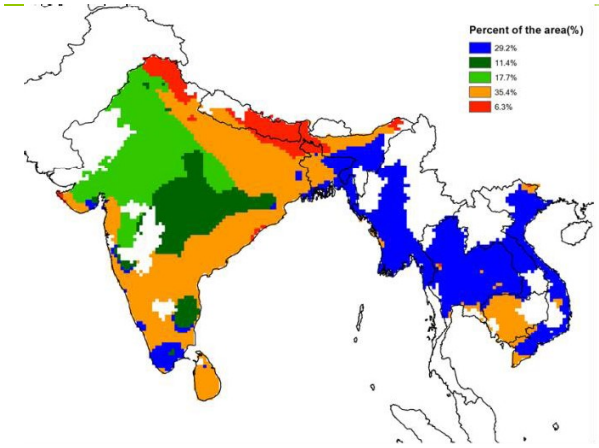
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, April - July 2019



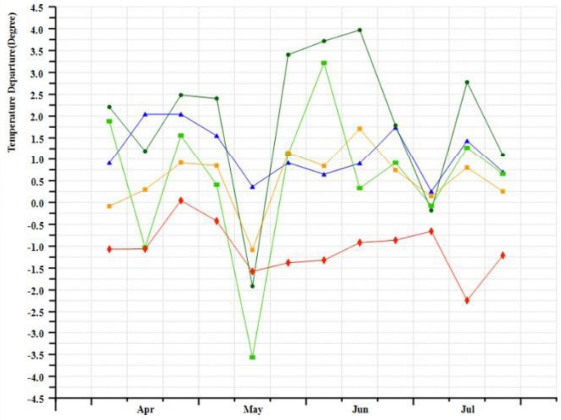
a. Spatial distribution of rainfall profiles



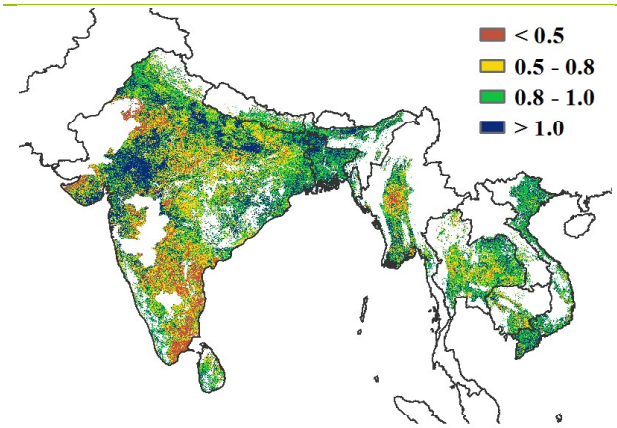
b. Profiles of rainfall departure from average (mm)



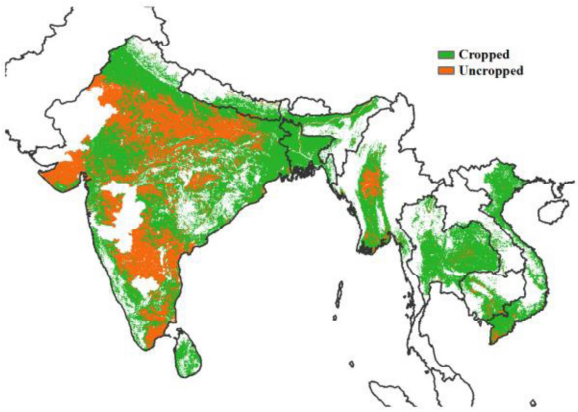
c. Spatial distribution of temperature profiles



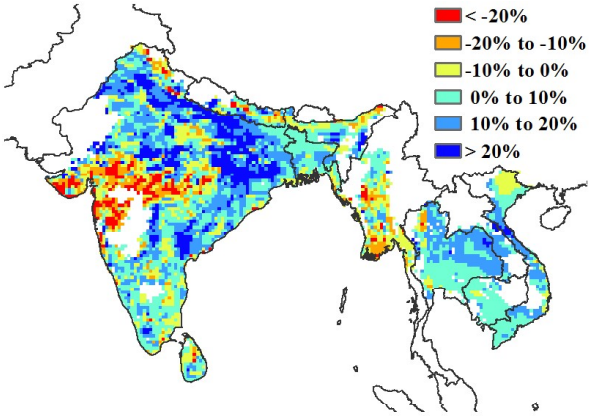
d. Profiles of temperature departure from average (℃)



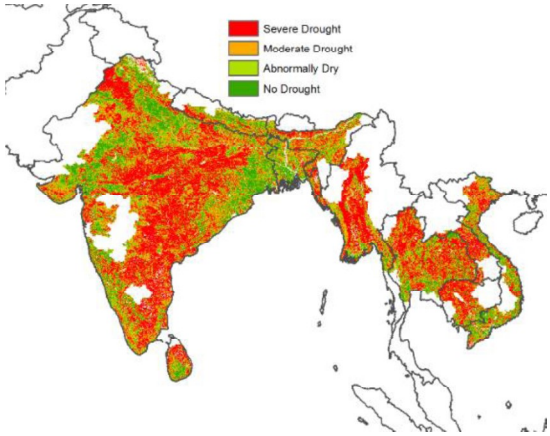
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.6 Western Europe

In general, crop condition was below average at the scale of the Western European MPZ, resulting from a combination of negative and positive extremes. The figures present an overview of CropWatch agroclimatic and agronomic indicators for this MPZ.

Crop condition was below average in most parts of the Western European MPZ, resulting from a combination of negative and positive extremes.

Significant differences in precipitation between different countries are observed. The whole MPZ showed a large drop in RAIN (11% below average), larger than in the other three major agricultural zones in the world (Table 2.1). All countries did not experience shortages at the same time. Over the entire monitoring period, poor precipitation was observed in more than 70% of the entire MPZ (France, Germany, Spain, UK, Austria, Czech Republic, Denmark and Slovakia), and the most severely affected countries were Denmark (RAIN -28%), Czech Republic (-24%) and Austria (-19%). Due to rain deficits from mid-May to late-May and from late-June to early-July in most parts of this MPZ, the grain filling phase of winter crops and vegetative growth of the major maize producing areas were negatively affected. Most parts of this MPZ recorded above average precipitation in early-May, from early-June to mid-June and mid-July. More rain is needed in the coming months to raise soil moisture, and create favorable conditions for the growth of summer crops.

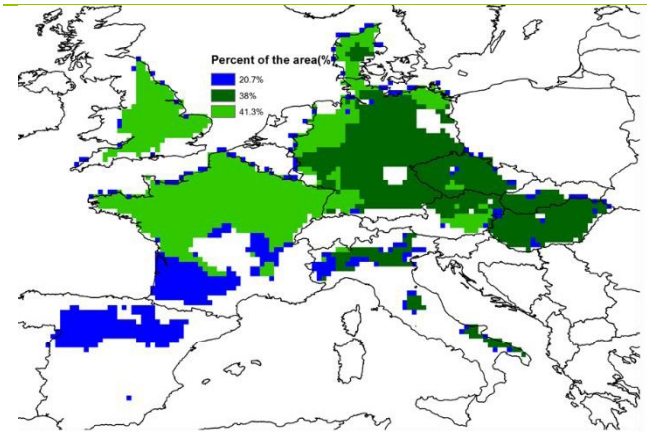
Temperature (TEMP) for the MPZ as a whole was about average, and sunshine was well above average with RADPAR up +4%. Most parts of MPZ experienced warmer-than-usual conditions after June, while below the average temperature mostly occurred in May. The spatial distribution of temperature profiles

indicates that two heat waves swept across Europe in late June and late July, receiving extensive media attention. High temperature shortened the grain filling stage of crops and accelerated the maturity, which may reduce crop yields.

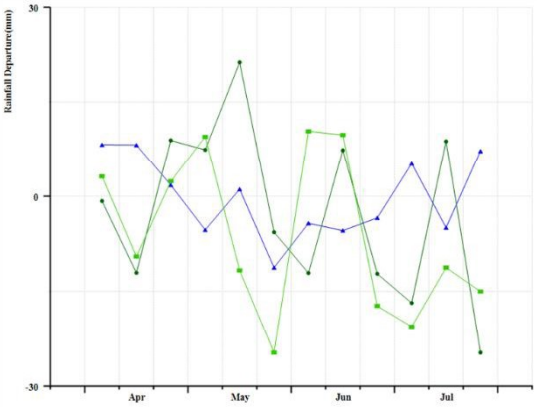
Due to overall warmer and sunnier conditions for the MPZ, the biomass accumulation potential BIOMSS was 7% above average. The lowest BIOMSS values (-10% and below) occurred in parts of Spain, UK, France, Germany, Italy and Denmark, and this spatial distribution is consistent with the above-mentioned precipitation deficit region. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) over France and Germany. The average maximum VCI for the MPZ reached 0.92. More than 95% of arable lands were cropped, which is 1% below the recent five-year average. Most uncropped arable land is concentrated in Spain, with patchy distribution in other countries.

Generally, crop condition in the Western Europe MPZ is expected to be below average considering the poor precipitation, persistent warmer-than-usual conditions and heat waves. More rain will be needed in several important crop production areas to ensure an adequate soil moisture supply for the growth of summer crops.

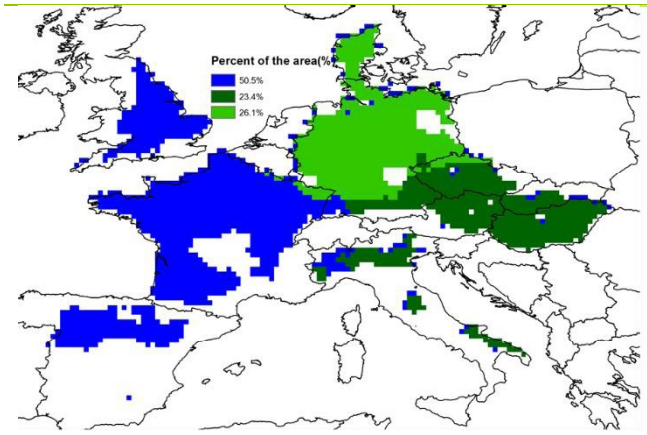
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, April - July 2019



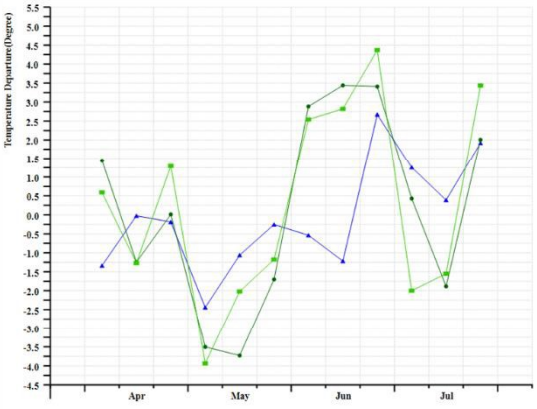
a. Spatial distribution of rainfall profiles



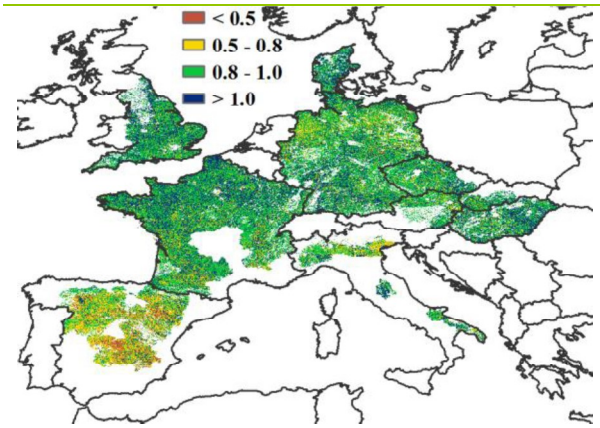
b. Profiles of rainfall departure from average (mm)



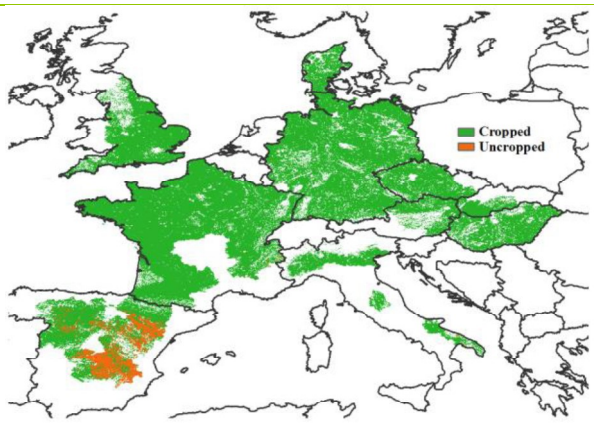
c. Spatial distribution of temperature profiles



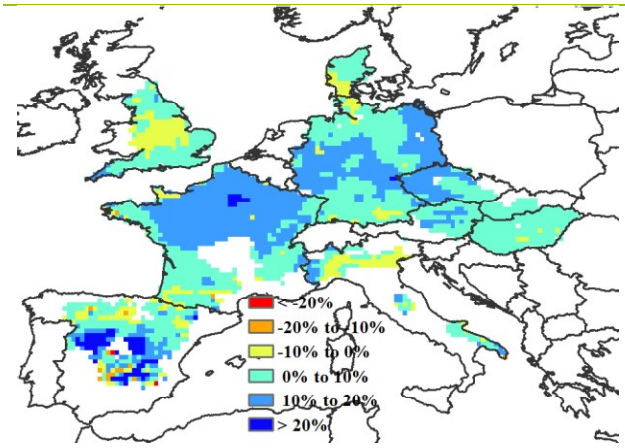
d. Profiles of temperature departure from average (℃)



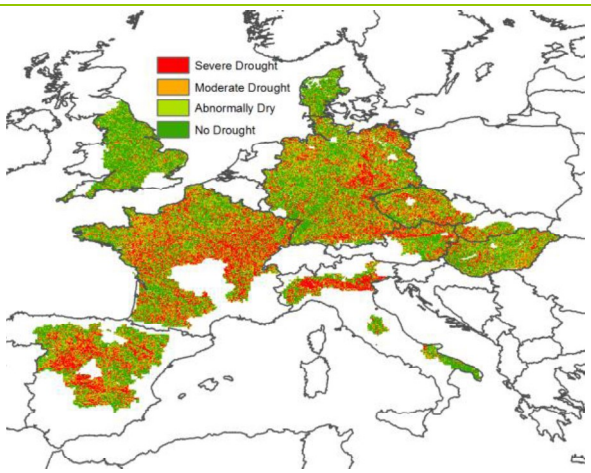
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.

2.7 Central Europe to Western Russia

Most parts of the Central Europe to Western Russia MPZ displayed average conditions of winter and summer crop (average VCIx=0.93). Temperature was globally somewhat warmer than average (TEMP +0.2℃), drier (RAIN -8%) and slightly more sunny (RADPAR +2%).

Eastern and southern areas of Western Russia received somewhat below average rainfall from April to June but marked excesses (over 60mm/dekad) at mid-July. This applies to 11.5% of cropland in the MPZ, mostly to north-eastern Republic of Bashkortostan, eastern Saratov Oblast, eastern Krasnodar Kray, northern Stavropol Kray, and central Kalmyk Republic. Another 32.2% of arable lands in the MPZ recorded excess precipitation larger than 50mm/dekad in the middle of May, including Poland, most of Moldova, southern Ukraine, eastern Belarus, south-eastern and south-western Romania and, in Russia, the Oblasts of Ulyanov and Orenburg (mainly the East) and the Chuvash and Udmurt Republics.

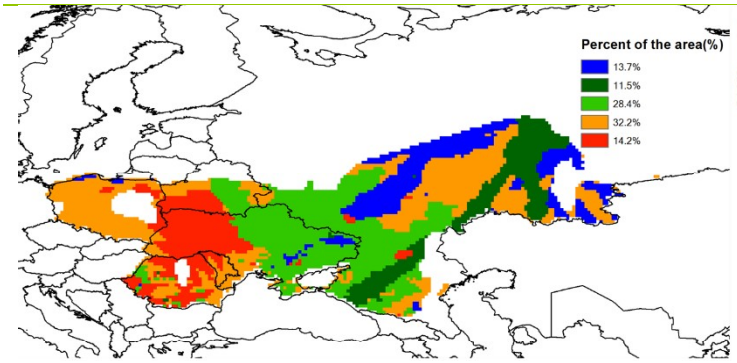
The largest cold anomalies (about 5.4℃ below average in mid-May) influenced mainly the East of western Russia, including the Oblasts of Nizhny Novgorod, Kirov and Perm and the Republics of Mari El and Udmurtia. In June and July the temperature anomaly became less severe being just 2.0℃ below average. Unseasonably warm weather (about 4.7℃ above average in mid-June) influenced mainly the western part of MPZ, including Poland, Romania, Moldova, Ukraine and most of southern Belarus.

Almost all the arable land was cropped during the monitoring period (with a CALF value of 98%). Due to the average agro-climatic conditions at the scale of the whole MPZ, the accumulated potential biomass (BIOMASS) is slightly above average (+3%), indicating an overall average level. However, the northeastern

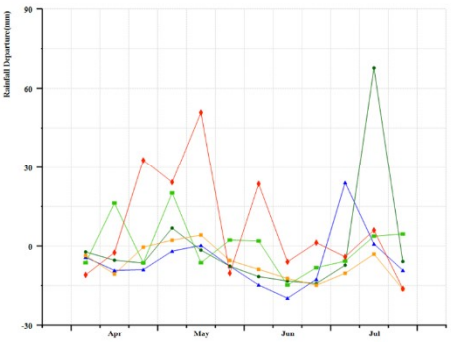
part of Western Russia (northern Republic of Bashkortostan and Republic of Tatarstan) showed a BIOMASS drop between -20% and -10%, which deserves close monitoring in the next JASO reporting period.

On the whole, with most areas in the MPZ indicating average crop conditions and agro-climatic factors, prospects for crop production are promising - but spatially variable - in Central Europe to Western Russia.

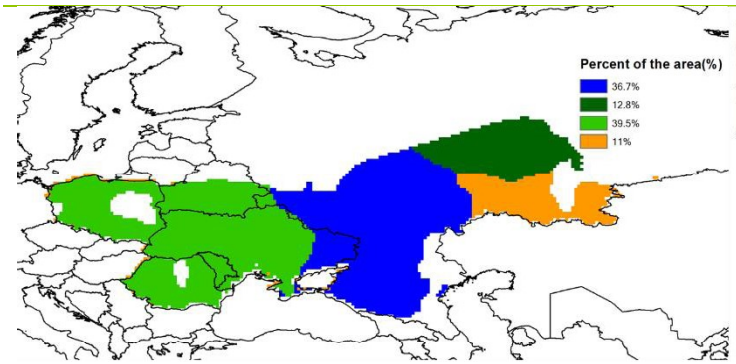
Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, April - July 2019



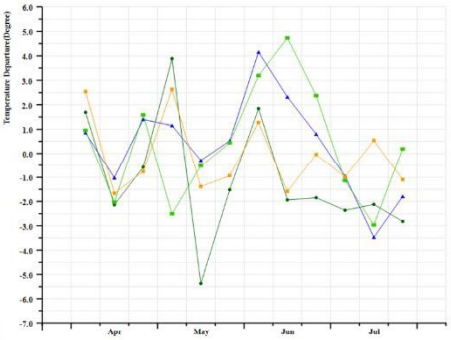
a. Spatial distribution of rainfall profiles



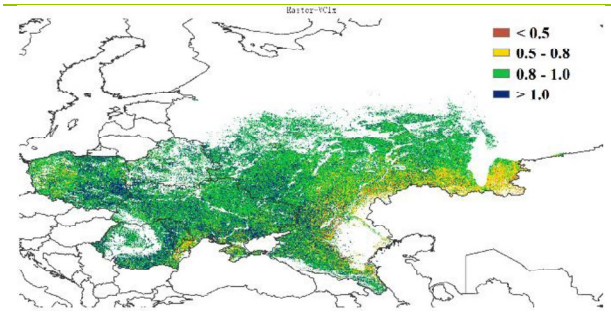
b. Profiles of rainfall departure from average (mm)



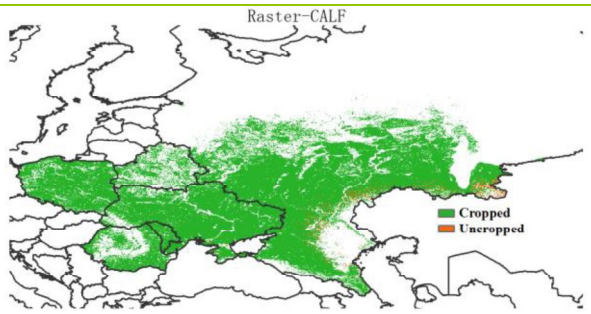
c. Spatial distribution of temperature profiles



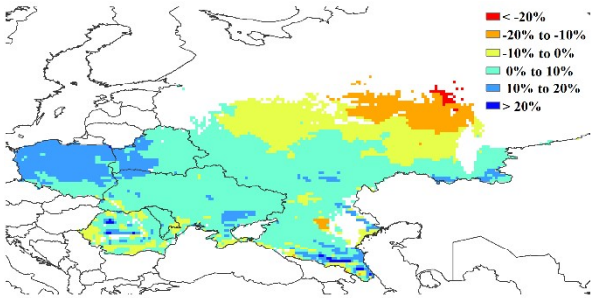
d. Profiles of temperature departure from average (℃)



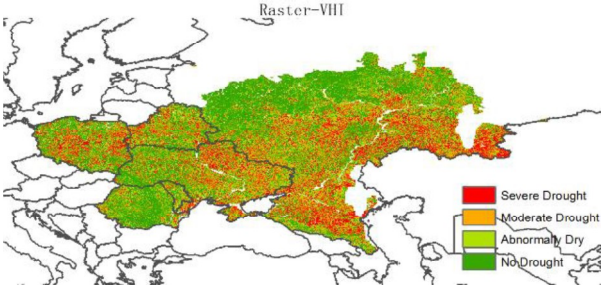
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B.