Chapter 2. Crop and environmental conditions in major production zones

Chapter 2 presents the same indicators—RAIN, TEMP, RADPAR, and BIOMSS—used in Chapter 1, and combines them with the agronomic indicators—cropped arable land fraction (CALF), maximum vegetation condition index (VCIx), minimum vegetation health index (VHIn), and cropping intensity—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 C 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.

Table 2.1. July-October 2016 agroclimatic indicators by Major Production Zone, current value and departure from 15YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
West Africa	925	11	26.2	-0.4	1004	0
South America	340	-5	19.4	-0.5	1010	1
North America	474	30	21.0	0.5	1075	-2
South and SE Asia	1153	12	27.2	-0.3	905	-4
Western Europe	209	-25	16.6	0.3	914	0
C. Europe and W. Russia	230	-1	15.3	-0.5	826	-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 (July-October) for 2001-2015.

Table 2.2. July-October 2016 agronomic indicators by Major Production Zone, current season values and departure from 5YA

	BIOMSS (gDM/m^2)		CALF (Cropped arable land fraction)		Maximum VCI Intensity	Cropping Intensity	
	Current	Departure from 5YA (%)	Current	Departure from 5YA (% points)	Current	Current (%)	Departure from 5YA (%)
West Africa	1997	3	97	1	0.93	127	-1
South America	917	-8	91	3	0.79	169	1
North America	1395	25	94	3	0.92	128	4
S. and SE Asia	1908	3	95	0	0.93	157	-6
Western Europe	863	-18	91	0	0.81	115	-10
Central Europe and W Russia	939	-3	98	3	0.89	101	-2

Note: See note for table 2.1, with reference value R defined as the five-year average (5YA) for July-October 2011-2015.

2.2 West Africa

Sorghum and millet are important staples in the northern, semi-arid (Sahelian) part of this MPZ. They are replaced in southern areas by more water demanding crops, especially in the west where high elevations

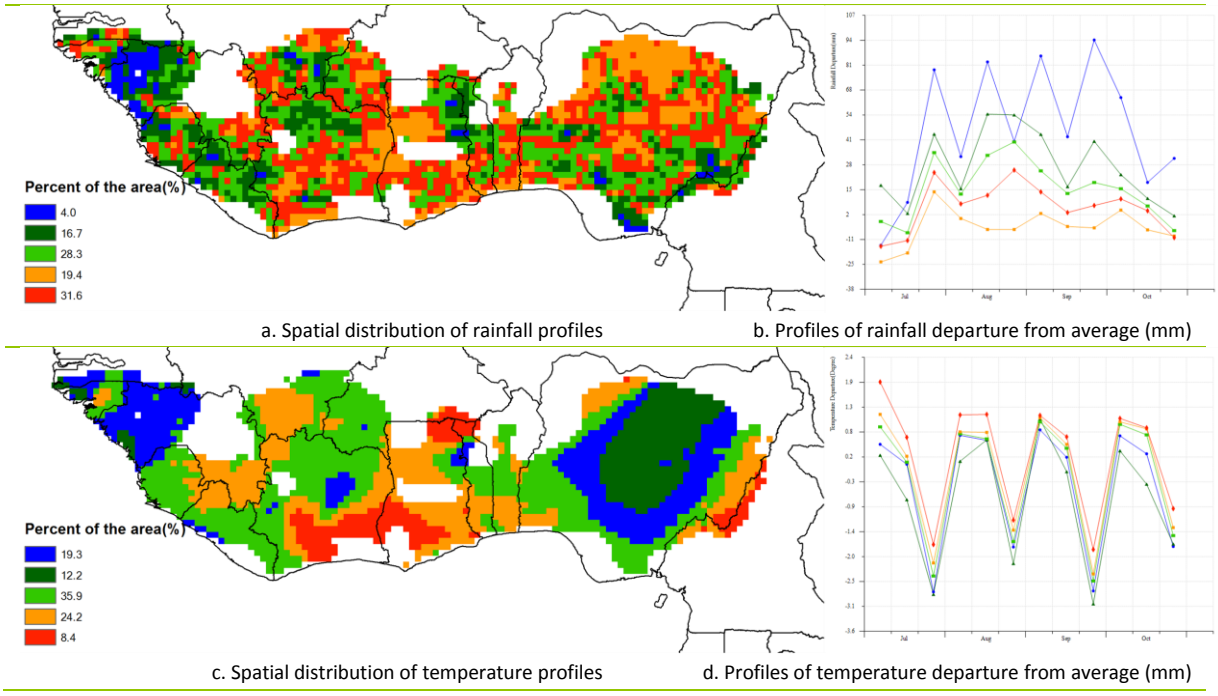
result in abundant precipitation. The reporting period corresponds to the main harvesting season throughout the region, especially for maize, sorghum, millet, and yams. In the west (Guinea to Liberia), rice plays an important part; the harvest has started and will extend into December, sometimes January. In the areas that tend to record bimodal rainfall (southern Côte d'Ivoire to Nigeria), the first maize crop is usually harvested from October, while the second is less advanced and will be harvested in 2017. Cassava, the main staple in the region is also still growing. The cropping intensity map clearly shows areas where two crops were cultivated along the Atlantic Ocean. For the whole MPZ, the cropping intensity reached 125%, slightly below average.

As a whole, the MPZ recorded above average rainfall (RAIN, +11%) and close to average temperature and sunshine, which resulted in a slight increase of the biomass production potential. The west of the region, which normally records between 1000 and 1500 mm rainfall over the current reporting period, enjoyed a significant increase of precipitation between 11% (Sierra Leone) and 18% (Guinea), as well as a decrease in sunshine (-1% in Liberia to -5% in Guinea Bissau). The rainfall in this area increased the Niger discharge for the benefit of the Sahel. In the center and east (Côte d'Ivoire to Nigeria) precipitation departures reached between +4% (Benin) and +14% (Togo) over average, and RADPAR was average or above average (0 to +2%). For the MPZ as a whole, the cropped arable land fraction reached 97%, an increase of 1 percentage point that can be assigned to favorable rain.

The spatial rainfall departure patterns confirm that the highlands of the western part of the MPZ (4% of crop lands) did very well. Most areas (76.6%) had a peak of above average rainfall (+20% to 50%) centered around August. The interaction of rainfall and temperature patterns resulted in the largest positive biomass production potential departures being concentrated in the southern areas, which corresponds to the areas that cultivate two maize crops, of which the first did well. No areas had NDVI that dropped significantly below average; the area where VHI was highest corresponds to the Sahelian part of Nigeria.

Altogether, conditions were close to average, with abundant but not excessive precipitation well distributed in time. CropWatch indicators depict a coherent situation with all crops doing well, including those to be harvested later this year and in early 2017 (second maize crop and cassava).

Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, July-October 2016

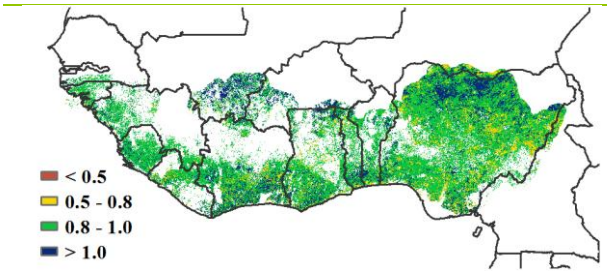


a. Spatial distribution of rainfall profiles

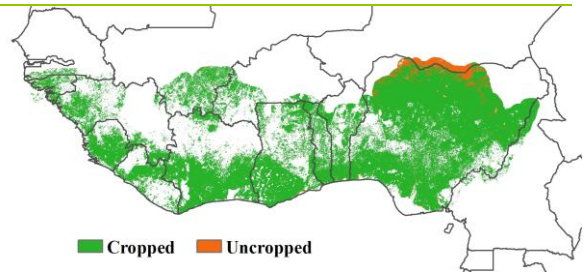
b. Profiles of rainfall departure from average (mm)

c. Spatial distribution of temperature profiles

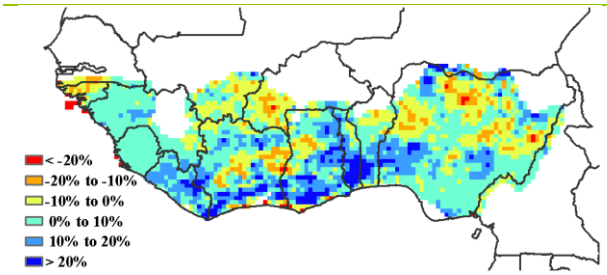
d. Profiles of temperature departure from average (mm)



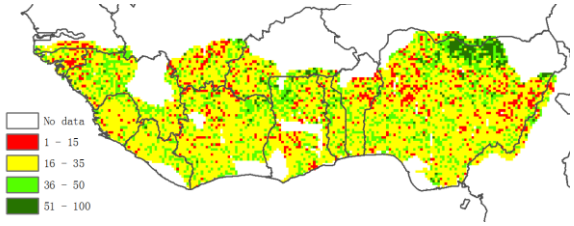
e. Maximum VCI



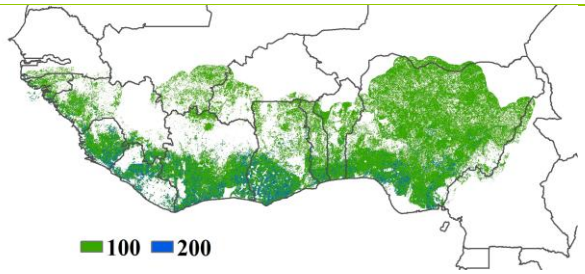
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping Intensity

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

2.3 North America

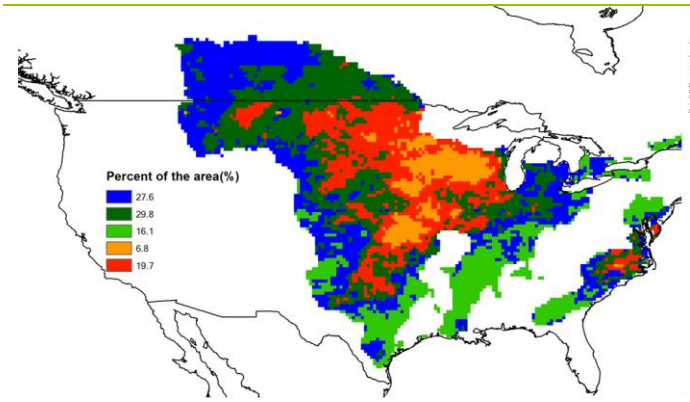
The current monitoring period from July to October 2016 covers the growth and harvesting season of summer crops. CropWatch agroclimatic and agronomic indicators indicate above average crop condition in the North American MPZ.

During the monitoring period, most of the MPZ enjoyed sufficient precipitation and normal temperature, which was beneficial to crop growth. The agroclimatic indicators show that RAIN was 30% above average, TEMP 0.3°C above, and RADPAR just 2% below. Abundant rainfall fell over the major crop production zones, including the Corn Belt (RAIN, +19%), northern Great Plains (+97%), British Columbia to Colorado (+41%), and the West Coast (+45%), which provided an adequate soil water supply for the growth of maize, soybean, and spring wheat. Especially after mid-September, above average temperature was very conducive to crop harvest.

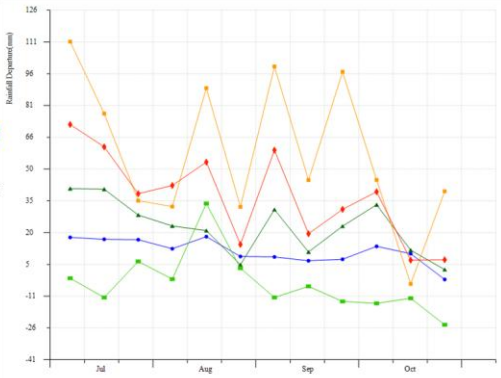
Agronomic indicators confirm the generally above-average crop condition in the MPZ. Compared to the average of the past five years, accumulated biomass potential (BIOMSS) increased significantly by 25%. Two distinct BIOMSS patterns are observed: values of 20% above average occurred in the northwestern regions (Corn Belt and northern Great Plains), while the southeast shows negative values, with some even beyond -20%. Good crop condition is confirmed by a high average VCIx value (0.92) in the southern Canadian Prairies and northern Great Plains, as well as in the Corn Belt where VCIx even exceeded 1, indicating very favorable crop condition. According to the CropWatch CALF indicator over the whole monitoring period, 94% of arable lands were cropped, which is 3 percentage points above average. At the same time, cropping intensity significantly increased (+4%).

Considering the performance of the zone's agroclimatic and agronomic indicators, good summer crop production can be expected for the North American MPZ.

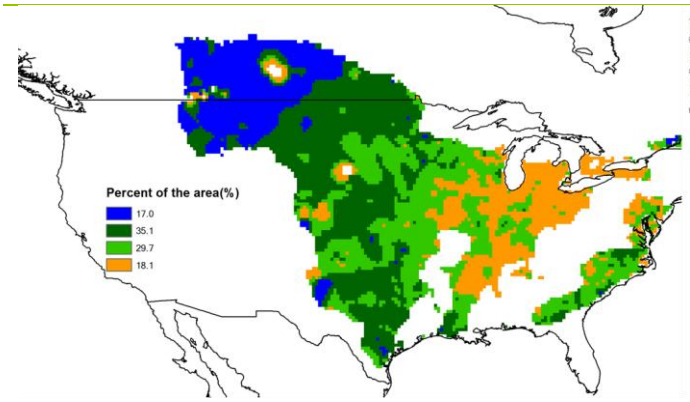
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, July-October 2016



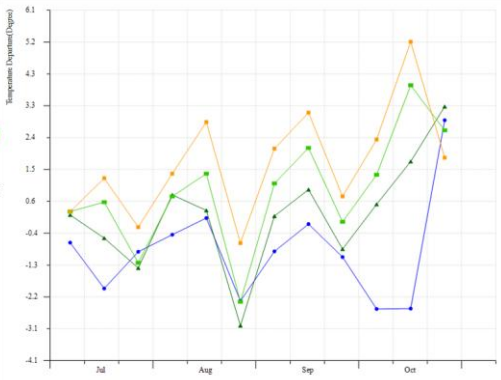
a. Spatial distribution of rainfall profiles



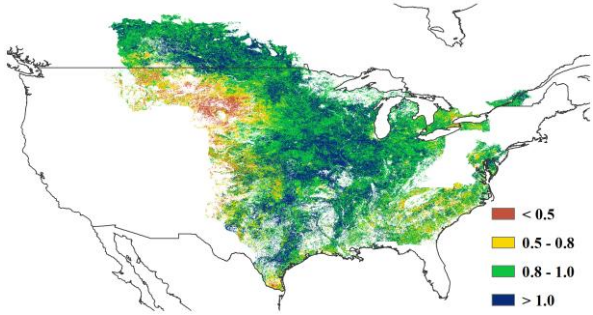
b. Profiles of rainfall departure from average (mm)



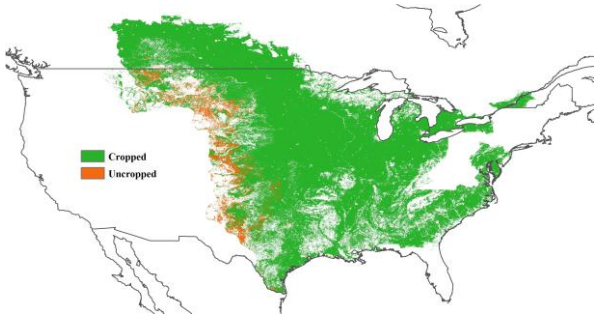
c. Spatial distribution of temperature profiles



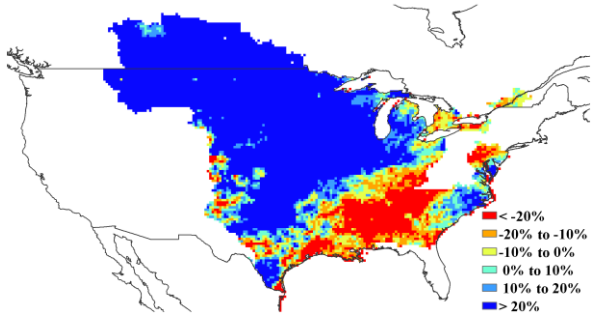
d. Profiles of temperature departure from average (mm)



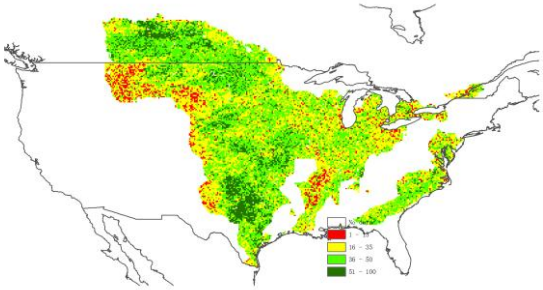
e. Maximum VCI



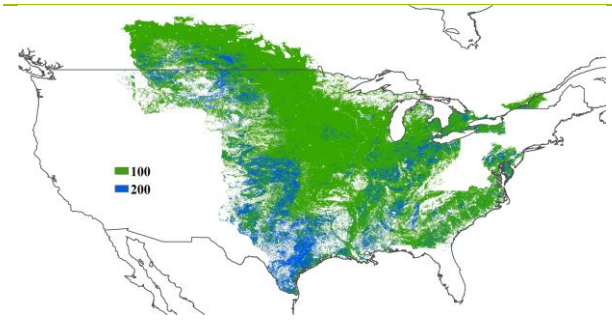
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping Intensity

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

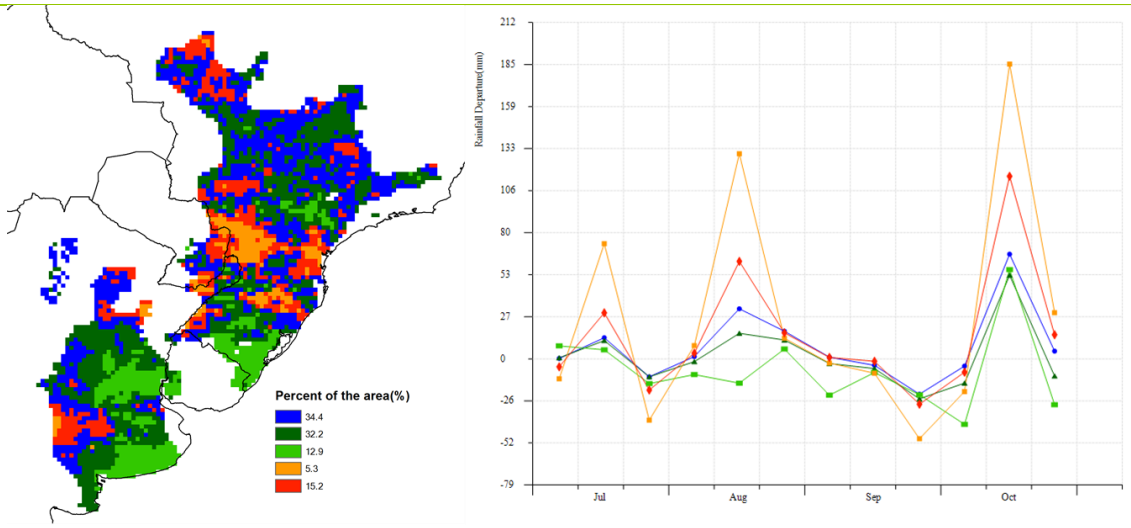
2.4 South America

This reporting period essentially covers the growing period of winter crops. Main crops are in the vegetative stages (maize) or at the beginning of planting (soybean). Figure 2.3 summarizes the CropWatch agroclimatic and agronomic indicators.

In general, RAIN was below average, with some variability among areas: negative departures in the Pampas, Patagonia, and semi-arid and Andean regions, and increments in northeast Brazil, the Amazon, and central-north Argentina. Increases in TEMP over average were more consistent among areas. Potential growth estimated through the BIOMSS indicator points at reductions in areas with a higher degree of RAIN deficit, while indicating increments in most areas with high RAIN. Maximum VCI highlights the variability of crop condition in the region. Despite the reductions in RAIN, Argentina shows in general higher maximum VCI values than Brazil, probably related to a higher retention of soil water from the previous season's rains (with strong El Niño effect) over temperate areas. Low VCI values occur locally in areas such as in the south of Buenos Aires province (Argentina) and Rio Grande do Sul and Paraná states (Brazil); they are associated with negative anomalies in precipitation. Low VHI values are observed for these areas, as well as in the northern areas of Brazil. BIOMSS reductions for the Pampas and Rio Grande do Sul due to lower rainfall do not always result in reductions in the vegetation health index (VHI), probably also due to the soil water retention from the extremely wet last season. For the central Pampas, changes in crop proportions from last year could also explain the high VHI values observed.

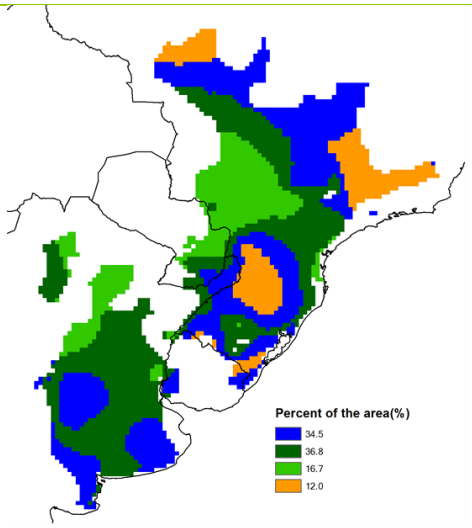
Overall, conditions are average to favorable for crops in the South America MPZ.

Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, July-October 2016

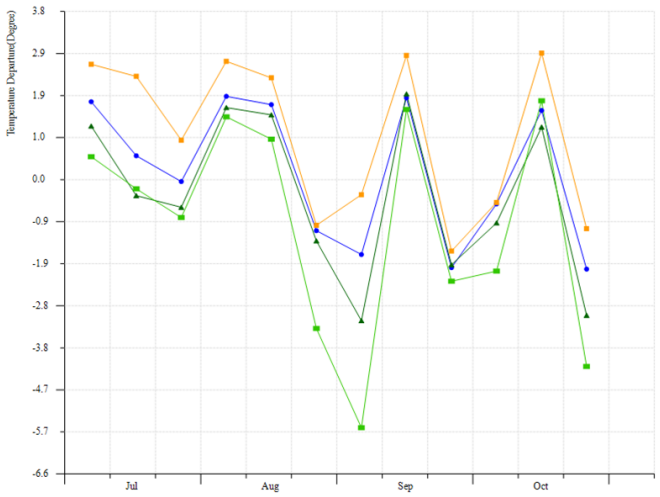


a. Spatial distribution of rainfall profiles

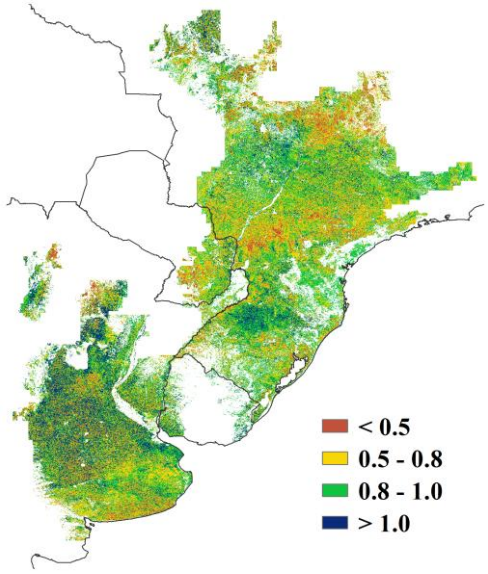
b. Profiles of rainfall departure from average (mm)



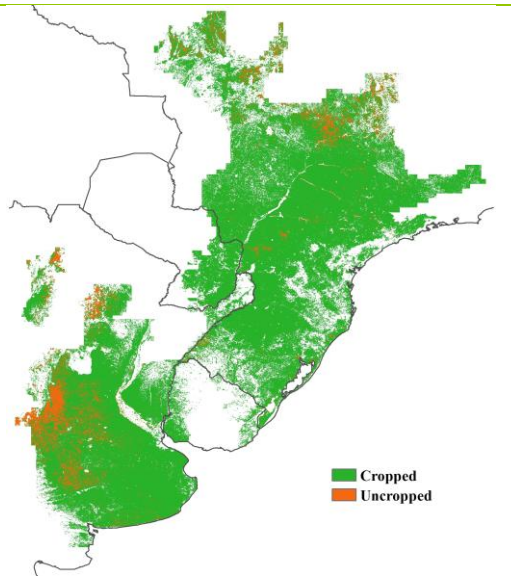
c. Spatial distribution of temperature profiles



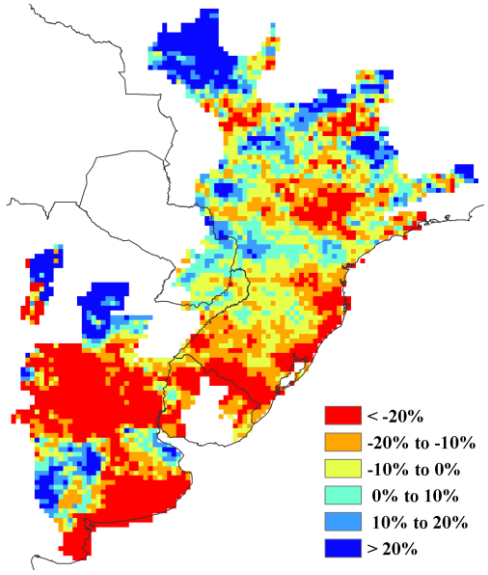
d. Profiles of temperature departure from average (mm)



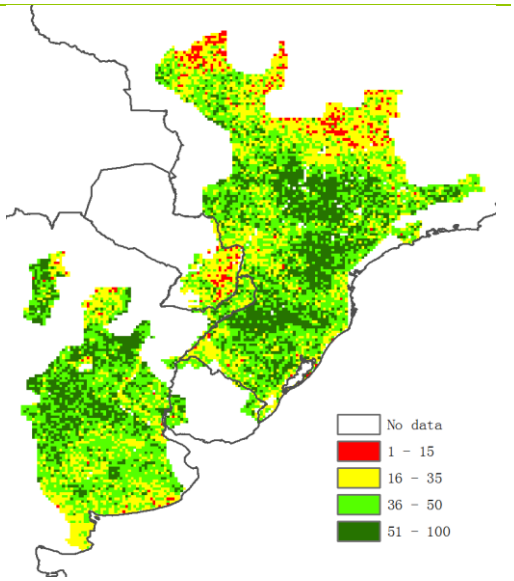
e. Maximum VCI



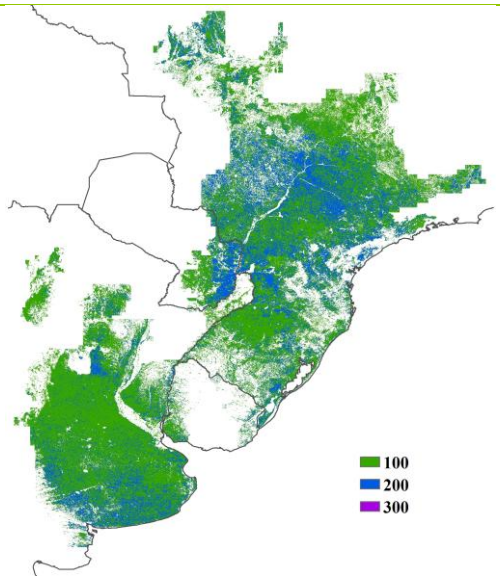
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping Intensity

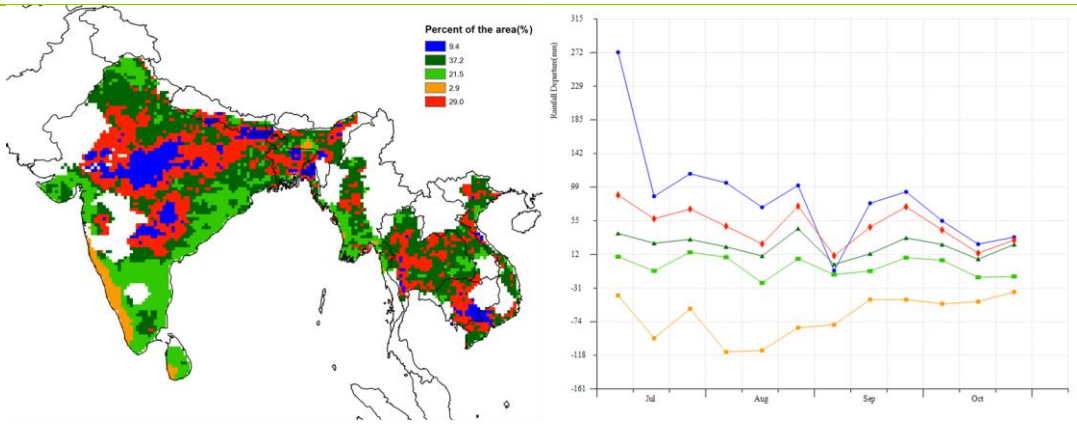
Note: For more information about the indicators, see Annex C.

2.5 South and Southeast Asia

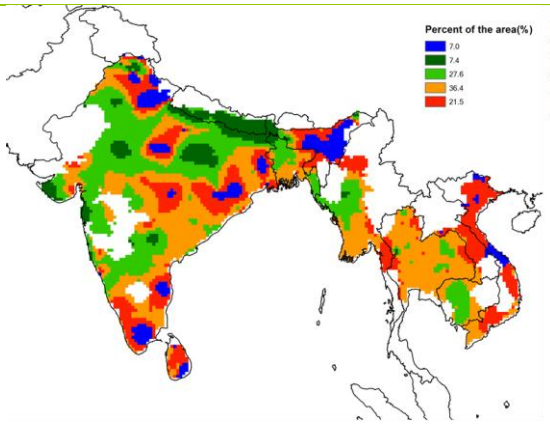
The reporting period is the planting and growing season of rice and maize. As per CropWatch agroclimatic indicators, the crop condition for the MPZ is average. During the monitoring period rainfall (RAIN) was 12% above average, with increases in Thailand (+9.4%) and Cambodia (+29%), Bangladesh (+19%), India (+12%), and Vietnam (+12%). The excess rainfall in these areas caused floods and damaged crops. While the biomass accumulation potential (BIOMSS) increased by 3%—probably due to the excess rainfall, temperature remained average. The photosynthetically active radiation (RADPAR) dropped 4% as compared to average. Meanwhile, maximum VCI values ranged from 0.5 to 1, pointing at average to favorable crop condition. In southern India and in some parts of Vietnam, however, maximum VCI values remained below 0.5, indicating poor crop condition. No change was observed in the region's fraction of cropped arable land (CALF), which was 95% during the monitoring period. The non-cropped areas are distributed mainly in the Indian state of Tamil Nadu, Haryana, and in southern Vietnam. The cropping intensity of the MPZ was 157%, 6% below average. Low values of VHI minimum were recorded in parts of Vietnam, the Indian state of Tamil Nadu, Karnataka, Kerala, Orissa, and Punjab, pointing to water stress in these areas linked to deficit rainfall.

Overall the crop condition is average in the MPZ as a whole, in spite of severe floods in India, Myanmar, Bangladesh, Vietnam and Thailand.

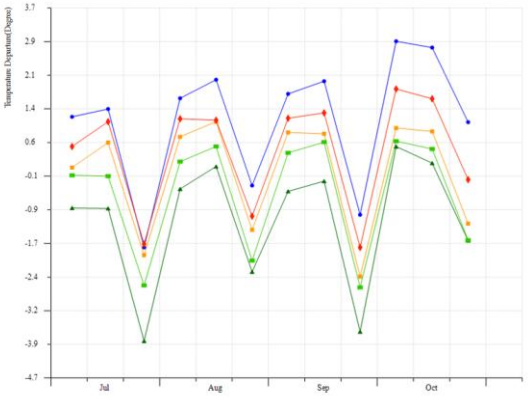
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, July-October 2016



a. Spatial distribution of rainfall profiles

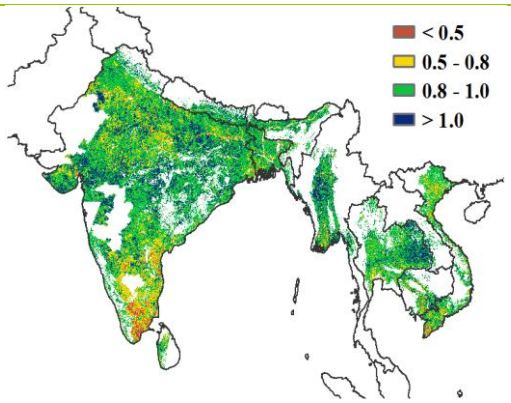


b. Profiles of rainfall departure from average (mm)

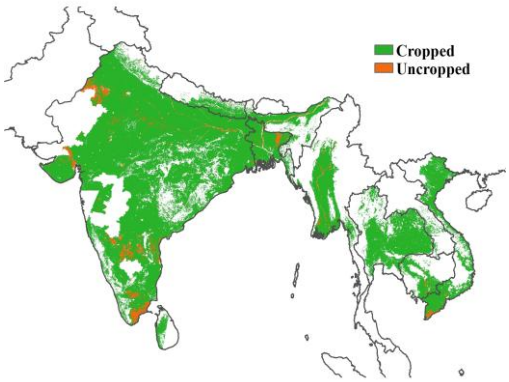


c. Spatial distribution of temperature profiles

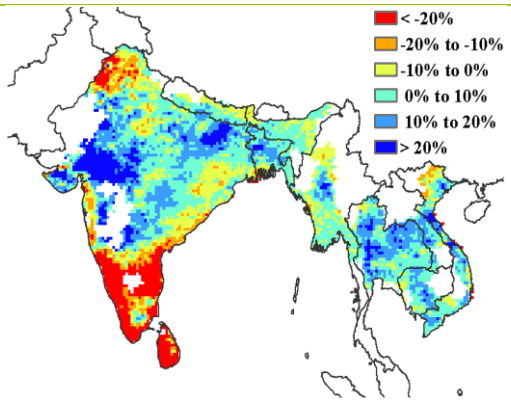
d. Profiles of temperature departure from average (mm)



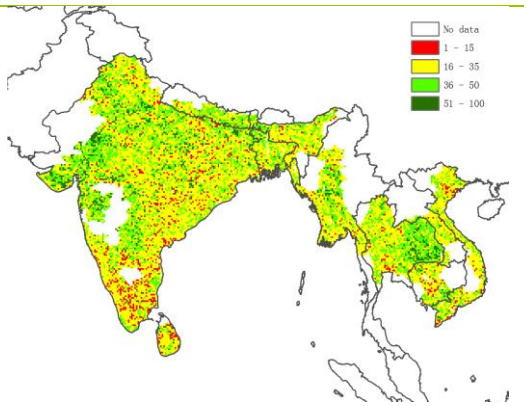
e. Maximum VCI



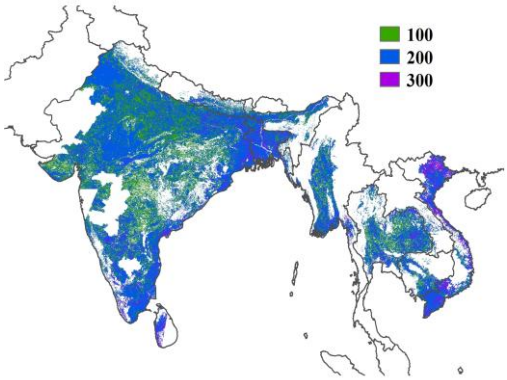
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping Intensity

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

2.6 Western Europe

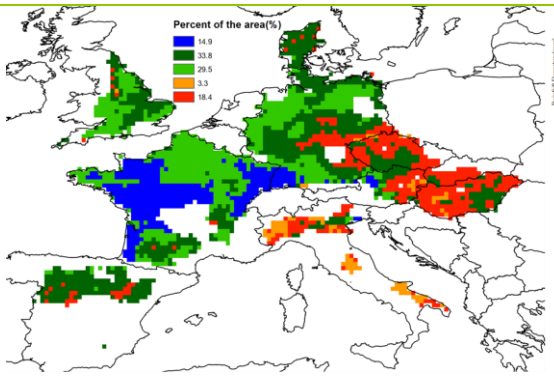
Crop condition was below average in most parts of the continental Western European MPZ, based on the integration of agroclimatic and agronomic indicators.

Total precipitation was 25% below average, but with exceptional positive departures over most of Germany, Hungary, Austria, the Czech Republic, Denmark, Italy, Spain, the southern part of northern France, and the east of the United Kingdom in late July and early September and during the second half of October. The west and east of France suffered a precipitation shortfall in late August. Temperature showed an increase of 0.3°C over average and radiation was about average. Below average temperatures were observed in most parts of Western Europe after early September except for Spain. In August, a heat wave that occurred across the whole of Europe was felt mostly in Germany, France, Italy, Belgium, Austria, and Switzerland; in parts of Spain temperatures approached 40 degrees from June to middle August, a historical record. The unfavorable climatic conditions (low rain and high temperature) were not beneficial for late crop development and maturation.

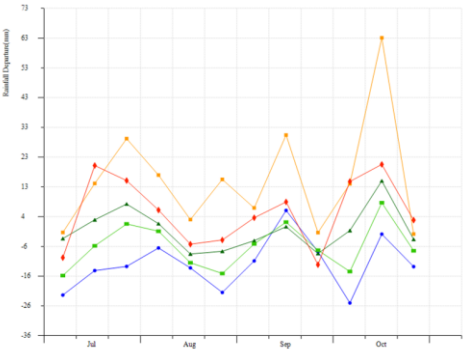
Due to the rainfall deficit, the biomass accumulation potential, BIOMSS, was 18% below the recent five-year average. The spatial distribution of BIOMSS shows that the lowest values (-20% and below) occur over most of France, Spain, northern Germany, the United Kingdom, and Denmark. The values for minimum VHI confirm the water deficit in those regions over the last four months. In contrast, BIOMSS in most other regions was 10% above average. According to the VCIx map, crop condition was below average in most of Spain, France, and Germany, compared with other regions in the MPZ. Average VCIx for the MPZ was 0.81. Cropping intensity (115%) was down 10% compared with the five-year-average and only 91% of the arable land was cropped across the MPZ. Most uncropped arable land was concentrated in Spain throughout this reporting period.

Generally, the condition of summer crops in the MPZ was below average and more rain will be needed to ensure adequate soil moisture supply for the ongoing winter crop season.

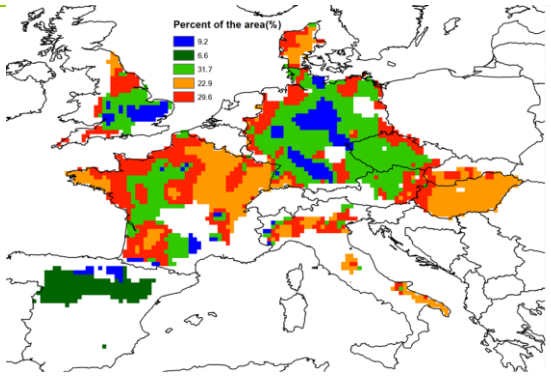
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, July-October 2016



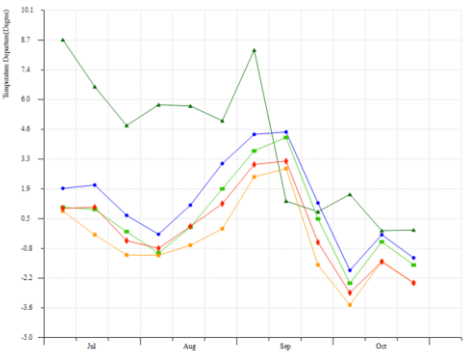
a. Spatial distribution of rainfall profiles



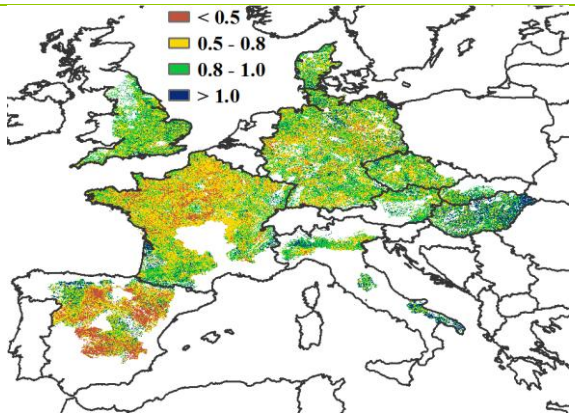
b. Profiles of rainfall departure from average (mm)



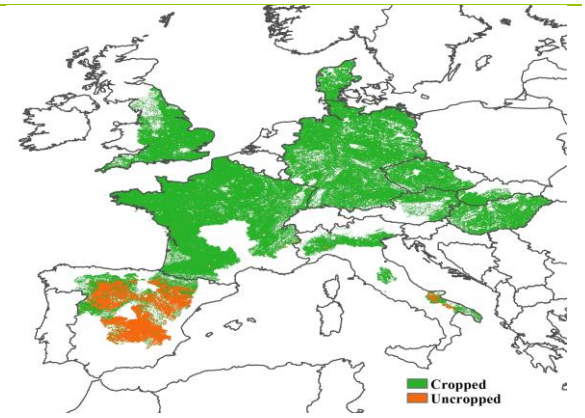
c. Spatial distribution of temperature profiles



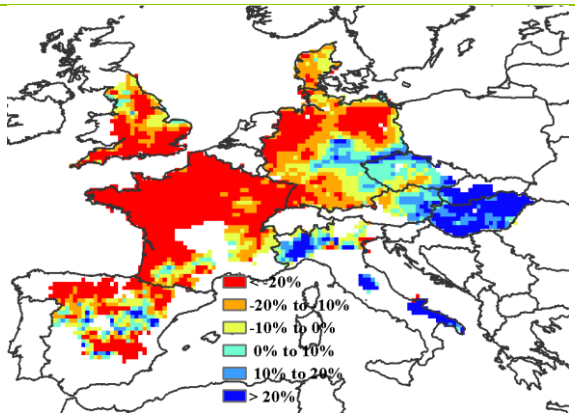
d. Profiles of temperature departure from average (mm)



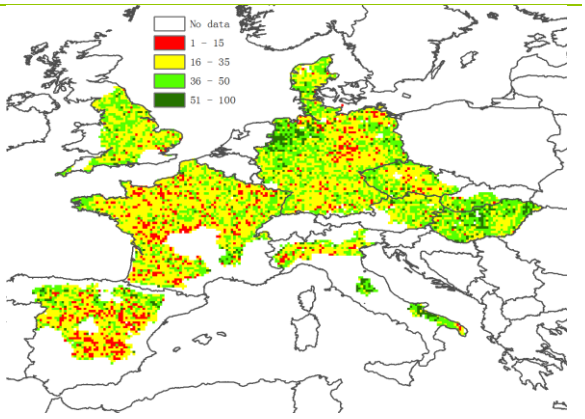
e. Maximum VCI



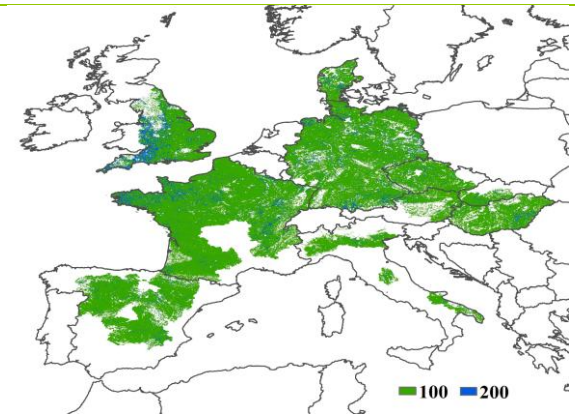
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping Intensity

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

2.7 Central Europe to Western Russia

The overall average agroclimatic variables over the MPZ (RAIN,-1%; TEMP,-0.5°C; and RADPAR, -2%) hide a situation made up by spatially contrasted situations.

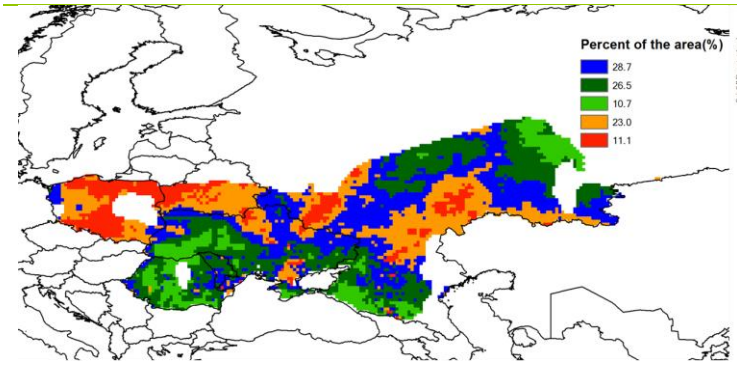
Unfavorable rainfall affected about 37.2% of the MPZ during July and August, especially in Romania (RAIN, -27%), southwest Ukraine (Lviv to Vinnytsia oblasts) and southern Russia (from the kray of Krasnodar to the Kabardino balkariya republic). The largest deficits occurred in the two republics of Ingushetiya (-42%), Adigeya (-39%), and the kray of Krasnodar (-32%). Favorable precipitation with peaks in July and October was recorded on a large band crossing the continent from Poland (+28%) in the west to the Russian oblasts of Samarskaya (+7%) and Saratovska (+29%), with maxima in the oblast of Leningrad (+48%) and the republic of Karelya (+47%). Temperature was generally low, with two colder periods in July and in September. The coldest area was the already-mentioned Adigeya republic with an average drop of 1.8°C

over the reporting period. The only area with significantly higher than average temperature occurred in the northeast of the MPZ around and between the oblasts of Kirov (+0.5°C over the reporting period) and Perm (+1.3°C) where the temperature departure peak exceeded 7°C in early August for two consecutive dekads.

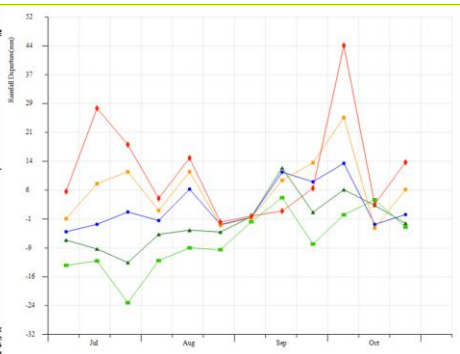
The resulting biomass production potential (BIOMSS, -3% on average for the MPZ), which is relevant mostly for summer crops, directly results from the agroclimate: a positive departure in Poland (+21%, decreasing in the west), northwest Belarus (+8% nationwide) and adjacent areas in Russia (oblast of Smolensk, +17%), as well as in the oblasts in the east of the MPZ mentioned for their high precipitation. Low values occur in the southern areas. The pattern is largely confirmed by the VCIx values: high in Poland and Belarus and intermediate in Ukraine and Romania where a mix of favorable and unfavorable situations occurs.

Uncropped arable land occurs mostly in the Caucasus (Stavropol kray), which is also characterized by clusters of unfavorable VHIn and low VCIx. Considering all indicators—including CALF (98% on average, an increase of 3 percentage points over average), the rather high average VCIx (0.89 on average; 0.9 in Poland, Ukraine and Russia), and the cropping intensity (101%, 2% below average)—mixed but about average conditions are estimated to prevail over the MPZ, with below average conditions in the southernmost areas where the outcome of the current winter crops season will crucially depend on winter precipitation.

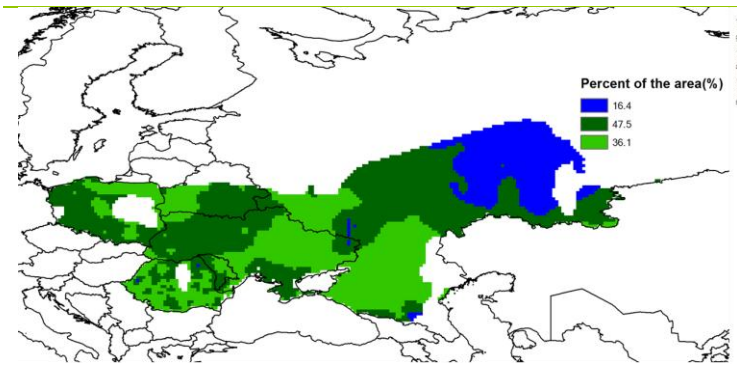
Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, July-October 2016



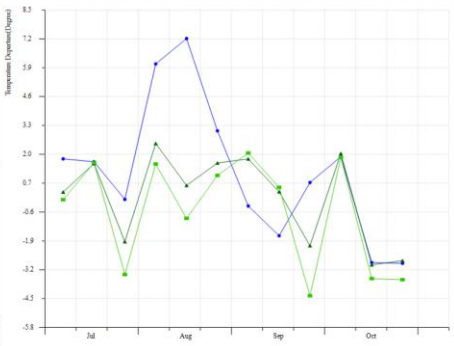
a. Spatial distribution of rainfall profiles



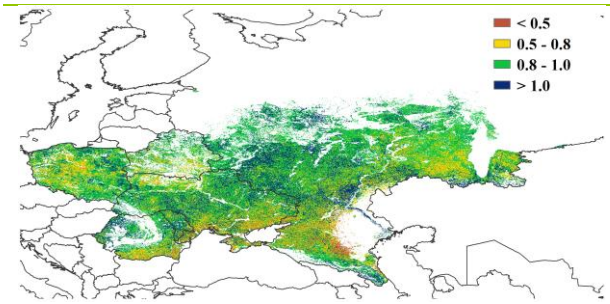
b. Profiles of rainfall departure from average (mm)



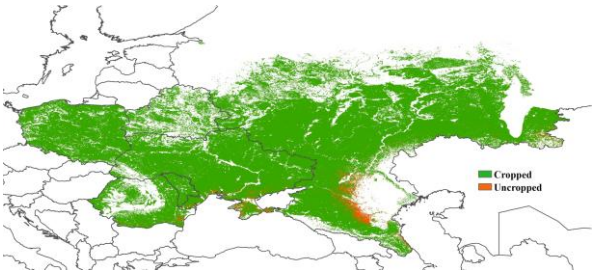
c. Spatial distribution of temperature profiles



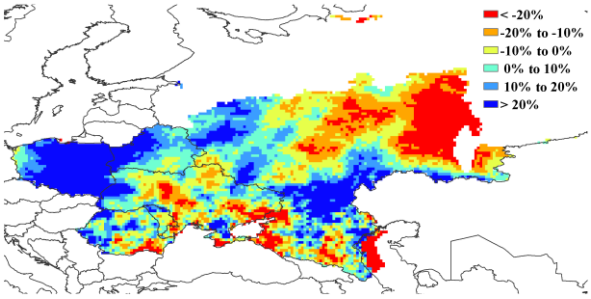
d. Profiles of temperature departure from average (mm)



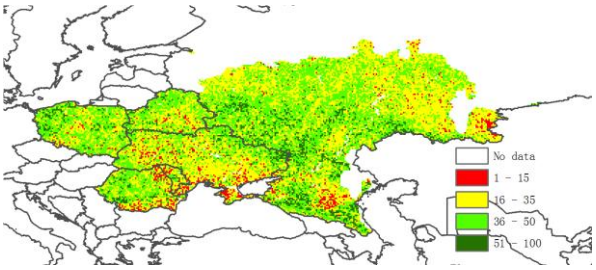
e. Maximum VCI



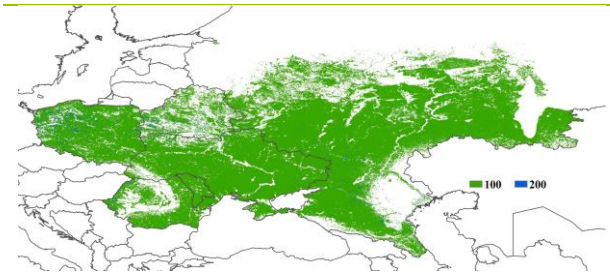
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping Intensity

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