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) and maximum vegetation condition index (VCIx)—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 fourteen- and five-year averages.

Table 2.1. July-October 2015 agroclimatic indicators by Major Production Zone, current value and departure from 14YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 14YA (%)	Current (°C)	Departure from 14YA (°C)	Current (MJ/m^2)	Departure from 14YA (%)
West Africa	961	16	26.5	-0.2	968	-4
South America	498	46	20.5	0.5	957	-5
North America	444	24	20.6	0.1	1092	0
South and SE Asia	1050	3	27.4	-0.1	969	3
Western Europe	238	-15	16.1	-0.3	910	0
C. Europe and W. Russia	168	-29	15.3	-0.6	869	3

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 fourteen-year average (14YA) for the same period (July-October) for 2001-14.

Table 2.2. July-October 2015 agronomic indicators by Major Production Zone, current season values and departure from 5YA

	BIOMSS (gDM/m^2)		Cropped arable land fraction		Maximum VCI Intensity	Cropping Intensity	
	Current	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current	Current (%)	Departure from 5YA (%)
West Africa	2052	5	83	-2	0.83	130	1
South America	1146	19	95	8	0.77	168	1
North America	1273	20	87	-3	0.87	120	-2
South and SE Asia	1694	-12	84	0	0.86	168	1
Western Europe	935	-13	91	-1	0.76	125	-2
C Europe and W Russia	735	-20	92	0	0.78	103	0

Note: Departures are expressed in relative terms (percentage) for all variables. 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 five-year (5YA) average for the same period (July-October) for 2010-2014.

2.2 West Africa

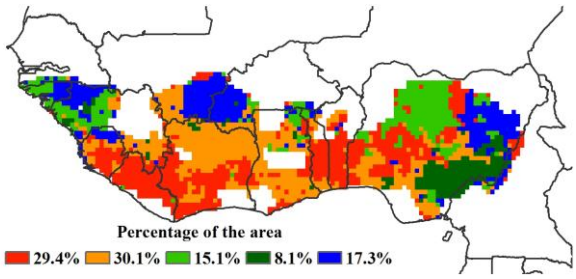
The west African MPZ as a whole recorded rather favourable rainfall conditions during the reporting period (+16%) even if the value hides large regional differences. In general, the west and the east as well as the northern fringe (corresponding to the southern Sahel) enjoyed favorable conditions: Guinea Bissau, +45%; Guinea, +29%; south-east Mali and south Burkina Faso (both with +35% nation-wide); northern Ghana (+14% over the whole country) and Nigeria (+21%, with excess concentrated in the northern half of the country). Temperature patterns show similar values the region; they were consistently below but close to average (-0.2°C). RADPAR was 4% below average (-2% in Liberia to -9% in Guinea Bissau).

The resulting biomass production estimate is up 5% on average with the most negative departures in Côte d'Ivoire (-5%) and Liberia (-8%), and the highest anomalies in Guinea Bissau (+11%), and Guinea Conakry and Ghana (both at +10%). The biomass production potential map shows unfavourable values in Liberia, the south of Côte d'Ivoire as well as Togo and Benin. This very largely coincides with the areas of high cropping intensity (200%) where the first maize crop, harvested in August and September, may have suffered some water stress in its final stages. The period also corresponds to the planting of the second maize crop to be harvested at the end of the year and throughout early 2016.

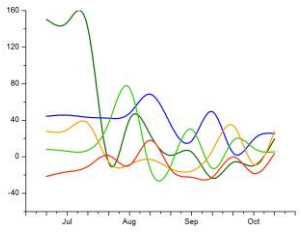
Rice and especially tubers constitute important crops in the area. For the western half of the region and irrigated rice in the eastern half, the harvest is on-going and will last until December or January of 2016. In the east, rain-fed rice is harvested earlier (in September) at about the same time as maize. Yams are harvested over a long period of about 6 months at the end of the year, while cassava is brought in later, usually around December and January.

The comparison of satellite-based crop indices, the agroclimatic indices and the crop calendar indicate that there were favorable conditions of cereals in the western and in the northern (Sahelian) parts of the region. However, conditions are mixed in Liberia and in the southern parts of the countries between Côte d'Ivoire and Nigeria. This data is correlated in figure 2.1.

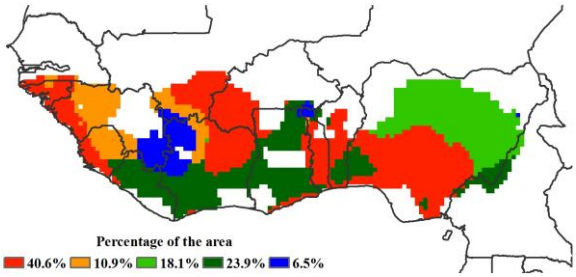
Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, July-October 2015



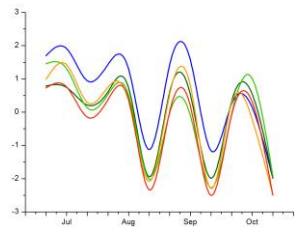
a. Spatial distribution of rainfall profiles



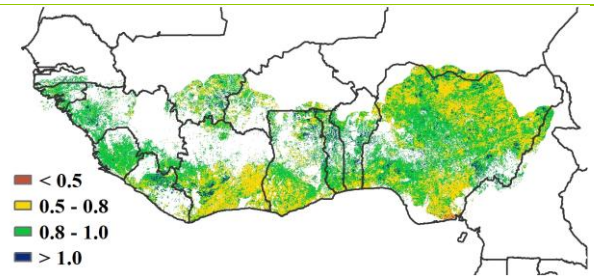
b. Profiles of rainfall departure from average (mm)



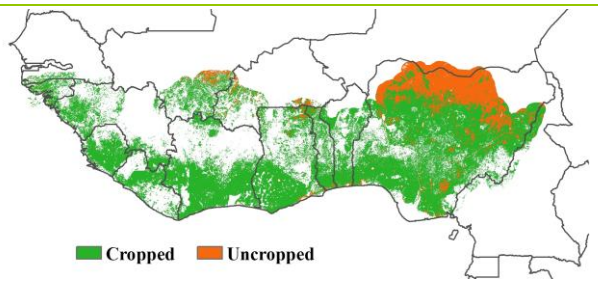
c. Spatial distribution of temperature profiles



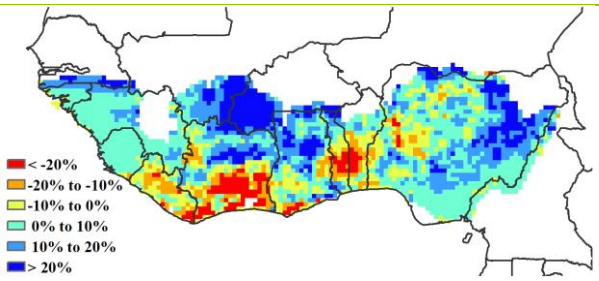
d. Profiles of temperature departure from average (°C)



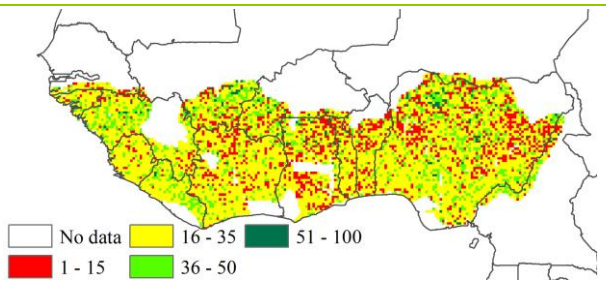
e. Maximum VCI



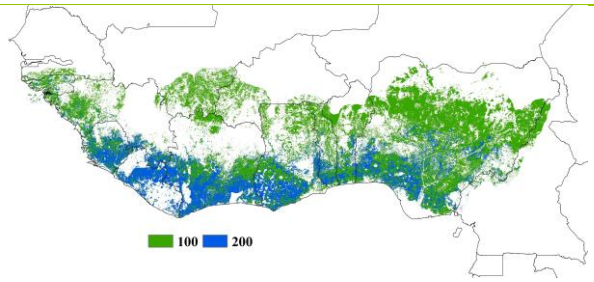
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



h. Cropping intensity

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

2.3 North America

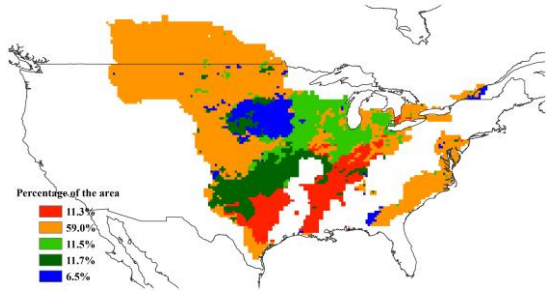
In general, crop condition was average in the North American MPZ during the July to October monitoring period of 2016, which covered flowering, heading, filling and the harvest of summer crops (maize, soybean, paddy, sorghum and spring wheat).

Overall, CropWatch agroclimatic indicators show favorable or normal weather conditions: rainfall was 24% above average, temperature was 0.1°C above average and radiation was average. Biomass shows a 20% positive departure compared to last five years average. However, the fraction of cropped arable land (CALF) was 3% below average and large uncropped arable land areas occurred in the major production zones of Canada and the northern spring wheat zones of the United States. A low CALF rate was paralleled by a 2% drop of cropping intensity and below average VCIx (0.5).

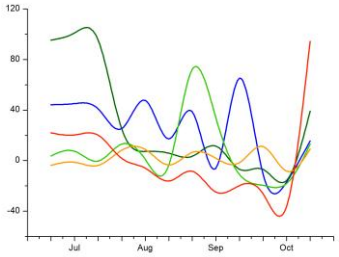
Abundant precipitation fell in the period from mid-August to mid-September in the Corn Belt, including Iowa (+43%), Illinois (+5%), Minnesota (+43%), Nebraska (+88%) and Missouri (+77%), which benefited the growth of maize and soybean in these states. After mid-September, rainfall declined to below average values, which had little influence on crops that had reached maturity and were harvested. In the rice production zones, below average rainfall continued from late-July onwards, and paddy yield decreased due to water deficit at the heading and grain filling stages.

After August, the major crop production zones of Canada recorded average rainfall and above average temperatures. However, this was insufficient to replenish soil moisture after the serious drought that happened during the previous monitoring period. This data is correlated in figure 2.2.

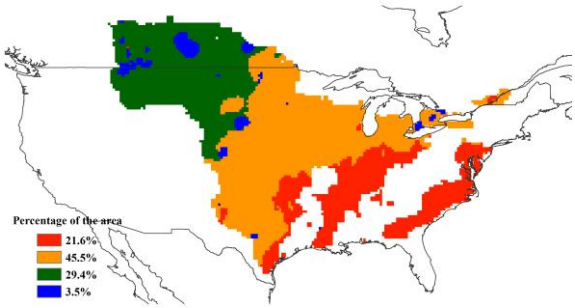
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, July-October 2015



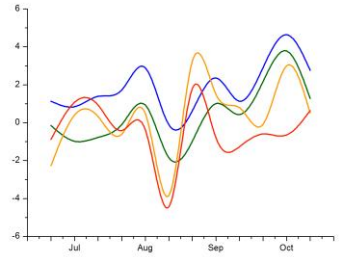
a. Spatial distribution of rainfall profiles



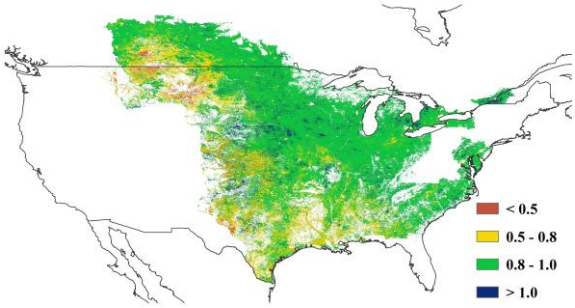
b. Profiles of rainfall departure from average (mm)



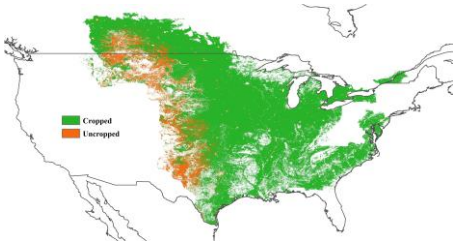
c. Spatial distribution of temperature profiles



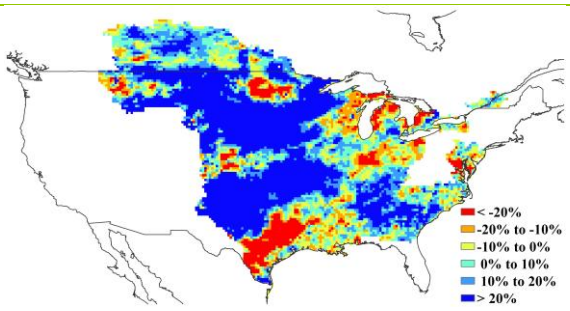
d. Profiles of temperature departure from average (°C)



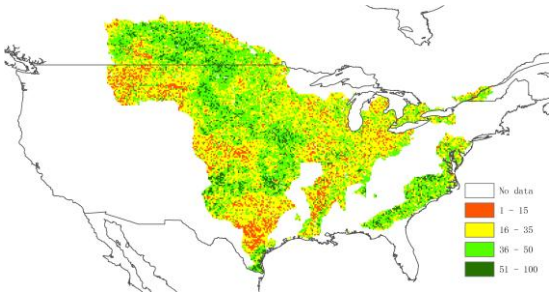
e. Maximum VCI



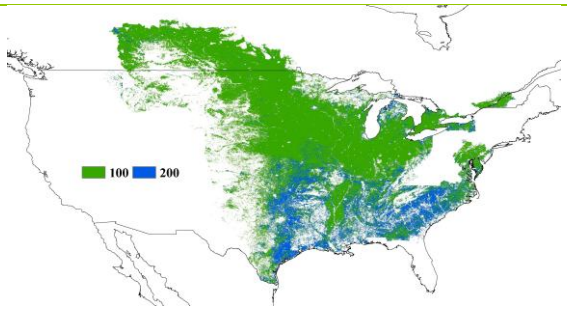
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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

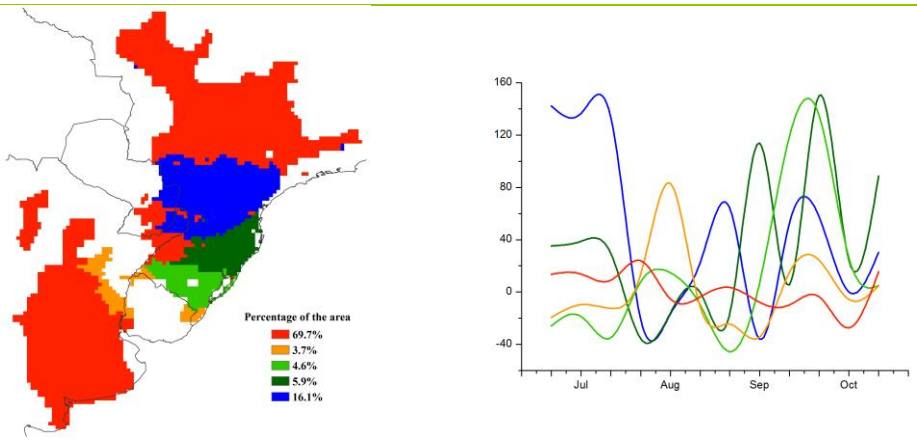
2.4 South America

The condition of crops was slightly above average in the South American MPZ during the monitoring period. The two major crops (maize and soybean) are currently off growing season. Sufficient (46% above average) rainfall above the area provided favorable soil moisture for winter crops (wheat and rapeseed). Warm weather during the winter benefits the emergence and seeding development of winter crops in the region as well. Overall agroclimatic conditions were beneficial to crops as shown by the 19% above average BIOMSS.

However, the spatial distribution of agroclimatic and agronomic indicators observed over July to October (figure 2.3) was inhomogeneous. Even if temperature over the whole MPZ was above average from July to August, temperature clusters indicate that below average temperature dominated the Pampas as well as southern Rio Grande do Sul. In combination with sufficient rainfall in Rio Grande do Sul, Santa Catarina, and Parana, BIOMSS is 20% above average in those regions while the variable is below average for most other regions mainly due to the below average rainfall. The vegetation health index (VHI) map confirms the favorable conditions in Rio Grande do Sul, Santa Catarina, and Parana but indicates water deficit in the Pampas and Sao Paulo. The unfavorable climatic conditions in the Pampas resulted in below average crop condition as confirmed by VCIx values below 0.5.

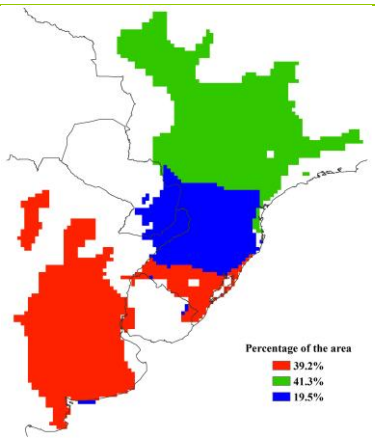
The cropped arable land fraction (CALF) for the MPZ exceeded 95%, which is 8% above the previous five-year average. Most of the uncropped arable land is located in central Cordoba and an area between Bahia Blanca and Santa Rosa. The cropping intensity is 168%, about 1% up compared to the five years average: 68% of the arable land is double cropped. Most of single cropping areas occur in the central Pampas and central Sao Paulo. Compared to the cropping intensity map in 2014, a clear shift of double cropping systems from central Buenos Aires to southern and eastern Buenos Aires is observed. This is strong evidence for the fact that local farmers commonly adopt a rotation in which single cropping of soybean in one year is followed by winter wheat - soybean double cropping in the following year. All of this data is correlated in figure 2.3.

Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, July-October 2015

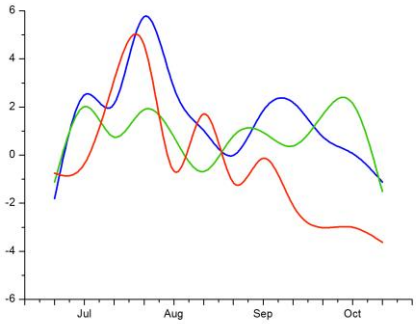


a. Spatial distribution of rainfall profiles

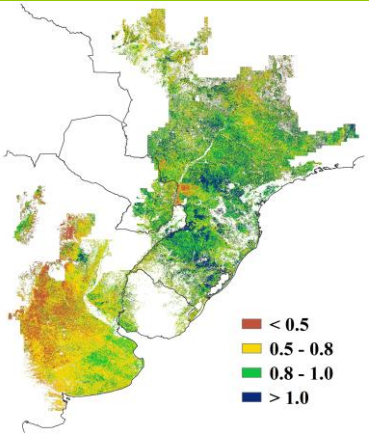
b. Profiles of rainfall departure from average (mm)



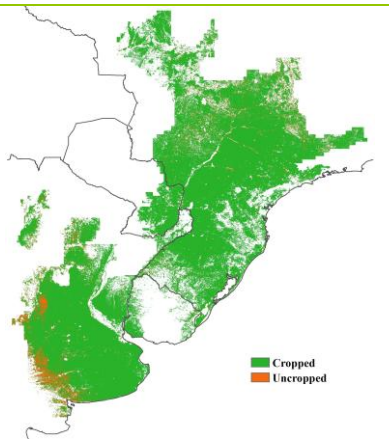
c. Spatial distribution of temperature profiles



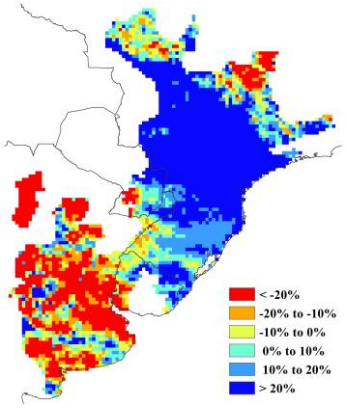
d. Profiles of temperature departure from average (°C)



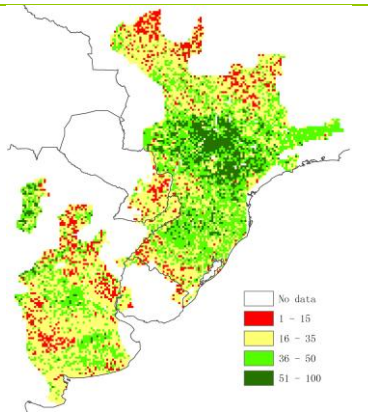
e. Maximum VCI



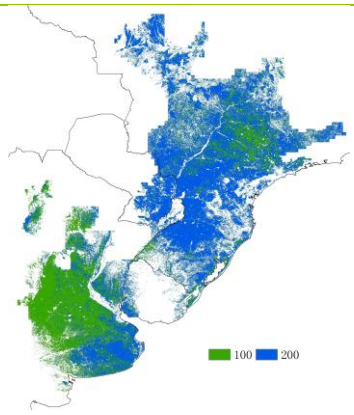
f. Cropped arable land



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

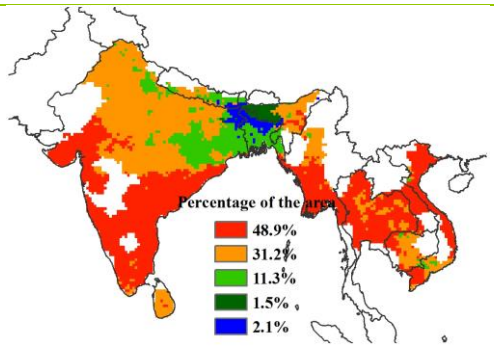
The reporting period covers the growing and harvesting of the main wet season crops in the South and Southeast Asia MPZ. The MPZ experienced 3% above average rainfall (RAIN), but was nevertheless below average in India (-2%), Thailand (-10%), Vietnam (-10%) and Myanmar (-8%). According to the rainfall profiles the MPZ received below average rainfall during mid August and mid September while it received above average rainfall during early September and throughout October, as can be seen in figure 2.4. The temperature (TEMP) was average; the profiles show that below average temperatures were recorded in the Indian states of Orissa, West Bengal, Assam and Jharkhand as well as in Bangladesh during the period of early September and October.

The maximum VCI values range from 0.8 to 1 indicating good crop condition. However, VCIx ranged from 0.5 to 0.8 in southern and northern India, as well as in central Myanmar and Cambodia pointing at average crop condition here.

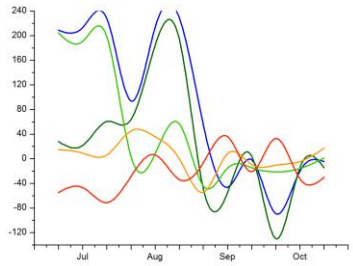
The fraction of cropped arable land was 84%. The uncropped lands were mostly distributed in central Myanmar and Indian states of Punjab, Gujarat, Andhra Pradesh, Maharashtra and Karnataka. The average biomass accumulation potential (BIOMSS) decreased 12% compared to the previous five-years average, resulting from low values in India (-12%), Thailand (-9%), Myanmar (-4%) and Vietnam (-3%).

In more details, up to 20% negative biomass accumulation was observed in southern and western India as well as in northern Thailand and Vietnam. The lower VHIn values mostly concentrated in central India and some scattered low rainfall areas. Altogether, the crop condition is average in this MPZ and does not raise major concerns. Figure 2.4 presents an overview of CropWatch agroclimatic and agronomic indicators.

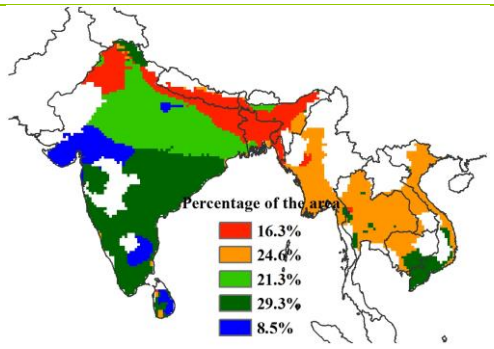
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, July-October 2015



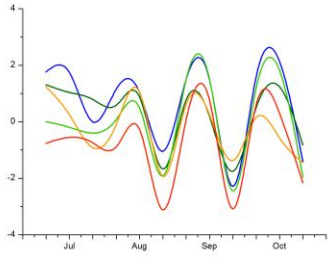
a. Spatial distribution of rainfall profiles



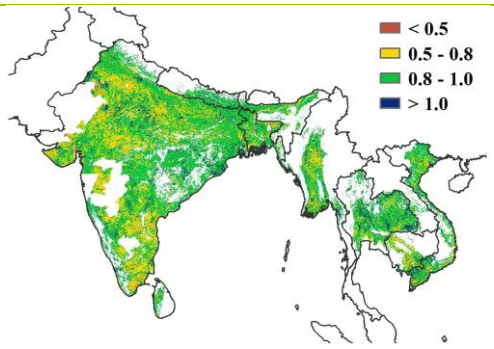
b. Profiles of rainfall departure from average (mm)



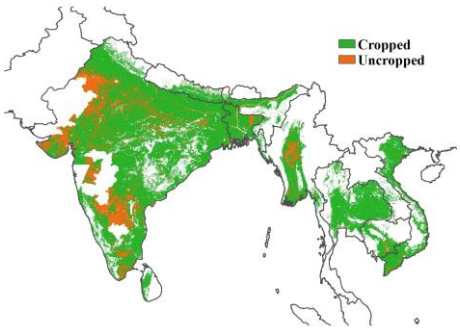
c. Spatial distribution of temperature profiles



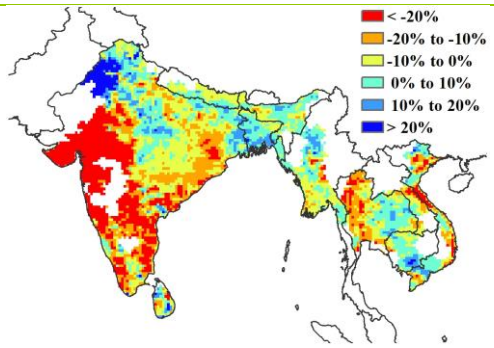
d. Profiles of temperature departure from average (°C)



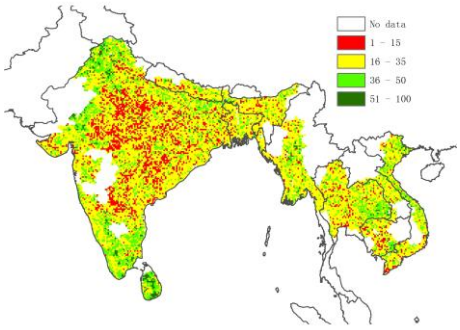
e. Maximum VCI



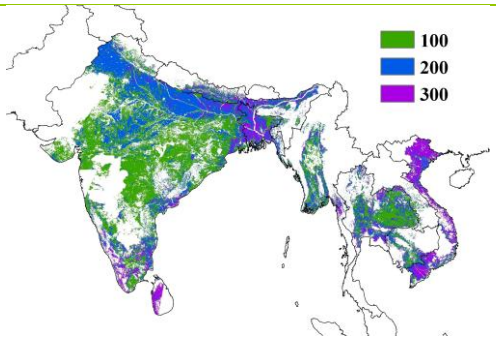
f. Cropped arable land



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

Overall, when integrating the findings of the various agroclimatic and agronomic indicators, crop condition was below average in most parts of Western Europe during this reporting period. Figure 2.5 represents an overview of CropWatch agroclimatic and agronomic indicators for this MPZ.

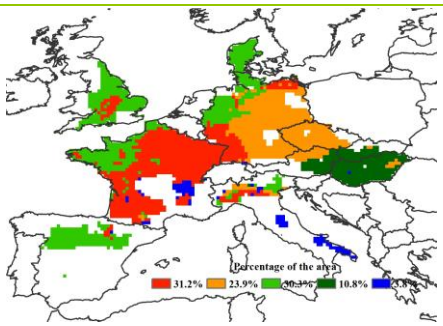
Total precipitation was 15% below the recent average, with exceptional positive departures over most of France and the southwest and the north of Germany from late August to early September, the south-east of France and the east as well as the centre of Italy from late August to October, and in most parts of Hungary after mid September. Temperature showed a decrease of 0.3°C compared to average and radiation was about average. The below average climatic conditions were not beneficial for late crop development and maturation.

Due to the rainfall deficit, the biomass accumulation potential, BIOMSS, was 13% 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, Germany, Czechia, northern Italy, northwest Austria as well as southern and eastern Germany. 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.

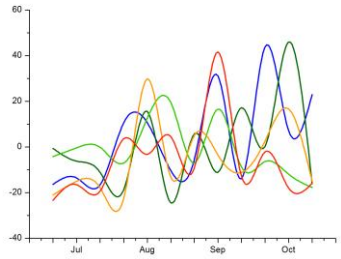
Cropping intensity (125%) was down 2% compared with the five-year-average and 91% of the arable land was cropped between July and October 2014, 1 percentage point lower than the recent five-year average; most uncropped arable land was concentrated in Spain throughout this reporting period. Accordingly, maximum VCI in Spain was lower as well, compared with other regions in the MPZ. Average VCIx for the MPZ was 0.76.

Generally, crop condition in Western Europe was below average. Pixels with low minimum VHI (below 15) are found scattered over most of France, Spain, southern Germany, Czechia and northern Italy. Figure 2.5 presents an overview of CropWatch agroclimatic and agronomic indicators.

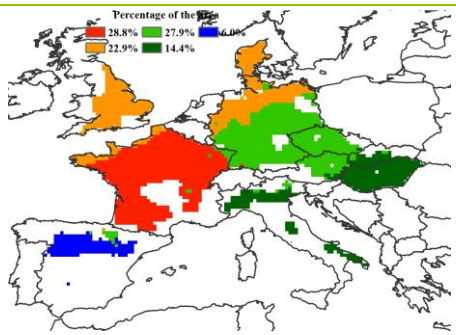
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, July-October 2015



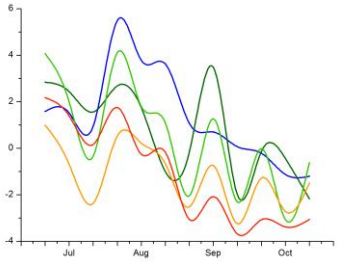
a. Spatial distribution of rainfall profiles



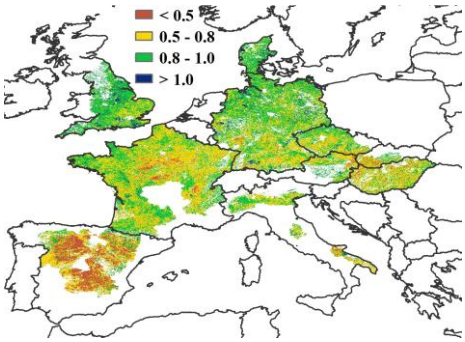
b. Profiles of rainfall departure from average (mm)



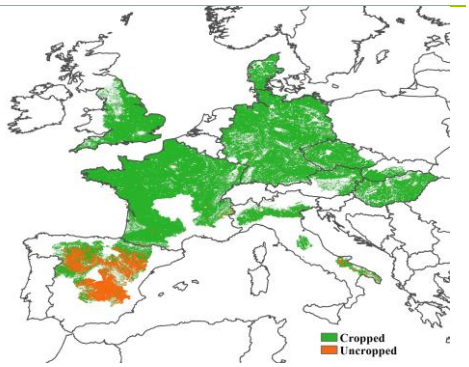
c. Spatial distribution of temperature profiles



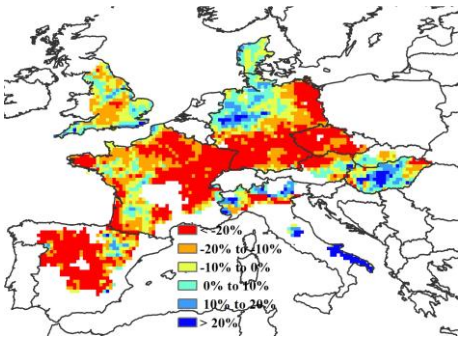
d. Profiles of temperature departure from average (°C)



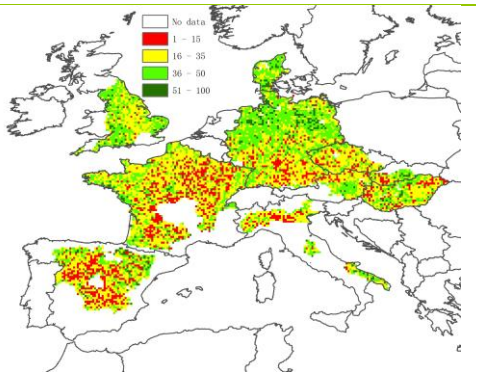
e. Maximum VCI



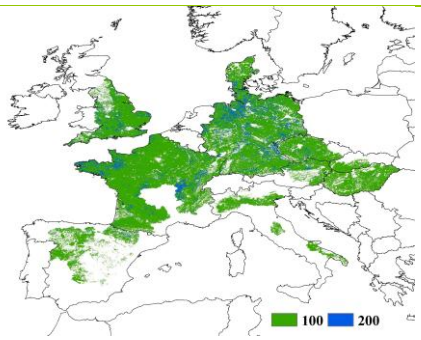
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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

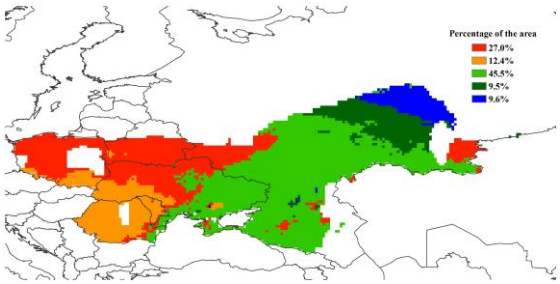
2.7 Central Europe to Western Russia

During the current monitoring period, the sowing of winter crops was completed in the Central Europe to Western Russia MPZ under generally unfavorable weather conditions. In this MPZ it was drier and colder than usual, with a 29% decrease in rainfall and a 0.6°C drop of temperature, although PAR displayed an increase of 3%.

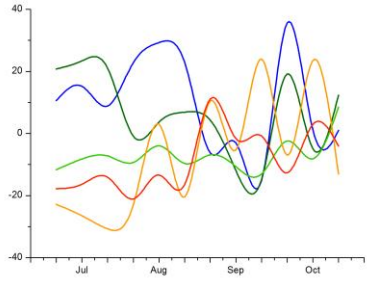
As indicated by the rainfall profiles, the western part of the MPZ (including Romania, Belarus, Poland and western Ukraine) showed a significant rainfall deficit in July and August while a diffuse peak occurred in Kirovskaya Oblast, Komi-permyatskiy Okrug and Permskaya Oblast in Russia in mid-August and early October. Temperatures in Romania, Poland, Ukraine, Belarus, and western Russia decreased from west to east, with lowest temperatures in Russia and eastern Ukraine. The scarce rainfall led to a significant drop in potential biomass for the whole MPZ (-20% compared to the five-year average). On the distribution map of the potential biomass, a large positive biomass departure would be expected only for the central and western part of the MPZ.

Accordingly, the VHI-based drought map shows the worst moisture condition to be in the Southern parts of Western Russia and eastern Romania compared to the previous monitoring period, which is confirmed by the Maximum VCI distribution map. 92% of the arable land was cropped from July to August 2015, at the same level as the five-year average. Generally, crop condition of the Central Europe to Western Russia MPZ was unfavorable throughout this monitoring period. Figure 2.6 shows the agroclimatic and agronomic indicators for this reporting period.

Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, July-October 2015

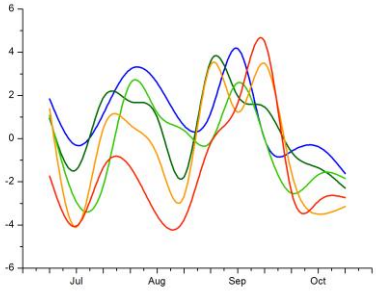


a. Spatial distribution of rainfall profiles

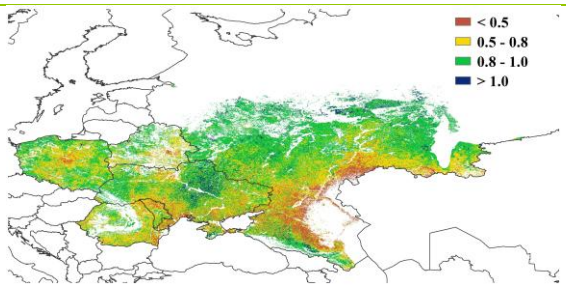


b. Profiles of rainfall departure from average (mm)

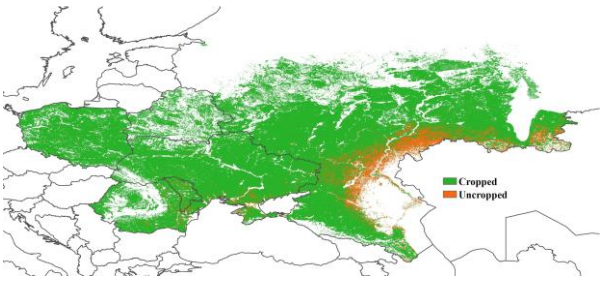
c. Spatial distribution of temperature profiles



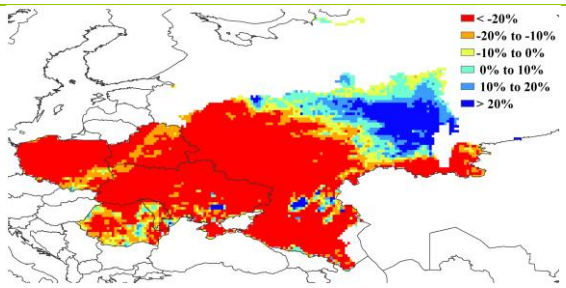
d. Profiles of temperature departure from average (°C)



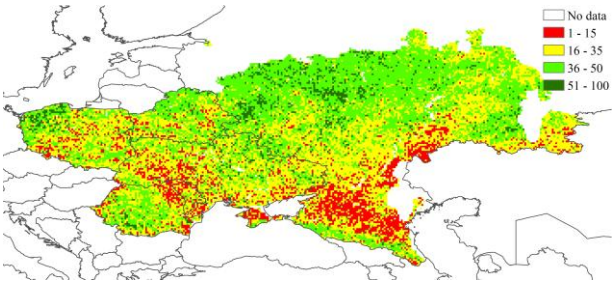
e. Maximum VCI



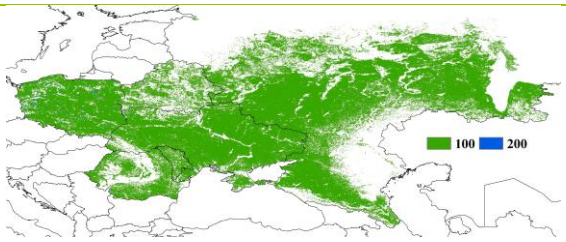
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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