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 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, respectively.

Table 2.1. October 2017 to January 2018 agroclimatic indicators by Major Production Zone, current value and departure from 15YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m²)	Departure (%)
West Africa	203	-8	26.5	-0.8	1097	-6
South America	727	1	23.5	-0.8	1277	-2
North America	273	-9	4.8	-0.3	547	-1
South and SE Asia	247	17	22.7	0.0	906	-7
Western Europe	247	-9	6.7	-0.3	300	-6
C. Europe and W. Russia	245	21	1.0	1.3	211	-11

*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 October in 2002-2016 to January next year.*

Table 2.2. October 2017 to January 2018 agronomic indicators by Major Production Zone, current season values and departure from 5YA

	BIOMSS (gDM/m²)		CALF (Cropped arable land fraction)		Maximum VCI Intensity
	Current	Departure (%)	Current	Departure (% points)	Current
West Africa	**517**	**-14**	**93**	**-1**	**0.90**
South America	**1743**	**-2**	**99**	**3**	**0.74**
North America	**730**	**-3**	**67**	**3**	**0.88**
S. and SE Asia	**520**	**8**	**95**	**1**	**0.94**
Western Europe	**857**	**-8**	**89**	**-1**	**0.86**
Central Europe and W Russia	**716**	**10**	**76**	**4**	**0.92**

Note: See note for table 2.1, with reference value R defined as the five-year average (5YA) for October in 2012-2016 to January next year.

2.2 West Africa

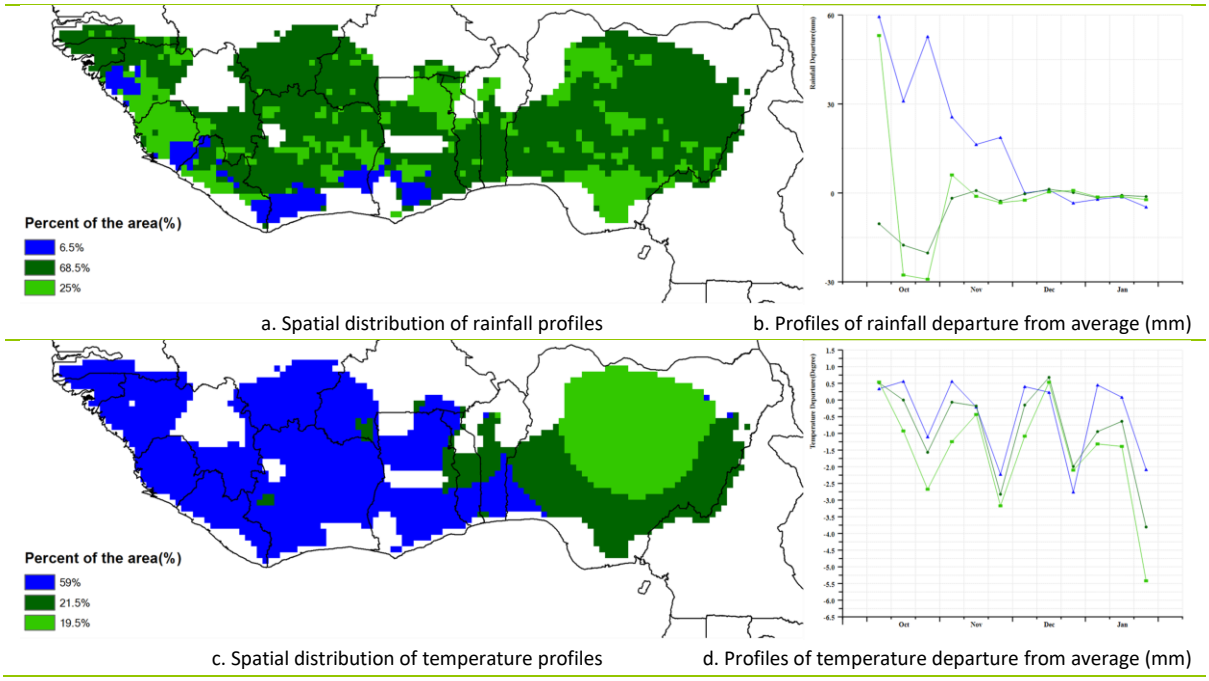
The reporting period marks the end of the main harvesting season throughout the region for maize, sorghum, millet, and yams, with cereal production expected to be above average (+5%). The season is strongly influenced by the seasonal variation of the water balance in supporting crop production,

especially cereals. The north of the MPZ, which has only one rainy season, most cereals were under harvesting. However, in the west (Guinea to Liberia), rice plays an important part and the harvest extends into December and sometimes even January. The first maize crop was harvested in October for the areas experiencing bimodal rainfall (southern Cote d'Ivoire to Nigeria), while the short season maize was harvested in January 2018. Cassava, the main staple in this region is still growing and predominantly reflected in the current cropped arable land area.

The CropWatch observations indicated a slightly below average rainfall in 68.5% of croplands in the MPZ which lead to an overall decrease (-8% for RAIN), with close to average temperature of 26.5 °C (-0.8% compared to the five-year average) and sunshine (RADPAR, -6% deviation), which gave a decrease in biomass production potential (BIOMSS, -14%). The coastal regions of Cote I'voire and Ghana as well as parts of northern Nigeria experienced a positive departure (>20%) in biomass as compared to the whole region (-20%). The west of the region, including the Niger catchment area enjoyed an increase of precipitation above average, which resulted in improved river flow and irrigated crops in the Sahel (in Niger, the flow peaks between December and March, according to the years). For most of the MPZ, the cropped arable land fraction (CALF) reached 93% at the time of decreasing rainfall that marks the end of the rainy season. The VCIx map as index of crop condition showed average VCIx of 0.9 (BIOMSS, +1%). These climatic conditions were favorable across the northern savannah agro-ecological zone of Nigeria which showed a good share of cropped arable land, hence the extent of agricultural production in Nigeria and the region as a whole.

During this period the growing season was coming to an end with precipitation well distributed in time and space, temperature fluctuating within a +/-2 °C margin after cessation of the rainy season. Based on these observations CropWatch indicators depicted a stable and coherent climatic condition for late crop harvest in early 2018.

Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, October 2017 to January 2018.

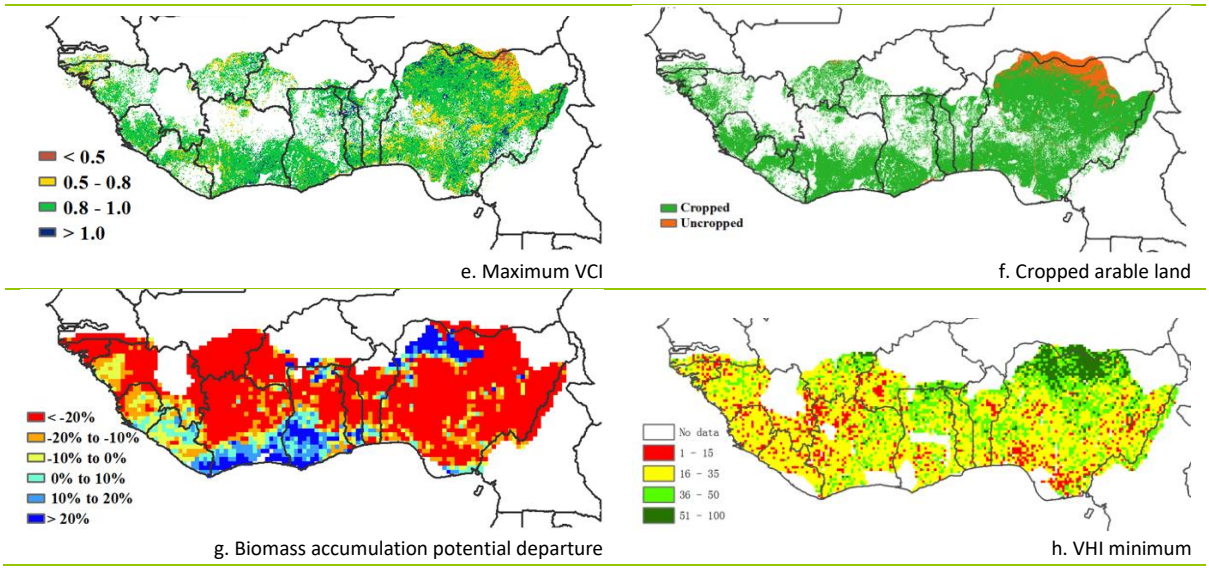


a. Spatial distribution of rainfall profiles

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

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

2.3 North America

Crop condition was generally below average in the south of the North American MPZ, at a time (October to January) when summer crops have been harvested and winter crops have been planted and reached over-wintering stage.

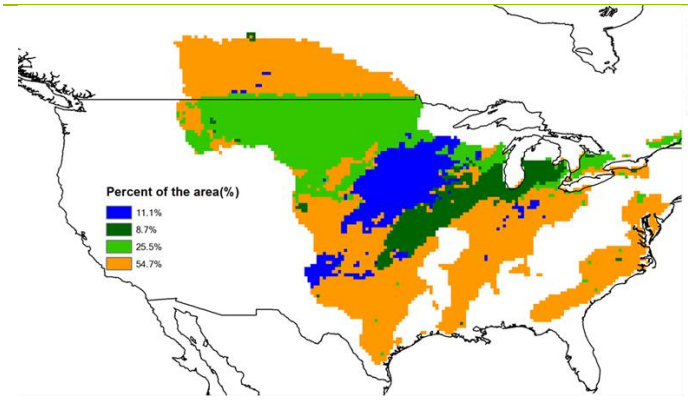
Dry weather was reported in the MPZ as a whole, with the RAIN CropWatch agroclimatic indicators 9% below average. Both temperature and RADPAR were average. Similar to the whole MPZ, the United States were also dominated by dry weather (RAIN was 9% below average), while wet and cold weather was recorded in Canada where RAIN was up 18% above the average. Temperature fluctuated significantly, in particular in the Northern Plains, where abnormally low-temperature occurring at the beginning of November (9℃ below average in the Northern Plains), followed by higher than average temperature (a 7℃ positive departure) in the middle of December and a cold peak (10℃ below the average) during late of December. Dry weather and significant variation of temperature resulted in BIOMSS being 3% below the average.

Predominantly dry weather was recorded in the Cotton Belt to the Mexican Nordeste area (MRU-16), the West Coast (MRU-14), and south-western United States and N. Mexican highlands (MRU-18): RAIN was 29%, 28% and 13% below average, respectively. RADPAR was average and stayed in the -1% to +1% range. Warm weather was recorded in MRU-18 (United States and N. Mexican highlands) with temperature 1.1℃ above the average. Moist weather was recorded in British Columbia to Colorado (MRU-C11), and the Northern Great Plains (MRU-C12), with rain departures of +21% and +24%, respectively, average TEMP and RADPAR 4% below the average.

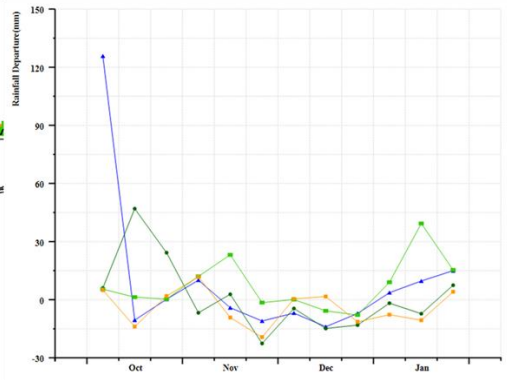
Dry weather caused the decrease of the potential biomass accumulation index below average in the south of the North American MPZ. BIOMASS was 14%, 10% and 13% below the average, respectively, in the Cotton Belt to Mexican Nordeste, West Coast (North American), and SW U.S. and N. Mexican highlands.

Production prospects are currently mixed; the North American MPZ needs further monitoring.

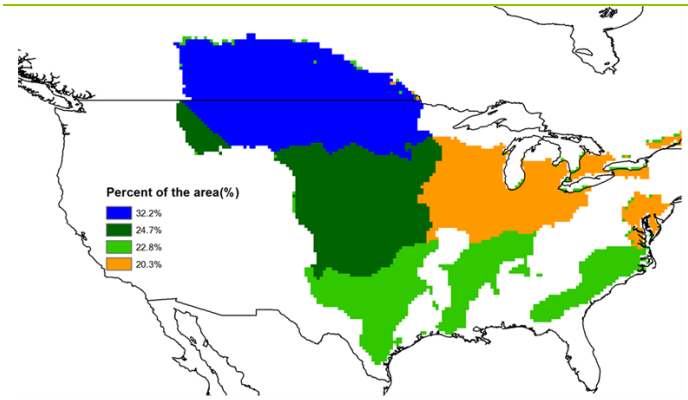
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, October 2017 to January 2018.



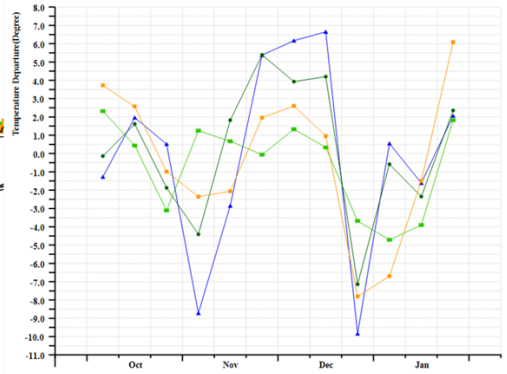
a. Spatial distribution of rainfall profiles



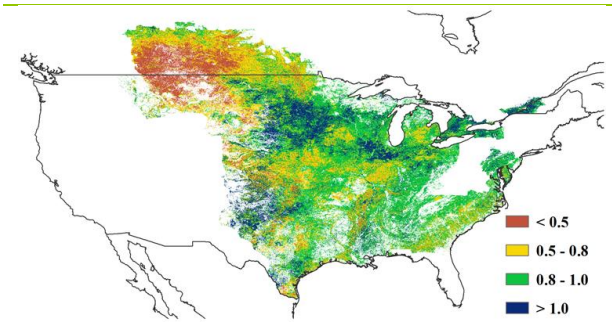
b. Profiles of rainfall departure from average (mm)



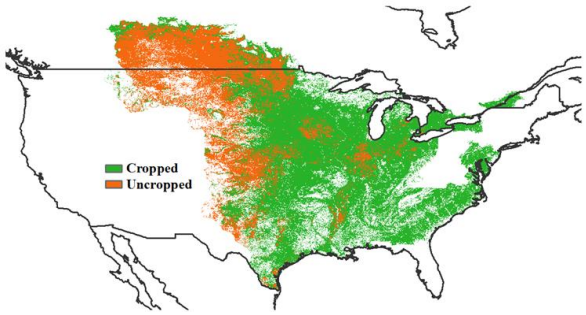
c. Spatial distribution of temperature profiles



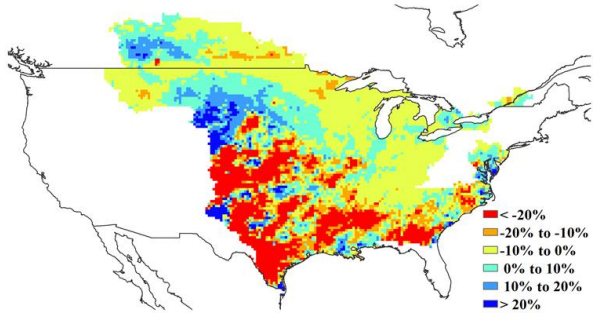
d. Profiles of temperature departure from average (mm)



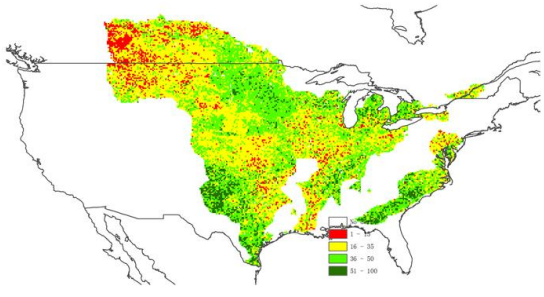
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.4 South America

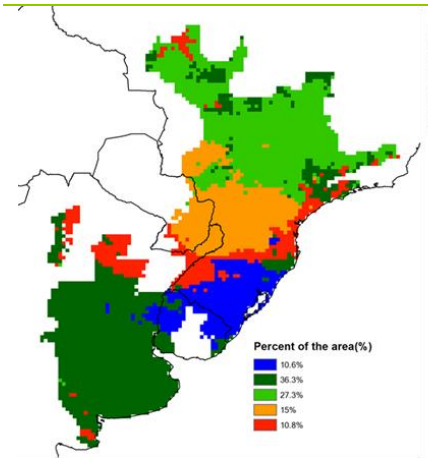
All Agroclimatic indicators show close to average conditions for the MPZ as a whole. Rainfall, for instance was slightly above average with 727 mm, a 0.5% positive departure. According to the map of rainfall patterns, the largest excess of rainfall occurred in October over Paraná and Rio Grande do Sul states in

Brazil. Temperature (23.5 °C) was mostly colder than average (-0.8 °C) especially over Rio Grande do Sul and the northern part of Argentina. MPZ-wide radiation was slightly below average (RADPAR, -2 %). The listed conditions led to a small decrease of the accumulated biomass potential (-3 %) below average.

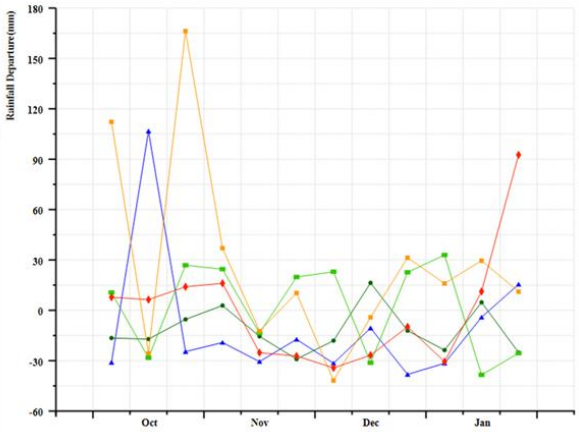
BIOMSS departure from average was largest (-20% and more) around (1) Rio Grande do Sul, Buenos Aires, and Santa Fe in Argentina. The same southwestern part of the MPZ also shows low VCIx values. A second deficit area, less intense than the one just mentioned affects parts of (2) Goiás and Mato Grosso States of Brazil, where the reduction in biomass was about 10% and where VCIx was high. The map of cropped and uncropped arable land shows that the decline in BIOMSS is not attributed to the decrease in the cultivated area, since the MPZ was almost fully cultivated (CALF at 100%, +3% above average). Including low minimum VHI in area (2) in the analysis provides the explanation: the weak drought that affected the northern part of the MPZ, was mitigated by rainfall later in the monitoring period; the high VCIx values in northern part confirm the favourable development of the cropsin the region.

Crop condition is generally average compared to 5YA in the South American MPZ.

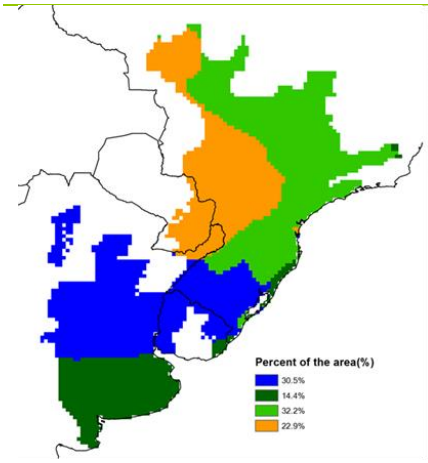
Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, October 2017 to January 2018.



a. Spatial distribution of rainfall profiles

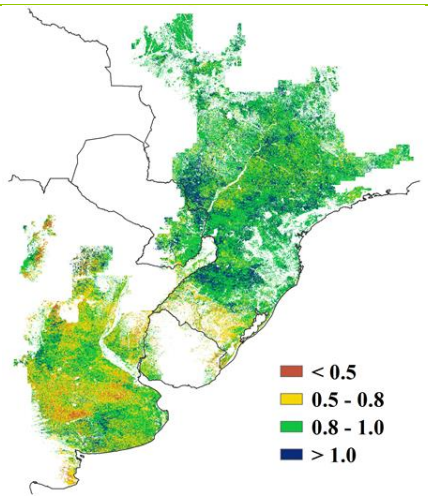


b. Profiles of rainfall departure from average (mm)

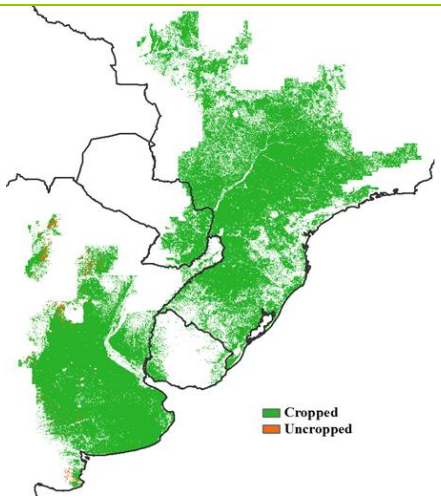


c. Spatial distribution of temperature profiles

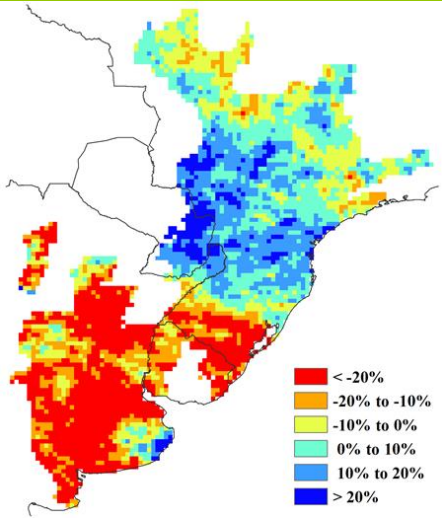
d. Profiles of temperature departure from average (mm)



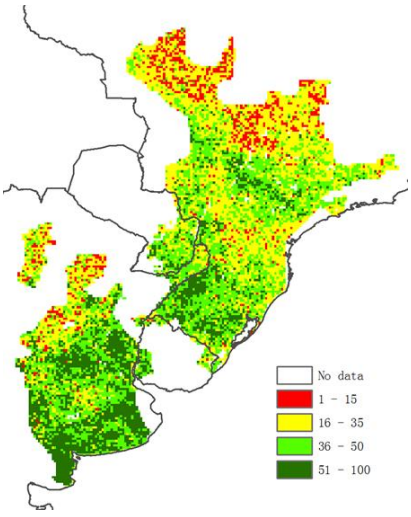
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.5 South and Southeast Asia

A great diversity of phenological phases occur in the MPZ: Bangladesh, Aman rice growth and harvesting, dry season Boro rice and wheat sowing and early growth; Cambodia, maize harvesting; India, Maize growing to harvesting, Kharif rice and soybean at harvesting; Myanmar, maize sowing as well as harvesting, Main rice at harvest, Second rice at sowing and growth, wheat at sowing and growth; Thailand, Main rice growth and harvest, and Second rice transplantation; Vietnam, growth to harvesting of 10th month rice in North and South, planting of rice (Spring North and South) and planting of Winter rice in North and South.

The vast region recorded average temperature (22.7 °C) while both rainfall and RADPAR suffered a deficit compared to average: 247mm or -17% for RAIN and 906MJ/m^2 or -7% for RADPAR. Most of the rainfall was received in the months of October and November; it would have been detrimental in countries where crop was ready for harvest. In India rainfall was near average, while Myanmar (+13%), Lao PDR (+23%), Thailand (+29%), Vietnam (+38%), Cambodia (+39%) and Bangladesh (+63%) received above average rainfall. Nepal was the only country with lower rainfall (-60%). During the reporting period countries at higher latitude (India, Myanmar and Nepal) experienced warmer temperature than expected as seen from the temperature distribution profile, whereas lower latitudes had cooler condition (Bangladesh, Cambodia, Lao PDR, Thailand and Vietnam). RADPAR received was below average in all the

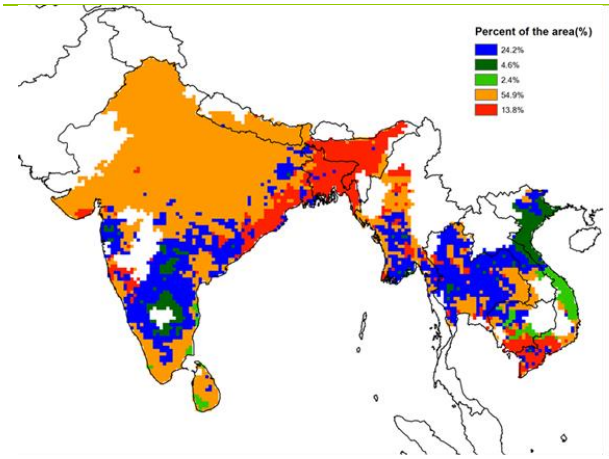
countries: Nepal (-3%), India and Myanmar (-5%), Cambodia and Thailand (-8%), Bangladesh (-11%), and Vietnam (-14%). Except for India (-5%) and Nepal (-40%), all countries had above average BIOMSS. The values ranged from Lao PDR (+10%), Thailand (+16%), Myanmar (+19%), Vietnam (+27%), Cambodia (+34%), and Bangladesh (+69%).

The cropped arable land fraction was high at 95% and VCIx at 0.94 indicates good yields. Uncropped areas were in western and central India, eastern Bangladesh, and some scattered patches in Thailand and Vietnam. Low VCI (<0.5) in continuous patches was also seen in Northwestern India, Eastern Bangladesh and scattered over Thailand and Vietnam.

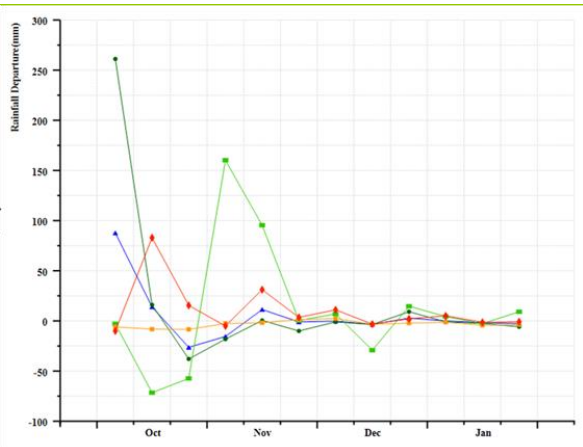
Crop area coverage and crop conditions as observed through agronomic indicators revealed BIOMSS accumulation potential would have been 520 gDM/m^2 (+8%) for the region. Biomass accumulation potential analysis indicated large continuous areas under high biomass (>+20%) in East India, few patches in East coast and Deccan Plateau regions of India; Myanmar; Central Thailand; West Cambodia; and Southern parts of Vietnam. Continuous large areas under low biomass accumulation (<-20%) are in Central and North India, few patches in South India, Northwest Thailand, and North Vietnam. Observations on minimum VHI indicate scattered occurrence of water stressed crops at several places across the region.

In summary the MPZ had a mixed pattern of crop condition based on the analysis of agro-climatic and agronomic indicators. The countries and regions at higher latitude had below average to average conditions for crops, whereas lower latitude had better conditions.

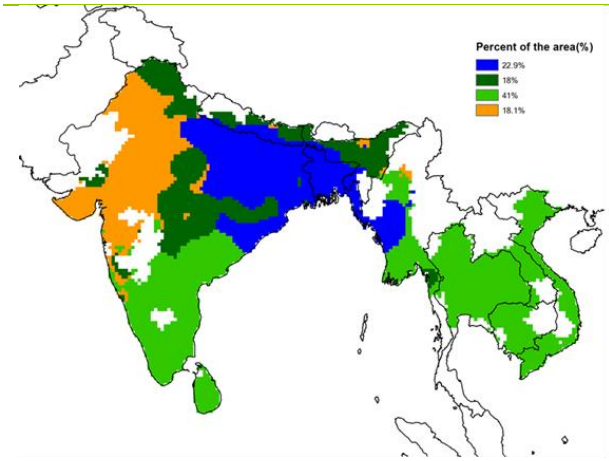
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, October 2017 to January 2018



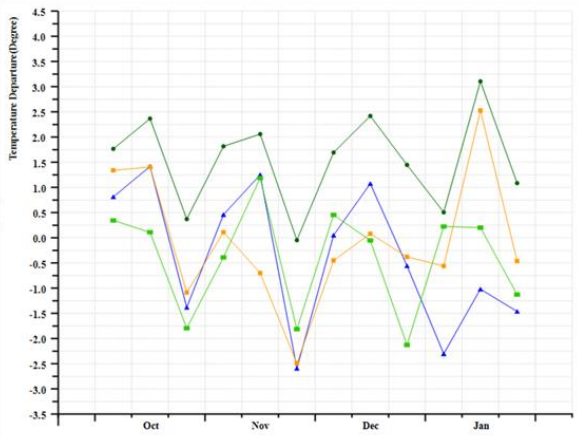
a. Spatial distribution of rainfall profiles



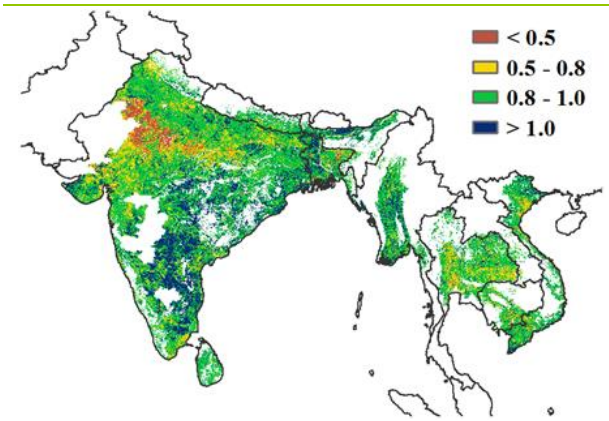
b. Profiles of rainfall departure from average (mm)



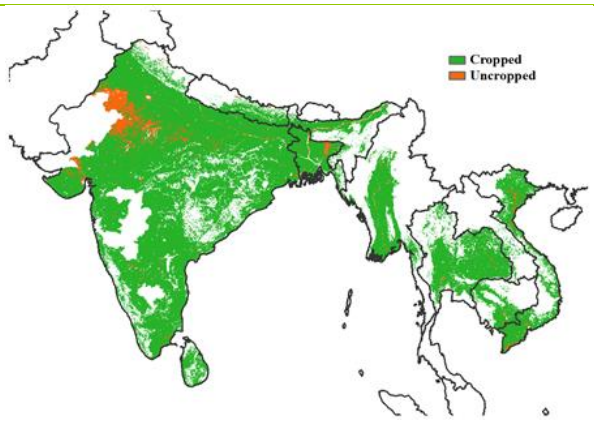
c. Spatial distribution of temperature profiles



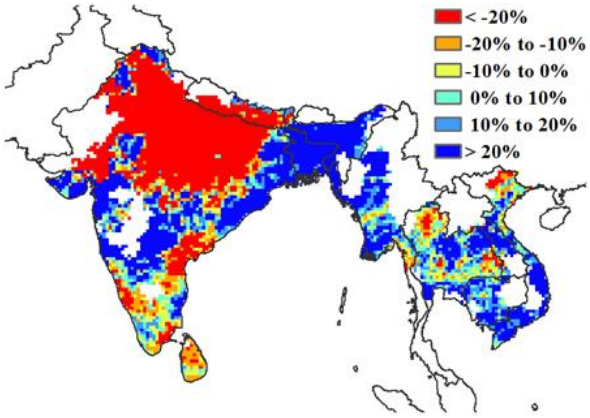
d. Profiles of temperature departure from average (mm)



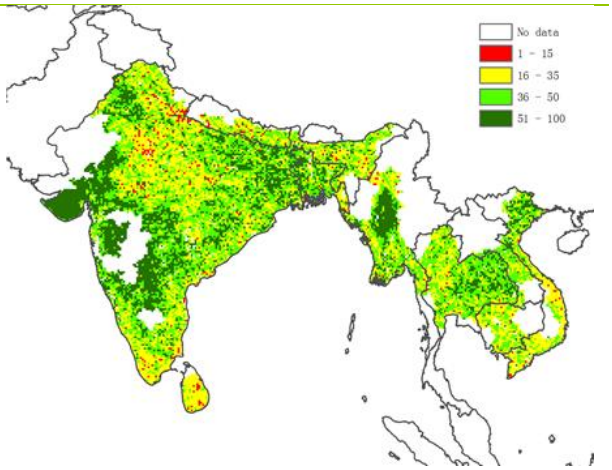
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.6 Western Europe

Crop condition was generally below average in most parts of the continental Western European MPZ during this reporting period. Summer crops were completely harvested, and winter crops were planted and reached over-wintering stages.

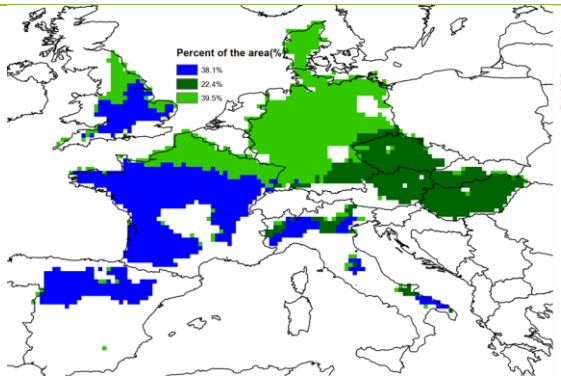
The agroclimatic indicators show that total rainfall across the MPZ was 9% below average, resulting from marked negative departures in (1) large parts of the Mediterranean region from October to November and after late-December, (2) the south of the United Kingdom from October to November and after late-December, (3) most of Germany, Denmark and north of France from mid-October to early-November, (4) the Czech Republic, Slovakia, Austria, and Hungary during mid-October and after mid-December. The most severely affected three countries were Spain (RAIN, -46%), Italy (-40%) and France (-30%). In large parts of northern Europe, the sowing of winter crops was delayed by the late harvesting of summer crops; it was further hampered by excessively wet conditions. In northern Germany, the abundant rain continued in this reporting period and delayed field operations. Rapeseed is worst affected; its optimal sowing window was over and a reduction in the planted area is expected. Most parts of the Mediterranean region will need more rain in the coming months to raise soil moisture levels and create favorable conditions for the growth of winter crops.

Temperature (TEMP) was slightly below average (-0.3 °C) for the MPZ as a whole, but radiation was well below average with RADPAR at -6%. Below average temperatures were observed in most parts of the MPZ from mid-October to mid-December. Sources indicate that frost damage has been minor so far.

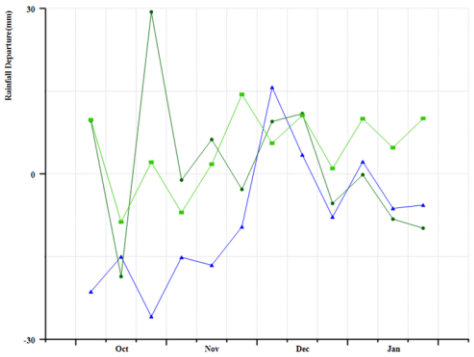
Due to the rainfall deficit, the biomass accumulation potential BIOMSS was 8% below the recent five-year average. The lowest BIOMSS values (-20% and less) occurred in most of France, Spain, Italy and United Kingdom. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) over north of the France, most of Germany and the Czech Republic, north and south of Austria, and east and west of Hungary. The average maximum VCI for the MPZ reached a value of 0.86 during this reporting period. More than 89% of arable lands were cropped, which is 1% below the recent five-year average. Most uncropped arable land is concentrated in Spain, northern and southeast Italy, and scattered in the Mediterranean region of France.

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

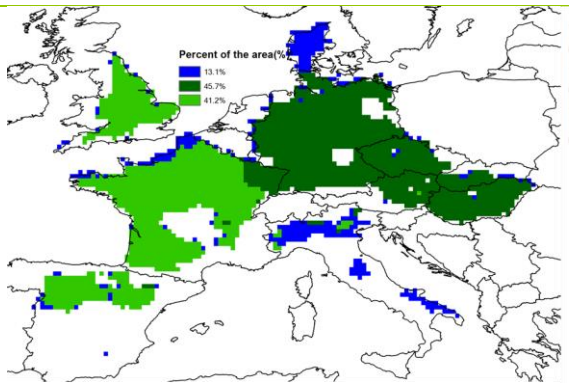
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, October 2017 to January 2018.



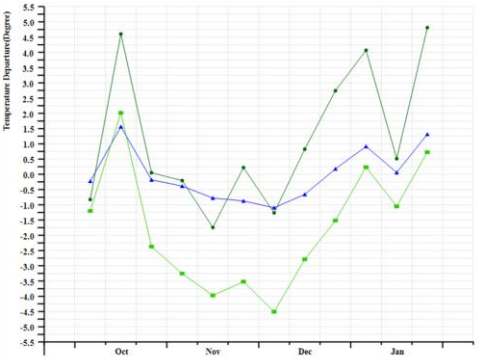
a. Spatial distribution of rainfall profiles



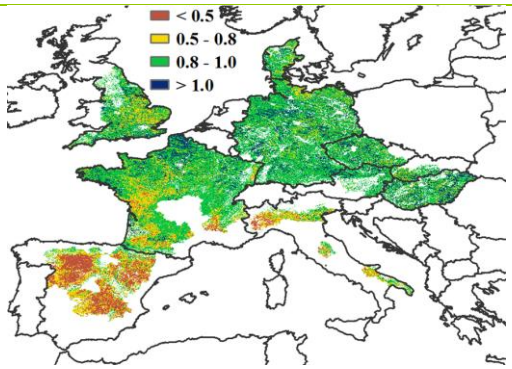
b. Profiles of rainfall departure from average (mm)



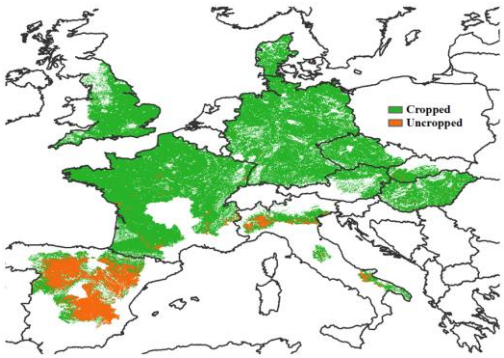
c. Spatial distribution of temperature profiles



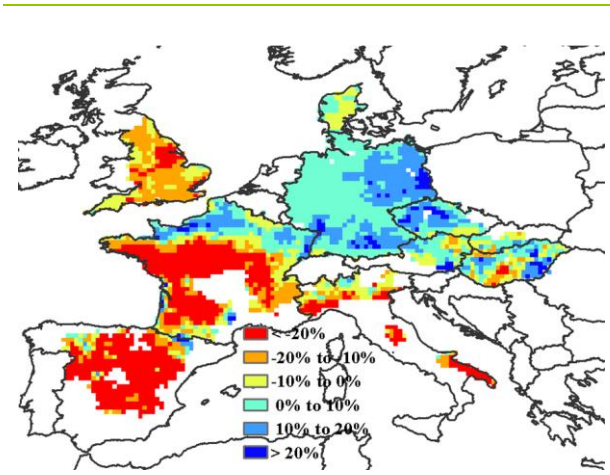
d. Profiles of temperature departure from average (mm)



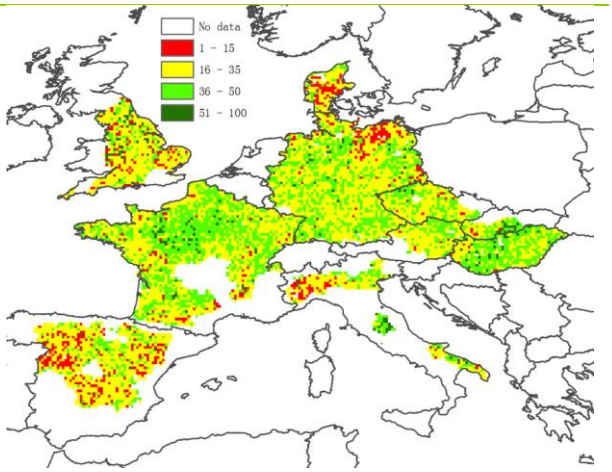
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.7 Central Europe to Western Russia

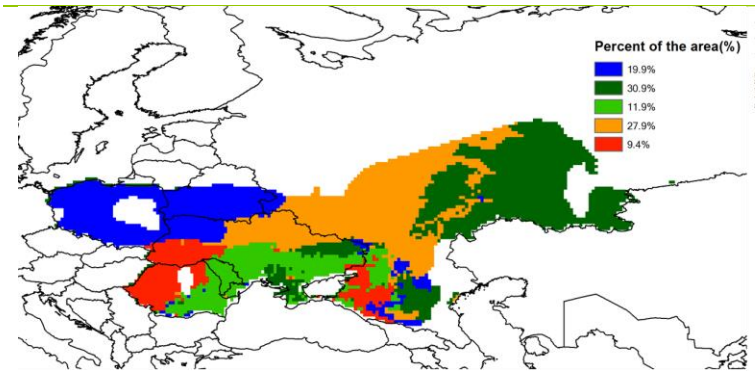
Over the monitoring period, the harvest of summer crops was completed, and winter crops were in their early vegetative stages under generally favorable weather conditions in most parts of the MPZ. The region experienced above normal thermal conditions, with a 1.3 °C increase in temperature compared to average, while rainfall increased 21.4% and radiation dropped by a significant 11.3%.

According to the rainfall profiles, favorable rainfall affected northwestern part of MPZ (almost 19% of the MPZ) from late-October and January, especially in Belarus (RAIN, +40%), Poland (+41%), and northwestern Ukraine. The maximum precipitation occurred in mid-December when it was 40mm above average in the western part of Romania, as well as Zakarpats'ka, Ivano-frankivs'ka and Ternopil's'ka Oblasts in southwestern Ukraine. Unfavorable rainfall was recorded in southern Ukraine and eastern Romania with the largest deficit (about 20mm) occurring in early-January. Temperature profiles show correlated variations in the whole MPZ except the east part (in Russia). Almost all areas of Central Europe to Western Russia enjoyed above average temperature from November to early-January, which benefits the development of winter crops. The coldest area occured in mid-December in the Russian oblast of Chelyabinskaya, with temperature remaining 7 °C below average.

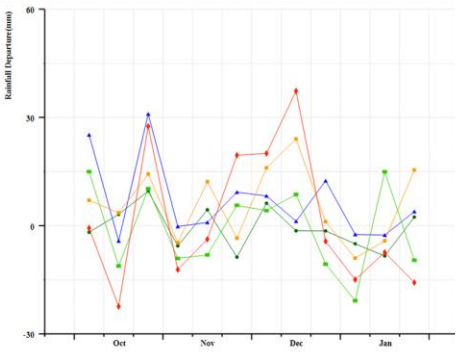
Due to abundant rainfall and high temperatures during the monitoring period in most parts of central Europe and western Russia, the biomass production potential (BIOMSS) for the MPZ as a whole increased 10% over average. This resulted from BIOMSS increases in north Ukraine (+8% for the whole country), Poland (+17%), and Belarus (+12%). However, southern Ukraine presented a low biomass level, down more than 20% in some pixels. The maximum VCI (0.92) is the highest among all MPZs. According to the maximum VCI map of this monitoring period, most pixels were in excess of 1 in Poland, Belarus and eastern Ukraine, representing good crop condition. Uncropped arable land occured mostly in eastern Ukraine and southwestern Russia, which is also characterized by clusters of unfavorable VHIn. CALF, however, increased by 4 percentage points over the reference period.

In general, with most parts indicating above average crop conditions, prospects for crop production are promising in Central Europe to Western Russia.

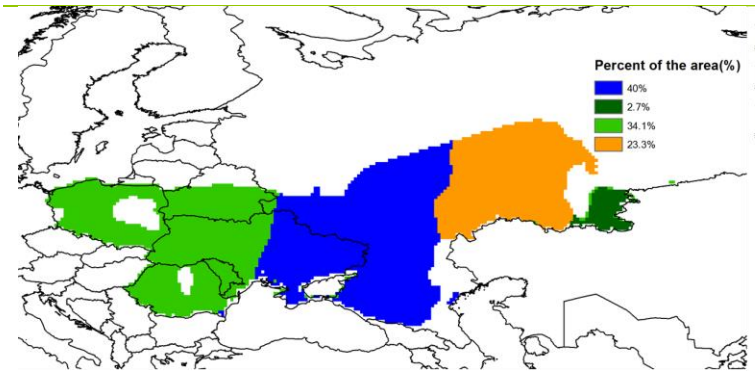
Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, October 2017 to January 2018.



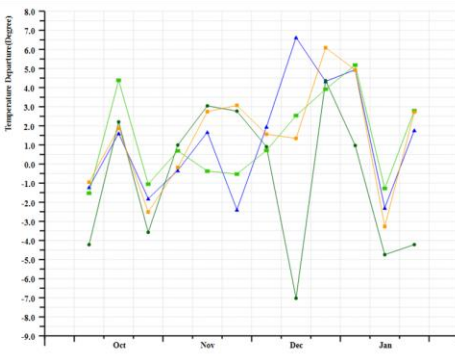
a. Spatial distribution of rainfall profiles



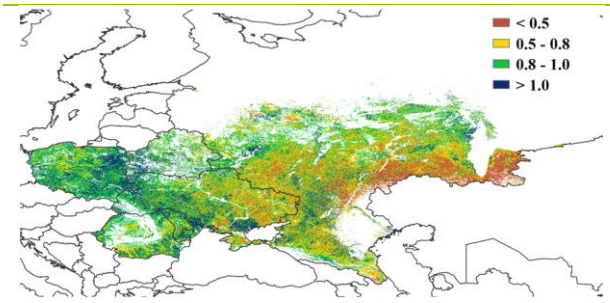
b. Profiles of rainfall departure from average (mm)



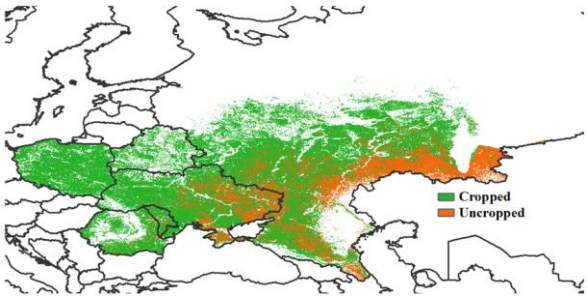
c. Spatial distribution of temperature profiles



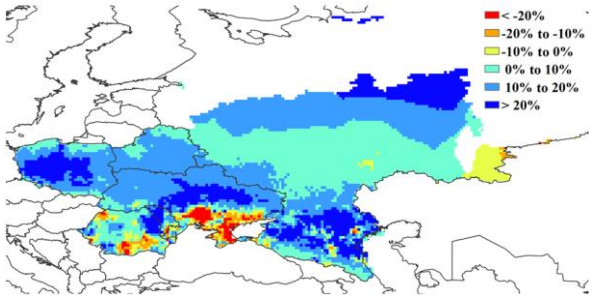
d. Profiles of temperature departure from average (mm)



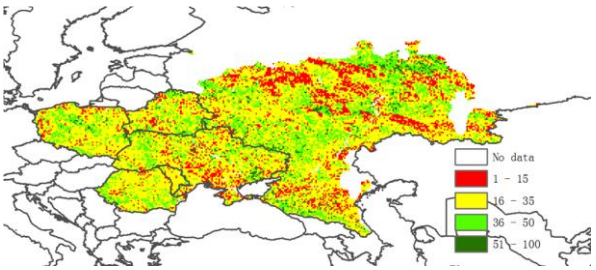
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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