

## 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 (VCI<sub>x</sub>), and minimum vegetation health index (VHI<sub>n</sub>)—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](http://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. October 2016-January 2017 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 <sup>2</sup> )	Departure from 15YA (%)
West Africa	230	6	27.1	-0.1	1167	0
South America	775	8	23.6	-0.7	1329	2
North America	310	4	6.5	1.4	538	-3
South and SE Asia	234	12	22.8	0.1	969	0
Western Europe	193	-29	4.8	-2.3	315	-2
C. Europe and W. Russia	220	9	-2.0	-1.7	225	-6

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-January) for 2002-2016.

**Table 2.2. October 2016-January 2017 agronomic indicators by Major Production Zone, current season values and departure from 5YA**

	BIOMSS (gDM/m <sup>2</sup> )		CALF (Cropped arable land fraction)		Maximum VCI Intensity
	Current	Departure from 5YA (%)	Current	Departure from 5YA (% points)	Current
West Africa	598	1	99	5	0.90
South America	1835	4	96	0	0.66
North America	813	12	70	11	0.92
S. and SE Asia	495	2	93	-1	0.91
Western Europe	752	-20	88	-2	0.81
Central Europe and W Russia	591	-10	74	2	0.79

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

### 2.2 West Africa

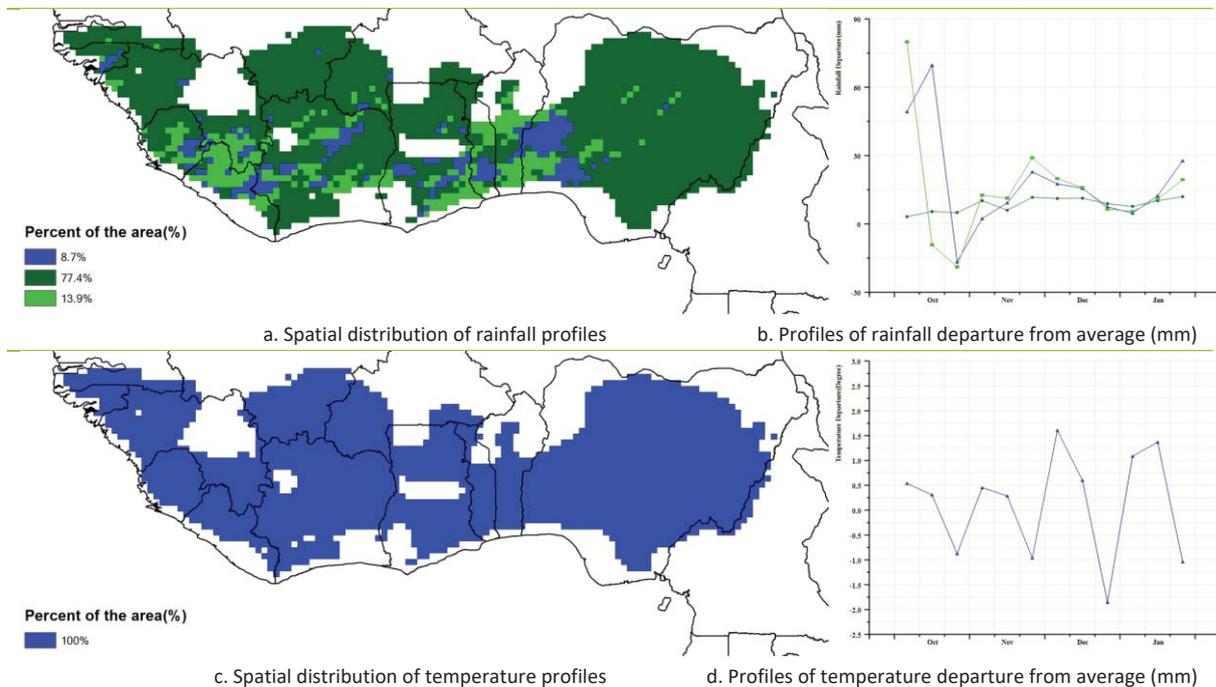
The seasonal variations of the water are the major climatic variable affecting crop distribution and phenology in West Africa. However, historical and economic factors have also helped create the present

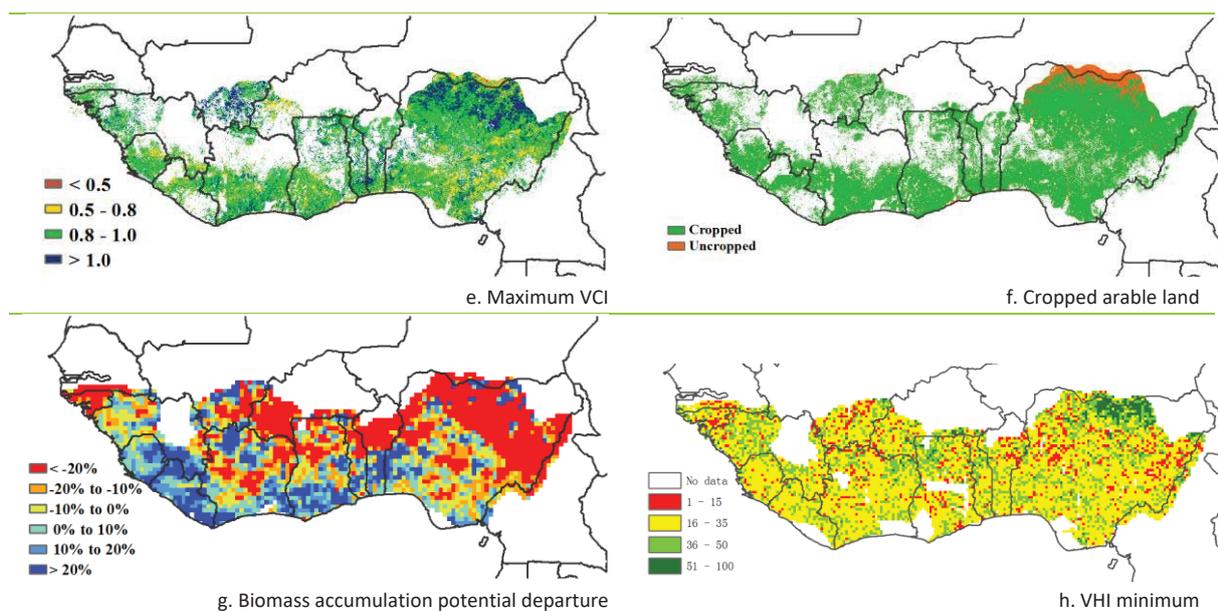
distribution, especially for cash crops. The reporting period marks the end of the main harvesting season throughout the region for maize, sorghum, millet, and yams, with cereal production expected to be above average (>5%). In the north of the MPZ, which only has one rainy season, the harvesting of cereals is underway. In the west (Guinea to Liberia), an important part is played by rice, of which the harvest extends into December and sometimes even January. In the areas that tend to record bimodal rainfall (southern Côte d'Ivoire to Nigeria), the first maize crop was harvested in October, while the short season maize was harvested in early 2017. In contrast, cassava (the main staple in the region) is still growing, as reflected by the area of cropped arable land.

Based on CropWatch observations, average rainfall was recorded in 77.4% of croplands in the MPZ, with close to average temperature of 27.1°C (-0.1% compared to the five-year average) and sunshine (RADPAR, 0% deviation), which gave a slight increase of the biomass production potential (BIOMSS, +1%). The west of the region enjoyed a significant increase of precipitation over average, contributing to the overall increase of +6% for RAIN for the MPZ, which also translated into increased Niger discharge for the benefit of the Sahel, especially irrigated rice in the inner Delta and flood recession crops along the river. For the MPZ as a whole, the cropped arable land fraction (CALF) reached 99%. Precipitation is currently slowing down, marking the end of the rainy season. According to the VCIx map in relation to crop condition, average VCIx was 0.9. Climatic conditions were generally favorable across the Nigerian northern savannah agro-ecological zone. During this period, Nigeria has a good share of cropped arable land reflecting the extent of agricultural production in the region.

Generally, as the growing season was coming to a close during this reporting period, the climatic conditions were close to average, with precipitation well distributed in time. The temperature fluctuated from normal average within a +/-2°C margin after cessation of the rainy season. CropWatch indicators depict a stable and coherent climatic condition conducive for late crop harvest in early 2017 (second maize crop and cassava).

**Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, October 2016-January 2017**





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. This monitoring period covers November 2016 to January 2017, and winter crops of 2017 have been planted and reached over-wintering stages. Overall, CropWatch agroclimatic indicators show warmer than average conditions: rainfall was 4% above average and the temperature departure was +1.4°C.

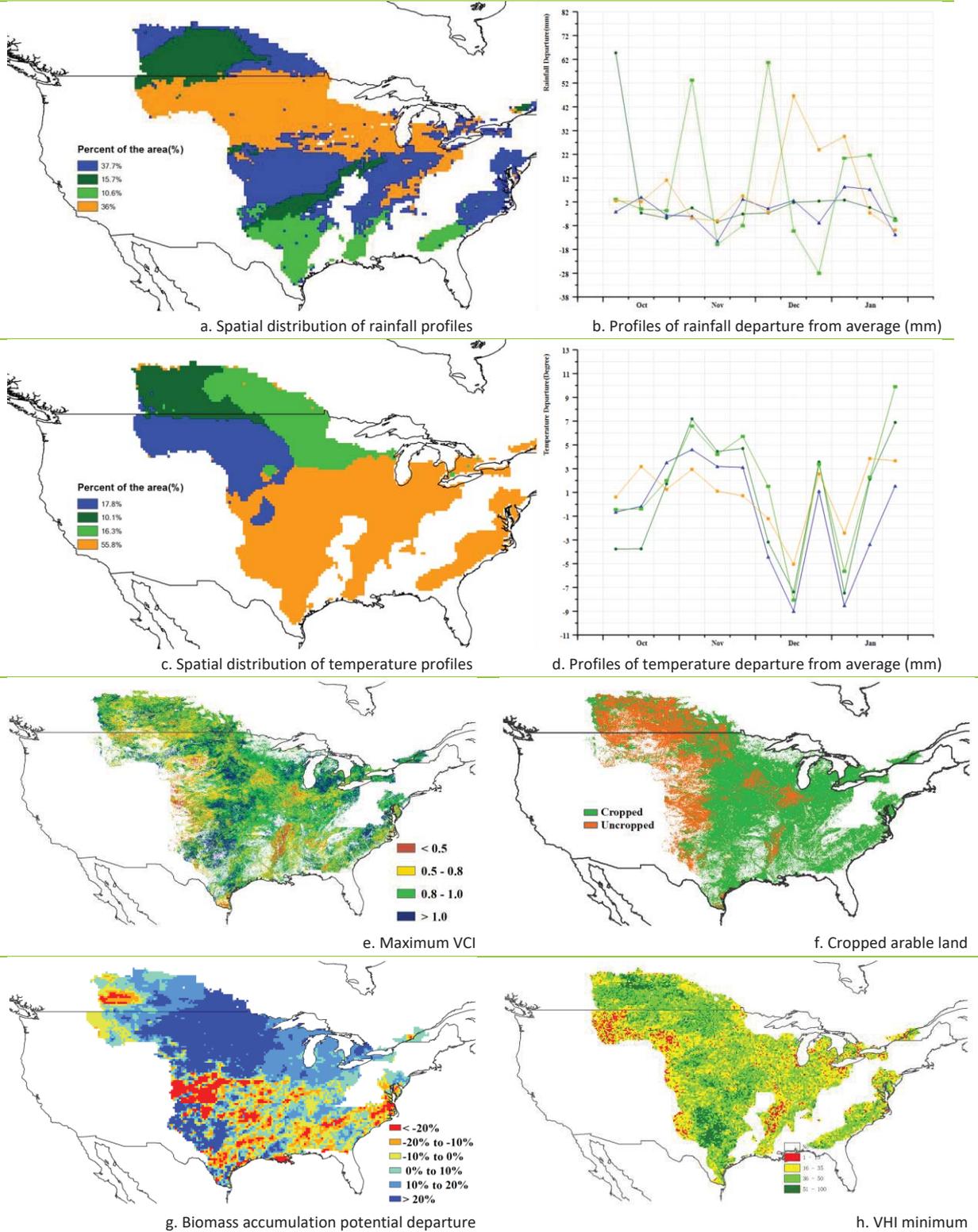
The North American MPZ covers essentially the Northern Great Plains (MRU-12), Corn Belt (MRU-13), and an area from the Cotton Belt to the Mexican Noreste (MRU-13). The first MRU received abundant rainfall (35% above average), while the second and third recorded amounts that were respectively just 1% above average or a deficit (-8%). The Northern Great Plains are a main production zone of winter crops, and abundant rainfall during the current reporting period will benefit the growth of winter crops after over-wintering stages.

Temperature in the MPZ fluctuated greatly: the MPZ was dominated by warm temperature before November 2016, after which it suffered ice-storms in December and January with a temperature departure reaching -9°C. After a spell with close to average temperature, some areas, especially in the northeast recorded TEMP values 9°C above average. The warm temperature benefited the sowing of winter crops, while extreme low temperature during over-wintering was good for killing pests. The spatial variation of rainfall and temperature also resulted in differences in the biomass accumulation potentials, with negative departures recorded in the Cotton Belt to Mexican Noreste area (such as in Alabama with -9%) and positive values elsewhere.

According to the maximum vegetation condition index (VCI<sub>x</sub>) map, crop condition was below average in the lower Mississippi. Especially for Arkansas, the minimum VHI map indicates drought due to rainfall deficit (-20%). Crops are above average in the winter crop zones, including Texas, Oklahoma, Kansas and South Dakota. The fraction of cropped arable land (CALF) was significantly above average (+11.32 percentage points), while uncropped land was distributed in the Canadian Prairies and the western Great Plains.

Overall, above average conditions prevail in the North American MPZ.

Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, October 2016 – January 2017



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

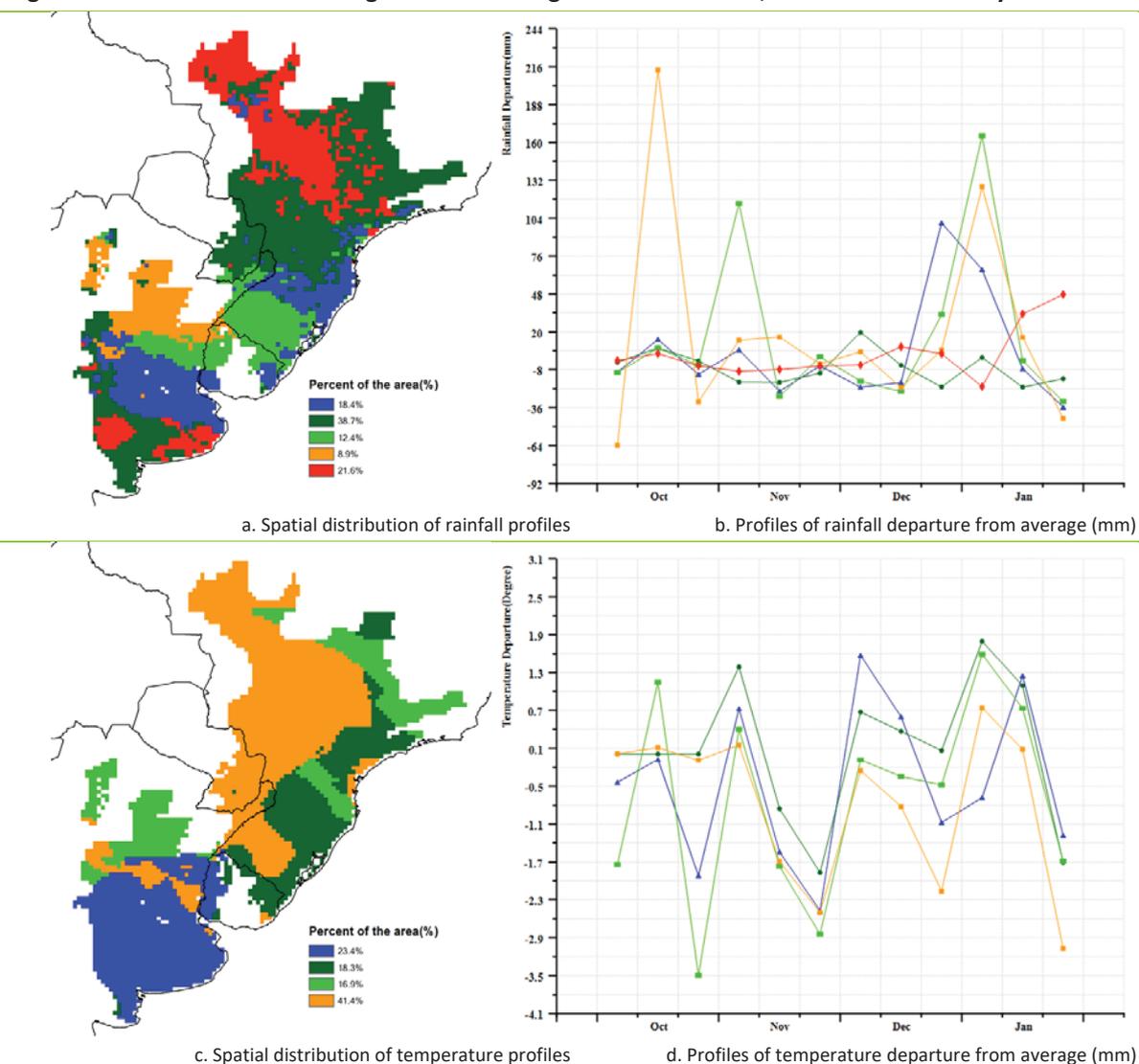
## 2.4 South America

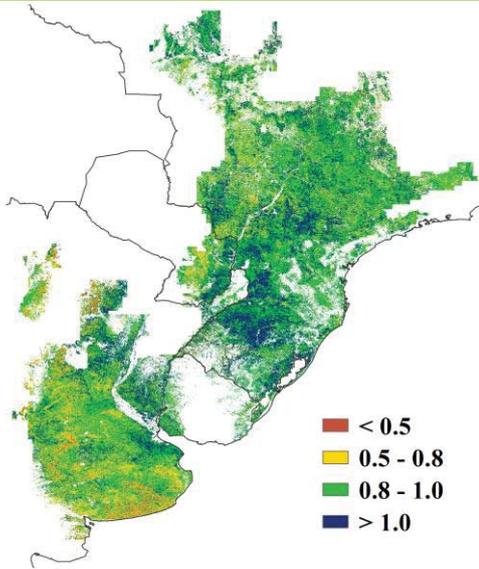
The current monitoring period covers the main harvesting time of winter crops in the Pampas, as well as soybean planting, early growing stages of maize, and the planting of late maize all over the MPZ.

Rainfall (RAIN) was 8% above average, while temperature was slightly below (TEMP,  $-0.7^{\circ}\text{C}$ ) and radiation (RADPAR) 2% above average as well, resulting in a projected BIOMSS of about 4% above the five-year average. Maximum VCI values, however, show that expected potential production is far from the high values observed during previous seasons. When considering spatial detail, precipitation was higher than average during December and January in central and northern Argentina and in the state of Rio Grande do Sul in Brazil. The same period experienced higher than average temperatures in the Pampas and near the coast in Brazil. Maximum VCI showed higher values for Brazil than for Argentina, reflecting areas with problems in the latter (such as flooding in northeast Buenos Aires and Cordoba provinces and drought in southern Buenos Aires), with poor conditions confirmed by the BIOMSS map. In general, VHI showed similar values across the MPZ, without any relevant differences between Argentina and Brazil.

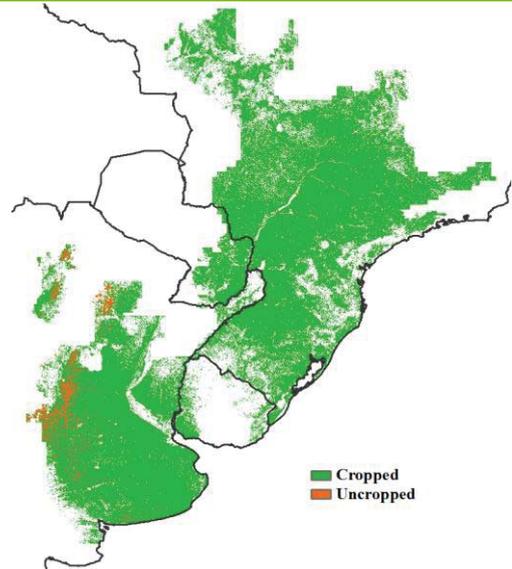
Altogether the prospects for summer crops remain favorable in Brazil, while some regions of Argentina suffered from poor conditions that may reduce their output.

**Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, October 2016-January 2017**

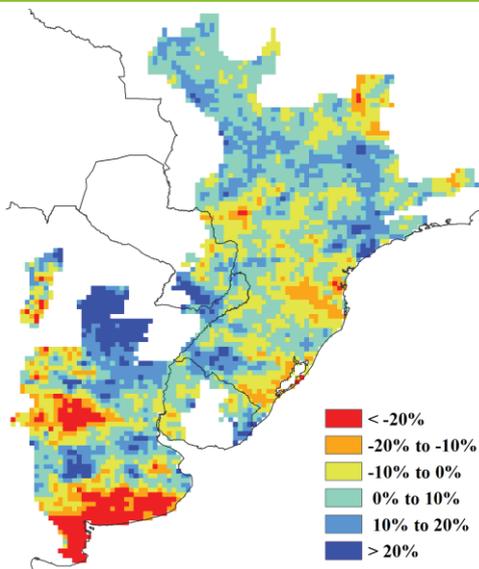




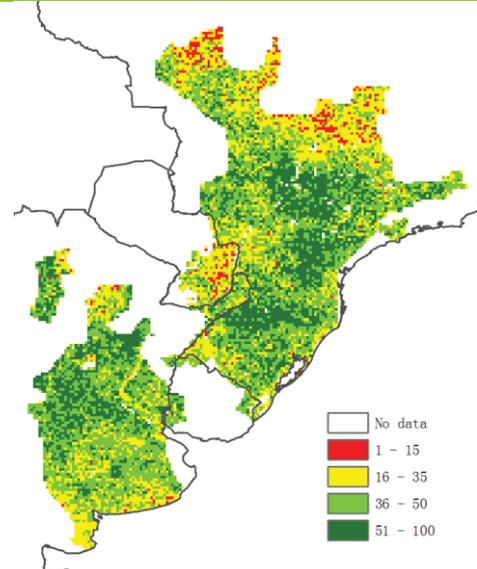
e. Maximum VCI



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

The reporting period covers mainly the growth and harvest of wet season crops in this MPZ. According to CropWatch indicators, the overall crop condition is average for the region, with marked differences between the dry west and the east. For the whole MPZ, rainfall was 12% above average, resulting from excess rainfall in Bangladesh (RAIN, +5%), Cambodia (+120%), Myanmar (+6%), Thailand (+82%), and Vietnam (+74%). However, in India rainfall was below average (-30%) as a whole, resulting from poor rainfall in Andhra Pradesh (-71%), Assam (-7%), Bihar (-23%), Chhattisgarh (-25%), Goa (-69%), Jharkhand (-58%), Kerala (-62%), Karnataka (-74%), Maharashtra (-42%), Madhya Pradesh (-34%), Nagaland (-15%), Odisha (-28%), Tamil Nadu (-60%), and West Bengal (-18%). A significant rainfall peak (+612 mm) occurred in the central regions of Vietnam in December, in relation with several cyclones that are described in the section on disasters (section 5.2).

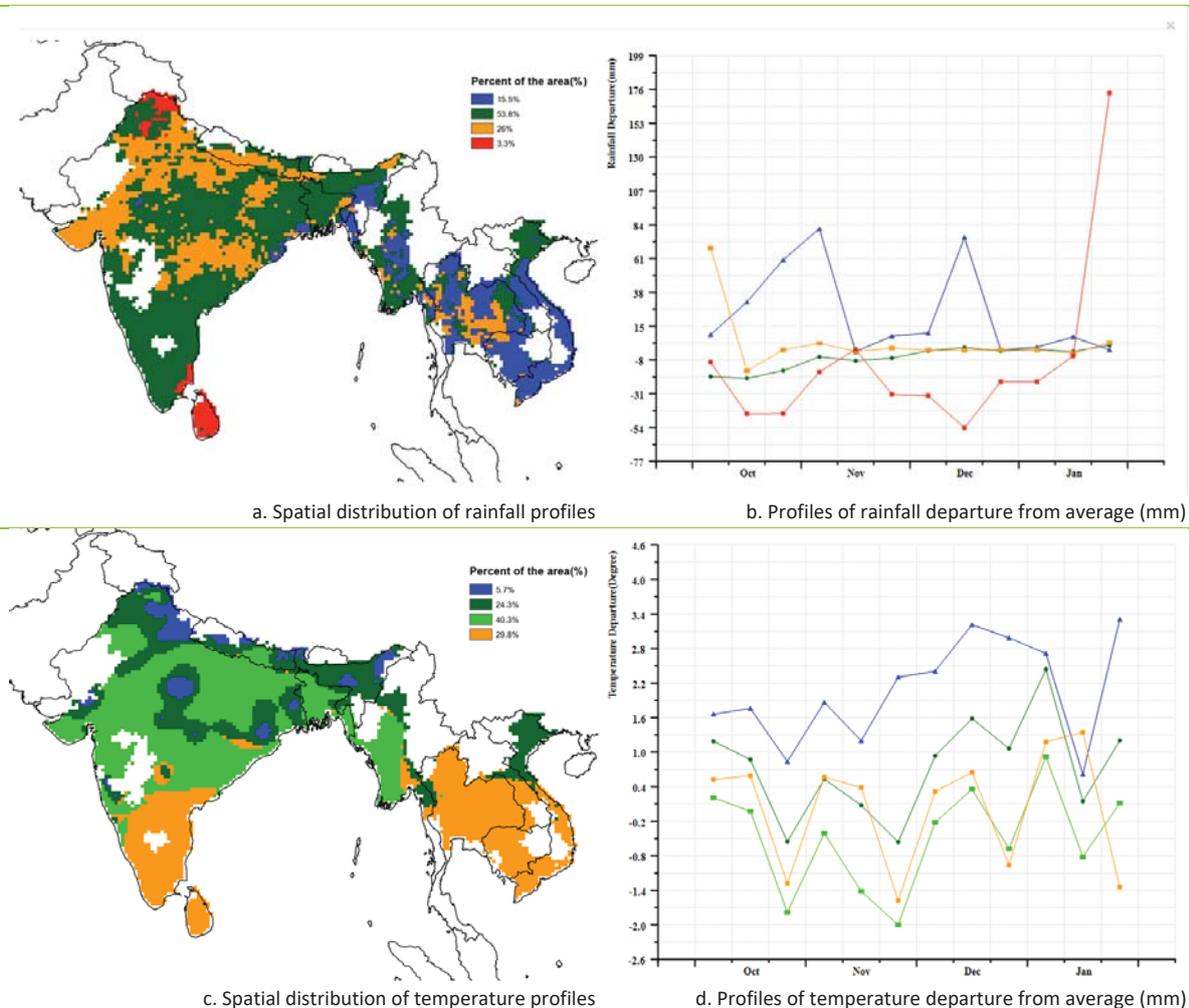
The MPZ experienced average temperature and radiation. Temperature peaks were noticed only in limited areas such as northern India (+3.0°C) in December. Cold spells occurred over the MPZ in November (-1.5°C) and in late January (-0.8°C). In the north, temperature was consistently above average.

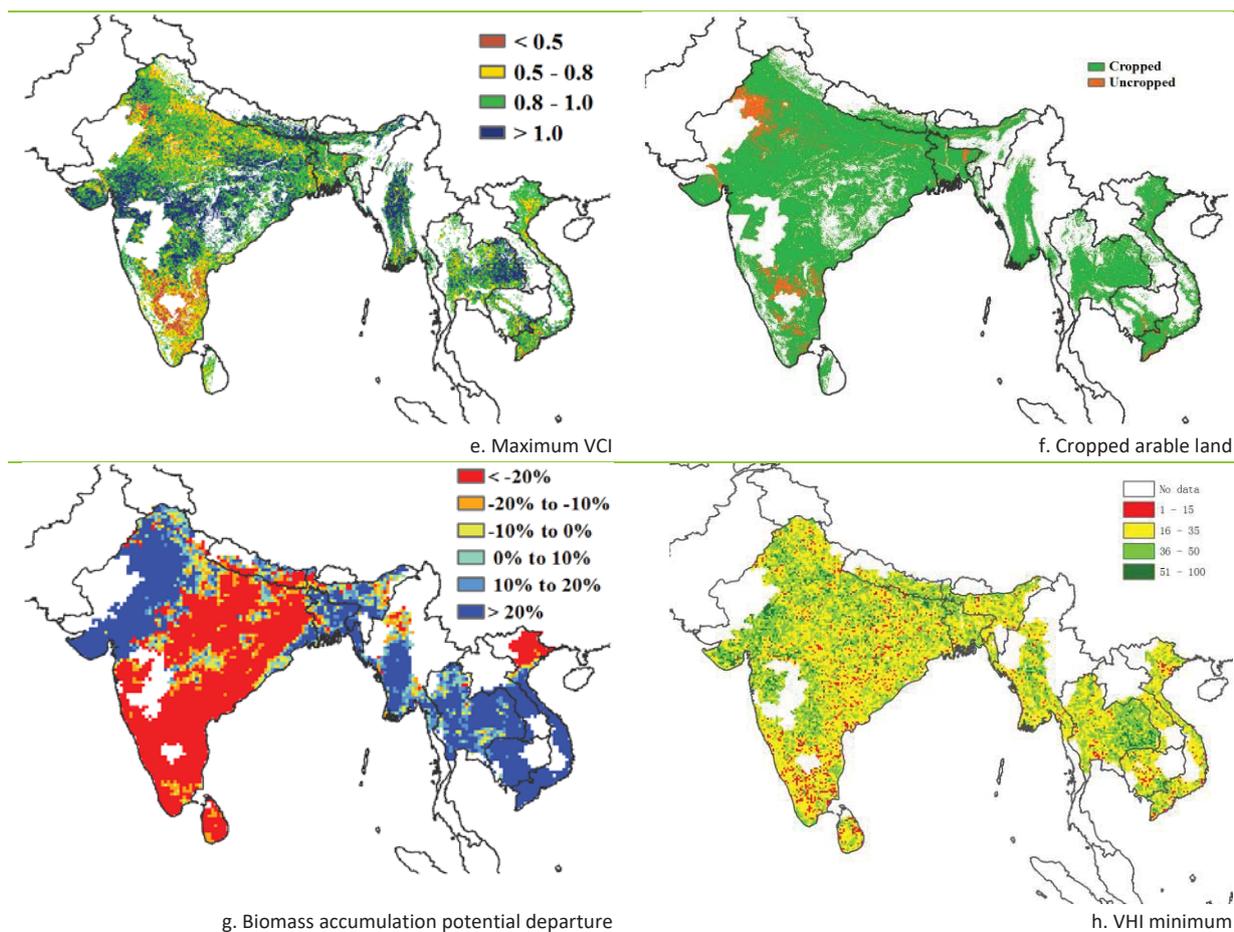
The biomass accumulation (BIOMSS) increased in the region by 2% as compared to the five-year average for the region in this same period. It was, however, down 20% in central to southern India, whereas the rest of the countries in the MPZ and western India experienced positive BIOMSS departures close to or above +20%. The largest biomass accumulation potential increases were recorded in Thailand (+38%), Vietnam (+37%), Myanmar (+10%), Cambodia (+62%), and Bangladesh (+16%). For India as a whole, BIOMSS dropped 20% below the average of the previous five years.

Maximum VCI values were high, except in parts of southern and northern India and in some parts of Vietnam, indicating poor crop condition in those areas. The minimum VHI values were distributed in a scattered manner, with lowest values in India, confirming the water stress in those areas.

Overall, agroclimatic indicators and vegetation indices show favorable crop condition throughout the region, with the exception of a large area in India and possibly parts of northern Vietnam.

**Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, October 2016-January 2017**





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

## 2.6 Western Europe

During the current monitoring period, crop condition was below average in most parts of the continental Western European MPZ based on the integration of agroclimatic and agronomic indicators. Summer crops were completely harvested, and winter crops were planted and reached over-wintering stages. Figure 2.5 represents an overview of CropWatch agroclimatic and agronomic indicators for this MPZ.

The agroclimatic indicators show that total rainfall was 29% below average, with exceptional positive departures over most of the Czech Republic, Austria, Slovakia, Hungary, middle-northern Germany, and eastern Denmark from October to early November, in northern Italy in mid-October, and in south and southeast France and northern Spain in late November. Occasional and scattered snowfall started early (November) and was more abundant in 2016-17 than in previous years; it also persisted longer than usual due to cold weather. Starting from the first week of January to the end of the month, the snow covered almost the whole MPZ from the east to the eastern fringe of France (Alsace), the country that experienced the largest negative temperature anomaly of the MPZ.

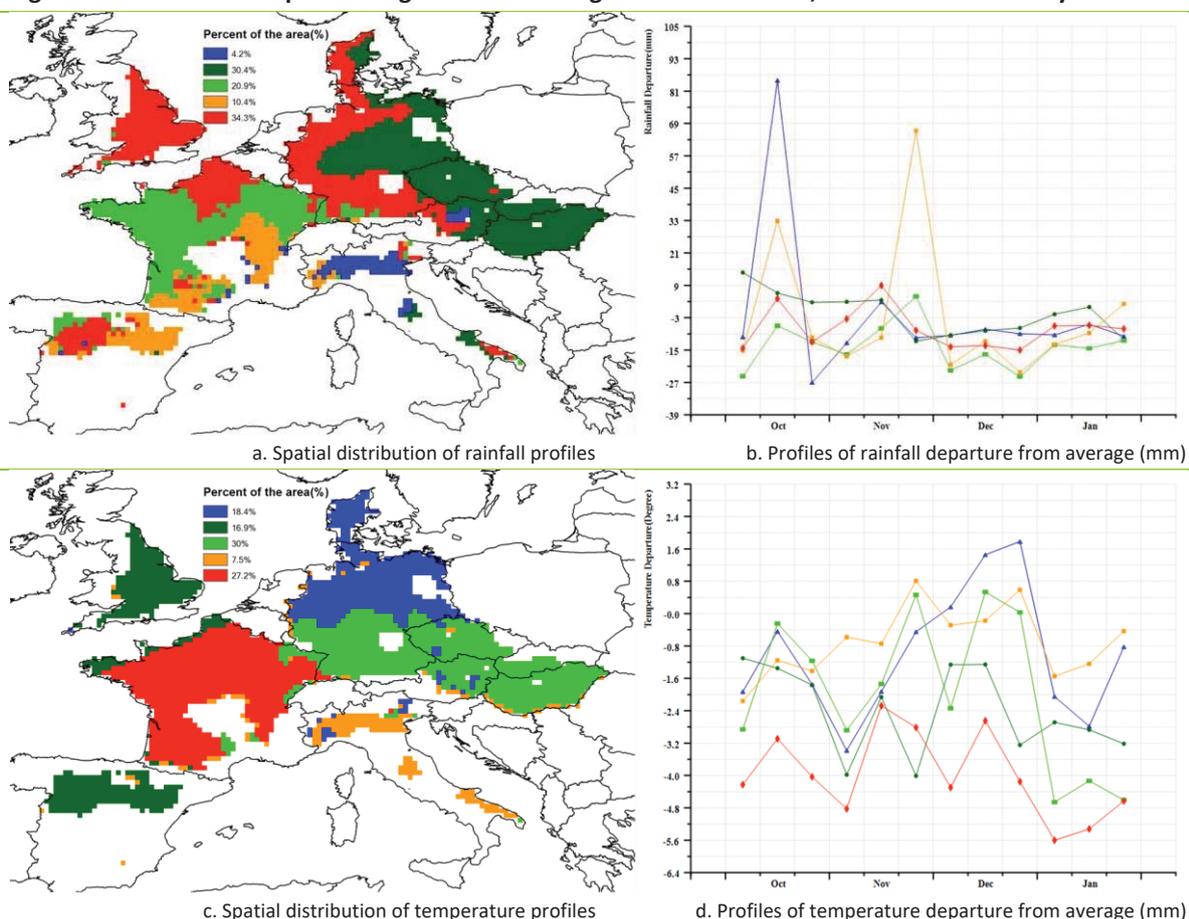
Substantially drier-than-usual conditions in early October in France and western Germany hampered the sowing of winter cereals. In northeastern Austria and northern Italy, heavy rains in the first half of October somewhat delayed part of the harvest of grain and maize and the sowing of winter crops, but benefited the emergence of winter crops that had been sown earlier. Temperatures over the whole MPZ were below average ( $-2.3^{\circ}\text{C}$ ), and temperature profiles indicate that above average temperatures were observed in northern Germany and Denmark from mid-November to early January. Radiation was 2% below average.

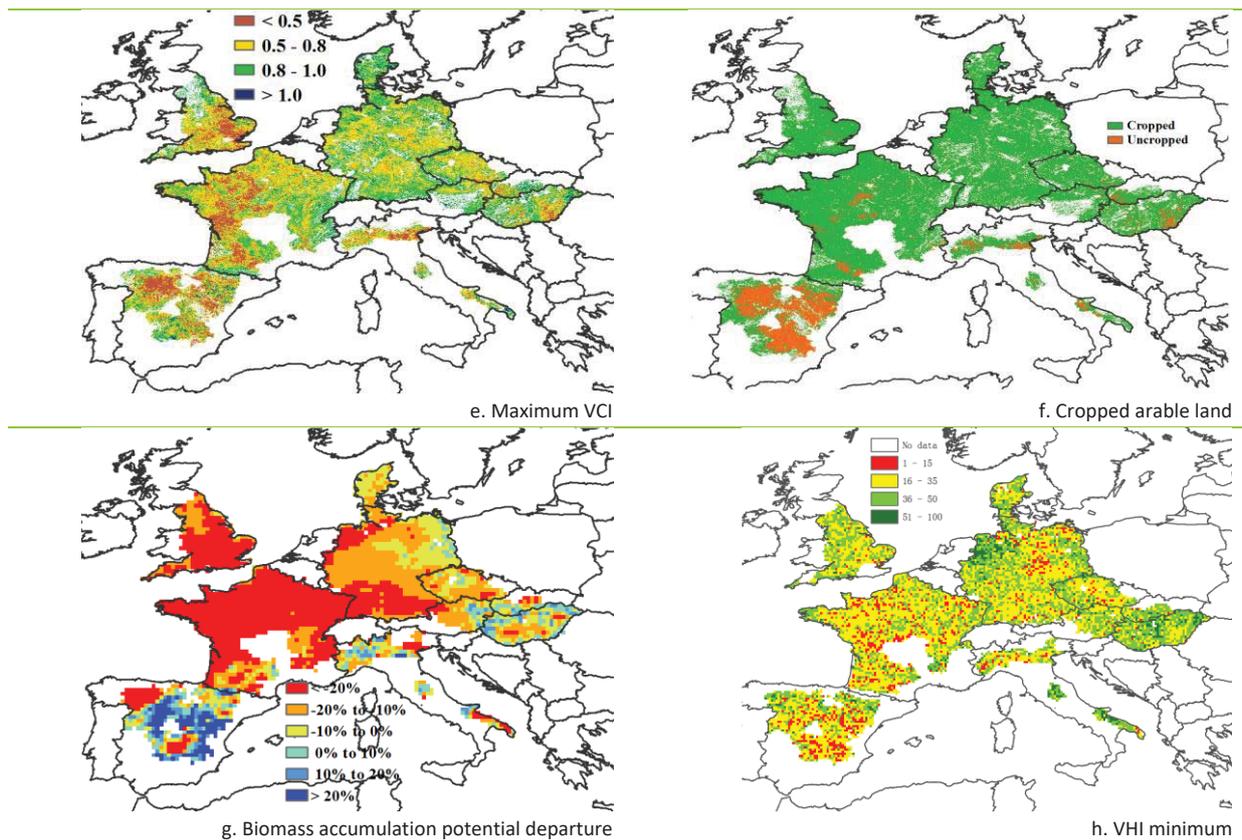
Due to the continuous rainfall deficit, especially after November, and coupled with the impact of low temperature (in particular in France, the United Kingdom, and Spain), the biomass accumulation potential BIOMSS was 20% below the recent five-year average. The lowest values (-20% and below) occur over most parts of the continental Western European MPZ (mainly concentrated in France, the United Kingdom, the south and east of Spain, and the south and northwest of Germany). In those regions, values for minimum VHI also confirm the water deficit to a certain extent. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) in parts of Austria, Slovakia, Hungary, central Spain, northern Italy, and northeast Germany.

Maximum VCI was relatively low in most of Spain, France, the United Kingdom, Germany, Czech Republic, northern Italy, southeast Hungary, southwest Slovakia, and northern Austria. Average VCIx for the MPZ was 0.81. Overall, 88% of arable land in the MPZ was cropped during this reporting period, 2 percentage points below average. Most uncropped arable land was concentrated in Spain and scattered in northern and southern Italy, central and southern France, southeast Hungary, and southwest Slovakia.

Overall, crop condition is currently average or below average along an east-west gradient.

**Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, October 2016-January 2017**





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

## 2.7 Central Europe to Western Russia

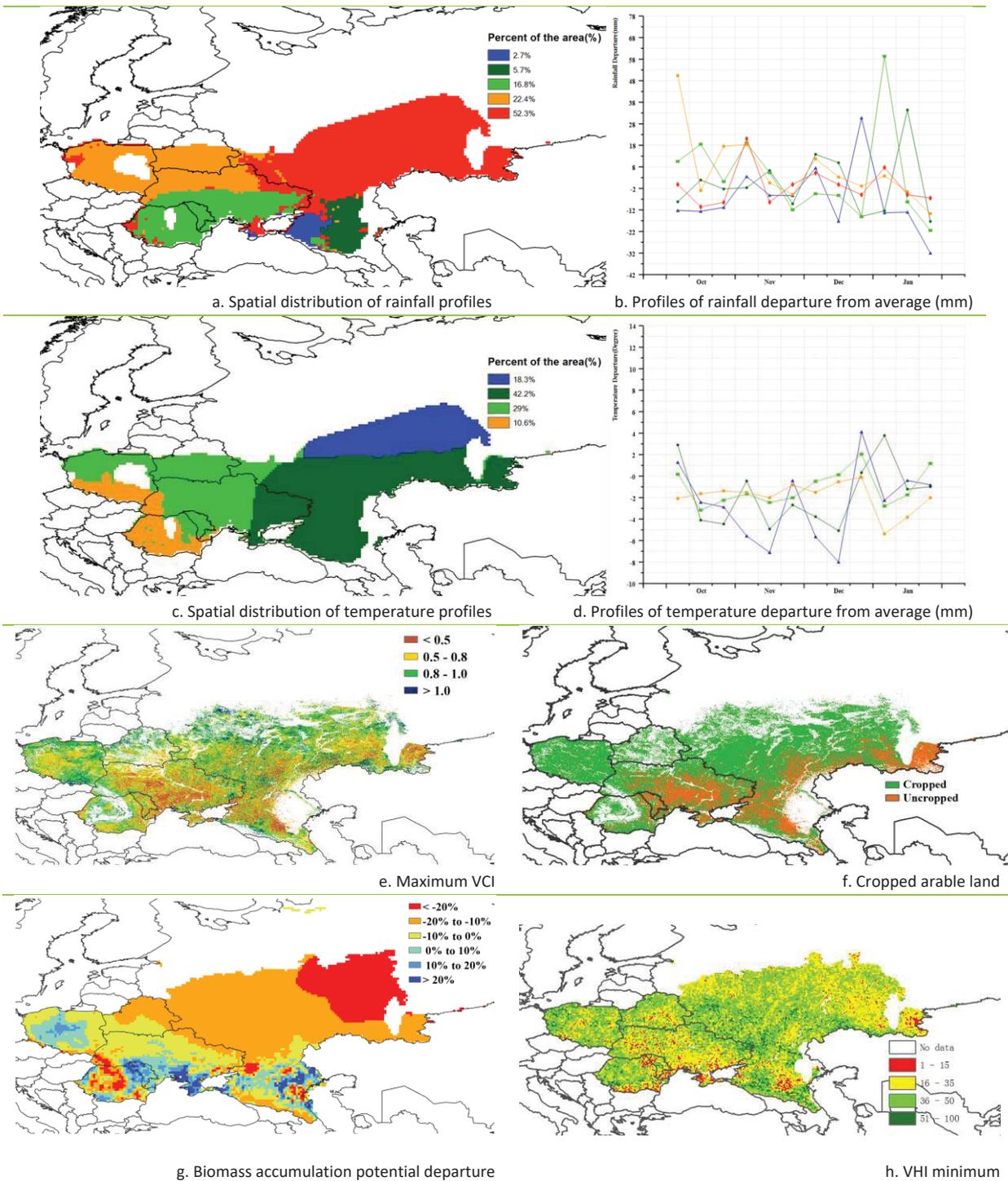
Over the monitoring period, the harvest of summer crops was completed, and winter crops were in their early vegetative stages under generally favorable weather conditions in most parts of the MPZ. The region experienced below normal thermal conditions, with a 1.7°C drop in temperature compared to average, while rainfall increased 9% and radiation dropped 6%.

According to the rainfall profiles, favorable rainfall affected the MPZ's western part (almost 39.2% of the MPZ) during October and November, especially in Romania (RAIN, +11%), Poland (+31%), and western Ukraine. The maximum precipitation occurred in January when it was 60% above average in Romania and southern Ukraine. Unfavorable rainfall was recorded in southern Russia (from the kray of Krasnodar to the Kabardino Balkariya republic), with the largest deficit occurring in the kray of Krasnodar, which experienced relative deficits of rain exceeding 20% in January. Much of the rain fell as snow, which started early (October), covering much of the MPZ (with fluctuations) from early December (covering only the Carpathian basin in Romania) and then the whole MPZ uninterruptedly from early January to the end of the reporting period.

Almost all areas of Central Europe to Western Russia enjoyed a below average temperature from October to December, which had negative effects on the development of winter crops. The coldest area included the oblasts of Kirovskaya and Nizhegorodskaya, along with Tatarstan republic, with two low periods in November and December. Due to the low temperatures during the monitoring period, the biomass production potential (BIOMSS) for the MPZ as a whole decreased by 10% compared to average. This results from BIOMSS drops in northern Ukraine (-7%), Belarus (-9%), and adjacent areas in Russia where this drop reaches 10% or even 20% and more. The maximum VCI (0.79) is lower compared with other MPZs. According to the maximum VCI map of this monitoring period, most pixels were below 0.5 in the central part of Ukraine and the oblasts of Krasnodar and Chelyabinsk, resulting from poor crop condition.

Uncropped arable land occurs mostly in Ukraine and southwestern Russia, which is also characterized by clusters of unfavorable VHI and low VCIx. CALF, however, increased by 29 percentage points over the reference period. In general, mixed conditions are estimated to prevail in this MPZ; the output of current winter crops will depend on the agrometeorological conditions in the next key vegetative stage.

**Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, October 2016-January 2017**



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