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), cropping intensity, and minimum vegetation health index (VHIn)—to describe crop condition in seven 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 seven MPZs, comparing the indicators to the thirteen- and five-year averages.

Table 2.1. July to October 2014 agroclimatic indicators by Major Production Zone, current value and departure from 13YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 13YA (%)	Current (°C)	Departure from 13YA (°C)	Current (MJ/m^2)	Departure from 13YA (%)
West Africa	876	7	26.8	0.7	1009	0
South America	403	20	21.1	2.2	1004	0
North America	419	18	20.3	0.2	1079	-2
South and Southeast Asia	1142	13	27.8	1.2	954	2
Western Europe	298	7	16.9	0.6	883	-3
Central Europe and Western Russia	184	-24	15.4	-0.2	876	4
Southern Australia	114	-36	13.6	0.9	963	1

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 thirteen-year average (13YA) for the same period (July-October) for 2001-13.

Table 2.2. July to October 2014 agronomic indicators by Major Production Zone, current season values and departure from 5YA

	BIOMSS (gDM/m^2)		Cropped arable land fraction		Cropping Intensity		Maximum VCI
	Current	Departure from 5YA (%)	Current (% of pixels)	Departure from 5YA (%)	2014 (%)	Departure from 5YA (% points)	Current
West Africa	2007	5	84	-1	124	-4	0.81
South America	1103	12	90	4	169	2	0.71
North America	1224	13	93	8	121	-2	0.87
South and Southeast Asia	1875	-1	87	-1	157	-7	0.86
Western Europe	1152	12	93	1	120	-6	0.83
Central Europe/ Western Russia	786	-17	92	0	101	-2	0.75
Southern Australia	492	-31	80	12	123	2	0.79

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 2009-13.

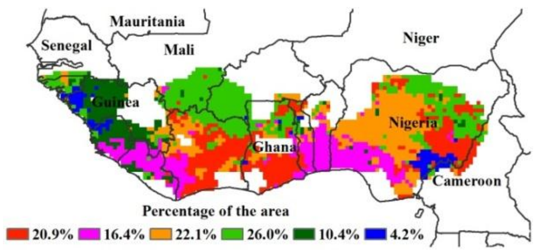
2.2 West Africa

The whole African continent experienced above normal thermal conditions during the reporting period, with very few exceptions. One of those exceptions was in Sierra Leone, where temperature was slightly below average (-0.3°C). Across the MPZ, rainfall and BIOMSS were about average (+7% and 0%, respectively). RADPAR was also approximately average (0% departure), with the exceptions of Sierra Leone (RADPAR +1%), Côte d'Ivoire (+1%), Benin (+3%), and Guinea Bissau (-3%). As a result of increased precipitation, BIOMSS is up around 5% compared to the five-year average, with large differences among countries: from -1% in Guinea Bissau to +16% in Liberia, with most countries in the +6% to +7% range. The whole region is now completing harvest—or has already done so, with the exception of the south where the harvest of roots and tubers (yams and cassava) typically comes later in the year. The same areas also usually cultivate a second maize crop that is due to harvest later in the year, also visible on the cropping intensity map.

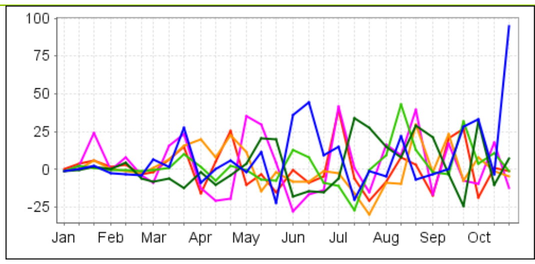
Most areas in the MPZ suffered a more or less synchronized rainfall reduction in July/August or August September; at the end of September, precipitation fell -25% over most of Guinea and Sierra Leone, but this was compensated by high rainfall at the end of October. At the beginning of October, southern Ghana and Côte d'Ivoire as well as eastern central Nigeria suffered a slightly milder water stress (-20%). As indicated above, the region as a whole experienced a slight rainfall excess with no serious shortfalls. In the western Sahelian parts of the MPZ, high—but not excessively so—temperature departures of up to +2°C occurred in early July, coinciding with a somewhat delayed beginning of the Sahelian season, occurring mostly to the areas indicated as “uncropped” in the cropped and uncropped arable land map.

Despite a slightly decreased fraction of cropped arable land (-1%) and cropping intensity (-4%), high VCIx combined with roughly average weather indicate favorable conditions for the MPZ’s first and second maize crops, roots and tubers, as well as rice.

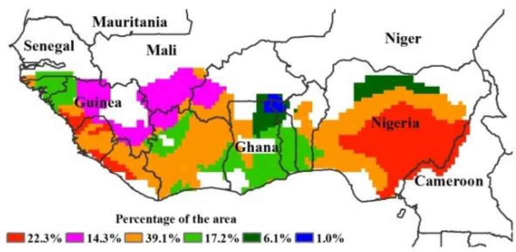
Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, July-October 2014



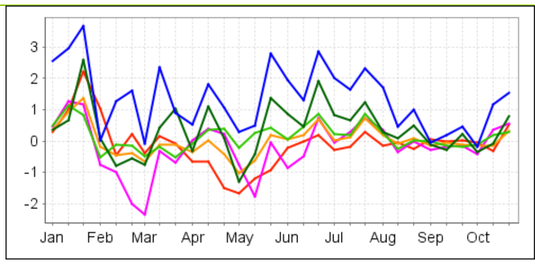
a. Spatial distribution of rainfall profiles



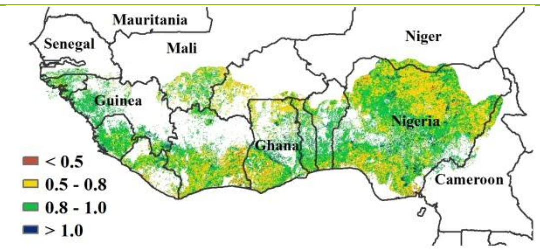
b. Profiles of rainfall departure from average



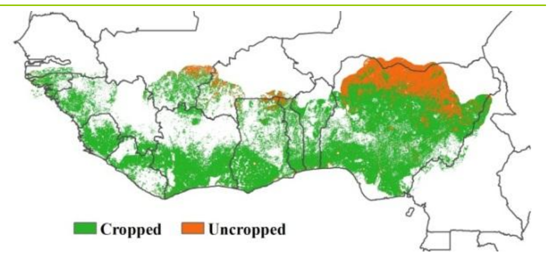
c. Spatial distribution of temperature profiles



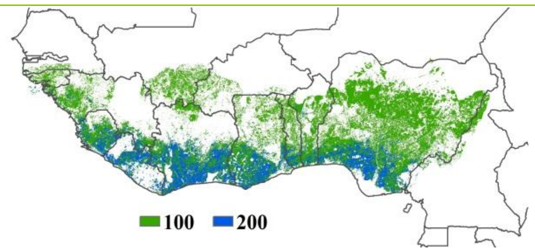
d. Profiles of temperature departure from average



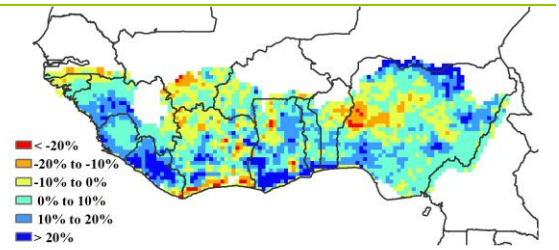
e. Maximum VCI



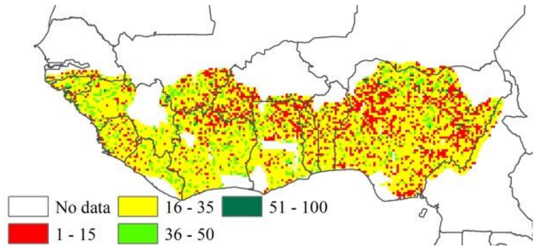
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

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

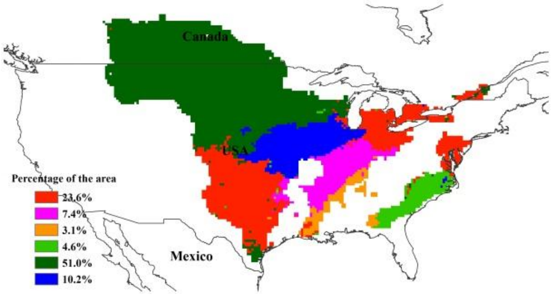
2.3 North America

In general, crops did well in the North American MPZ in 2014. Overall, rainfall (RAIN) increased by 16% over average, temperature (TEMP) increased by 0.4°C, and radiation (RADPAR) dropped 2%.

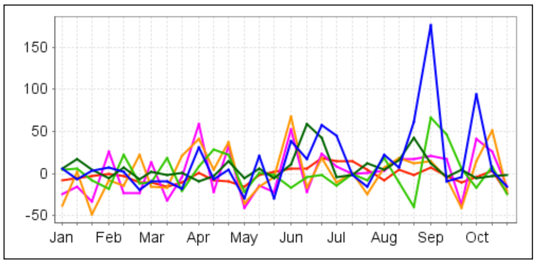
Between February and late May, Texas, Oklahoma, Kansas, and Ohio suffered a significant rainfall deficit. From mid-April to mid-May, the deficit extended to almost all areas of the North American MPZ, especially to Texas, Oklahoma, Kansas, Montana, Arkansas, and Indiana. The impact is confirmed by low VHIn values in the MPZ (see figure 2.2). Late May witnessed above average temperature in almost all regions, contributing to worsening water deficits and stressing winter wheat. Fortunately, from the beginning of June to mid-July, rainfall recovered to above average while temperature dropped below average: abundant rainfall was recorded in northwestern and central regions, such as Alberta, Saskatchewan, Manitoba, Montana, North Dakota, South Dakota, Nebraska, Minnesota, and Wisconsin, especially in southern Iowa and in the northern Illinois. After mid-July, parts of the southwestern United States (Texas), northeast (Ohio), and in the central United States, rainfall was basically average, with minor departures. Abundant rainfall continued in the northwest, northern Great Plains and southwest of the Great Lakes, southern Iowa, and in the northern Illinois. These areas are part of the major soybeans and maize producers, so that good performance of soybeans and maize is to be expected.

The good performance is supported by agronomic indicators, including accumulated biomass (+13% over the recent five-year average) and VCIx with a value of 0.85. The fraction of cropped arable land (CALF) increased 8% compared to the five-year average, while cropping intensity decreased 2%. The indicators concur and better than average summer crops production is to be expected. As to winter wheat (mostly harvested in June), below average production is to be expected due to serious water deficits in May.

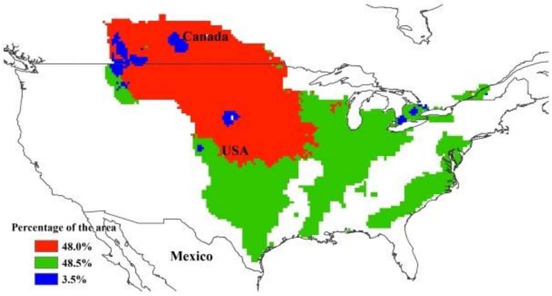
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, July-October 2014



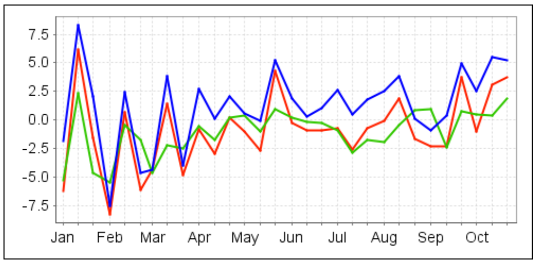
a. Spatial distribution of rainfall profiles



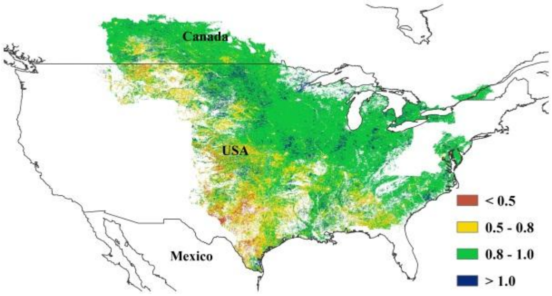
b. Profiles of rainfall departure from average



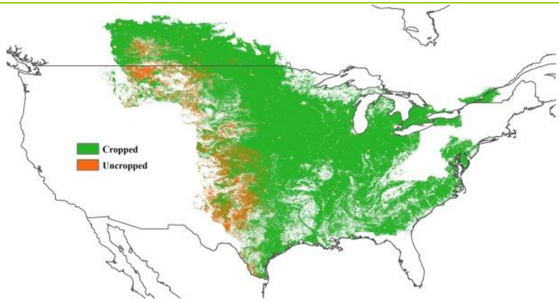
c. Spatial distribution of temperature profiles



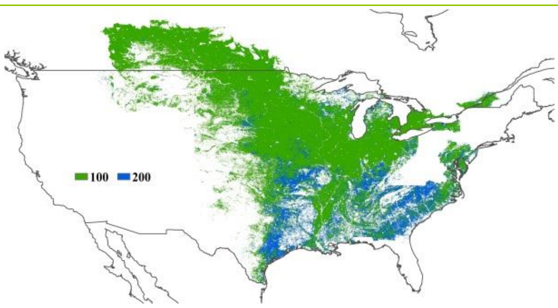
d. Profiles of temperature departure from average



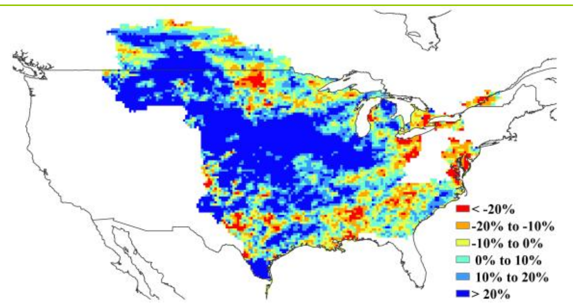
e. Maximum VCI



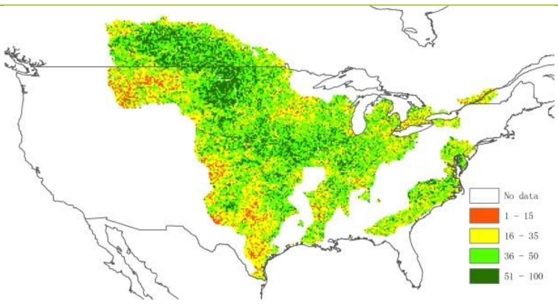
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

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

2.4 South America

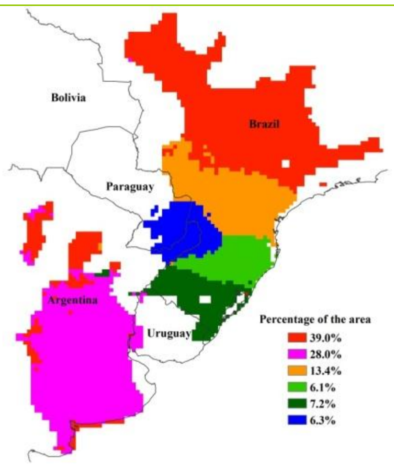
Generally, above average rainfall and air temperature in the MPZ advanced the harvesting of wheat and the emergence and development of early planted summer crops. Figure 2.3 summarizes the CropWatch indicators for the MPZ.

Rainfall (RAIN) and temperature (TEMP) were generally favorable between July to October 2014, with 20% above average rainfall and temperature up 2.0°C compared with the period's average. Average RADPAR provided adequate radiation for crops over the last four months. However, RAIN varied a lot from place to place. Average rainfall dominates Argentina and the northern Latin American MPZ (Sao Paolo and northern Mato Grosso Do Sul) while Parana, Santa Catarina, and Rio Grande do Sul experienced above average rainfall. Persistent high temperature from July to October together with average rainfall induced water deficit in the central Pampas, which is confirmed by the low VHI (below 35). Regions from northern Mato Grosso do Sul to Sao Paulo suffered from drought due to very warm weather (5.0°C degree above average) and normal rainfall in mid-October. Spatially, VCIx is well correlated with VHIn, indicating that water deficit was indeed the key limiting factor for crop development in the MPZ for July to October. The average condition of crops was nevertheless above average, as confirmed by 12% above average biomass (BIOMSS). In Mato Grosso do Sul to Sao Paulo. The spatial patterns of maximum VCI and minimum VHI are paralleled by below average biomass (-20%).

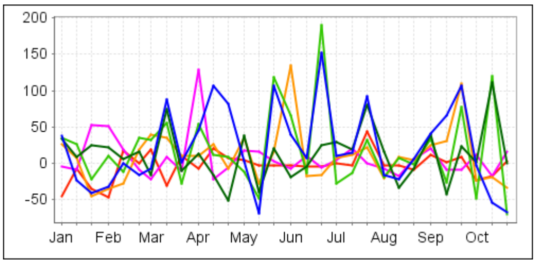
From July to October 2014, 90% of the arable lands were cropped, which is 4% higher than the recent five-year average. Most uncropped arable land was scattered in the central Pampas, where harvest of soybeans of the previous season concluded in May and planting will take place in November to December. Average cropping intensity for the MPZ is estimated at 169%, 2% up from the recent five year average. A double cropping system dominates most of southern Paraguay and Brazil (Rio Grande do Sul, Santa Catarina, and Parana) and central Buenos Aires province.

The persistent high temperature (>2.0°C) shortened the grain filling stage, accelerating wheat maturation and reducing yield accumulation in key wheat producing areas in the MPZ.

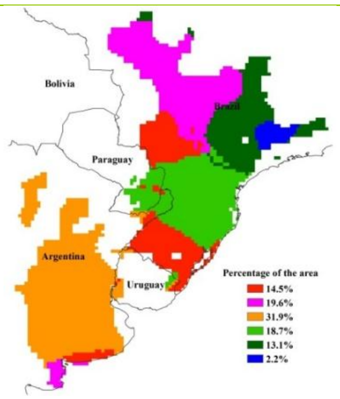
Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, July-October 2014



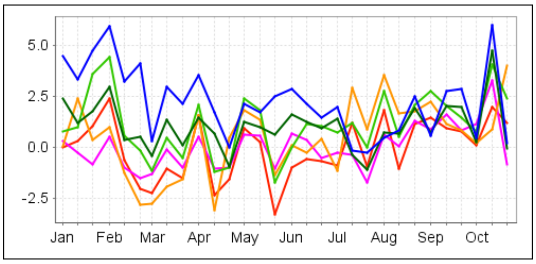
a. Spatial distribution of rainfall profiles



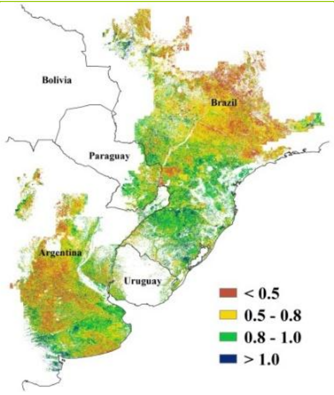
b. Profiles of rainfall departure from average



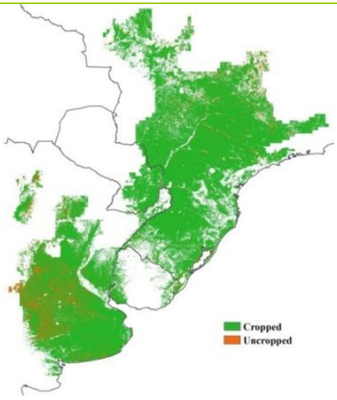
c. Spatial distribution of temperature profiles



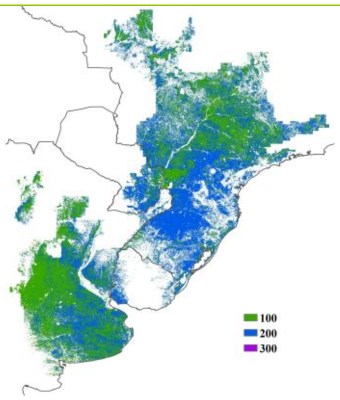
d. Profiles of temperature departure from average



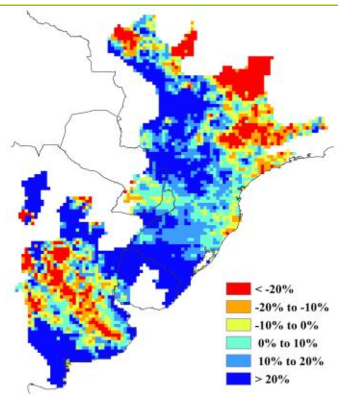
e. Maximum VCI



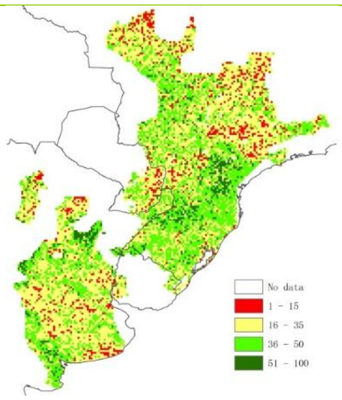
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

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

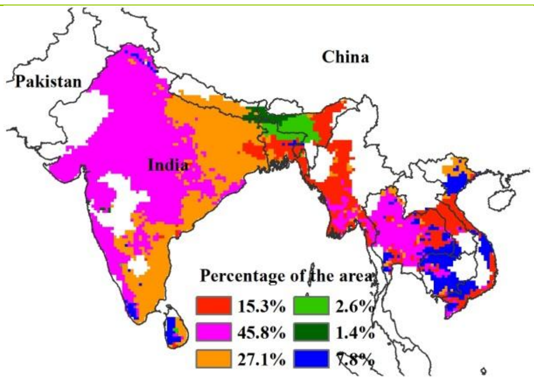
2.5 South and Southeast Asia

In the region as a whole, agro-climatic and agricultural indicators during July to October indicate increases of RAIN (+13%), TEMP (1.2°C), and RADPAR (2%) compared with average. High rainfall occurred mostly in mid-August in Meghalaya, the western part of Assam in India, and Rangpur, north Dhaka, and Sylhet in Bangladesh. Otherwise, rainfall was comparable to the average, and so was temperature with the exception of north Bihar in India. The biomass accumulation potential (BIOMSS) shows favorable conditions around Tonle Sap in Cambodia, the Red River delta of Vietnam, Tamil Nadu in India, and Central Dhaka in Bangladesh, which are the main rice plantation areas.

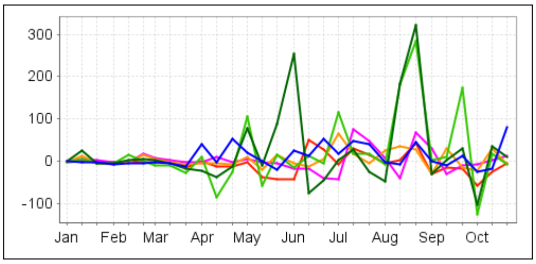
The VCIx map indicates good crop condition (+0.86), particularly in the northeastern region of Thailand, Banteay Meanchey, Battambang, and Siem Reap in Cambodia, and Madhya Pradesh in India. The fraction of cropped arable land (CALF) dropped by 1% compared with the last five-year average, affecting mostly Haryana, south Andhra Pradesh in India, and the central dry zone of Myanmar, which is related to the low maximum VCI and the low biomass accumulation potential. Low VHIn occurs in Uttar Pradesh, Madhya Pradesh in India, and the central dry zone of Myanmar, consistent with the low biomass accumulation potential. Cropping intensity dropped by 7% compared with the five-year average. Triple-cropping occurs mostly in West Bengal in India, the Red River delta, and the Mekong delta of Vietnam.

Figure 2.4 presents an overview of CropWatch indicators for South and Southeast Asia.

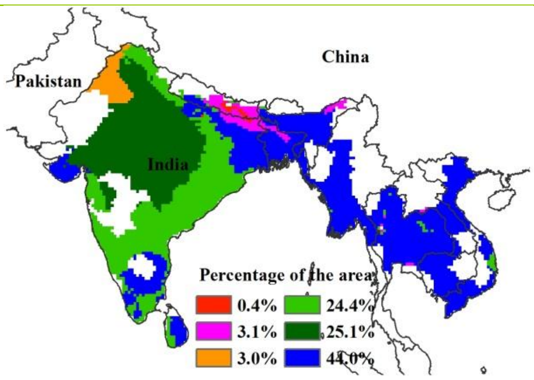
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, July-October 2014



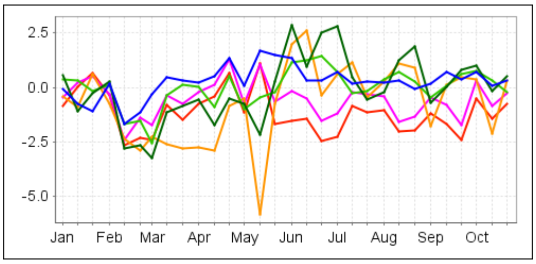
a. Spatial distribution of rainfall profiles



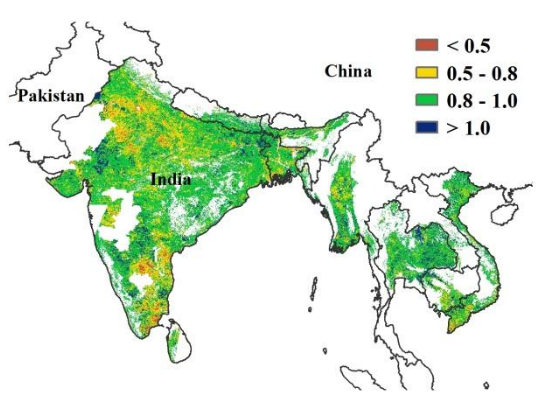
b. Profiles of rainfall departure from average



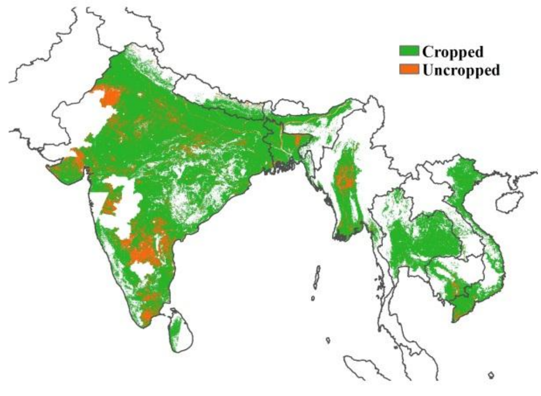
c. Spatial distribution of temperature profiles



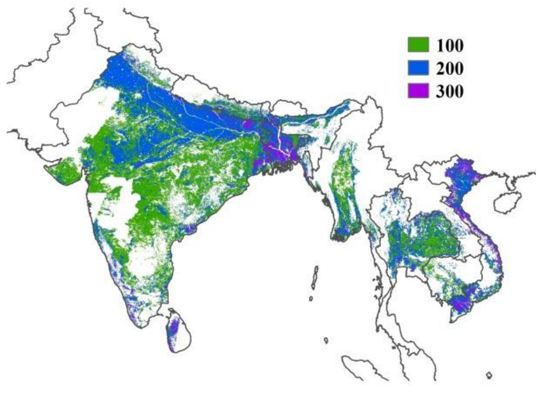
d. Profiles of temperature departure from average



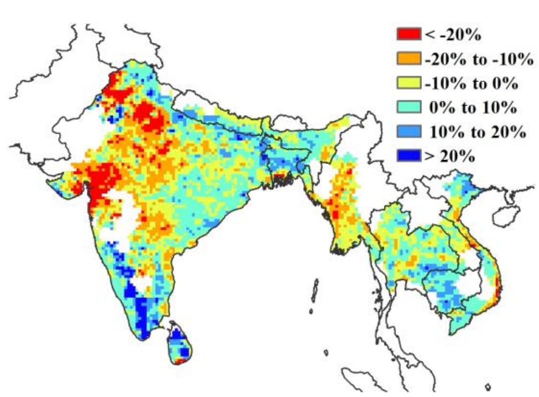
e. Maximum VCI



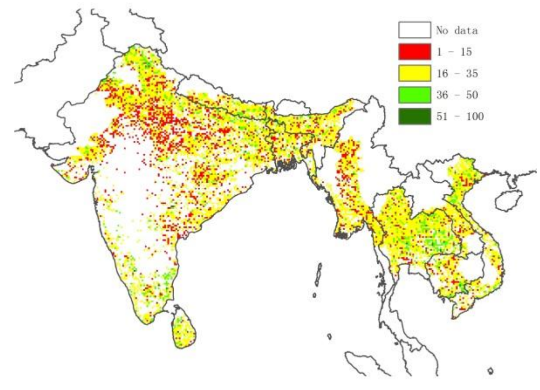
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

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

2.6 Western Europe

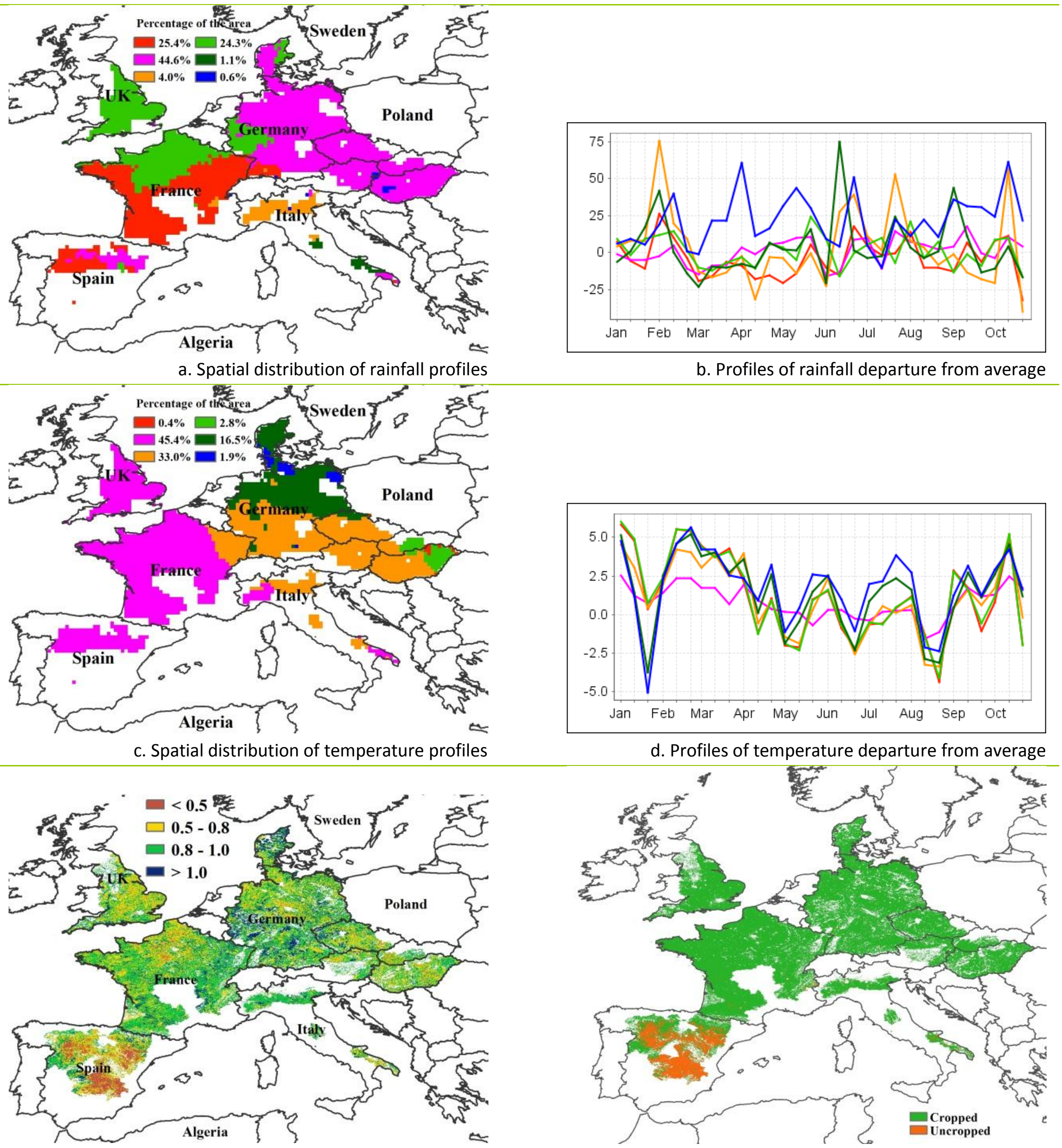
Overall, when integrating the findings of the various agroclimatic and agronomic indicators, most parts of Western Europe presented favorable condition of summer crop and a large average VCIx value (0.83) over the monitoring period. (See also figure 2.5.)

Rainfall (RAIN) and temperature (TEMP) were generally favorable from July to October 2014, with above average values for both rainfall (+7%) and temperature (+0.6°C). Three percent below average RADPAR was observed over the same period. The above average climatic conditions are beneficial for late crop development and maturation.

The condition of crops was above average, as suggested by 12% above average biomass (BIOMSS). Biomass accumulation in west and southwest France and northern and south-central Spain, however, was well below average (20% lower), while in contrast, biomass in most other regions was 10% above average. The rainfall deficit from early August to September and the continuously below average temperature in mid-August in west and southwest France and northern and south-central Spain was the main reason for the low biomass, which is confirmed by the low values of the VHI minimum map and below average values of VCIx.

Although cropping Intensity (120%) was down 6% compared with the five-year-average, more than 93% of the arable lands were cropped in July to October 2014, 1% higher than the recent five-year average. Only central Spanish regions show uncropped land from July to October. Accordingly, maximum VCI was lower as well, compared with other regions in the MPZ. Generally, crop condition in Western Europe was above average relative to both the thirteen-year and the five-year averages. Pixels with low minimum VHI (below 15) are found sporadically in northeastern France, southern Germany, and south-central Britain, but especially in central Spain.

Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, July-October 2014



a. Spatial distribution of rainfall profiles

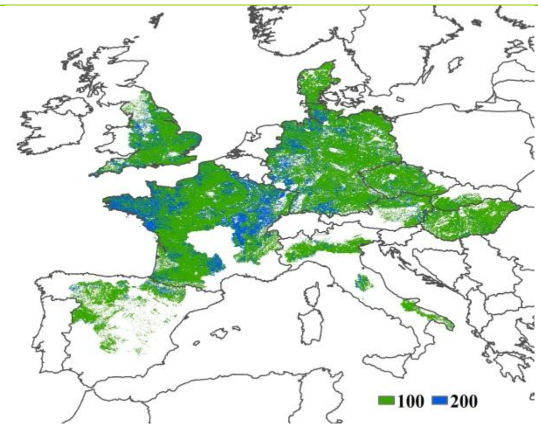
b. Profiles of rainfall departure from average

c. Spatial distribution of temperature profiles

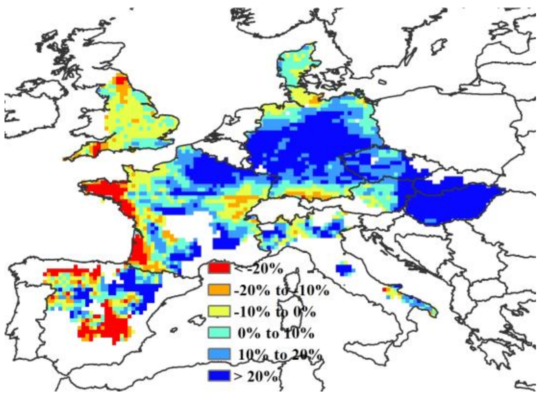
d. Profiles of temperature departure from average

e. Maximum VCI

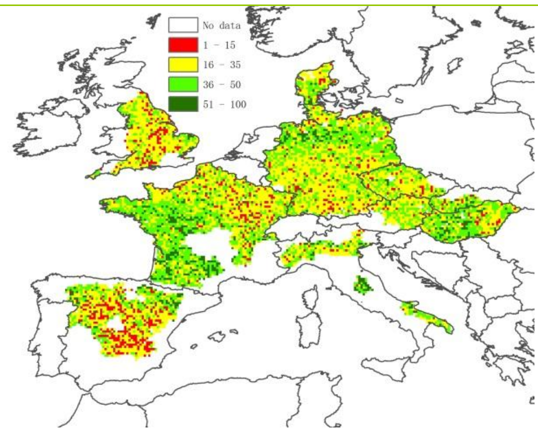
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

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

2.7 Central Europe to Western Russia

During the current monitoring period, sowing of winter crops was completed under generally favorable weather conditions, although drier conditions than usual has been experienced for the MPZ (24% drop in rainfall compared to average and a PAR increase of 4%). The crop condition deteriorates from north to south, with poor conditions in the southern Ukraine and southern part of western Russia.

As indicated by the rainfall profiles, the extreme south of western Russia (including the republics of Karatchayevo-cherkesiya, Kabardino-balkariya and Severnaya Osetiya-alaniya) shows two peaks in rainfall: one well marked in mid-October, one diffuse in southern Poland and southwest Romania in September. Temperature profiles show correlated variations in Romania, Poland, Ukraine, Belarus, and western Russia. From August to October the temperature fluctuated but was generally low at the end of the period.

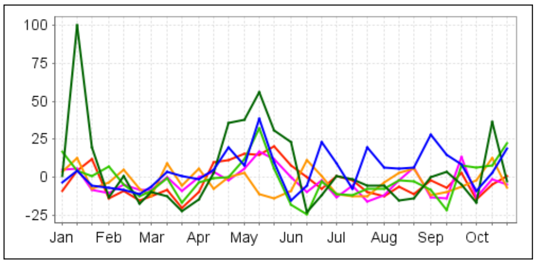
The scarce rainfall led to a significant drop in potential biomass for the whole MPZ (17% compared to the five-year average). On the distribution map of the potential biomass, a large positive biomass departure would be expected for the central part of the MPZ (including most parts of Belarus, Ukraine, and western Russia), while a positive biomass production pattern is observed in southern Poland, western Romania, and adjacent areas in Ukraine.

Accordingly, VHI-based drought profiles show worse moisture condition compared with the previous monitoring period. Ninety-two percent of the arable lands in August to November 2014 are cropped, at the same level as the five-year average, maximum VCI (0.75) is lower compared with other regions. Generally, crop condition is favorable but slightly below expectations in the southern part of the MPZ.

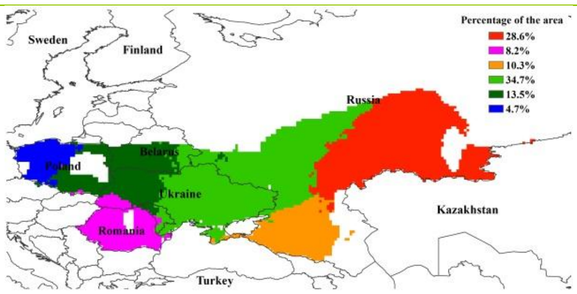
Figure 2.6 illustrates the CropWatch agroclimatic and agronomic indicators for the MPZ.

Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, July-October 2014

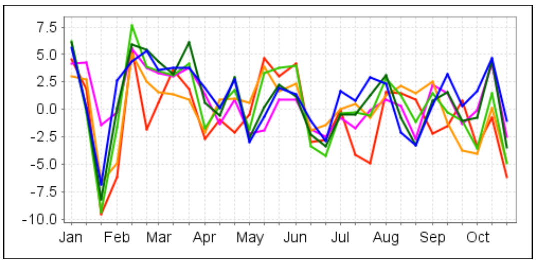
a. Spatial distribution of rainfall profiles



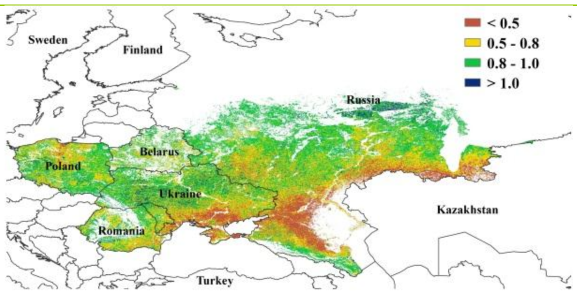
b. Profiles of rainfall departure from average



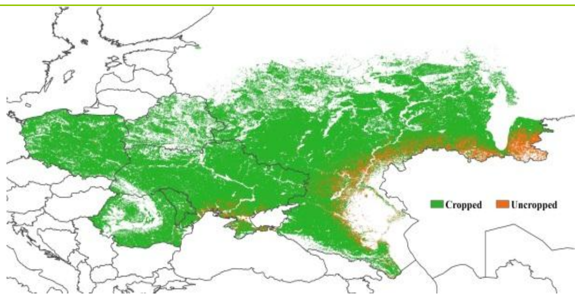
c. Spatial distribution of temperature profiles



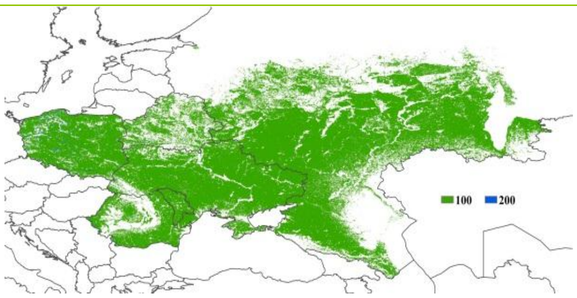
d. Profiles of temperature departure from average



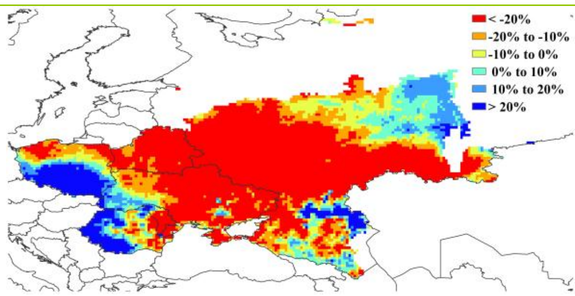
e. Maximum VCI



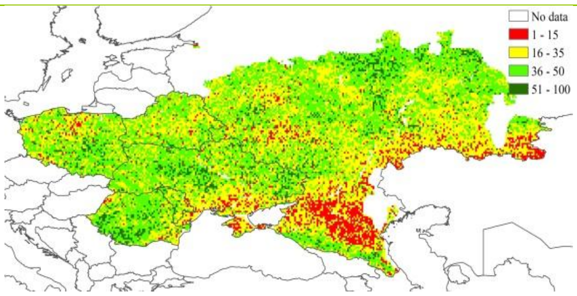
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

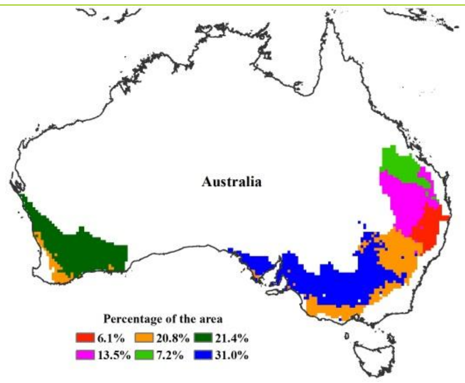
Note: For more information about the indicators, see Annex C.

2.8 Southern Australia

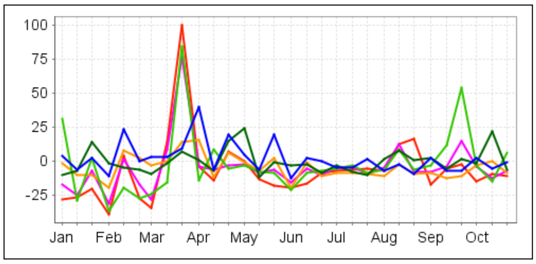
Crop condition in Southern Australia was a bit below average during the reporting period. The temperature (TEMP) increased by 0.9°C and radiation (RADPAR) increased by 1%, compared to average. Rainfall (RAIN) decreased by 36%, although current rainfall was only 114 mm. As a result, potential biomass (BIOMSS) decreased by 31%. The cropped arable land fraction (CALF) increased by 12% over the Southern Australia region compared to the recent five-year average, while cropping intensity at 123% remains at an average level, 2% above the five-year average. The maximum VCI correlated well with cropped arable land, with an average value of 0.79. The maximum VCI in southwestern and central New South Wales was less than 0.5, as the area had uncropped land this year. Based on both the agroclimatic and agronomic indicators, CropWatch estimates that the growing of wheat and barley would be negatively influenced in Southern Australia, which was confirmed by the decreasing potential biomass due to reduced rainfall. In some regions, however, rainfall showed an increase. For example, in September, rainfall exceeded average values by over 50% in southeastern Queensland and in October, by nearly 25%, in southwestern Western Australia, where temperature also rose above average (+2°C). CropWatch estimates that winter wheat and barley in both these regions would probably still have average productions.

Figure 2.7 presents an overview of the agroclimatic and agronomic indicators for Southern Australia.

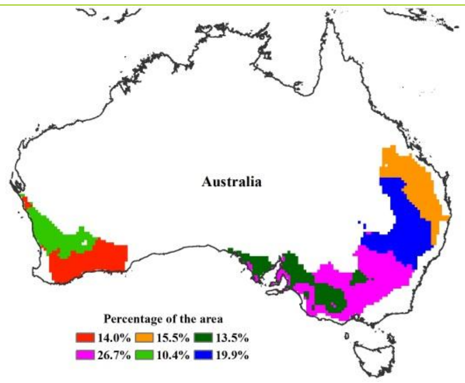
Figure 2.7. Southern Australia MPZ: Agroclimatic and agronomic indicators, July-October 2014



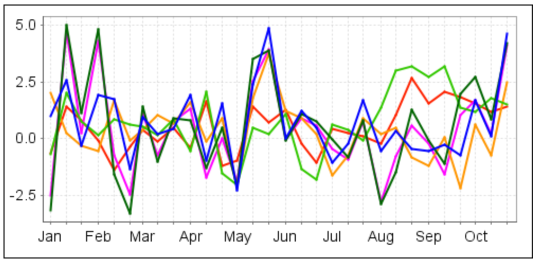
a. Spatial distribution of rainfall profiles



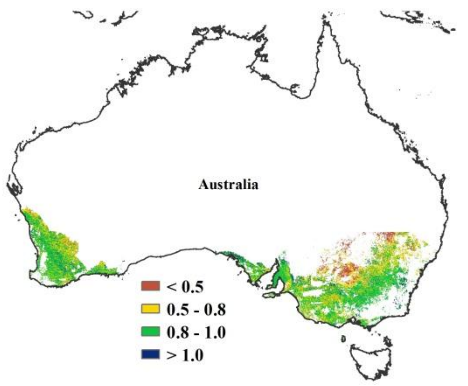
b. Profiles of rainfall departure from average



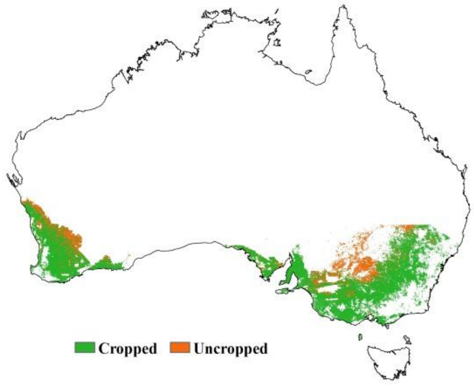
c. Spatial distribution of temperature profiles



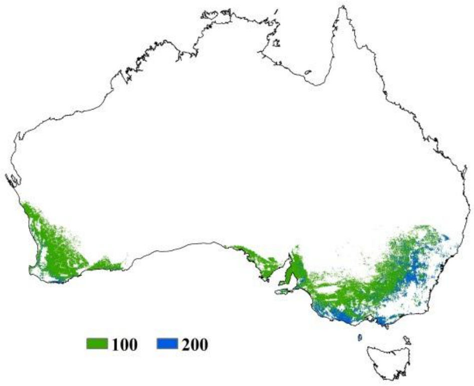
d. Profiles of temperature departure from average



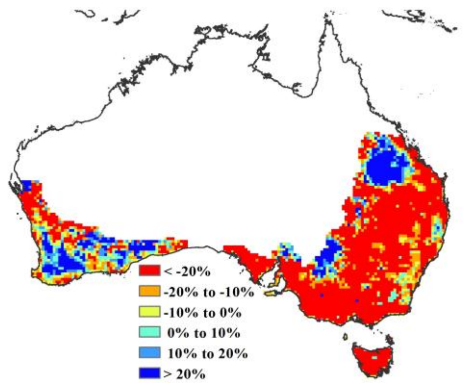
e. Maximum VCI



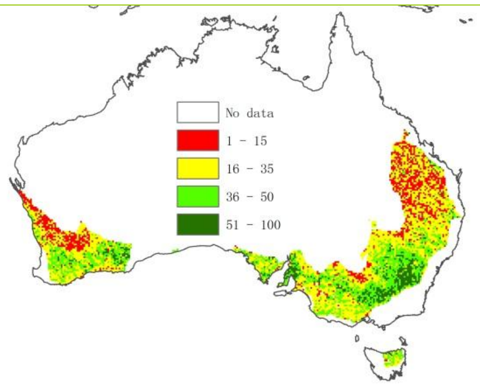
f. Cropped arable land



g. Cropping intensity



h. Biomass accumulation potential (gDM/m^2)



i. VHI minimum

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