Chapter 2. Crop and environmental conditions in major production zones

Chapter 2 presents the same indicators—RAIN, TEMP, RADPAR, and BIOMASS—used in Chapter 1, and combines them with the agronomic indicators—cropped arable land fraction (CALF), maximum vegetation condition index (VCIx), and vegetation health index (VHI)—to describe crop condition in seven Major Production Zones (MPZ) across all continents. As there is a partial overlap between MPZs and several CPSZs, some extreme conditions already mentioned in Chapter 1 are described here with additional detail on the timing of rainfall and temperature and their spatial patterns.

For more information about these zones and methodologies used, see the Quick reference guide in the beginning of this bulletin, 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 five- and thirteen-year averages. Based on the table data and the detailed analyses for each MPZ, their overall situation can be described as very promising in Southern and Southeast Asia and in South America, positive with some reservations in Europe (western as well as east to Russia) and in West Africa, and mixed in Australia and particularly in North America.

Southern and continental Southeast Asia and South America underwent rather similar conditions in relative terms: Slightly above average rainfall and close to average temperature resulting in increased biomass potential (14 and 10% respectively) but a close to average fraction of cultivated land. The most positive indicator in both areas is VCI (close to 0.85), indicating a season that is comparable to good previous years.

Table 2.1. January to April 2014 agroclimatic indicators by Major Production Zone, current value and departure from 5YA and 13YA

	RAIN			TEMP			RADPAR		
	Current (mm)	Departure (%)		Current (°C)	Departure (°C)		Current (MJ/m^2)	Departure (%)	
		5YA	13YA		5YA	13YA		5YA	13YA
West Africa	202	11	16	28.5	-0.2	0.0	991	4	2
South America	719	10	8	23.6	0.1	0.0	1157	0	-2
North America	277	-3	-5	2.5	-2.3	-2.3	747	-1	-1
South and Southeast Asia	124	7	1	23.4	-0.5	-0.4	1113	0.3	1
Western Europe	185	-11	-19	7.3	2.3	2.0	530	-2	-1
Central Europe and Western Russia	143	-13	-17	0.2	1.9	1.1	497	3	4
Southern Australia	187	-27	-11	21.2	0.6	0.5	1280	2	0.1

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 five-year (5YA) or thirteen-year average (13YA) for the same period (January-April) for 2009-13 (5YA) or 2001-13 (13YA).

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

	BIOMASS (gDM/m^2)		Cropped arable land fraction		Maximum VCI
	Current	Departure (%)	Current (% of pixels)	Departure (%)	Current
West Africa	634	9	70.3	-2	0.75
South America	1826	10	99.4	0	0.86
North America	639	-12	53.2	-8	0.61
South and Southeast Asia	416	14	88.3	-2	0.84
Western Europe	724	-9	96.6	1	0.90
Central Europe/ Western Russia	584	-4	89.3	19	0.79
Southern Australia	672	-12	55.7	8	0.70

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 (January-April) for 2009-13.

In Europe (from the Atlantic ocean to the Ural mountains) rainfall was significantly below average (-20% to -17%) and temperature higher than the average of the recent years (+2.0°C and +1.1°C), resulting in biomass expectations close to average. In the west, the increase in cropland was insignificant (+1%), while in the east a very significant increase was observed (+19%). Combined with the rather positive VCI values of 0.80 in the east and as much as 0.9 in the west, the cropland fraction and the "zero biomass" increase nevertheless indicate at least average crop condition: rainfall is rarely limiting in those areas and increased sunshine (+4% in the east) directly boosts crop yields.

The interpretation of the West African data is not so straightforward. The area includes agro-ecologically very diverse areas, covering both rainforest, usually well watered in the south, as well as much dryer, semi-arid ecosystems and farming systems in the north. It appears that above average rainfall did not occur in the north, where it would have contributed to a very early start of the growing season. Altogether, the combination of a slight biomass increase with moderate VCI point at average conditions in the south where planting of maize and rainfed rice has started in March.

In southern Australia rainfall was below average (-11%) and accompanied by above-average temperature, resulting in a decrease of the biomass accumulation potential but nevertheless a slight increase in cropped arable land. VCI is low, which indicates conditions close to a mediocre season.

The North American MPZ suffered from both reduced precipitation and consistently low temperature in several waves, resulting in a global average departure of -2.3°C, which is considerable when the large area and the long time period (four months) are taken into consideration. The negative impact is visible in all indicators, starting with reduced biomass accumulation (-12%), reduced cropped land area (-8%), and the lowest VCI value of all MPZs, pointing at a just average performance compared with the recent thirteen years.

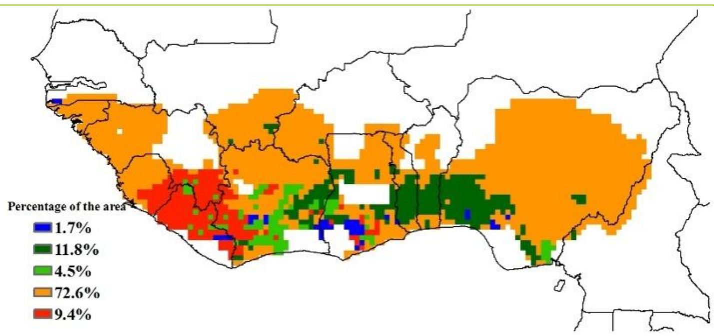
2.2 West Africa

With some minor variations due to elevation and terrain features, most of the West African MPZ was in the dry season in January and February, when the last 2013 crops were being harvested. In March and April, the southernmost areas, particularly in the center and east, have started planting maize and rainfed rice. About three quarters (72.6%) of the pixels in the MPZ experienced very close to average rainfall during January and February, indicating they experienced seasonally dry weather. Poor rainfall conditions occurred only in the west of the region (Liberia, Sierra Leone, and southeast Guinea) in March and, to some extent, in April in less than 10% of the area. This corresponds to a late onset of the rainy season but not of the cropping season, as the west tends to plant later than the east. The overall high rainfall departure (+16%) for the region during the first four months of the year is largely due to abundant rainfall (+50%), still in March, from south-west Nigeria to east Côte d'Ivoire. As far as temperature is concerned, the region was generally warmer than average at the beginning of the year, gradually returning to average (or even below average in central east Nigeria) at the end of April.

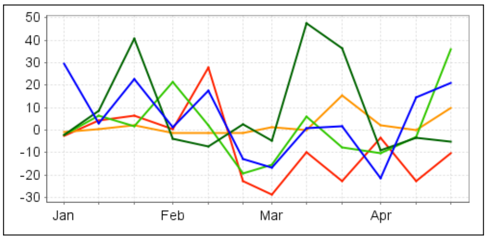
In the southernmost areas of the MPZ—where crops are grown during the reporting period (as illustrated by the cropped arable land map), VCI values are high, indicating favorable crops by local standards. This is confirmed by positive biomass accumulation departures over a large area extending from Nigeria to south-east Côte d'Ivoire, while remaining areas in the west show large biomass potential drops. This is very consistent with the already mentioned rainfall patterns, but only partially confirmed by VHI: the core of the area where biomass is below average (-100 gDM/m^2) is characterized by steadily decreasing VHI, in an area centered on the border area between Sierra Leone, Guinea, and Liberia. March witnessed a drop in VHI in central-eastern Nigeria, which is associated with low temperature.

Altogether, the available indications point at a satisfactory start of the season in the southern area of the MPZ.

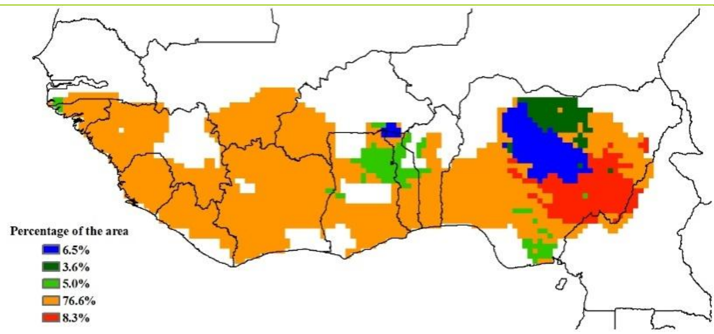
Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, January-April 2014



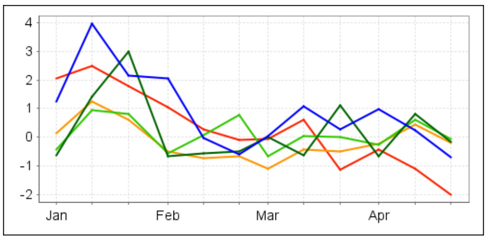
a. Spatial distribution of rainfall profiles



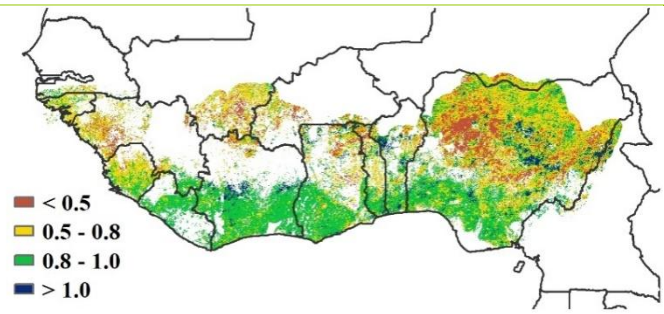
b. Profiles of rainfall departure from average



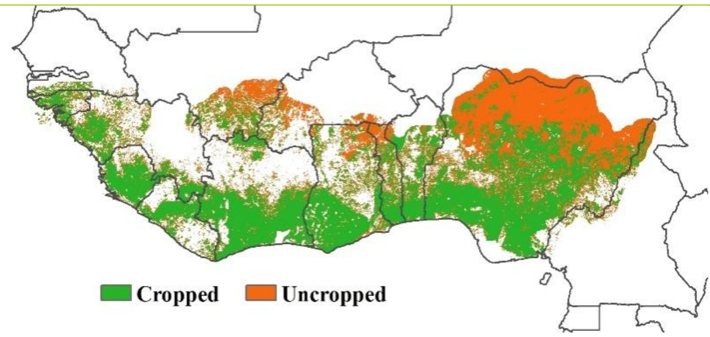
c. Spatial distribution of temperature profiles



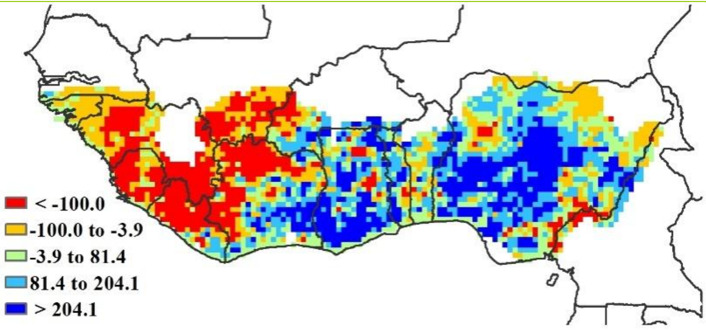
d. Profiles of temperature departure from average



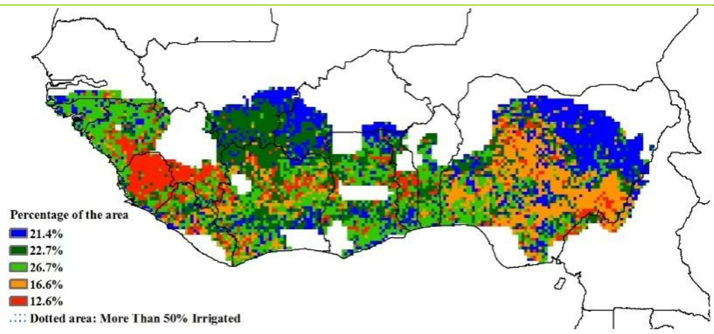
e. Maximum VCI



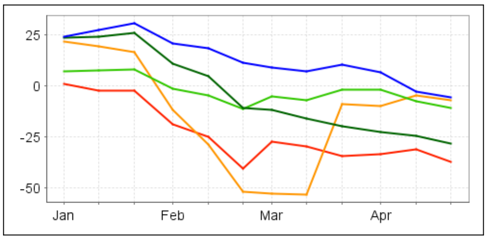
f. Cropped arable land



g. Biomassaccumulation potential (gDM/m^2)



h. Spatial distribution of VHI profiles



i. Profiles of VHI departure from average

2.3 North America

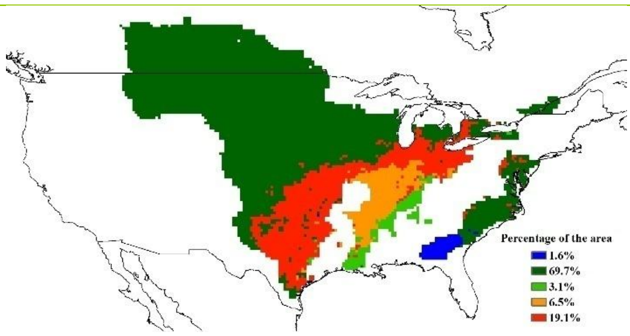
Rainfall in almost all regions of the MPZ was comparable to the recent five-year average (69% of the area); in 19% of the area, rainfall was slightly lower than the five-year average, corresponding to the east region of Texas, Oklahoma, Missouri, and Indiana. The remaining regions showed a large increase after February, including the west of Kentucky, Tennessee, and Mississippi. Contrary to rainfall, temperature fluctuated widely and was frequently lower or much lower than average, resulting locally in late planting.

Spring crops are being sown or about to be sown. Large uncropped areas are mostly distributed in the northern regions of the MPZ due to late phenology and abnormal temperatures. The fraction of cropped areas is 52%, a decrease of 8% in comparison with the recent five-year average, especially in North Dakota, South Dakota, the southern region of Manitoba and Saskatchewan, and the Great Lakes region. As temperatures turned favorable, winter crops recovered. They are in good condition in Georgia and South Carolina, with maximum VCI above 0.8; average condition crops correspond to Indiana, Illinois, Iowa, and some parts of Oklahoma and Texas, with VCIx ranging from 0.5 to 0.8.

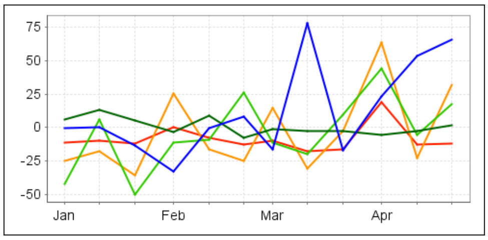
Biomass accumulation potential was 12% below the recent five-year average in this monitoring period and two typical spatial clusters of biomass accumulation potential can be identified: (i) in northwest and southeast regions of the MPZ, including Georgia, South Carolina, Montana, and North Dakota, biomass accumulation was more than 18.5 gDM/m^2 above the recent five-year average; (ii) negative departures took place in crop zones in the northeast and southwest, including the Great Lakes (Wisconsin, Illinois, Indiana, Ohio) and High Plains (Texas, Oklahoma, and Kansas) regions, with departures more than 122.4 gDM/m^2 below the recent five-year average.

Similar to the biomass accumulation potential, VHI also shows two contrasting behaviors: (i) in South Carolina, Georgia, and Texas, VHI fluctuated and went from high to low and again to high, a situation that may result from temperature fluctuations over the monitoring period; (ii) more than 80% of the area showed a decreasing trend from January to April, especially in parts of Iowa, Kansas and Oklahoma, where VHI was 25% below the recent five-year average, indicating inferior crop growing condition. As a result, the value of VHI stayed above average during the whole monitoring period in more than 60% of the area; for 18.3% of the area, VHI dropped below average from the beginning of March to the end of April, and for 8.7% of the area VHI was persistently below average.

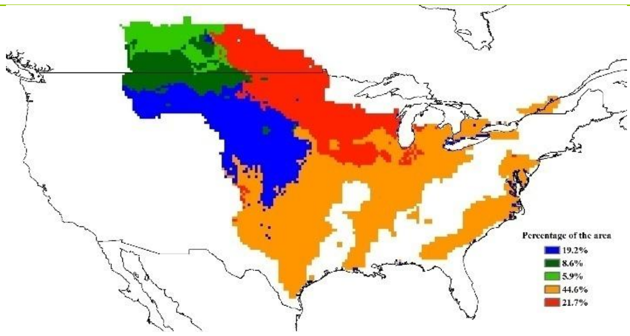
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, January-April 2014



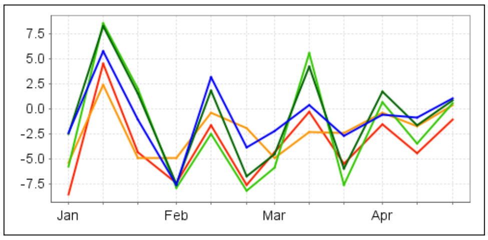
a. Spatial distribution of rainfall profiles



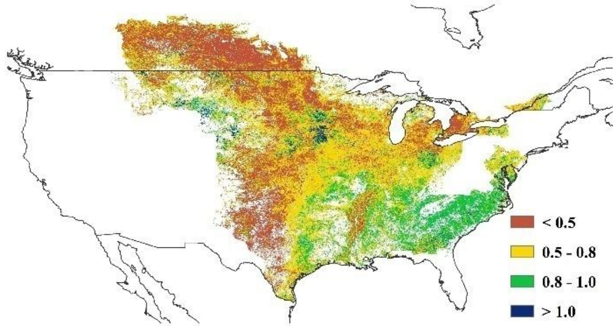
b. Profiles of rainfall departure from average



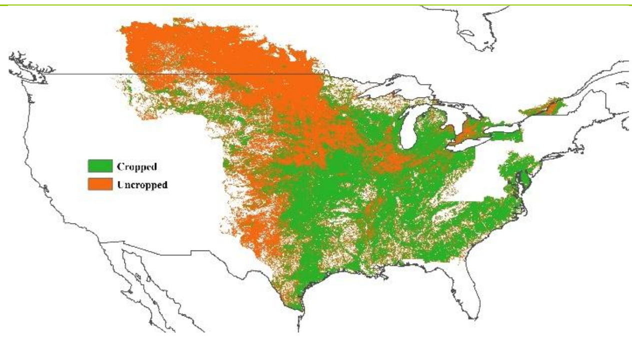
c. Spatial distribution of temperature profiles



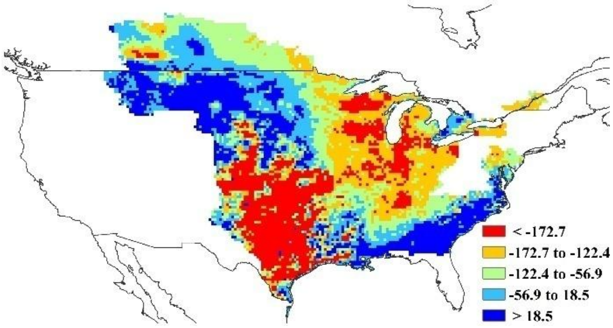
d. Profiles of temperature departure from average



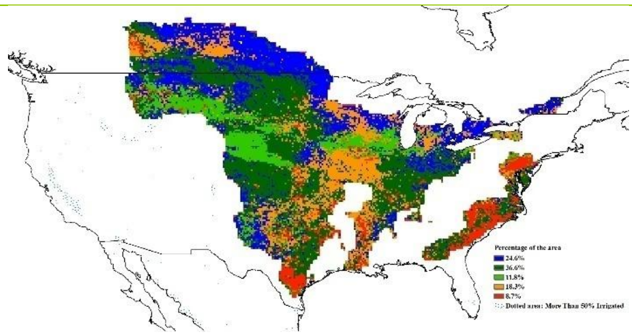
e. Maximum VCI



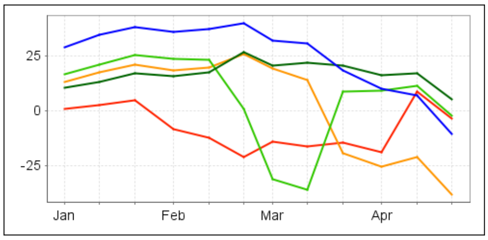
f. Cropped arable land



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



h. Spatial distribution of VHI profiles



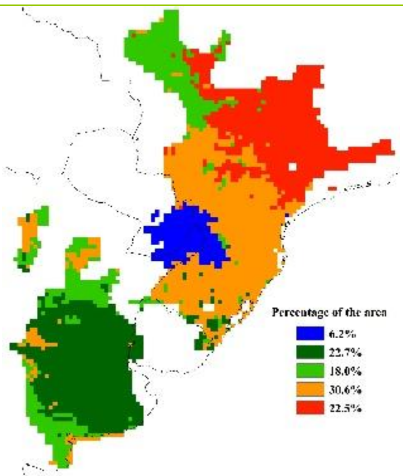
i. Profiles of VHI departure from average

2.4 South America

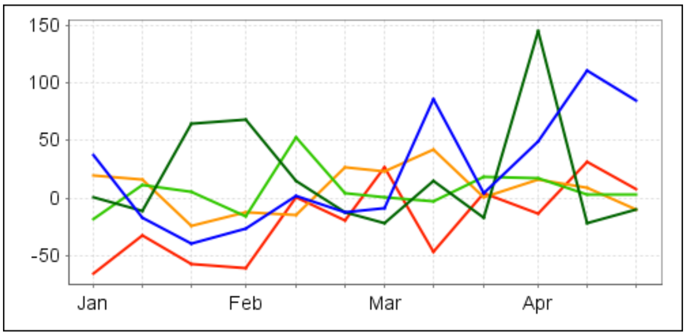
January to April 2014, rainfall in the MPZ was generally 10% above the recent five-year average over the same period. Exceptions were southern Paraguay, where below average rainfall was observed in late January, and Goiás and Minas Gerais in Brazil, where rainfall was well below normal from January to early February and mid-May. Temperature and PAR were normal compared with the average of the last five years. It is interesting to observe that the spatial distribution of temperature profiles followed the same pattern throughout the MPZ, with below normal temperature from mid-February to late March and mid-April, except for the eastern coastal regions and southeastern Minas Gerais. As a result of favorable environmental conditions, biomass is well above the five-year average from southeastern Brazil to Bahia Blanca. In contrast, biomass was 45% lower than average in southeastern Minas Gerais because of low precipitation. Regarding the whole MPZ, accumulated biomass in January to April 2014 is 10% above average.

More than ninety-nine percent of the arable lands in January to April 2014 are cropped, at the same level as the five-year average. Only regions close to Bahia Blanca show uncropped land from January to April. Accordingly, maximum VCI and VHI were lower compared with other regions. Below five-year average maximum VCI and VHI were also found sporadically, distributed in southeastern Minas Gerais due to the unfavorable climatic conditions (especially low precipitation). Generally, crop condition is favorable but slightly worse in the northern MPZ (Goiás and Minas Gerais in Brazil). The harvesting of maize and soybean is now underway and almost completed.

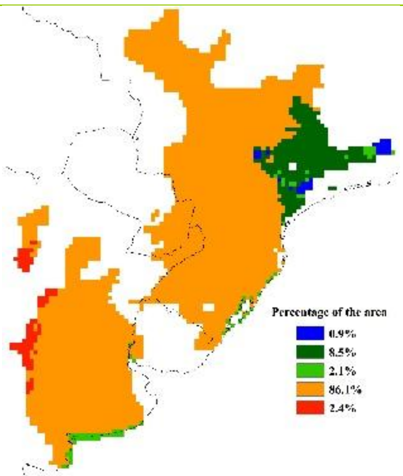
Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, January-April 2014



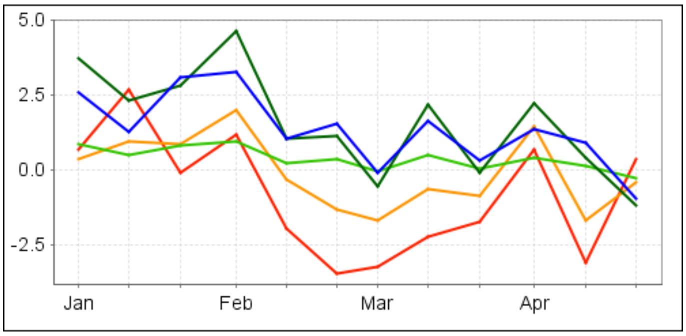
a. Spatial distribution of rainfall profiles



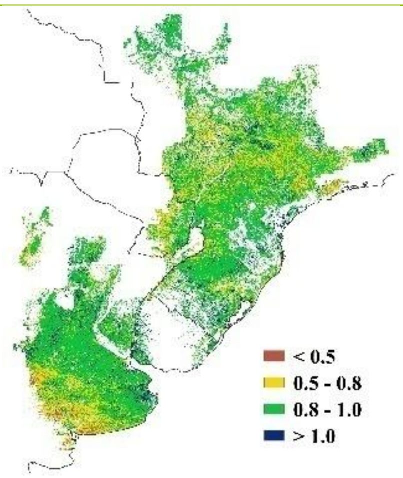
b. Profiles of rainfall departure from average



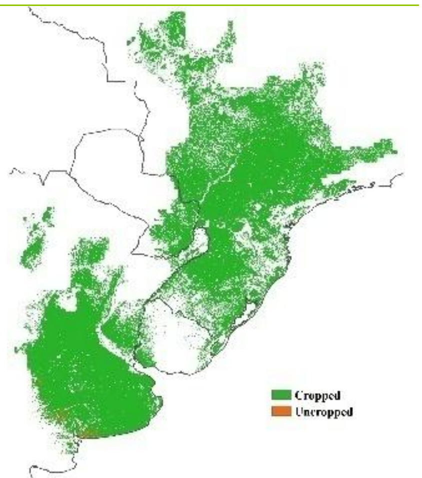
c. Spatial distribution of temperature profiles (% difference)



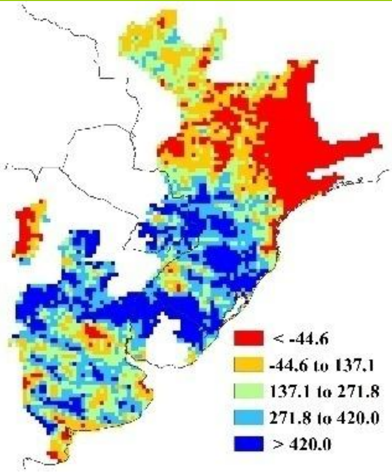
d. Profiles of temperature departure from average



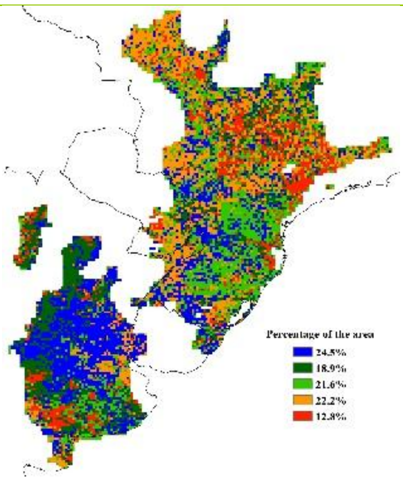
e. Maximum VCI

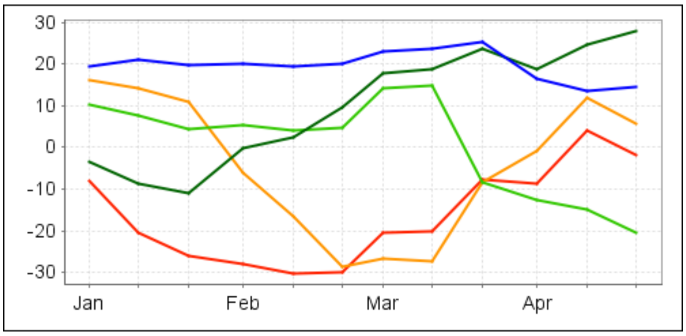


f. Cropped arable land



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





h. Spatial distribution of VHI profiles

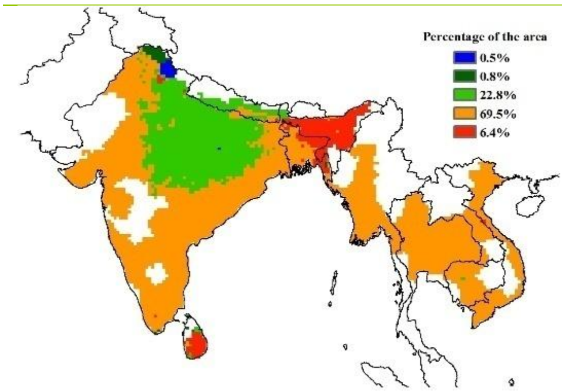
i. Profiles of VHI departure from average

2.5 South and Southeast Asia

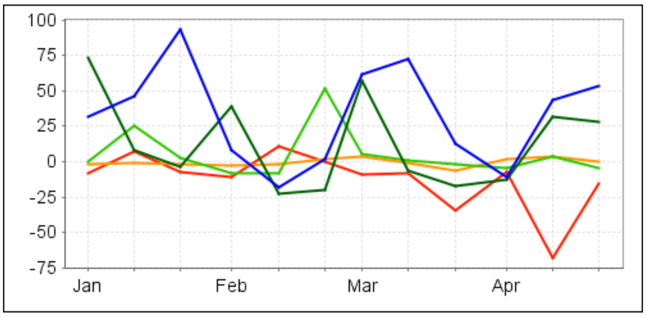
The South and Southeast Asia MPZ covers a heterogeneous region. Rice is the dominant crop while wheat and maize are grown mostly in India and Myanmar. The analysis of agroclimatic and agronomic indicators during January to April indicates slightly increased rainfall and PAR accumulation over both the last five years and the thirteen-year average. In most countries, precipitation was close to the average, only slightly below average in Assam (during mid-April) and Sri Lanka. Temperature was significantly below average, especially in the center and north of India, the Red River delta of Vietnam, and Magwe in Myanmar. However, temperature continued to increase in March due to the approaching summer season. The Indian Meteorological Department is closely monitoring possible impacts of the El Niño Southern Oscillation (ENSO) event, which is likely to affect rice and sugarcane yields.

Maximum VCI values are high in Madhya Pradesh, where the highest rainfall occurred. The biomass accumulation in the MPZ is the world's highest increase (+14%) compared to the five-year average. The spatial distribution of VHI profiles describes above average conditions in the central and north of India, Magwe, and the dry zone of Myanmar, where the temperature was significantly below average. On average, the fraction cropped arable land dropped by 2 percentage points compared with the last five-year average, affecting mostly north Rajasthan and Karnataka.

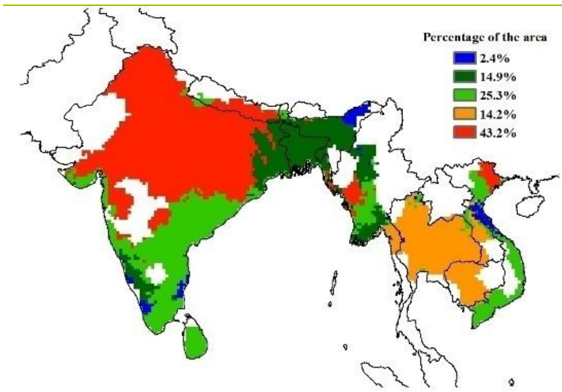
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, January-April 2014



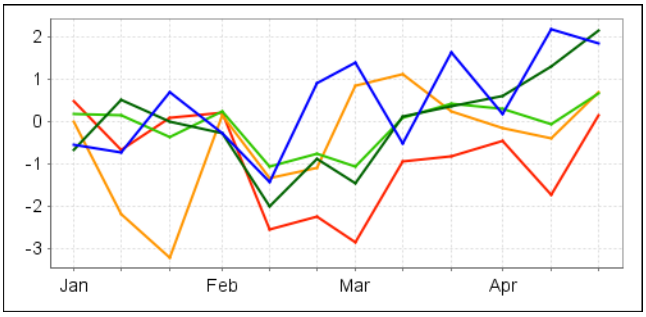
a. Spatial distribution of rainfall profiles



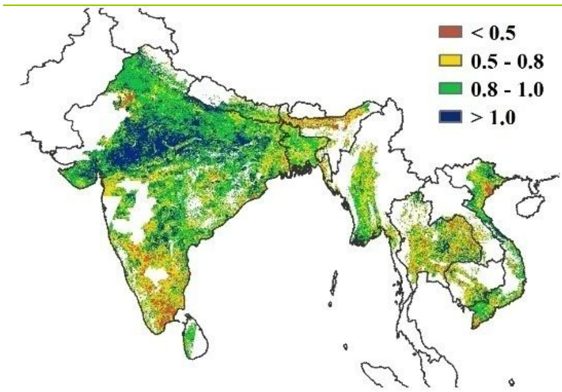
b. Profiles of rainfall departure from average



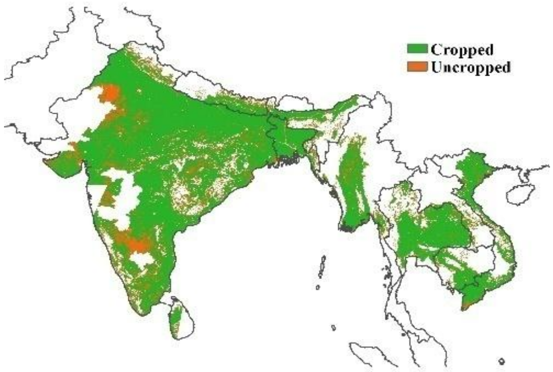
c. Spatial distribution of temperature profiles



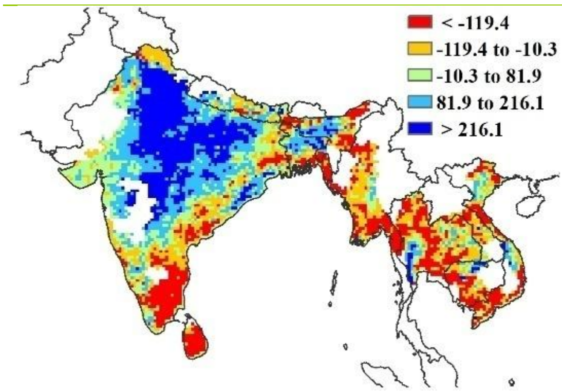
d. Profiles of temperature departure from average



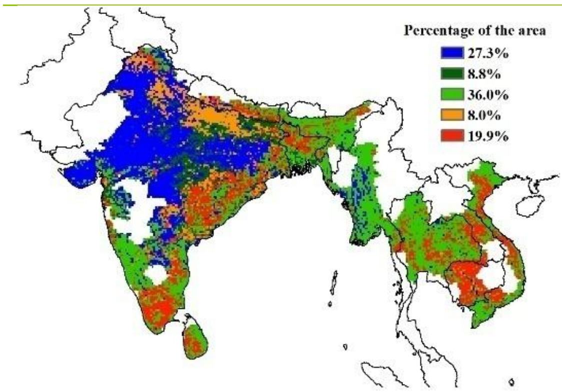
e. Maximum VCI



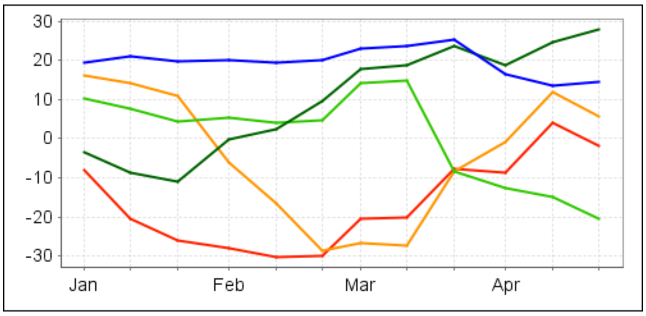
f. Cropped arable land



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



h. Spatial distribution of VHI profiles



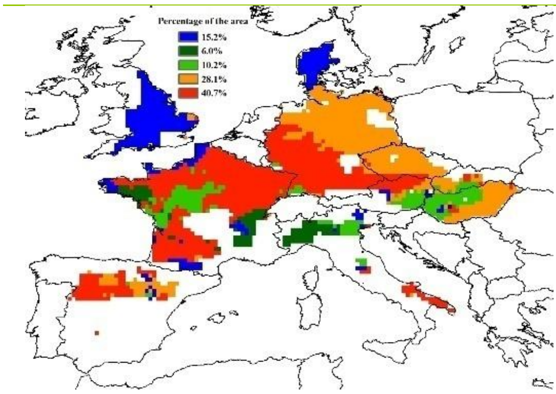
i. Profiles of VHI departure from average

2.6 Western Europe

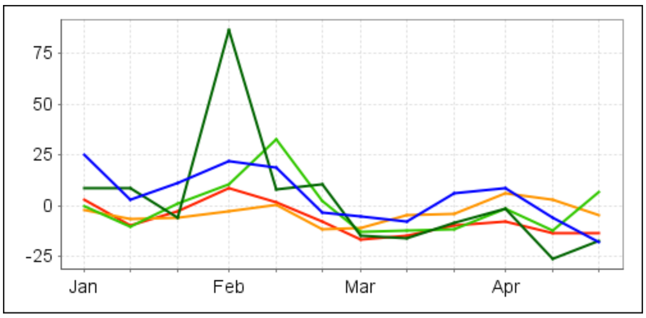
Overall, the total January to April precipitation in Western Europe was 11% and 19% below the recent five-year and thirteen-year averages, respectively, with exceptional positive departures over northwestern France, southeastern France, and northern Italy. Temperature showed an increase of 2.3°C and 2.0°C compared with the same two references periods. The spatial distribution of temperature show a positive departure in the west and negative in the east, especially in late January and early April. PAR displays a decrease of 2% compared to the past five-year average. The cropped arable land fraction reached 96.6% during the monitoring period.

The average maximum VCI values reach a high value of 0.9, indicating favorable crop condition, but lower values are seen for south and east Spain (Aragon and Castilla), southwest France (Central Midi-Pyrenees and east Brittany), and in the United Kingdom (Cambridgeshire and Lincolnshire). The VHI values show a poor condition in western Germany, France, east and south Spain, eastern Italy and eastern United Kingdom compared to the last five-years, due (in varying extends) to low precipitation. As a result of poor environmental conditions, biomass is below the five-year average in Germany, Czechia, central France, and southern France and Spain, again because of low precipitation. In general, the biomass accumulation of the whole MPZ shows a decrease of 9% compared to average.

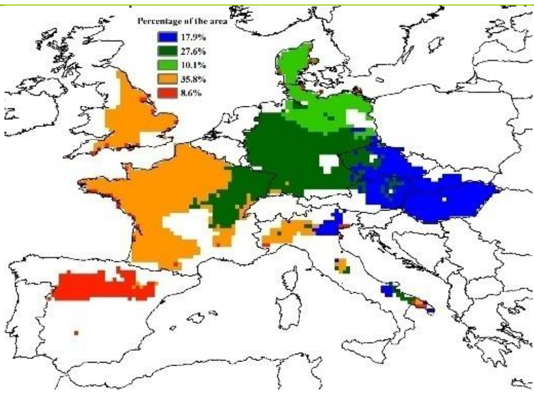
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, January-April 2014



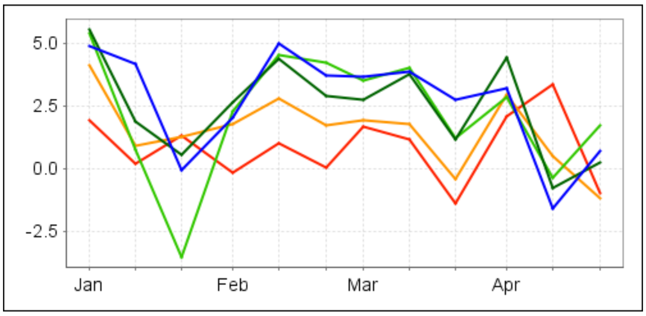
a. Spatial distribution of rainfall profiles



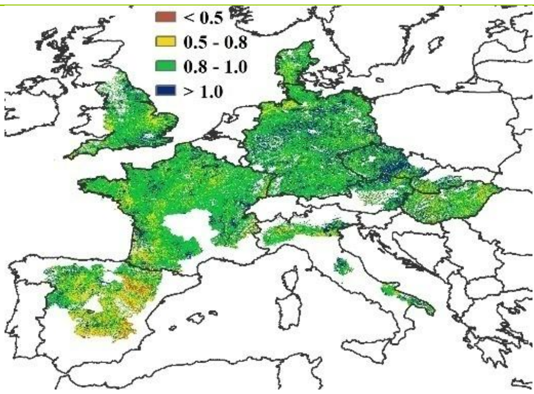
b. Profiles of rainfall departure from average



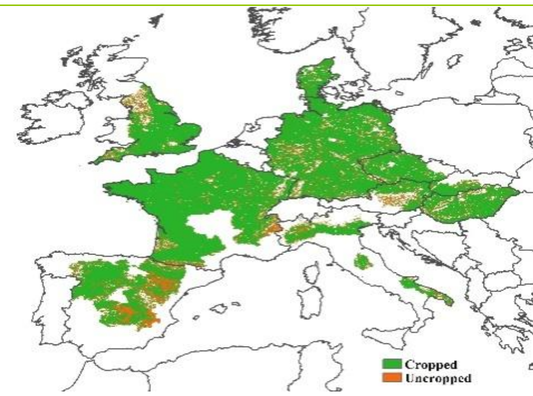
c. Spatial distribution of temperature profiles



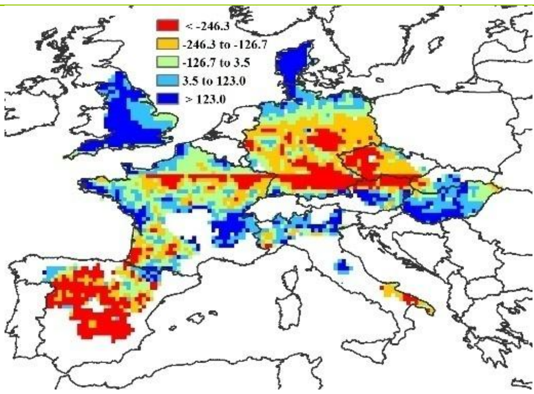
d. Profiles of temperature departure from average



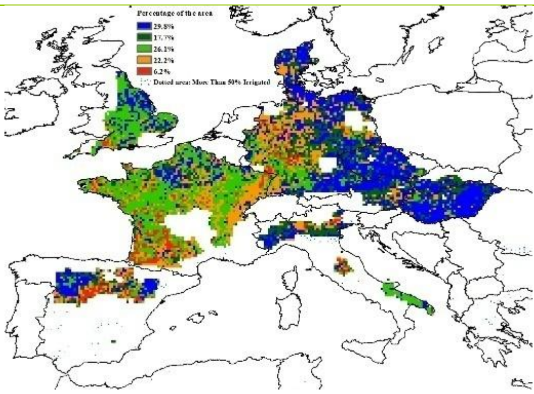
e. Maximum VCI



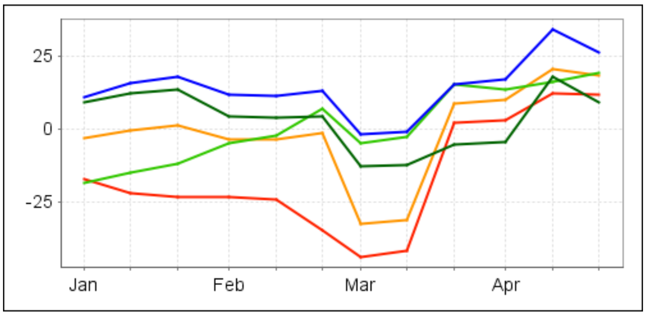
f. Cropped arable land



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



h. Spatial distribution of VHI profiles



i. Profiles of VHI departure from average

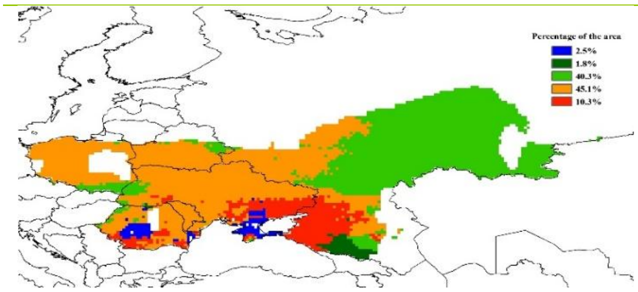
2.7 Central Europe to Western Russia

During the current monitoring period, winter crops were in the vegetative stage in central Europe to western Russia. Warmer and drier than usual weather has been experienced for the whole MPZ with decreased rainfall (-17%) and increased temperature (1.1°C) and PAR (4%) condition, compared with the recent thirteen-year average. The crop condition degrades from west to east, with favorable condition in Poland and relatively poor conditions in western Russia.

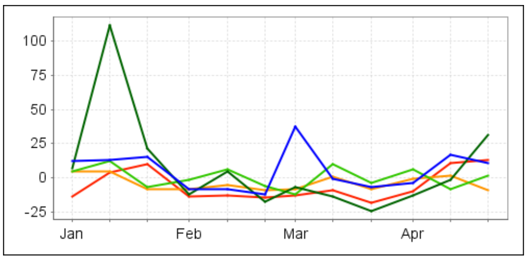
As indicated by the rainfall profile analysis, only the extreme south of western Russia (including Karatchayevo-cherkesiya Rep., Kabardino-balkariya Rep., Severnaya Osetiya-alaniya Rep., Ingushetiya Rep., and Chechnya Rep.) received well above average rainfall in mid-January. Crimea as well as Hunedoara, Alba, and Sibiu regions in Romania experienced above average rainfall in early March, while other regions present average to slightly below average moisture condition. The whole region experienced a severe temperature drop at the end of January and the beginning of February (as much as 7.5°C below average in the east and north, including most of Ukraine) but conditions returned to average in February and remained above average until the end of March.

The scarce rainfall led to a slight drop in potential biomass for the whole MPZ (-4% compared to the five-year average), which is consistent with the moderate level of maximum VCI at 0.79. If only temperature and rainfall are considered, a large positive biomass departure would be expected for the west of the MPZ (including Kostromskaya Oblast, Nizhegorodskaya Oblast, and the Southern Region in Russia), while the center and south of the MPZ (including most parts in Romania and Ukraine) would suffer a negative departure. However, the actual area of cropped land is another important factor in this crop condition assessment: uncropped arable land was mostly distributed in Russia, especially in the south of Chelyabinsk Oblast and Tatarstan Rep., which corresponds to the below average maximum VCI. The maximum VCI map also indicates favorable crop condition in Poland (VCIx of 0.98), followed by Romania (VCIx of 0.96), in which most of the area experienced a record high VCIx value. The VHI cluster and profile also confirm the different patterns from west to east, with downward crop condition for west Russia from March to April (indicated by blue and orange) and an upward trend for the remaining countries in this MPZ (highlighted in red and green).

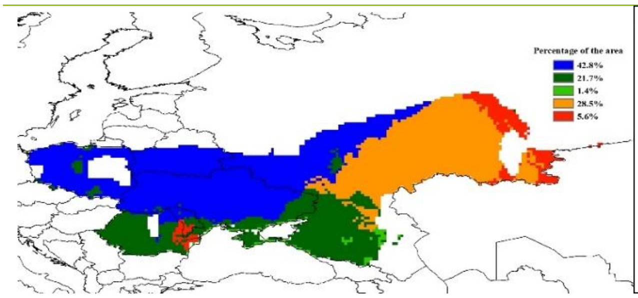
Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, January-April 2014



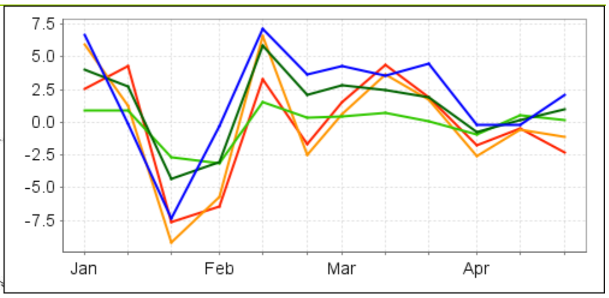
a. Spatial distribution of rainfall profiles



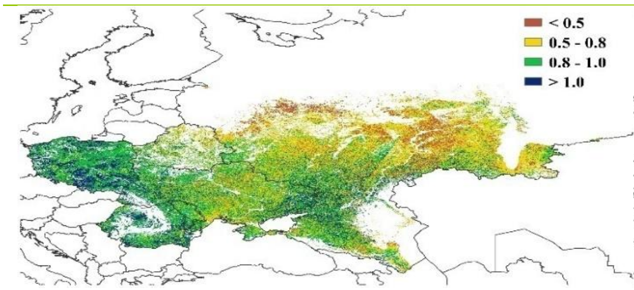
b. Profiles of rainfall departure from average



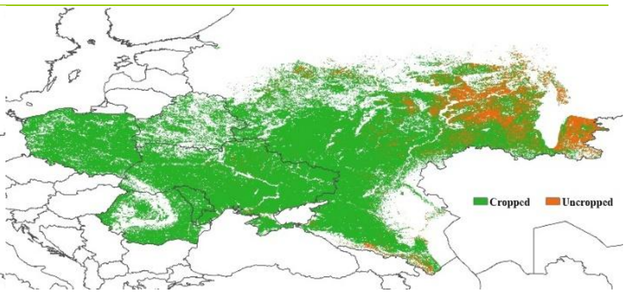
c. Spatial distribution of temperature profiles



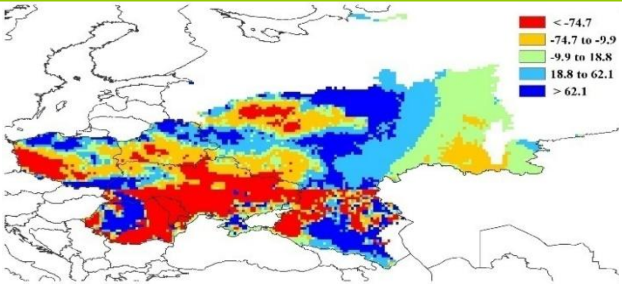
d. Profiles of temperature departure from average



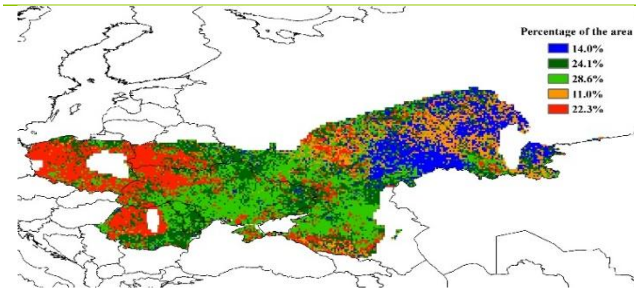
e. Maximum VCI



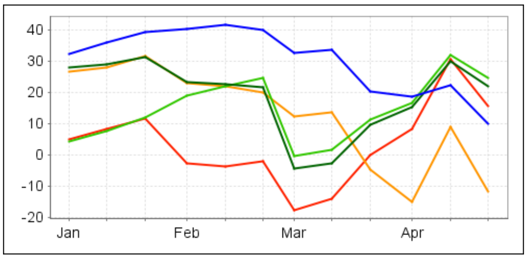
f. Cropped arable land



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



h. Spatial distribution of VHI profiles



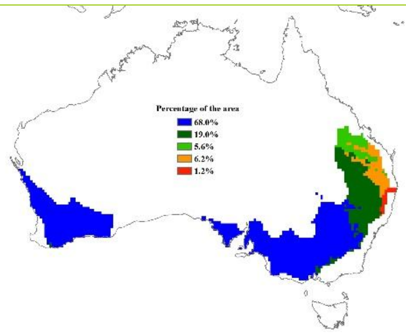
i. Profiles of VHI departure from average

2.8 South Australia

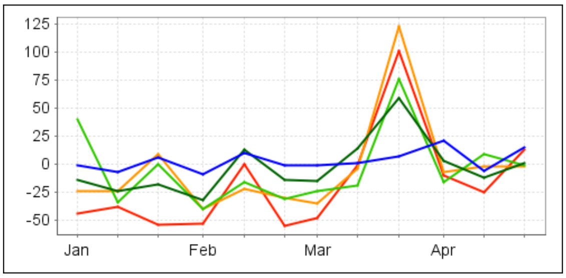
On the whole, crops in southern Australia showed poor condition during the period between January and April. The total precipitation in Southern Australia decreased by 27% and 11% from January to April respectively, compared to the last five-year and thirteen-year average, especially in south-eastern Queensland and eastern New South Wales from January to early March. The temperature shows a general stable level compared to the past conditions all over the Southern Australia region. PAR displays an increase of 2% compared to the five-year average.

VCIx and VHI both show a favorable situation in the southeastern part of South Australia, with the biomass accumulation potential increasing by 51% and 76% respectively (compared to the five- and thirteen-year averages) as a result of the large precipitation increase. However, condition of crops in Victoria, southeastern New South Wales, and western West Australia was not as good as average as a result of (in varying degrees) low precipitation. In general, biomass showed a decrease of 12% compared to average, with a mediocre VCIx (0.7) for the whole southern Australian region.

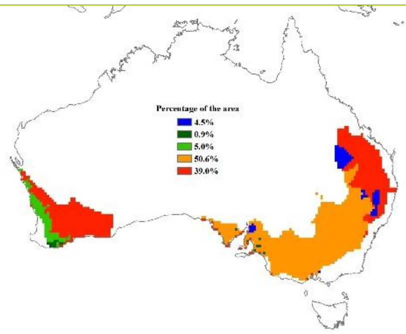
Figure 2.7. South Australia MPZ: Agroclimatic and agronomic indicators, January-April 2014



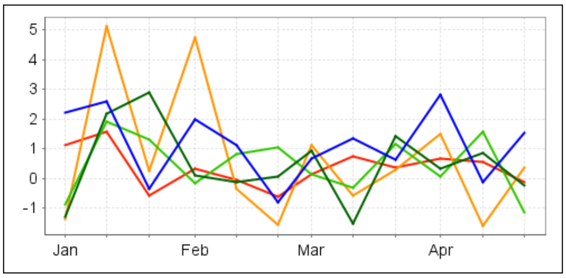
a. Spatial distribution of rainfall profiles



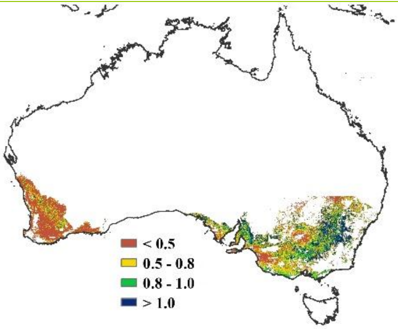
b. Profiles of rainfall departure from average



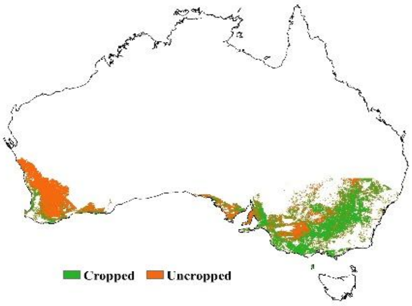
c. Spatial distribution of temperature profiles



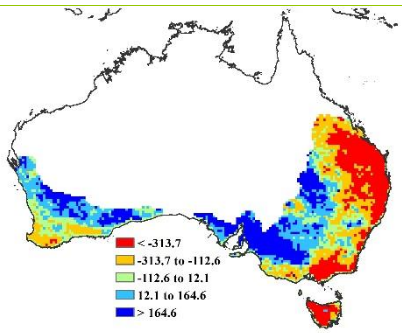
d. Profiles of temperature departure from average



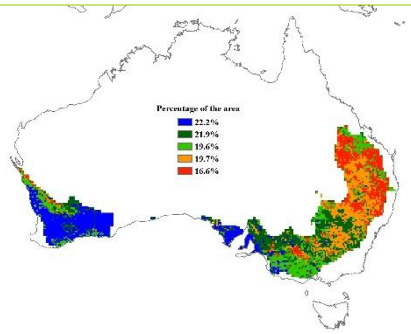
e. Maximum VCI



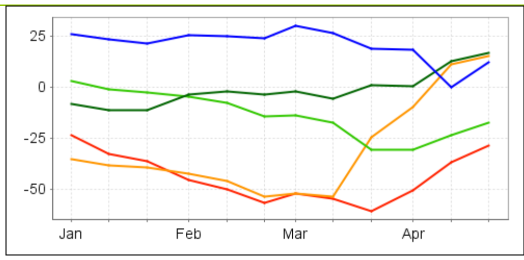
f. Cropped arable land



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



h. Spatial distribution of VHI profiles



i. Profiles of VHI departure from average