Chapter 4. China

Chapter 4 presents a detailed CropWatch analysis for China, focusing on the seven most productive agro-ecological regions of the east and south. After a brief overview, detailed analysis including maps and profiles for NDVI, VCI, CALF, and BIOMASS are provided for the individual regions. Additional information on the agroclimatic indicators for agriculturally important Chinese province are provided in table A.11 in Annex A.

4.1 Overview

As shown in table 4.1, China winter crops production is expected to reach 123.5 million tons, an increase of 1,674 thousand tons compared to 2013. Both increased yield and increased planting area contribute to the 1.4% increase in production. Among the 11 monitored provinces, Chongqing, Hebei, Hubei, Jiangsu, Shanxi and Sichuan experienced production increases of more than 2%. As the largest producer of winter crops, Henan benefited from the favorable climatic conditions, with winter crops production increasing by 1.1% respectively. Meanwhile, decreased production was observed in Shandong and Chongqing due to the decrease in planting area for winter crops.

Table 4.1. China, 2014 winter crops production (thousand tons) and percent difference with 2013, by province

	Winter crops	
	2014	Δ%
Anhui	12122	1.3
Chongqing	2297	2.3
Gansu	3108	-2.4
Hebei	10783	3.5
Henan	25862	1.1
Hubei	6120	2.3
Jiangsu	9995	3.4
Shaanxi	4389	1.3
Shandong	22107	-1.5
Shanxi	2170	6
Sichuan	5495	2
National total	123541	1.4

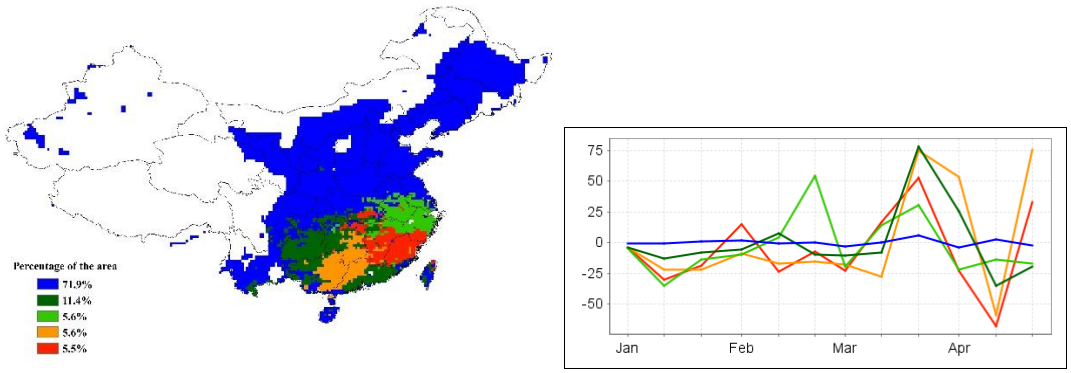
Table 4.2. China, 2014 winter wheat production (thousand tons) and percent difference with 2013, by province

	Wheat	
	2014	Δ%
Anhui	11375	2.9
Chongqing	1119	-1.1
Gansu	1622	-2.4
Hebei	10609	3.6
Henan	25747	1.0
Hubei	4450	0.9
Jiangsu	9501	4.1
Shaanxi	3953	1.6
Shandong	21886	-1.6
Shanxi	2095	6.4
Sichuan	4596	0.6
National total	112228	1.4

Winter wheat is the dominant winter crop in China, accounting for 90.6%. As shown in table 4.2, China winter wheat production for 2014 underwent an estimated modest increase of 1.4%, to reach just above 112 million tons. The differences in production among the provinces somewhat differ from the variations in the agroclimatic and agronomic indicators, with the two neighboring provinces of Jiangsu and Anhui, mostly in the lower Yangtze ecozone (and CPSZ) undergoing a production increase brought about by both increased area and yield. In the Loess region, however (especially Shanxi), the increase directly reflects crop condition comparable with the best recent years. The reduction of winter wheat planting areas in Shandong, Gansu and Chongqing resulted in decreased production.

In China, most winter crops including winter wheat and rapeseed were in wintering and tillering stage during the reporting period. The condition of the winter crops was slightly above the recent five-year average. Figures 4.1-4.5 illustrate the distribution and profiles of RAIN and TEMP indicators and profiles, as well as the fraction of cropped arable land (CALF), maximum VCI, and minimum VHI. Indicator values are provided in table 4.3.

Figure 4.1. China spatial distribution of rainfall profiles (a) and rainfall profiles (b), January-April 2014



Agroclimatic indicators in China were generally comparable with the averages for the same period over the previous five years, with a 3% decrease in rainfall, 1°C increase in temperature, and 2% increase in PAR. The agroclimatic conditions resulted in biomass 7% below the thirteen-year average. Specifically, rainfall was at an average level to the north of the Yangtze River for the whole reporting period, but above (in late March) and below (mid-April) average in South China and the Lower Yangtze River region. Temperature followed almost the same pattern throughout the country: above average in January and late March but below average in February.

Agroclimatic conditions were distributed unevenly, resulting in a complicated situation. Both high and low maximum VCI occur scattered in almost all provinces. Below average rainfall in the Lower Yangtze region and Northeast China resulted in low biomass. In the Northeast region, 50% lower rainfall resulted in low soil moisture, which will hamper the sowing and emergence of spring wheat, soybean, and maize. Moreover, although climatic indicators demonstrate normal conditions in Southern China, biomass in the region is 25.4% below average due to the lower temperature in February. Nearly doubled precipitation in the Loess region favored crop developments and grain filling in this semi-arid region, as indicated by 80.8% higher biomass and high maximum VCI (0.96). Although in the central area of the North China Plain—a major winter wheat producing region—crops suffered from a drought from October 2013 to January in 2014, effective rainfall in the recent four months has boosted soil moisture and allowed crops to recover. Together with the warmer and sunny winter weather and favorable or average conditions after the wintering period in the major winter crop producing areas, CropWatch puts prospects for winter crops at a good level.

The cropped arable land fraction (CALF) was 70% for the reporting period (with 3.9 percentage points absolute departure from the five-year average), with most of the uncropped land found in the Northeast China region, Northwest China, Inner Mongolia and the most northern part of the North China Plain (where no crops are in the field during winter). The sowing of spring crops is under way from mid-April. The Lower Yangtze region and Southern China are the only two regions with below average CALF (decreases of 1 and 0.2 percentage points, respectively).

Minimum VHI indicates that the Lower Yangtze region as well as Sichuan, Chongqing, southern Shaanxi, and central Inner Mongolia experienced mild water stress, while in other regions, water was adequate for crop growth or planting, especially in the North China Plain, northeast China, Gansu Province, and southern Xinjiang (figure 4.5).

Figure 4.2. China spatial distribution of temperature profiles (a) and temperature profiles (b), January-April 2014

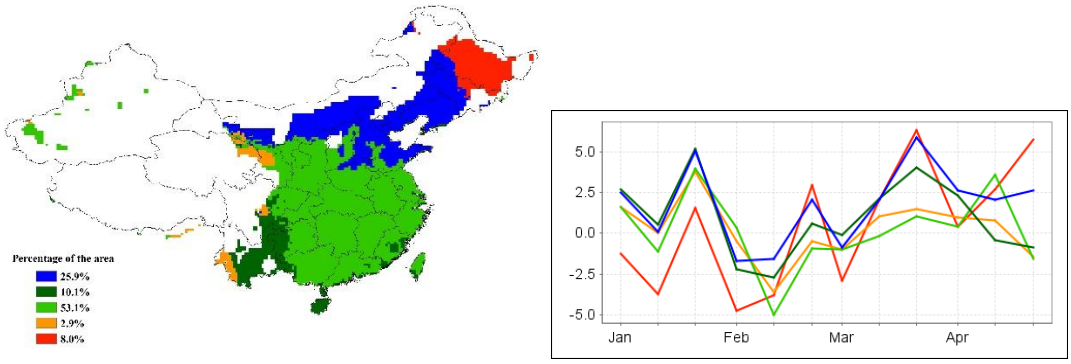


Figure 4.3. China cropped and uncropped arable land, by pixel, January-April 2014

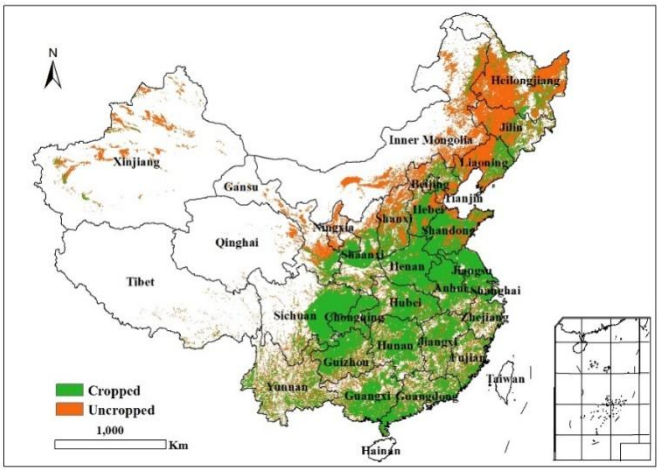


Figure 4.4. China maximum Vegetation Condition Index (VCI), by pixel, January-April 2014

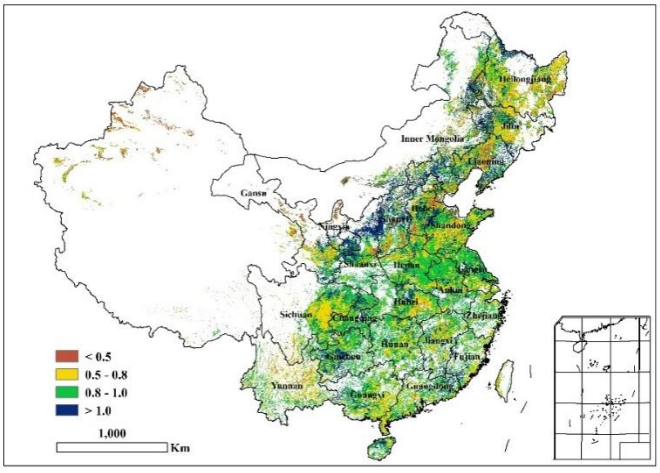


Figure 4.5. China minimum Vegetation Health Condition Index (VHI), by pixel, January-April 2014

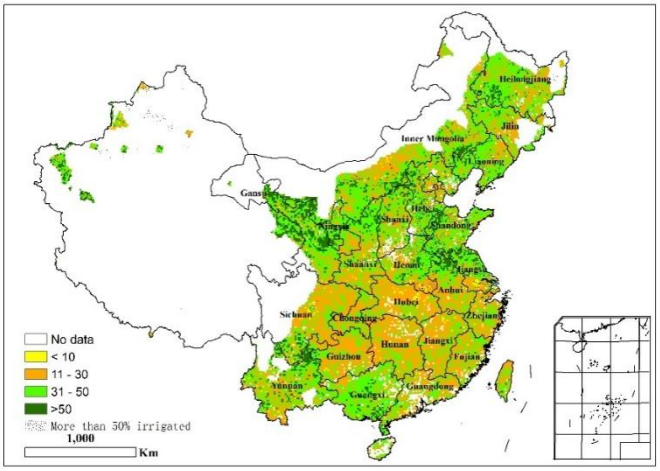


Table 4.3. CropWatch agroclimatic and agronomic indicators for China, January-April 2014, departure from 5YA and 13YA

Region	Agroclimatic indicators			Agronomic indicators		
	departure from 13YA (2001-2013)			departure from 5YA (2009-2013)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMASS (%)	Fraction of arable actually cropped (Absolute difference in % points)	Maximum VCI
Huanghuaihai	1	1.4	2	0.0	4.1	0.83
Inner Mongolia	7	1.9	-0.5	7.0	4.1	0.96
Loess region	97	0.7	2	62.7	16.2	0.96
Lower Yangtze	-11	0.4	3	-8.9	-1.0	0.86
North-East	-50	1.1	1	-41.8	11.5	0.84
Southern China	0	-0.2	1	-29.2	-0.2	0.83
South West	4	0.3	2	-2.9	0.3	0.86

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 (5YA) or thirteen-year average (13YA) for the same period (January-April). VCI=Vegetation condition index.

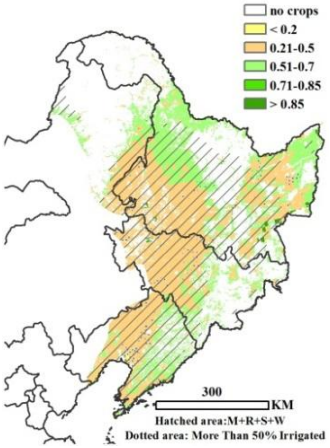
4.2 Regional analysis

Figures 4.6 through 4.12 present crop condition information for each of China's seven regions. The provided information is as follows:(a) General setting: NDVI background; combined maize, rice, soybean and wheat cultivation area, and areas where more than 50 percent of the land is irrigated; (b) Crop condition development graph based on NDVI, comparing the latest season (since October 2013) to the five-year average (5YA), the five-year maximum, and the January 2012- April 2013 period; (c) Spatial NDVI patterns for January 1-April 30 2014 (compared to the (5YA); (d) NDVI profiles associated with the spatial patterns under (c); (e) maximum VCI (over arable land mask); (f) Cropped arable land fraction (CALF); and (g) biomass for the period January 1–April 30, 2014. Additional information about agroclimatic indicators for China is provided in Annex A, table A.11.

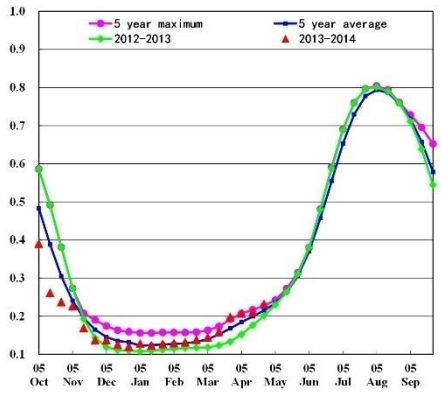
North-east region

No crops are cultivated in Northeast China from January to mid-April. Wheat and maize sowing starts in late April, and only a small proportion of arable land was actually cropped because sowing only just got underway. CropWatch agroclimatic indicators show air temperature and PAR accumulation kept balance with the average of the recent thirteen years, while the region suffered from inadequate rainfall (as much as 50% below average). As a result, the biomass accumulation shows a 39.4% decrease.

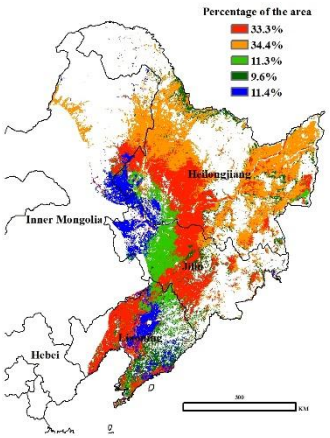
Figure 4.6. Crop condition China North-east region



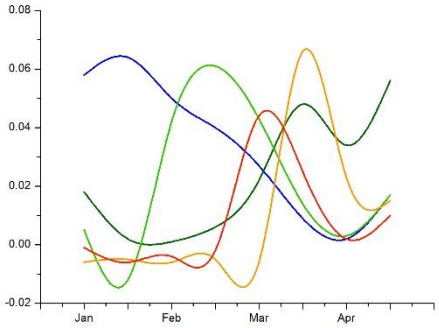
(a) NDVI background



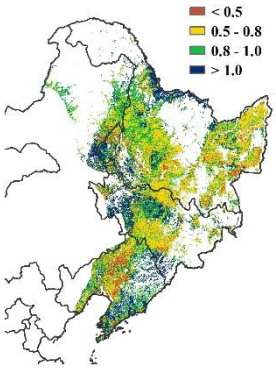
(b) Crop condition development graph based on NDVI



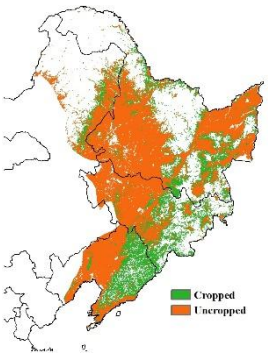
(c) Spatial NDVI patterns compared to 5YA



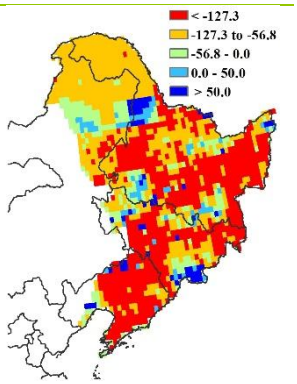
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

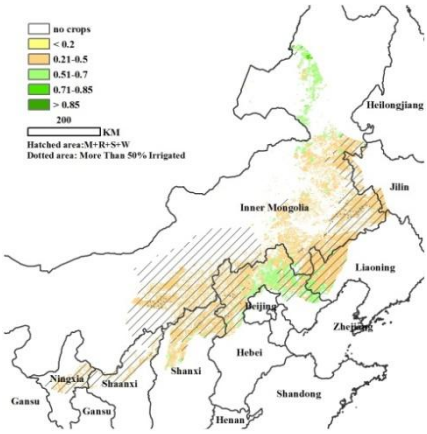


(g) Biomass

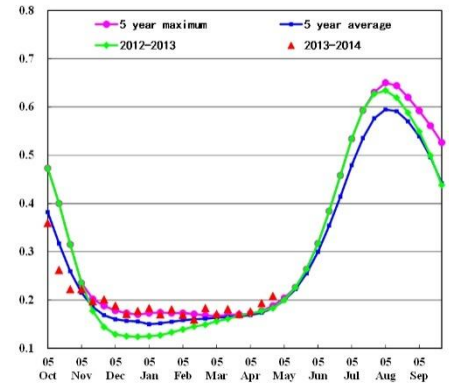
Inner Mongolia

Due to low temperature, no crops are cultivated between January and March in the region. With the temperature gradually increasing, crops start to grow from April. Considering the last four months, rainfall and temperature indices were above the thirteen-year average, resulting in an increase of the fraction of actually cropped land by 4.1 percentage points, and an increase in biomass by 7.2%. As a result, conditions are favorable for the sowing and early growth of spring crops. The NDVI clusters reflect good crop condition in this period. West Liaoning province and parts of eastern Inner Mongolia have low vegetation condition according to the VCIx map, because no crops are grown yet. The potential biomass is poor compared to the five-year average in partly cropped arable land, which may be a result of the environmental indices (a higher temperature average but low rainfall) in this period.

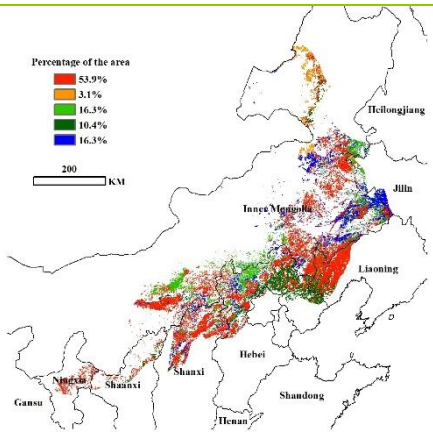
Figure 4.7. Crop condition China Inner Mongolia region



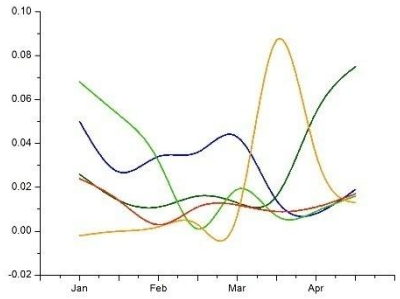
(a) NDVI background



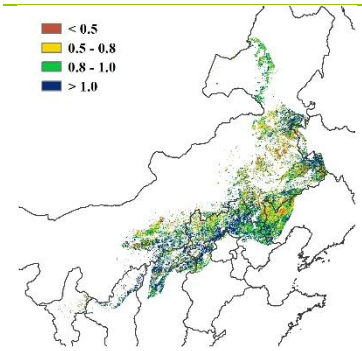
(b) Crop condition development graph based on NDVI



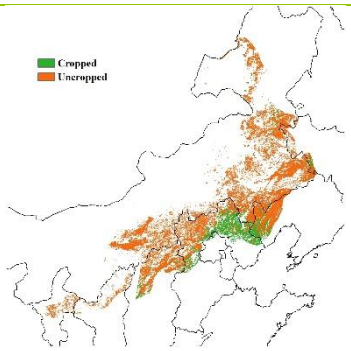
(c) Spatial NDVI patterns compared to 5YA



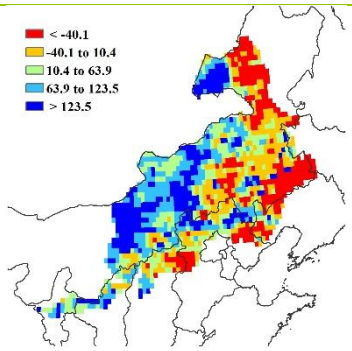
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

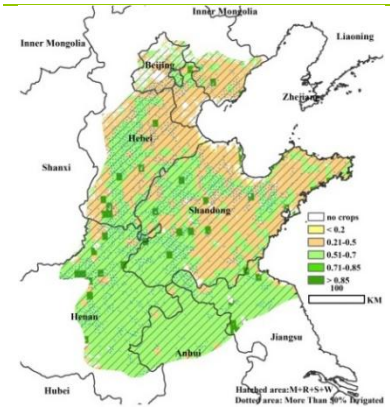


(g) Biomass

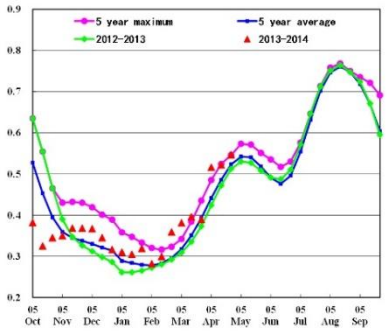
Huanghuaihai

Winter crop condition in Huanghuaihai region is generally favorable, although the crop was initially negatively affected by dry weather during the winter period. Currently, winter crops (mainly winter wheat and rapeseeds) are reaching maturity and are ready to be harvested. Compared with the thirteen-year (2001-13) average, weather conditions were, in general, favorable for crop development and grain filling, with above average rainfall, temperature, and PAR. It needs to be mentioned that high temperature in winter strengthened the development of crops as indicated by the above average NDVI in December and January. According to the spatial NDVI patterns (compared to the 5YA) and the corresponding NDVI profiles, a severe drop in NDVI occurred during February in Henan province and western Shandong, a result of continuous drought. However, NDVI has since been either average or above average over the whole region. Southern Hebei and regions to the south of Tianjin show the lowest values for VCIx, as does central Shandong. Generally, the maximum VCI in the Huanghuaihai region is the same as the average of the previous five years.

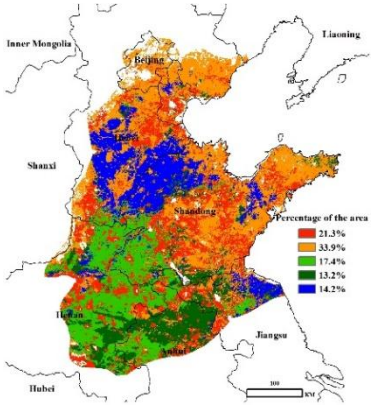
Figure 4.8. Crop condition China Huanghuaihai region



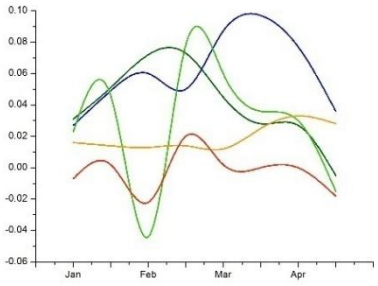
(a) NDVI background



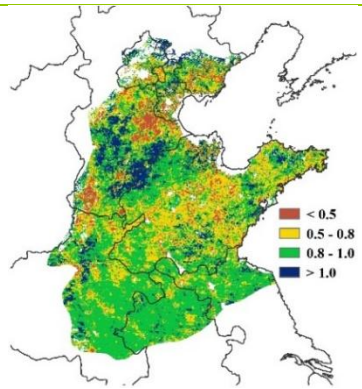
(b) Crop condition development graph based on NDVI



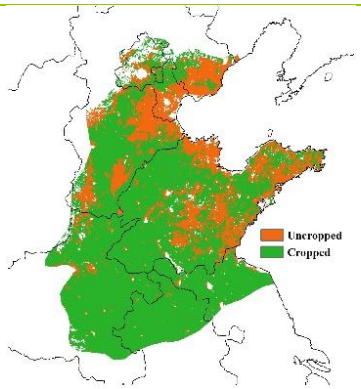
(c) Spatial NDVI patterns compared to 5YA



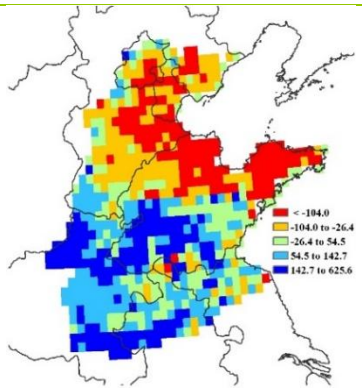
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

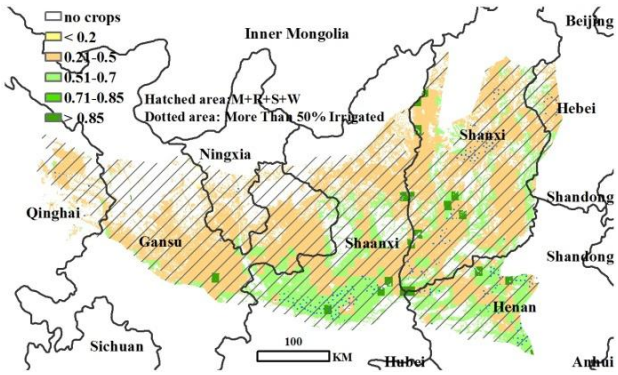


(g) Biomass

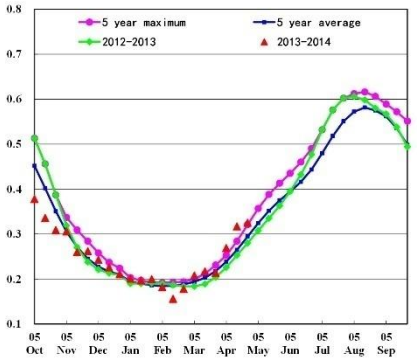
Loess region

The Loess region includes Gansu, Ningxia, Shaanxi, Shanxi, and Henan provinces. The main crops in this area are spring wheat, winter wheat, and some vegetables. Winter wheat is sowed in October and will be harvested in June; spring wheat in Ningxia is planted in late February and early March. The past four months are an important stage for the growth of the winter wheat. The average NDVI profile indicates that crop condition is better than last year's and also above the five-year average in this region. The NDVI cluster and profiles also demonstrate this, though the crop condition fluctuated sharply over the monitoring period. Crop condition is better than the five-year average, especially in northern Shanxi and the northeast of Henan province, in accordance with maximum NDVI. Rainfall profiles show that rainfall varied smoothly over time, contrary to temperature. In the past four months, rainfall, temperature and PAR exceeded the thirteen-year average by 97%, 0.7 degrees, and 2%, respectively, which can promote the region's crops growth. This year, more land is cropped (as shown by the fraction of arable land actually cropped), with CALF 16.2 percent above average; the uncropped arable land is mainly located in the central parts of Shaanxi and Hebei provinces.

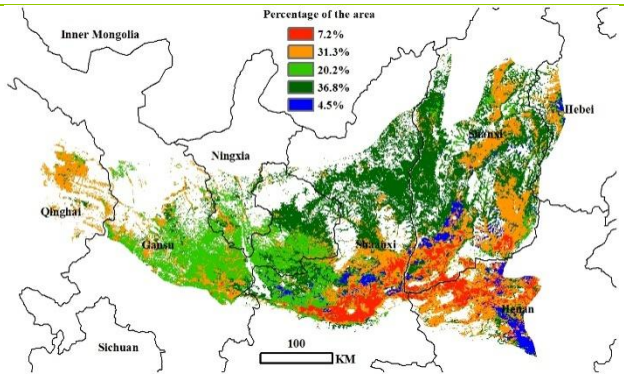
Figure 4.9. Crop condition China Loess region



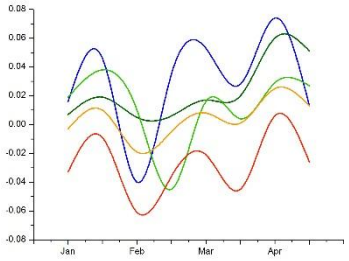
(a) NDVI background



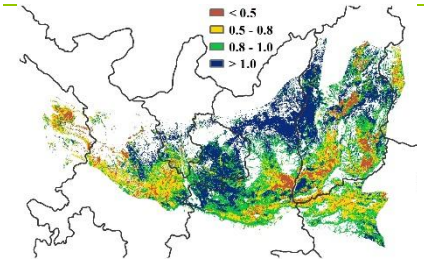
(b) Crop condition development graph based on NDVI



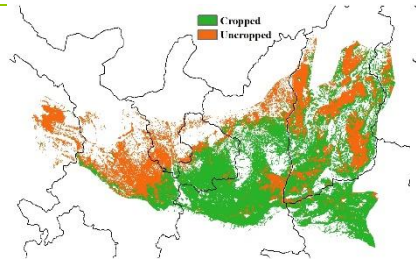
(c) Spatial NDVI patterns compared to 5YA



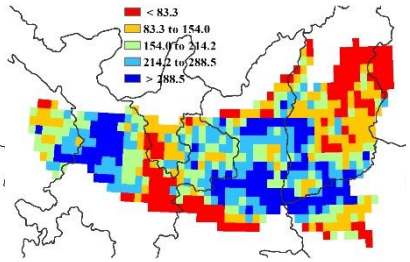
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

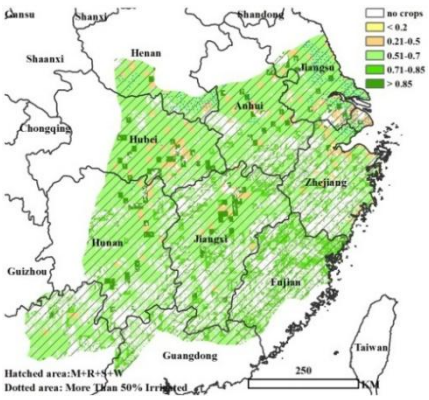


(g) Biomass

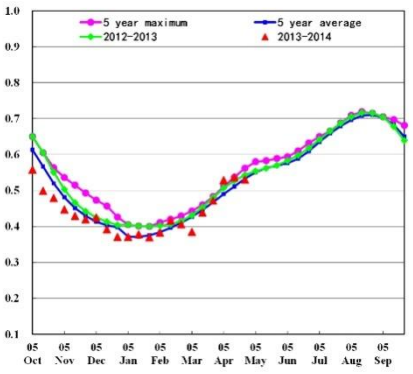
Lower Yangtze region

The Lower Yangtze region includes ten provinces. In the north of the region (e.g., Henan, Anhui, and Jiangsu provinces) winter wheat is sowed in October and harvested in late May and early June; in the south, early rice is planted in late April and early May. The average NDVI development curves show that crop condition in this area is below last year's level and also below the five-year average, which is in agreement with the NDVI cluster and profiles. In southern Henan and Anhui, eastern Hubei and the whole region of Jiangxi, crop condition remained below average during most of the monitoring period. It decreased sharply in the north of Guangxi and Guangdong provinces in early March because of the wet weather. In the south of Jiangsu and east of Hunan, crop condition was persistently above the recent five-year average, as confirmed by the map of the maximum VCI. The agroclimatic indicators show that temperature and PAR are above average, while rainfall is below average by 11 percent. The fraction of cropped arable land is 1 percentage point below average, demonstrating cropped land decreased. Uncropped land is mainly located in the east of Hubei and central area of Jiangxi province.

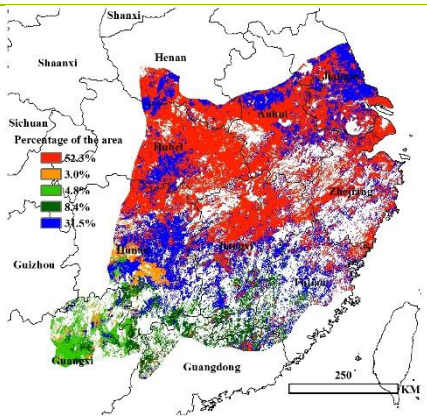
Figure 4.10. Crop condition China Loess region



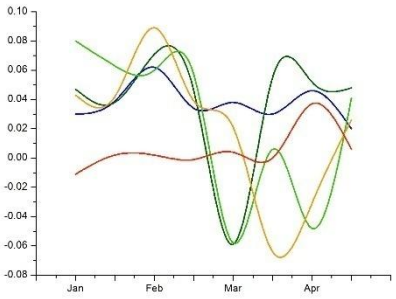
(a) NDVI background



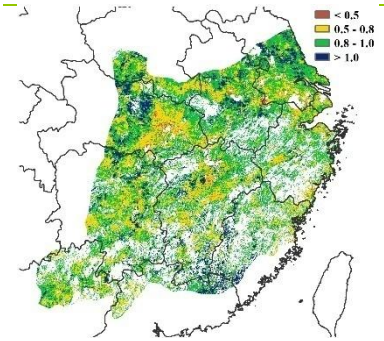
(b) Crop condition development graph based on NDVI



(c) Spatial NDVI patterns compared to 5YA

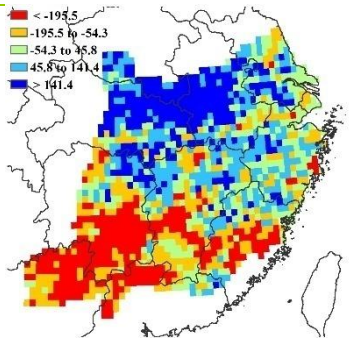


(d) NDVI profiles



(e) Maximum VCI

(f) Cropped arable land fraction

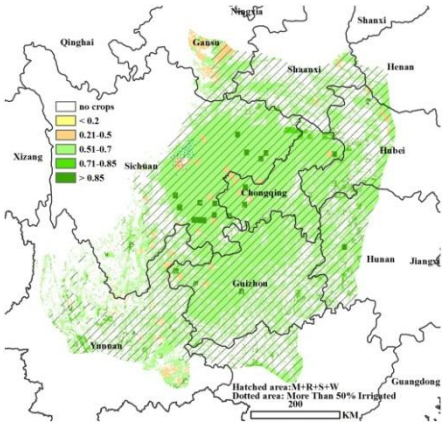


(g) Biomass

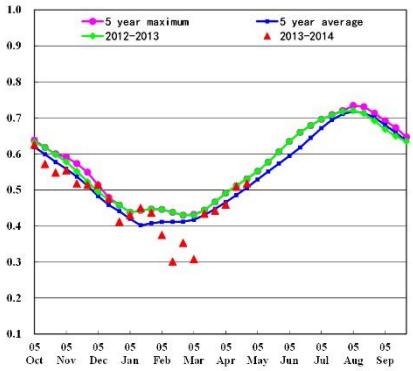
South-west China

The ongoing growing season in Southwest China can generally be described as average. In January, the condition of crops reached the five-year maximum level, while in February and March, it decreased sharply and was far below average. In April, it recovered again, attaining to the five-year average level. The NDVI profiles also reflect the poor crop condition during February and March, and favorable conditions in January and April. Compared to the five-year average, precipitation increased by 4% and the average temperature and PAR accumulation increased by 0.3°C and 2%, respectively, which led to an increase in biomass by 12%. The potential biomass reflects the poor level in North Yunnan (also shown by the VCIx map), northwest Guangxi, and west Hunan, mainly due to the severe drop in precipitation. However, when compared to the thirteen-year average, the biomass shows a minor decrease of 3%, due to frequent droughts in the region in recent years. Almost all arable land was cropped during the reporting period.

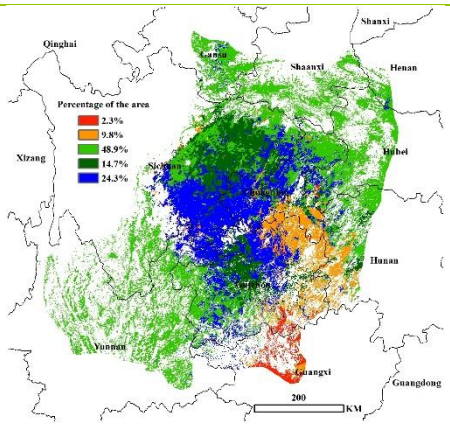
Figure 4.11. Crop condition Southwest China region



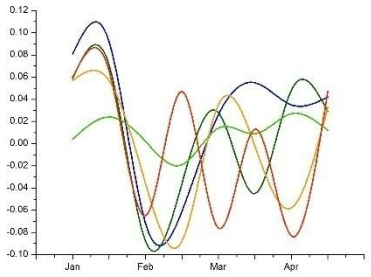
(a) NDVI background



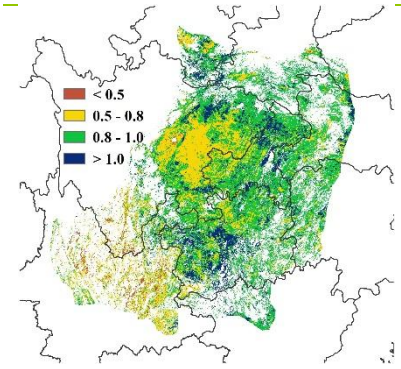
(b) Crop condition development graph based on NDVI



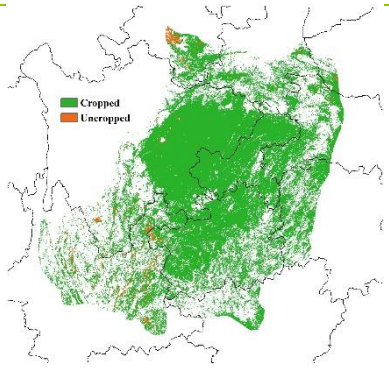
(c) Spatial NDVI patterns compared to 5YA



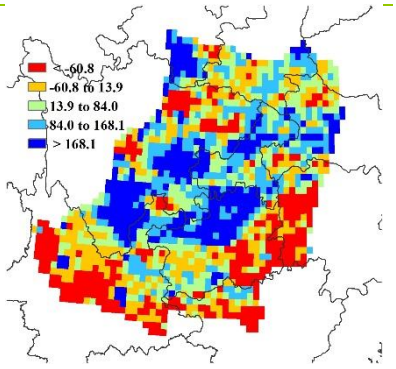
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

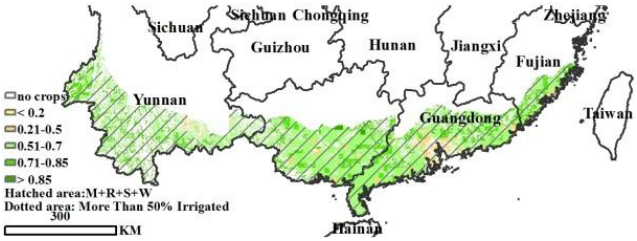


(g) Biomass

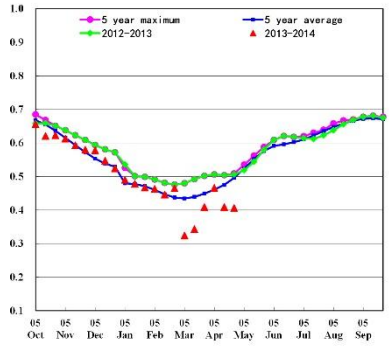
Southern China

In southern China, the period from January to April mainly covers the growing of early rice and spring maize. The crop condition was poor during the entire period covered by this bulletin. Crop condition was on par with the average of the previous five years in the first two months, and then crops turned to grow worse than average in March and April. The agroclimatic indicators and biomass indicate that rainfall and PAR accumulation kept balance with the average of the previous thirteen years, but air temperature was slightly below average over the whole monitoring period. It is worth observing that excessive rainfall and inadequate solar radiation occurred from late February to early March in Guangxi and Guangdong province, hampering crop growth. This is confirmed by the sharp decrease in the NDVI profiles around early March, mostly in the center of the Southern China region where maximum VCI also stays below 0.8.

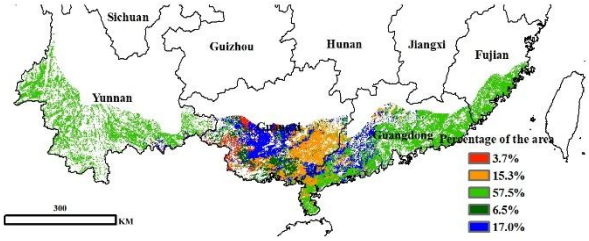
Figure 4.12. Crop condition Southern China region



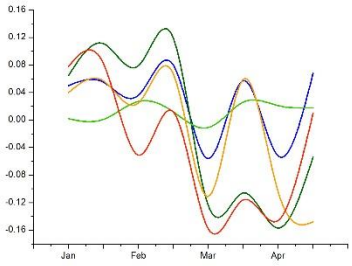
(a) NDVI background



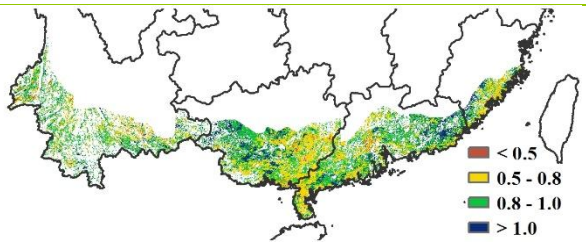
(b) Crop condition development graph based on NDVI



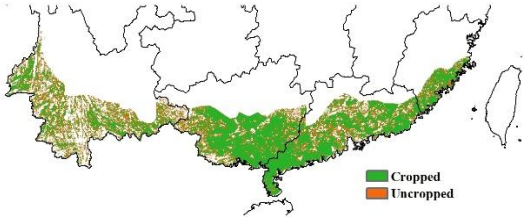
(c) Spatial NDVI patterns compared to 5YA



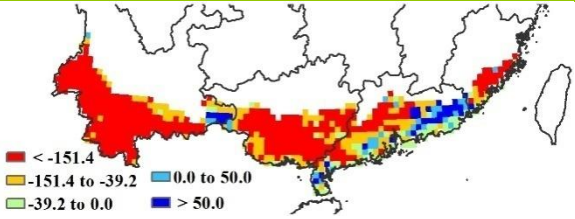
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction



(g) Biomass