Chapter 4. China

Chapter 4 presents a detailed analysis for China, focusing on the seven most productive agro-ecological regions of the east and south. After a brief overview of the 2014-2015 winter crops growing season, detailed analyses including maps and profiles are provided for NDVI, maximum Vegetation Condition Index (VCIx), and biomass (BIOMSS) in individual regions. Additional information on the agroclimatic indicators for agriculturally important Chinese provinces are provided in table A.11 in Annex A.

4.1 Overview

In China, the beginning of the reporting period for this bulletin—early October—is the major planting time of most winter crops including winter wheat and rapeseed, right after the harvesting of the autumn crops.

From October 2014 to January 2015, agro-climatic conditions in China were generally favorable (see figures 4.1 and 4.2). Specifically, average temperature was only 0.5°C above average, which is beneficial for winter wheat survival during winter. It should be highlighted that 14% above average rainfall combined with average PAR contributed a 10% above average potential biomass estimate. As indicated in table 4.1, the 2014-2015 winter was generally warm with temperature above average in all seven regions; the lowest increase (0.1°C) occurred in the Northeast region and the most significant one in Huanghuaihai (0.9°C). The Lower Yangtze region was the only area suffering from below average rainfall among the seven regions (RAIN, -28%). Frequent showers occurred in January in the center of Yunnan and northwest of Guangxi provinces, while in Jiangxi, Fujian, Zhejiang, and the north of Guangdong province, rainfall was always below average. Temperature dramatically fluctuated from October to January throughout China; it was below average in mid-December and early November and average or above average at other times during the monitoring period.

Cropped arable land fraction (CALF, figure 4.3) was near the recent five-year average. Huanghuaihai and the Loess region are the only two regions where CALF was below the last five years' average. In Inner Mongolia and the Northeast region, the indicator was 1% above average, while for the Lower Yangtze region, South China, and Southwest China, cropped arable land was at the five-year average level. As for major wheat producing provinces (12 provinces covering 85% of total wheat production in China), CALF was 1.5% above the previous year, indicating that the total cropped area of winter crops increased from the 2013-2014 winter season. Most of the uncropped arable land during this reporting period is located in northern and central Gansu, northern Shanxi and Shaanxi, eastern Shandong, southern Jiangsu, and Anhui provinces. Uncultivated farmlands were either reserved for other crops to be planted later or unsuitable for winter crops due to the low temperature.

Maximum VCI (VCIx, figure 4.4) was distributed unevenly, resulting from complex climatic situations. High VCIx values occurred mostly in Southwest China and eastern Shandong province. Low VCIx values were mainly located in the North China Plain. The low VCIx in those regions results from the dry weather from July to October 2014. At the regional scale, BIOMSS is above average, except for the Lower Yangtze and Northeast regions and corresponding provinces.

Figure 4.1. China spatial distribution of rainfall profiles, October 2014-January 2015

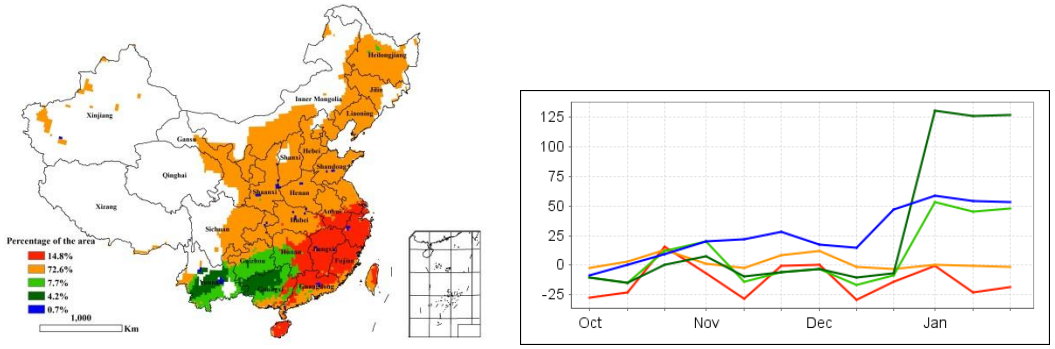


Figure 4.2. China spatial distribution of temperature profiles, October 2014-January 2015

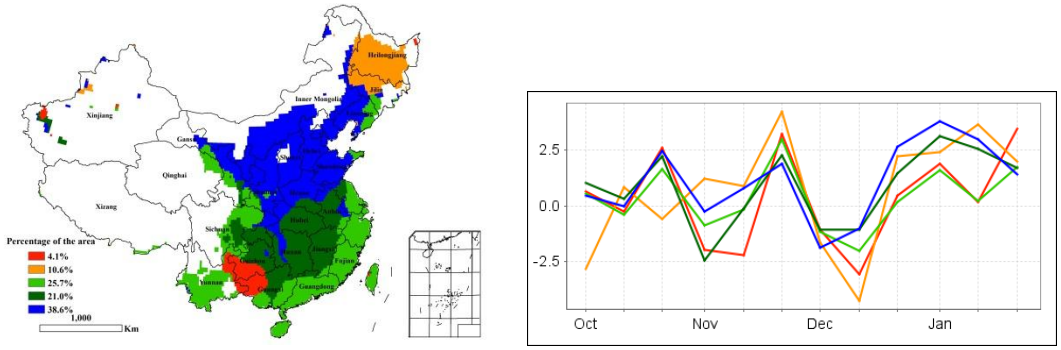


Figure 4.3. China cropped and uncropped arable land, by pixel, October 2014-January 2015

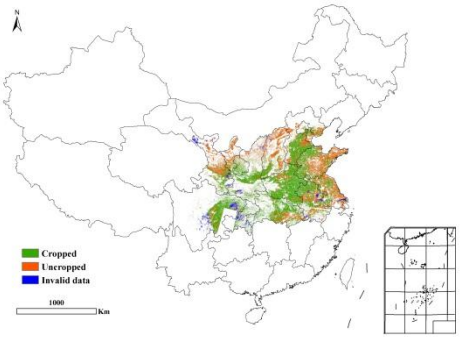


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, October 2014-January 2015

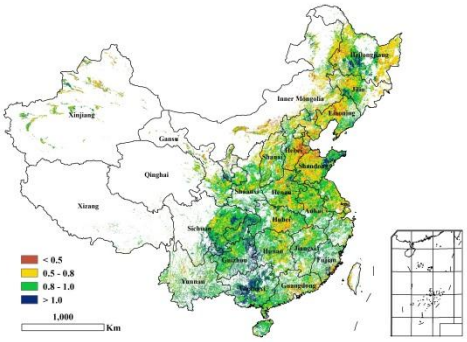


Table 4.1. CropWatch agroclimatic and agronomic indicators for China, October 2014-January 2015, departure from 5YA and 13YA

Region	Agroclimatic indicators			Agronomic indicators		
	Departure from 13YA (2001-13)			Departure from 5YA (2009-13)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	44	0.9	-3	16	-3	0.78
Inner Mongolia	52	0.8	-3	4	1	0.78
Loess region	34	0.7	-4	18	-4	0.83
Lower Yangtze	-28	0.8	0	-24	0	0.83
Northeast China	28	0.1	-2	-1	1	0.75
Southern China	20	0.5	-3	16	0	0.88
Southwest China	81	0.8	-3	59	0	0.91

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 (October-January). VCI=Vegetation condition index.

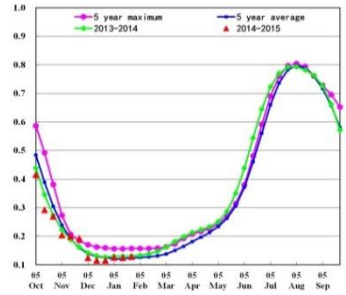
4.2 Regional analysis

Figures 4.5 through 4.11 present crop condition information for each of China's seven regions. The provided information is as follows: (a) Crop condition development graph based on NDVI, comparing the January-October 2014 period to the previous season, to the five-year average (5YA), the five-year maximum; (b) Spatial NDVI patterns from October 2014 to January 2015 (compared to the (5YA); (c) NDVI profiles associated with the spatial patterns under (b); (d) maximum VCI (over arable land mask); (e) biomass for October-January. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A, table A.11.

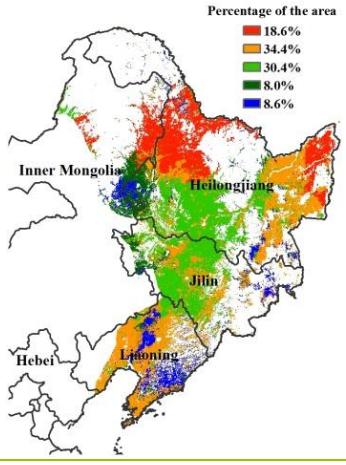
Northeast region

No crops are grown between late October and January in Northeast China due to the low temperatures. For the period under consideration, the CropWatch agroclimatic indicators show markedly above average rainfall (+28%) and a slight decrease in PAR (-2%). Temperature was about average. Abundant snow will ensure good soil moisture, which will benefit spring crops in 2015.

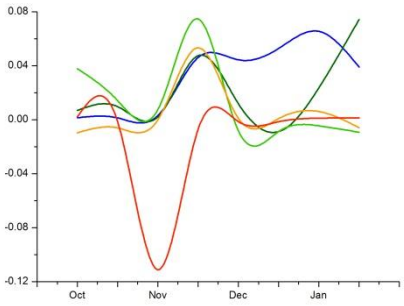
Figure 4.5. Crop condition China Northeast region, October 2014-January 2015



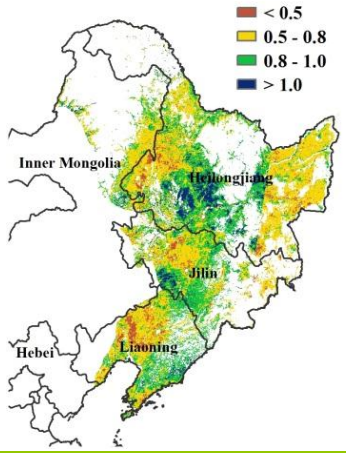
(a) Crop condition development graph based on NDVI



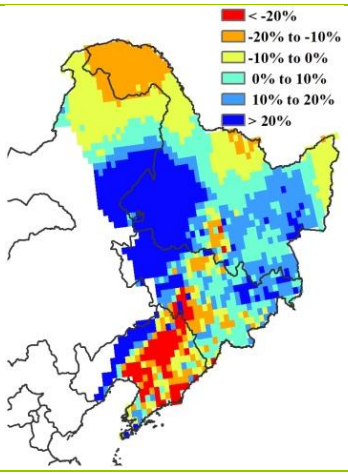
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

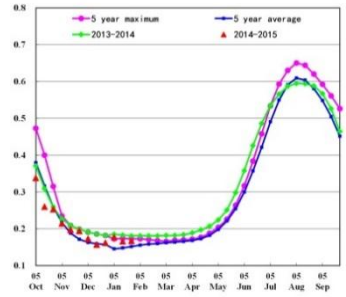


(e) Biomass

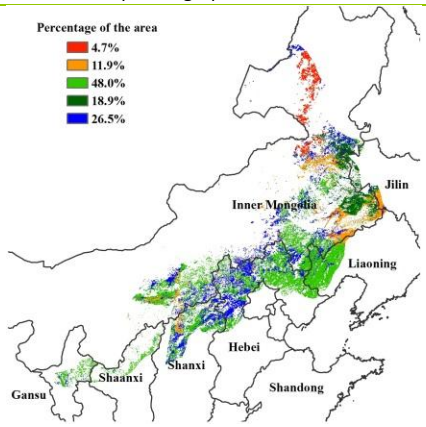
Inner Mongolia

2014 Crops have already been harvested by October 2014. Inner Mongolia does not grow any winter crops due to low temperature between October and January. Compared with average conditions, CropWatch agroclimatic indices indicate a sharp increase of rainfall (+52%) and decrease of radiation (-3%); temperature was slightly above average. Biomass (expressed with the CropWatch BIOMSS indicator), however, was above the last five-year average for the same period (+4%). Abundant snow since December and above rainfall will be favorable for the sowing of upcoming spring crops. However, temperature was higher than average in most areas in Inner Mongolia, which may have some influence on spring crops by prematurely depleting soil moisture reserves.

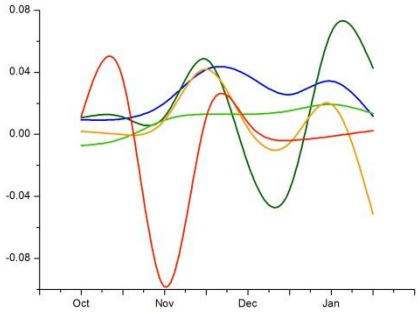
Figure 4.6. Crop condition China Inner Mongolia, October 2014-January 2015



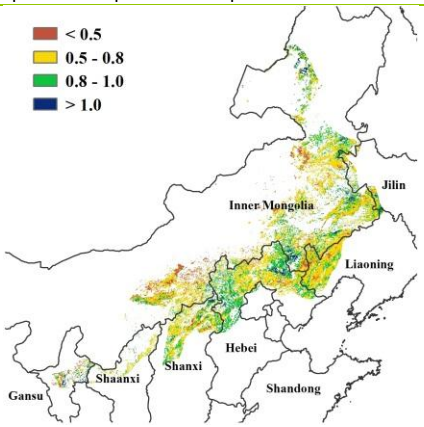
(a) Crop condition development graph based on NDVI



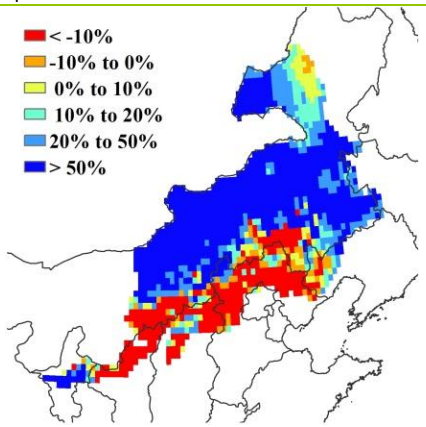
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

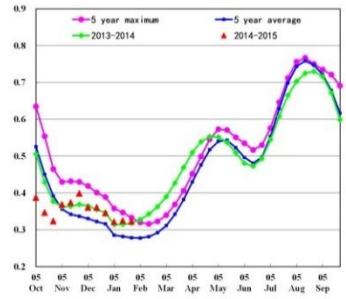


(e) Biomass

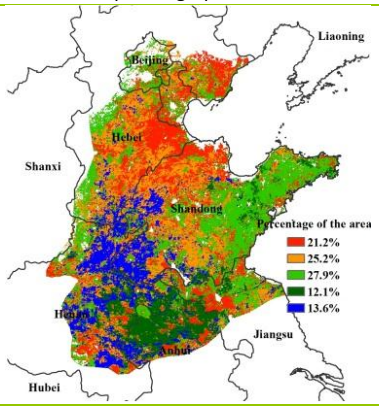
Huanghuaihai

Crop condition in Huanghuaihai was generally above the recent five-year average and at the same level as the previous year. Currently, crops in the region are mainly winter wheat, which is at wintering stage. Winter wheat will green up starting in mid-March. Dry weather conditions from July to October in the regions hampered the emergence of winter wheat as confirmed by the below average NDVI in October shown in the NDVI development graph. Starting in November, above average rainfall promoted winter wheat development before dormancy, allowing crop conditions to recover to average. Overall, favorable climatic conditions with 44% above average precipitation will provide adequate soil moisture for winter crops after dormancy. Over the last four months, crop conditions were below average only in Cangzhou, Hebei Province, and other scattered regions (as shown in the spatial NDVI pattern map) where VCIx values consistently below 0.5 were observed.

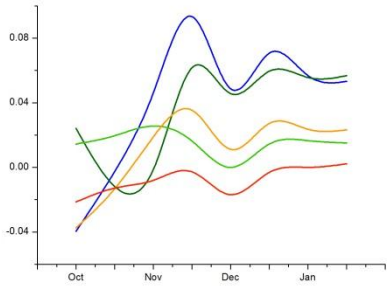
Figure 4.7. Crop condition China Huanghuaihai, October 2014-January 2015



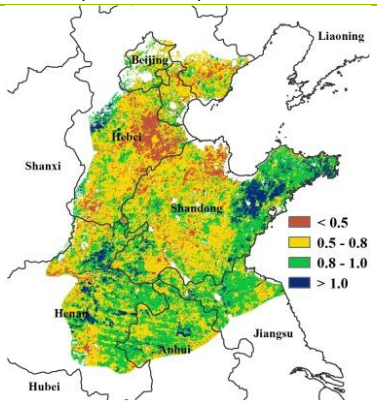
(a) Crop condition development graph based on NDVI



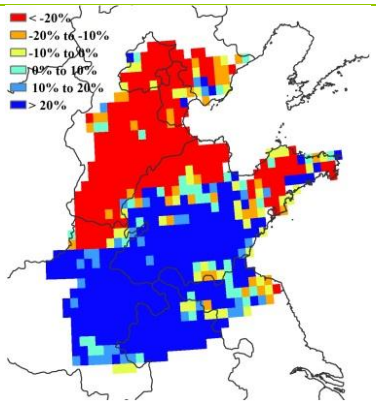
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

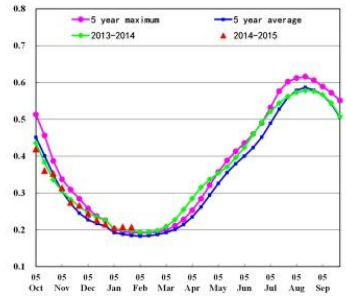


(e) Biomass

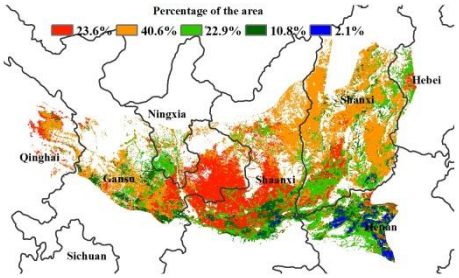
Loess region

Crop condition in the Loess region was better than the five-year average and the last year during the monitoring period. When compared with the average, precipitation and temperature increased by 34% and 0.7°C, respectively, while radiation decreased 4%, as expected from the above average rainfall. The potential biomass increased by 18% when compared with the five-year average as a result of both favorable rainfall and temperature. Winter wheat was sowed in October, and it is currently dormant. The NDVI clusters and profiles confirm that crop condition was above average in more than 75% of the areas, especially in northwest of Henan and Fen-Wei Plains in Shaanxi and Shanxi Provinces. In the most east of Gansu and the adjacent regions in Shaanxi, province, crop condition was below average when compared with the recent five years due to droughts. The value of the maximum VCI was 0.83 and and the highest maximum VCI is observed in southern Ningxia. The cropped arable land fraction was below average (-4%), which indicate that crop condition is good but that the cultivated area decreased.

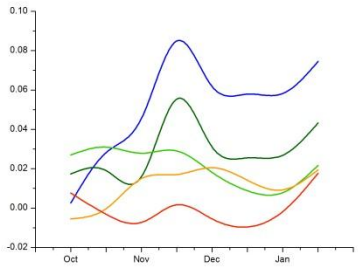
Figure 4.8. Crop condition China Loess region, October 2014-January 2015



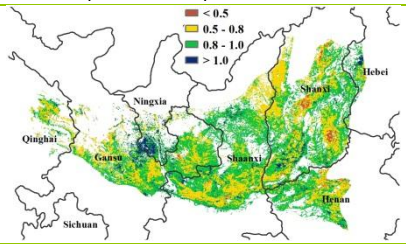
(a) Crop condition development graph based on NDVI



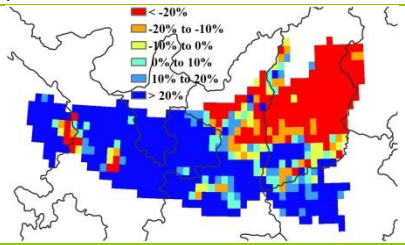
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

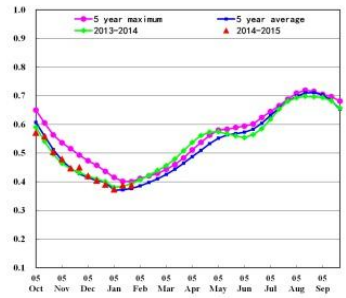


(e) Biomass

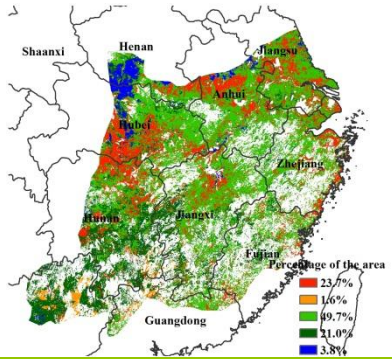
Lower Yangtze region

Crop condition was above the five-year average in the Lower Yangtze region. The CropWatch agroclimatic indicators indicate that temperature was above average, while rainfall was lower than average in this region. The potential biomass decreased by 24% over the five-year average, probably resulting from unfavorable rainfall. During the past four months, crop condition was above average in almost 75% of the region; drought and below average rainfall constrained the growth of crops in the south of Hubei and north of Hunan provinces starting in October 2014. In the south of Henan, northeast of Guangxi, and east of Hunan province, crop condition was above average due to adequate temperature and precipitation, which is confirmed by the distribution of maximum VCI. The value of the maximum VCI was 0.83, while the fraction of cropped arable land did not change compared to its average value.

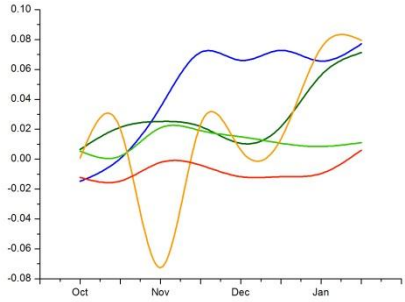
Figure 4.9. Crop condition Lower Yangtze region, October 2014-January 2015



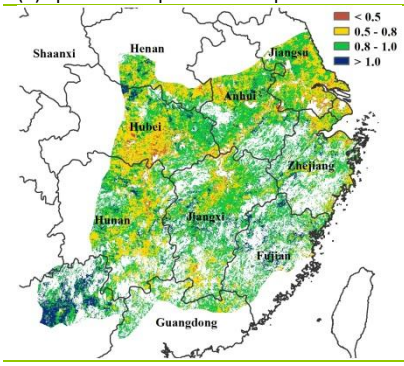
(a) Crop condition development graph based on NDVI



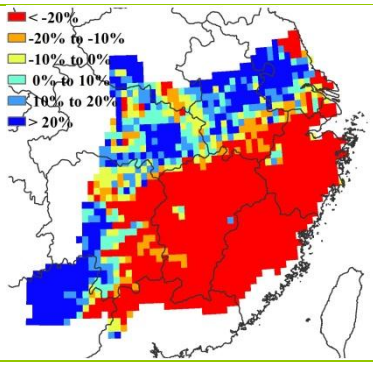
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



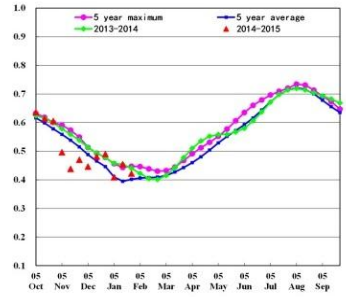
(e) Biomass

Southwest China

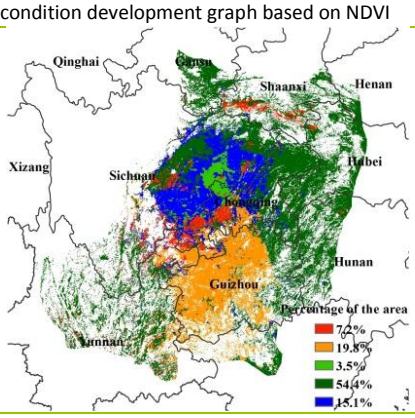
The monitoring period covers planting of winter wheat and rapeseed in Southwest China. Overall, crop conditions shows an above average level, compared to the average of the recent five years. Rain has increased by 81%, accompanied by a temperature rise of 0.8°C and a 3% decrease of RADPAR, resulting in an estimated 59% increase of the potential biomass accumulation. Potential biomass accumulation map also showed above average in most of the region. The cropped arable land fraction stayed the same as the recent five-year average.

According to the spatial NDVI patterns and profiles, winter wheat in the eastern part of Sichuan province experienced below average condition in November 2014, which is confirmed by the NDVI based crop condition development graph, probably due to decreased precipitation (a 19% decrease of precipitation from October to January, which may affect the outcome of the season). A small fraction (7.2% of the region) of land in this region showed below average conditions in December, including southern Shaanxi, southwestern Chongqing, and southeastern Sichuan. Altogether, most of southwestern China displays above average conditions, including Chongqing, Guizhou, northern Yunnan, western Hunan, western Hubei, southern Gansu, and northwestern Guangxi. The overall maximum VCI of 0.91 confirms this positive outlook.

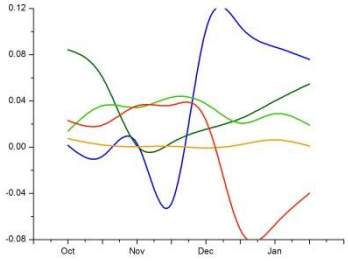
Figure 4.10. Crop condition Southwest China region, October 2014-January 2015



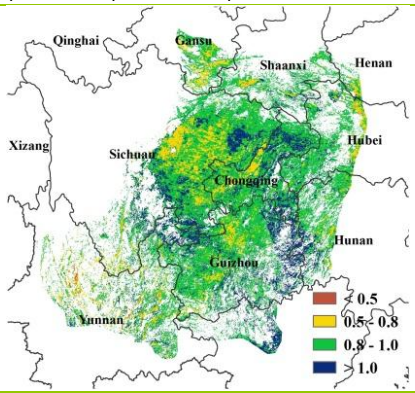
(a) Crop condition development graph based on NDVI



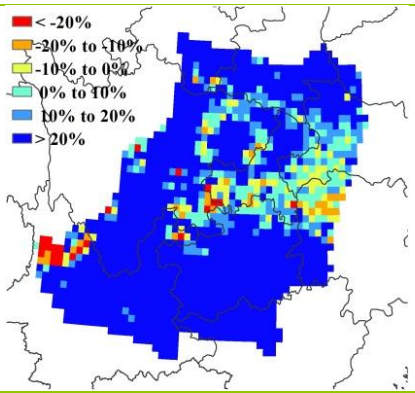
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

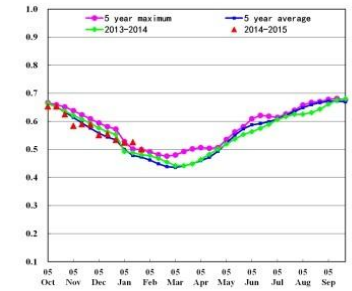


(e) Biomass

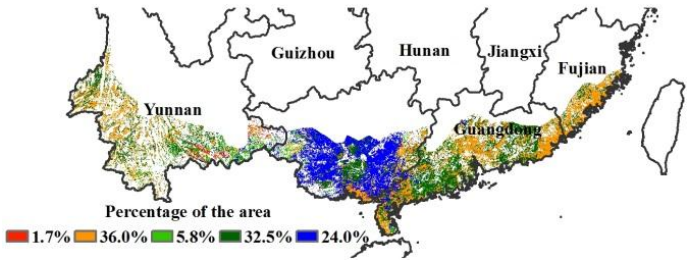
Southern China

In southern China, the monitoring period corresponds to the harvest season for late rice and the planting season for winter wheat. The overall crop condition currently is average compared to the last five years, which is clearly illustrated by the NDVI-based crop condition development graph. Precipitation increased 20% and temperature was about average (+ 0.5°C), while RADPAR decreased by 3% compared to average. The precipitation in Fujian dropped very significantly (-76%), compared to average, with an absolute value of 57mm, which is bound to negatively impact the growth of winter wheat. The precipitation in Guangdong (+129%), Guangxi (+83%), and Yunnan (+94%) all show an increase over expected values. Maximum VCI reached 0.88, with the cropped arable land fraction staying at the same level as the five-year average. The best crop condition occurs in southern Guangxi and southern Yunnan, with the maximum VCI of most regions attaining to 0.8-1.0 or even above 1.0, indicating an increased production of late rice and winter wheat. For southern Guangdong, the NDVI profile graph shows an overall average level. In general, the indicators show average crop condition in southern China for the monitoring period.

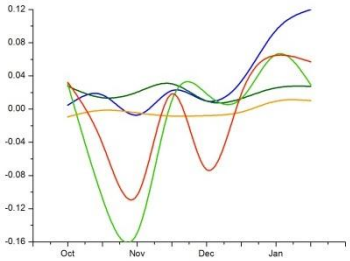
Figure 4.11. Crop condition Southern China region, October 2014-January 2015



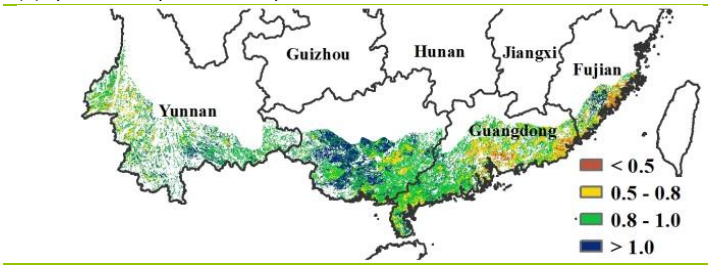
(a) Crop condition development graph based on NDVI



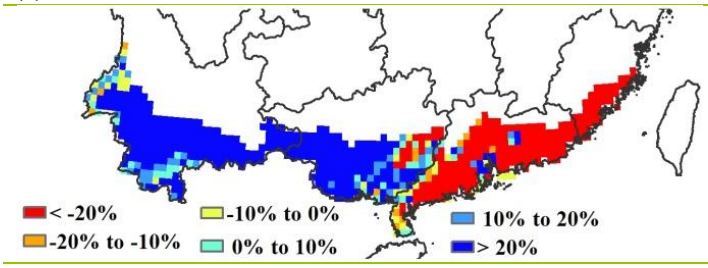
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass