Chapter 4. China

After a brief overview of the agro-climatic and agronomic conditions in China over the reporting period (section 4.1), Chapter 4 presents an updated estimate of major cereals and soybean production at provincial and national level as well as summer crops production and total annual outputs (4.2) and describes the situation by region, focusing on the seven most productive agro-ecological regions of the east and south: Northeast China, Inner Mongolia, Huanghuaihai, Loess region, Lower Yangtze, Southwest China, and Southern China (4.3). Additional information on the agro-climatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

From the perspectives of agroclimatic indicators, the overall conditions were generally favorable in China from July to October 2020, with rainfall increasing above average by 10%, temperature and radiation slightly down by 0.4°C and 10%, respectively. As a result, the maximum VCI was rather high at 0.95. Moreover, the mean of CALF for the whole country was 1% above average.

According to the spatial distribution of rainfall profiles, both above-average and below-average rainfall was observed during the monitoring period. Some provinces in middle China (most parts of Chongqing, Jiangsu, Anhui, southern parts of Henan, and some parts in Hubei, marked in dark green) received 120 mm/dekad more rainfall as compared to the average in mid-July, while some parts in Yunnan, Sichuan, Shaanxi, Shanxi, Henan, and Shandong (marked in light green) also experienced excessive rainfall (more than 90 mm/dekad as compared to the average) in Mid-August. All of the main agricultural regions of China recorded above-average rainfall, with the largest positive departure occurring in Northeast China (+46%).

Only one main agricultural region in China recorded above-average temperatures (Southern China, +0.1°C), while the other regions all recorded below-average temperatures with negative departures ranging from -0.7°C (Inner Mongolia and Loess region) to -0.1°C (Northeast China). The map with the spatial distribution of temperature profiles indicates that temperatures fluctuated during the monitoring period as follows: 10.1% of cultivated regions in northeast parts of China (western parts of Heilongjiang and Jilin, and some parts of Inner Mongolia) had positive temperature anomalies by more than 1.3°C, occurring in middle to late July, while 44% of the cropped areas in central, northern, and eastern China (covering 14 provinces) experienced negative temperature anomalies by more than 2.5°C in both mid-July and early October.

As for RADPAR, all AEZs in China received less radiation as compared to the 15YA, as a result of excessive rainfall, with the biggest negative anomaly in Southwest China (-18%), and the smallest in Huanghuaihai (-5%). In respect to BIOMSS, all of the AEZs in China had negative departures of BIOMSS, with the departures between -18% (South-west China) and -5% (Southern China), as a result of the relatively lower temperatures. As can be seen in the spatial distribution of potential biomass departure from the 15YA, negative departures by more than 20% were concentrated mainly in southwest China (some parts in Yunnan, Guizhou, Sichuan, and Tibet) and some parts in Hunan.

CALF increased in the Loess region (+4%) and Inner Mongolia (+2%) as compared to the 5YA, indicating that the outlooks of crop production in these two regions are promising. The remaining regions all showed average CALF.The largest departure of Cropping Intensity occured in Southwest China (+7%), while all the other AEZs in China had the CI departure ranging from -1% to 4%. The VCIx values were higher than 0.9 in all of the main producing regions of China, with values between 0.94 and 0.98. When

combining VHIn with the rainfall profiles, droughts were estimated for some parts of Huang Huai Hai region in July only.

Table 4.1 CropWatch agroclimatic and agronomic indicators for China, July - October 2020, departure from 5YA and 15YA

Region	Agroclimatic indicators				Agronomic indicators		
	Departure from 15YA (2004-2018)				Departure from 5YA (2014-2018)		Current period
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Cropping intensity (%)	Maximum VCI
Huanghuaihai	19	-0.4	-5	-6	0	-1	0.94
Inner Mongolia	24	-0.7	-7	-8	2	0	0.94
Loess region	1	-0.7	-6	-9	4	0	0.98
Lower Yangtze	6	-0.6	-10	-10	0	3	0.94
Northeast China	46	-0.1	-9	-6	0	0	0.97
Southern China	3	0.1	-6	-5	0	4	0.94
Southwest China	17	-0.4	-18	-18	0	7	0.96

Figure 4.1 China crop calendar

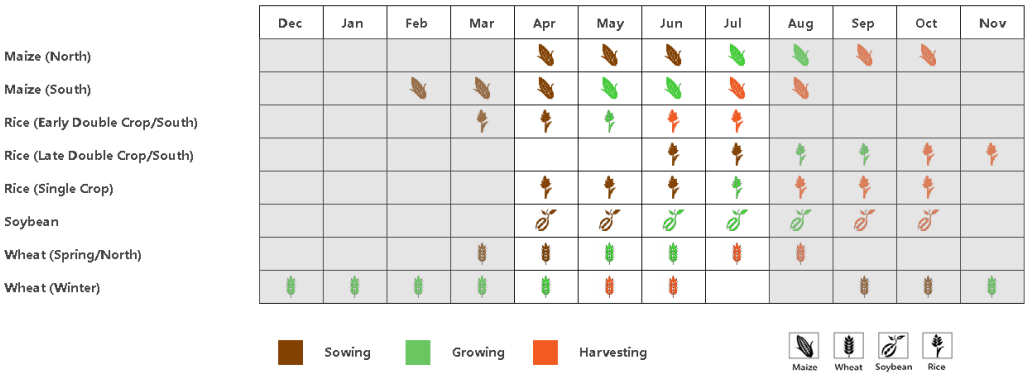


Figure 4.2 China spatial distribution of rainfall profiles, July to Oct 2020

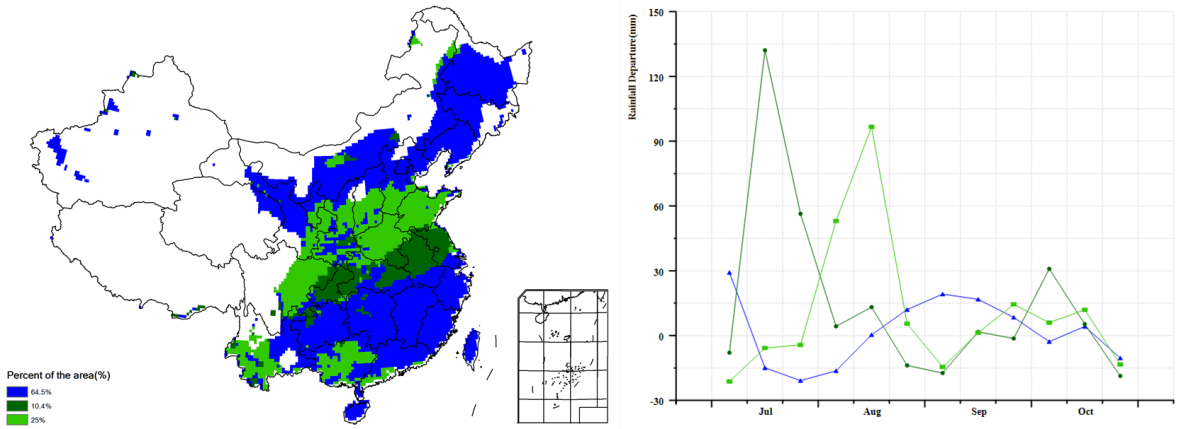


Figure 4.3 China spatial distribution of temperature profiles, July to Oct 2020

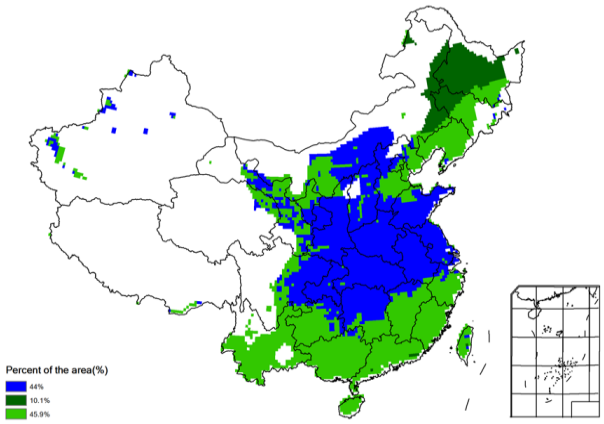


Figure 4.4 China cropped and uncropped arable land, by pixel, July to Oct 2020

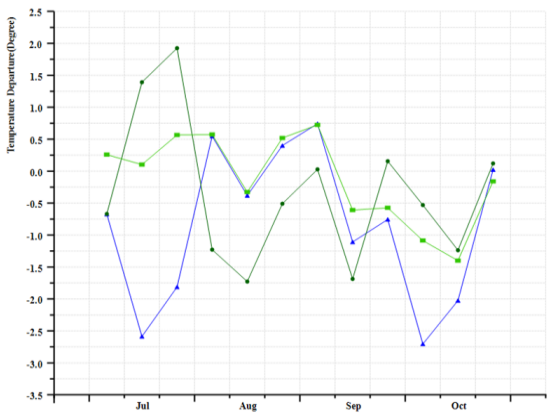


Figure 4.5 China maximum Vegetation Condition Index (VCIx), by pixel, July to Oct 2020

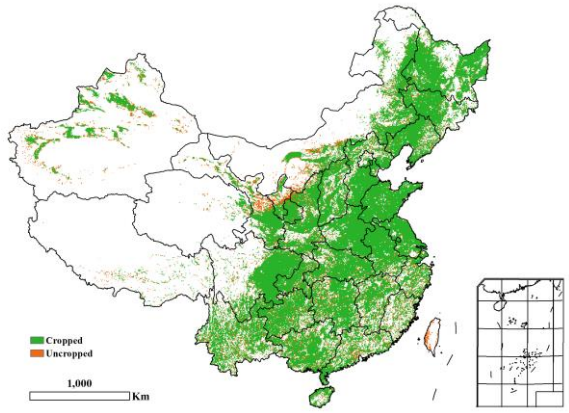
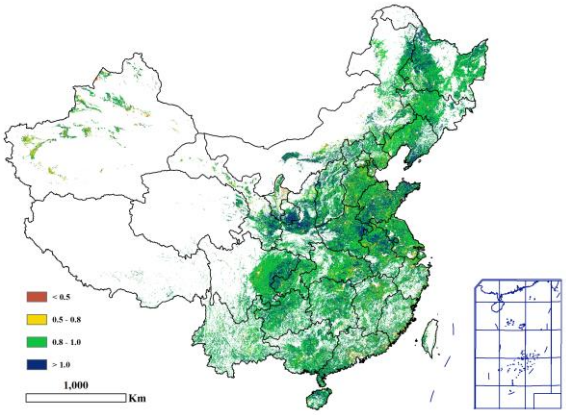
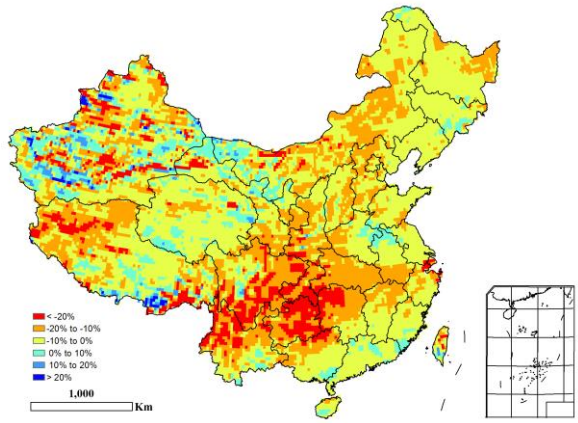
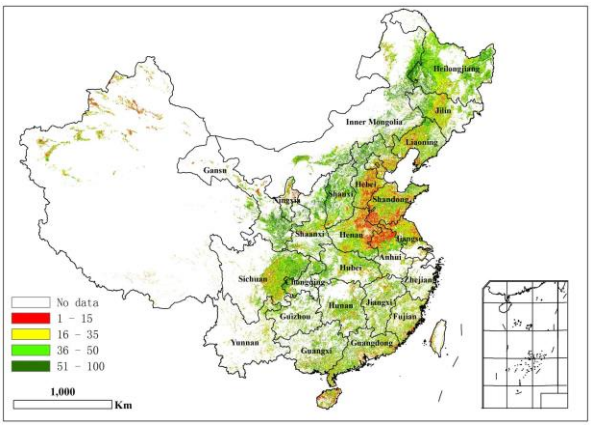


Figure 4.6 China biomass departure map from 15YA, by pixel, July to Oct 2020



F Figure 4.7 China minimum Vegetation Health Index (VHIm), by pixel, July to Oct 2020





4.2 China's winter crops production

Thousands of samples over more than 600 counties in Northeast China, North China and the middle and lower reaches of the Yangtze River from July to October in 2020 were collected and used as the trianing and validation samples. In support of the national 10 m resolution cultivated land data, the remote sensing index model, agrometeorological yield estimation model and crop area estimation method, the main grain and oil crops in China in 2020 (mainly including maize, rice, corn, rice, etc.) were quantitatively monitored and predicted. The results are as follows:

The latest remote sensing data was used to revise the total grain output in 2020 and it is expected to be 631.437 million tons, an increase of 5.06 million tons over the same period last year, an increase of 0.8%. Among them, the total output of autumn crops (including corn, mid-season rice, late rice, spring wheat, soybeans, tuber crops, and other minor crops) is expected to be 466.489 million tons, an increase of 0.3% over 2019 and an increase of 1.39 million tons (Table 4-2). In terms of provinces, the provinces with the highest year-on-year increase in autumn grain and total annual grain output are mostly distributed in the Northwest, North China and the Loess Plateau, including Shanxi, Ningxia, Henan, Shaanxi, Shandong, Hebei, Gansu, etc. The increase rate was more than 3%, and the total grain output increased by more than 2% in those provinces mentioned above. The provinces with the highest decline in autumn grain and total grain output included Jilin, Jiangxi, Jiangsu, Inner Mongolia, Heilongjiang, etc. The reduction of crops production was mainly due to extreme weather such as floods and typhoons.

Table 4.2 China 2020 winter crops, summer crops and total annual crop production and percentage difference from 2019, by province

	Winter crops		Early rice		Summer crops		Total#	
	2020	△(%)	2020	△(%)	2020	△(%)	2020	△(%)
Anhui	12042	2	1911	3	20544	-0.3	34497	0.5
Chongqing	2318	3			8172	0.6	10490	1.0
Fujian			1564	3	4718	-1.1	6282	0.0
Gansu	3605	0			6838	3.3	10443	2.3
Guangdong			5060	4	8283	2.0	13343	2.8
Guangxi			5137	5	9926	-0.4	15063	1.4
Guizhou					12360	-0.7	12360	-0.7
Hebei	12336	0			21356	3.5	33692	2.3
Heilongjiang					69889	-1.2	69889	-1.2
Henan	28081	4			26635	5.2	54716	4.7
Hubei	5492	2	2077	-11	18058	1.2	25627	0.3
Hunan			8399	1	19629	-1.0	28028	-0.4
Inner Mongolia					29385	-1.7	29385	-1.7
Jiangsu	10216	-1			19865	-1.8	30081	-1.4
Jiangxi			7206	-2	10227	-2.8	17433	-2.4
Jilin					37055	-3.3	37055	-3.3
Liaoning					23456	3.2	23456	3.2
Ningxia					3029	8.2	3029	8.2
Shaanxi	4223	6			6995	4.0	11218	4.6
Shandong	25638	3			20913	3.9	46550	3.3
Shanxi	2352	2			10041	8.5	12393	7.2
Sichuan	5785	-1			27250	0.4	33035	0.0
Yunnan					14786	-1.3	14786	-1.3
Zhejiang			801	1	6416	0.3	7217	0.4
Sub total	112087	2.2	32154	1	437096	0.5	581337	0.8
Other provinces*	19415	5.9	1292	-3	29393	-2.2	50100	0.7
China*	131502	2.7	33446	1	466489	0.3	631437	0.8

* Production of Taiwan province is not included.

Maize

The total national maize output in 2020 is 226.078 million tons, an increase of 1.73 million tons and 0.8% from 2019. The national maize planting area increased slightly by 0.2% on average, while the national average maize yield recovered from the year of reduced production in 2019, an increase of 0.5% on average (Table 4-3). Benefit from good rain and heat conditions, maize production in the Huanghuaihai Plain, the Loess Plateau, and the Northwest Region has increased significantly compared with last year, including Henan, Hebei, Shandong, Shanxi, Shaanxi, Ningxia, Gansu and Xinjiang. Maize yields increased by more than 2.0%. Prompt the increase in maize output in 8 provinces and regions increased above 3.0% on average. And the increase in maize output in Henan, Shandong and Hebei ranked the top three in China, with an increase of 0.85 million tons, 0.7 million tons and 0.63 million tons respectively.

Table 4.3 China 2020 production (thousand tons) of maize, rice, wheat, and soybean, and percentage change from 2019, by province

	Maize		Rice		Wheat		Soybean	
	2020	△(%)	2020	△(%)	2020	△(%)	2020	△(%)
Anhui	3604	1.5	17356	-0.4	11527	1.6	1066	1.3
Chongqing	2129	2.0	4698	0.0	1143	2.5		
Fujian			2823	1.3				
Gansu	5727	3.3			3131	2.2		
Guangdong			11448	2.9				
Guangxi			10672	2.2				
Guizhou	5173	0.4	5265	-1.8				
Hebei	18741	3.5			12032	0.3	188	4.6
Heilongjiang	40969	-2.3	21713	0.9	437	-0.5	5123	-1.0
Henan	15895	5.6	3836	3.2	27963	4.2	819	5.4
Hubei			15540	-0.7	3945	2.0		
Hunan			25265	-0.4				
Inner Mongolia	23088	-1.8			1898	-4.8	1185	-0.1
Jiangsu	2184	0.9	16081	-2.3	9990	-0.6	747	0.1
Jiangxi			16432	-2.4				
Jilin	29763	-3.8	5757	-0.8			796	-0.2
Liaoning	18129	3.7	4403	0.9			418	2.4
Ningxia	1730	8.6	441	7.1	758	-4.4		
Shaanxi	3973	5.2	1044	-0.6	4138	5.6		
Shandong	19007	3.8			25409	2.9	699	6.2
Shanxi	9260	8.6			2277	1.7	158	5.9
Sichuan	7160	0.4	14784	0.3	4941	-1.5		
Xinjiang	6690	5.3			5132	-2.3		
Yunnan	6351	-0.3	5730	-2.5				
Zhejiang			6523	0.4				
Sub total	219571	0.9	189809	-0.1	114721	1.8	11198	0.6
China*	226078	0.8	201176	-0.2	127052	2.9	14574	0.9

* Production of Taiwan province is not included.

In combination of remote sensing data during the whole growth period with meteorological data, the maize yields of four northeastern provinces were revised. The results showed that maize lodging caused 950 thousand tons and 1.18 million tons drop of maize production in Heilongjiang province and Jilin province, respectively, the decreasing rate of which are 2.3% and 3.8%. Inner Mongolia was affected by the lack of rainfall during the maize tasseling period, and the maize production decreased by 420 thousand tons. The agro-meteorological conditions in Liaoning province were generally normal with sufficient rain and heat during the key growth period of maize, and the maize production increased by 650 thousand tons year-on-year. With the impact of typhoons, the total maize output of the four northeastern provinces decreased by 1.9 million tons year-on-year. On the other hand, the increase of maize yield in the Huanghuaihai plain, the Loess Plateau and the Northwest region compensated the impact of the reduced maize production in the Northeastern provinces. The typhoon-induced maize lodging and yield decrease in some parts of the Northeast provinces did not result in the decrease of the national maize production.

Rice

The total rice production of China was 201.176 million tons, with a decrease of 0.2% and a reduction of 440 thousand tons when compared to last year. The continuous heavy rainfall and floods in the rice-producing zones from June to August significantly affected the production of mid-season rice, which resulted in a decline of 740 thousand tons compared to 2019 and the total production of 132.452 million tons. Late rice benefitted from favorable agro-climatic conditions in the late growing season , the total production of late rice was 35.278 million tons, with an increase of 0.3% than 2019(Table 4-4). Though the Northeast China suffered from continuous typhoons, the rice production was rarely affected. A

decrease of 50 thousand tons for the rice production was observed in Jilin Province, while Heilongjiang and Liaoning provinces both increased.

Table 4.4 China 2020 early rice, single rice/semi-late rice, and late rice production and percentage difference from 2019, by province.

	Early rice		Single rice		Late rice	
	2020	△(%)	2020	△(%)	2020	△(%)
Anhui	1911	3.2	13720	-0.8	1725	-0.8
Chongqing			4698	0.0		
Fujian	1564	3.4			1259	-1.1
Gansu						
Guangdong	5060	4.1			6388	2.0
Guangxi	5137	5.0			5535	-0.4
Guizhou			5265	-1.8		
Hebei						
Heilongjiang			21713	0.9		
Henan			3836	3.2		
Hubei	2077	-11.5	10584	1.2	2879	1.3
Hunan	8399	1.0	8678	-1.0	8188	-1.0
Inner Mongolia						
Jiangsu			16081	-2.3		
Jiangxi	7206	-1.9	3006	0.0	6220	-4.0
Jilin			5757	-0.8		
Liaoning			4403	0.9		
Ningxia			441	7.1		
Shaanxi			1044	-0.6		
Shandong						
Shanxi						
Sichuan			14784	0.3		
Xinjiang						
Yunnan			5730	-2.5		
Zhejiang	801	0.9	4848	0.5	874	-0.9
Sub total	32154	0.8	124587	-0.2	33068	-0.7
China*	33446	0.6	132452	-0.6	35278	0.3

* Production of Taiwan province is not included.

Soybean

The total soybean production of China continued to increase following the same trends as the past 5 years and reached 14.574 million tons this year, with an increase of 130 thousand tons and an increase of 0.9% when compared to 2019. Across the country, the cropping area of soybean increased by 0.5% than average. For provinces of ShanXi, Inner Mongolia, Shandong, Liaoning and HeBei, the planted area of soybean increased by more than 1%. The agro-climatic conditions in North China are favorable, and soybean production increased by more than 4% in Hebei, Henan, Shanxi and Shandong provinces. The drought in July in Northeast China affected soybean during the pod and seedling season, which leads to the decreases of 1.0%, 0.1% and 0.2% for soybean production in Heilongjiang, Inner Mongolia and Jilin decreased respect.

4.3 Regional analysis

Figures 4.10 through 4.16 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Phenology of major crops; (b) Crop condition development graph based on NDVI, comparing the current season up to October 2020 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for July to October 2020 (compared to the (5YA)); (d) NDVI profiles associated with the spatial patterns under (c); (e)

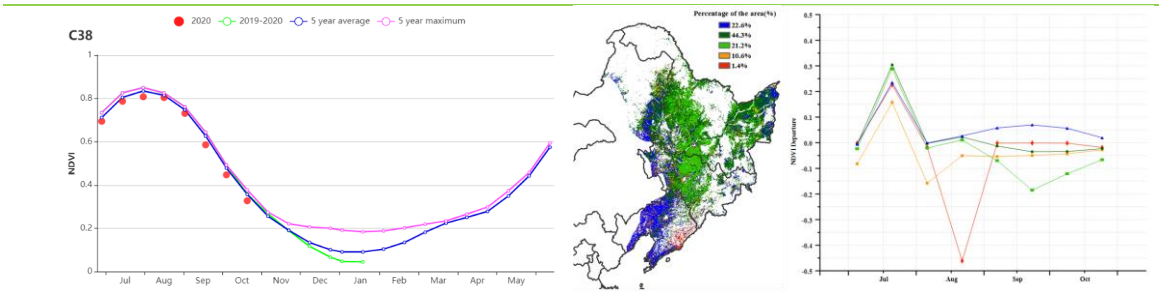
maximum VCI (over arable land mask); and (f) biomass for July to October 2020. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

Northeast region

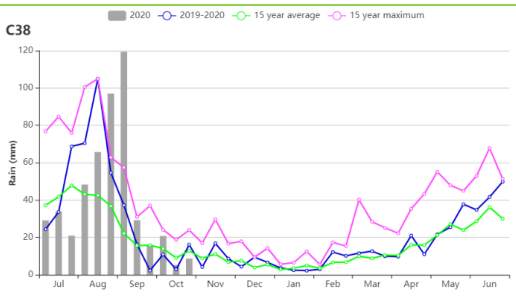
The current monitoring season (July to October) covers the harvest of all spring crops in Northeast China. Maize, rice, and soybeans reached maturity in August and September in Heilongjiang, Jilin and Liaoning Provinces, and the harvest had been completed by the end of October. CropWatch Agroclimatic Indicators (CWAIs) have shown that the precipitation greatly deviated from the average level (46% above average) and the temperature was slightly lower than the average level (-0.1°C). The photosynthetically active radiation was lower by 9%. Affected by typhoon Bawi, Maysak and Haishen, the precipitation in late August to September was significantly higher than the average especially in Heilongjiang and Jilin provinces. As for biomass, it was below the average level in most areas in Northeast China mainly due to below-average solar radiation. Only few areas in Jilin and Liaoning were slightly above average, and the overall potential biomass was 6% below average.

In general, the crop conditions during the monitoring period were below the 5YA. VCIx was above 0.8 in most areas in Northeast China during the current monitoring season. But affected by typhoons Bawi, Maysak and Haishen, the crop conditions in most areas of Heilongjiang and Jilin provinces were below average from August to October, especially those areas affected by flooding and lodging due to excess precipitation.

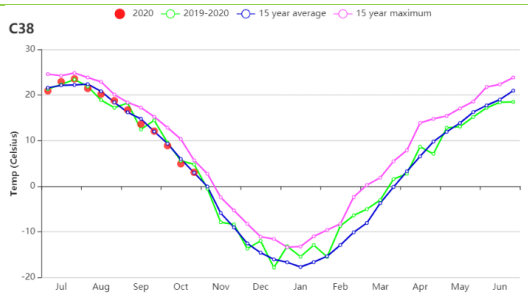
Figure 4.8 **Crop condition China Northeast region, July - October 2020**



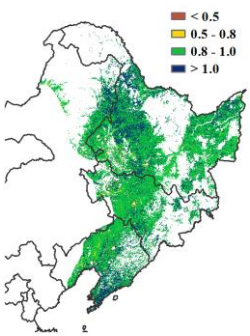
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



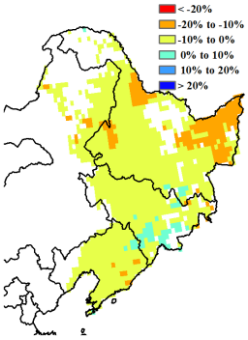
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure

Inner Mongolia

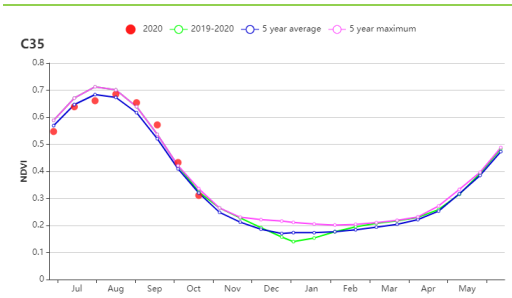
During this monitoring period, maize and soybean are the main summer crops in Inner Mongolia. Generally, the conditions were average.

Overall RAIN was above average (+24%). However, there was a 20 day period of below-average rainfall in late July and early August. That period is critical for the pollination of maize and soybean. TEMP was below average by 0.7°C, and RADPAR was below average by 7%. The resulting BIOMSS dropped to below average as well (-8%).

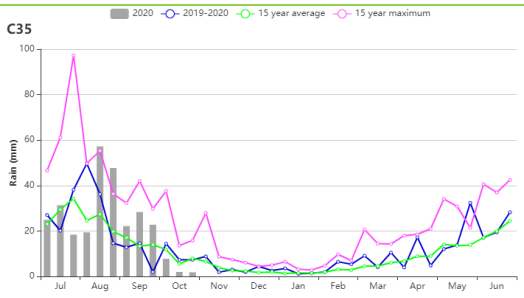
The NDVI development graph indicates below-average crop condition from June to mid-August. In early July and August, about 30.4% of the region was below average, particularly in central and eastern Inner Mongolia, central Ningxia, northern Shaanxi and western Liaoning, which suffered from different degrees of drought. Thereafter, crop conditions improved and reached— and sometimes exceeded — the maximum of the 5YA from late August to September. Favorable rainfall in mid-August boosted crop growth, clearly shown by above-average NDVI and confirmed by the spatial NDVI patterns and profiles in most of the areas mentioned above. Unfavorable condition persisted on 14.5% of the region until the end of September. This is also confirmed by lower maximum VCI values in those regions. After September, as crops were reaching maturity, weather conditions had limited effects on crop yield. CALF in this region reached 97%, which was above average by 2%, as compared to the 5YA.

Overall, the Inner Mongolia is expected to have average or slightly below-average crop production.

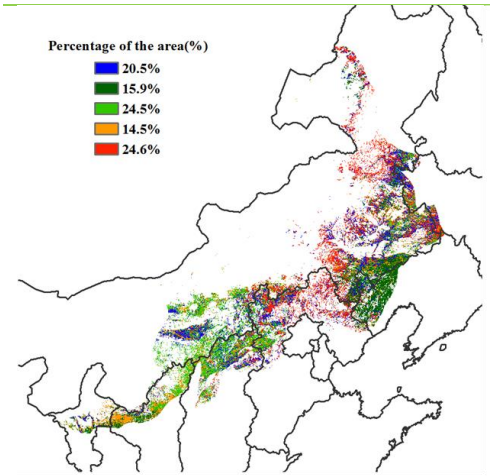
Figure 4.9 **Crop condition China Inner Mongolia, July - October 2020**

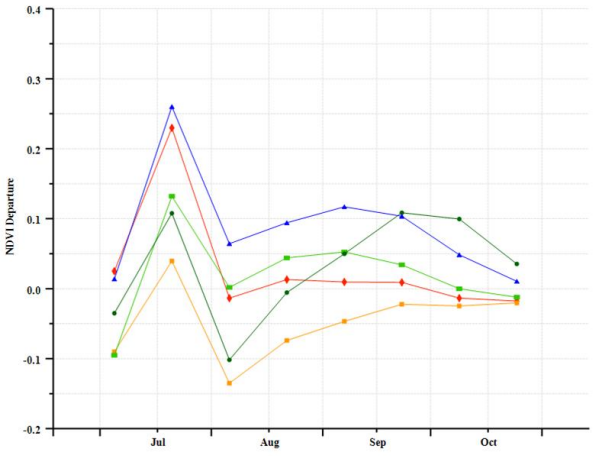


(a) Crop condition development graph based on NDVI

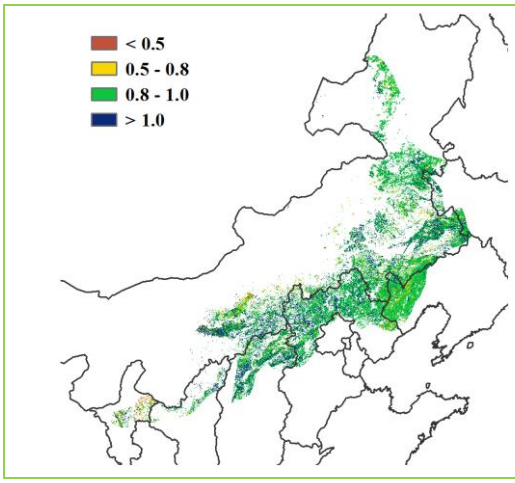


(b)Time series rainfall profile

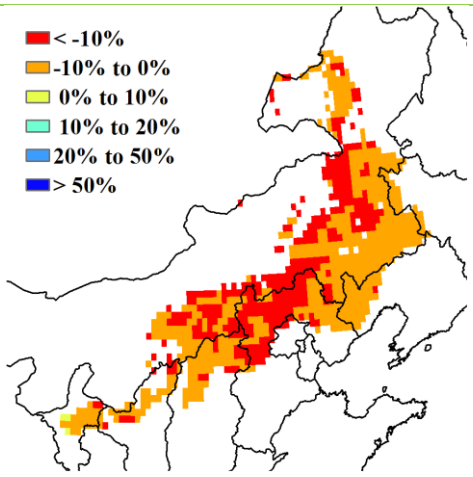




(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles



(e) Maximum VCI



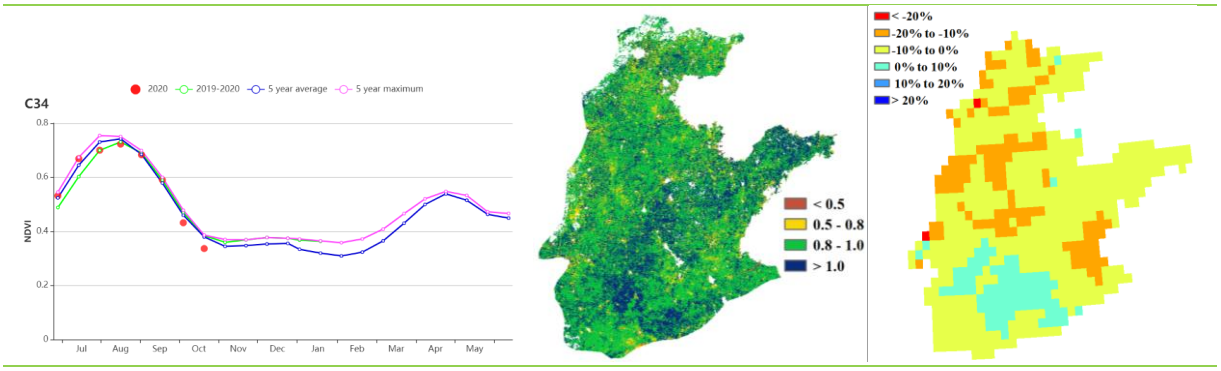
(f) Biomass departure

Huanghuaihai

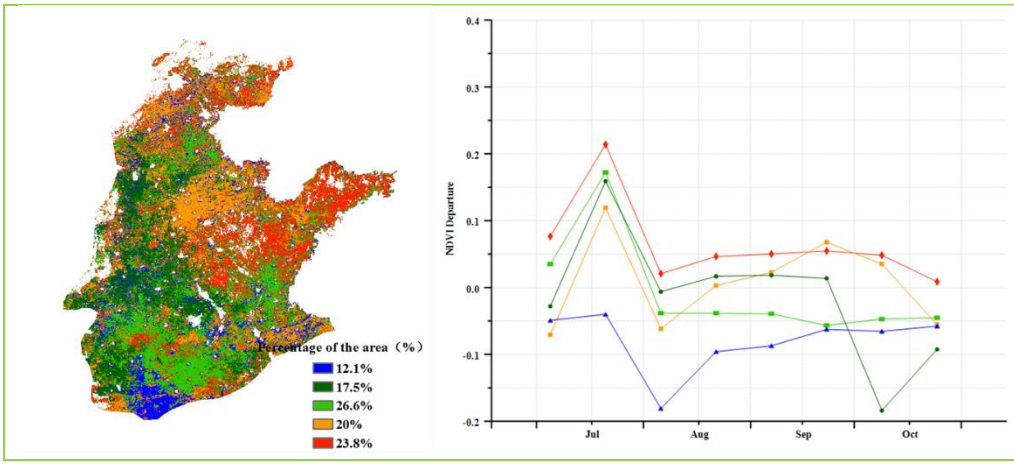
The main crop in Huanghuaihai region are summer maize and winter wheat. This monitoring period covers the whole cycle of summer maize from July to late September. The winter wheat sowing period started in early October. Crop conditions in Huanghuaihai region during the monitoring period were more favorable in the northern half and less favorable in the southern half.

The NDVI values were above the 5YA in July but fell slightly below the 5YA in early and mid-August. In September the crop condition kept pace with 5YA and then dropped to below average levels in October. Agro-climatic indicators show that precipitation increased by 19% while temperature and radiation fell by 0.4℃ and 5% compared to the 15YA, which led to 6% drop in BIOMSS compared to 15YA. Wet and cold weather may be responsible for the reduction of maize yield. The maximum VCI value for Huanghuaihai was 0.94. As shown by NDVI clusters and profiles, 12.1% of cropland over northern Anhui and some scattered areas across the whole region, displays below-average condition during most of this monitoring period. 23.8% of cropland over the eastern and central areas of Shandong show above-average conditions. 17.5% of cropland in southern Hebei and northern Henan departed a lot from average in late September and early October. This pattern is confirmed by the distribution maps of VCIx map and the biomass departure map.

Figure 4.10 **Crop condition China Huanghuaihai region, July - October 2020**



(a) Crop condition development graph based on NDVI (b) Maximum VCI (c) Biomass departure



(d) Spatial NDVI patterns compared to 5YA (e) NDVI departure profiles

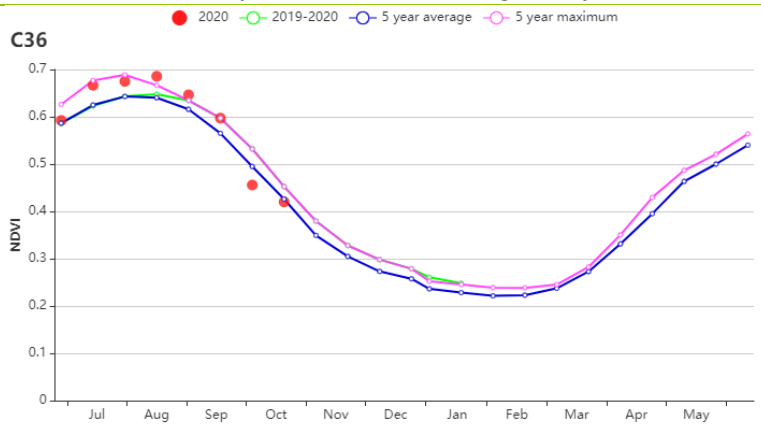
Loess region

During the reporting period, maize was harvested in late September and early October, and winter wheat was planted in October. The CropWatch Agroclimatic Indicators (CWAIs) show that the weather conditions in this region were close to the 15YA: Rainfall (RAIN) exceeded the average by 1%, temperature (TEMP) was below average by 0.7°C, and radiation (RADPAR) dropped by 6%. The potential biomass (BIOMSS) was 9% below average as a result of reduced radiation and lower temperature.

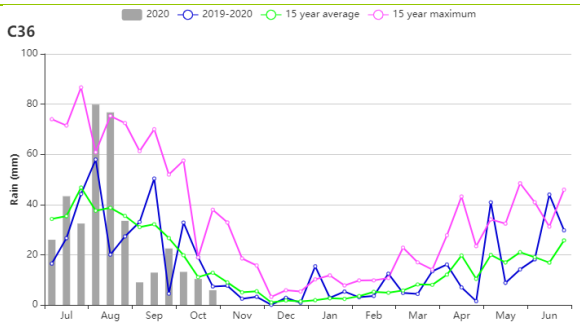
According to the regional NDVI development graph, crops started maturing from August to early September, after which they were harvested from mid-September until the end of the monitoring period. The overall crop conditions were slightly above or close to the 5-year average from July to September.

In most of the region, spatial patterns of NDVI departure clustering and the profiles show that the crop conditions were close to the five-year average from July to September. About 9.6% of the cropped area was below the 5-year average in October, which occurred mainly in the northwest of Henan province, and the south of Shannxi and Ningxia. The Maximum VCI map shows high values of VCIx (0.98) in most cropped areas of the region. Almost 99% of the farmland was cultivated according to CALF (+4%) as compared to the 5YA, showing favorable crop prospects for this region.

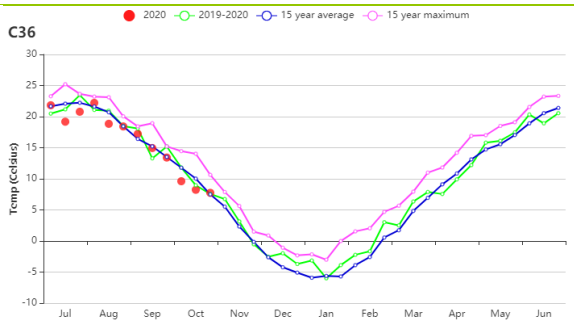
Figure 4.11 **Crop condition China Loess region, July - October 2020**



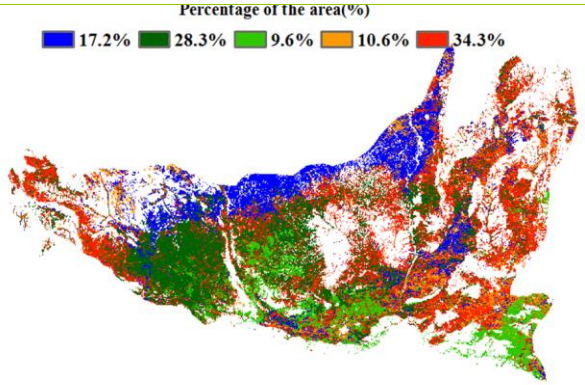
(a) Crop condition development graph based on NDVI



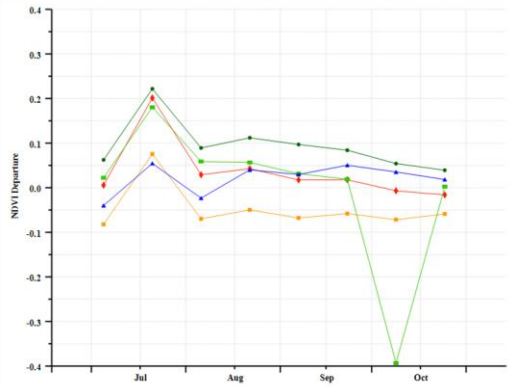
(b) Rainfall profiles



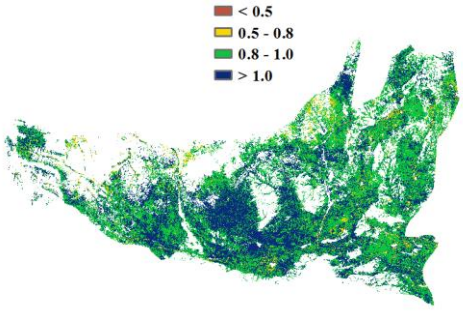
(c)Time-series temperature profile



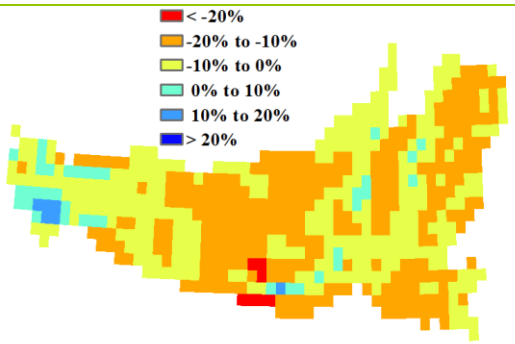
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Maximum VCI



(g) Biomass departure

Lower Yangtze region

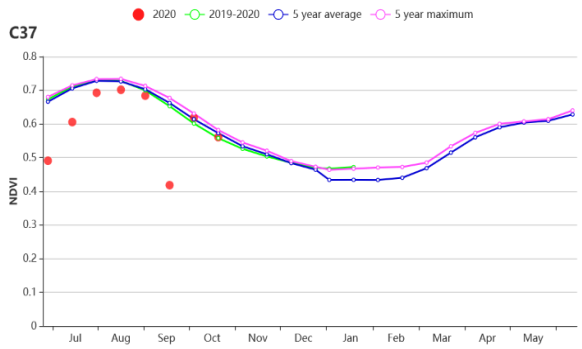
By October, the late rice matured in the center of Lower Yangtze region including Hubei, Hunan, Jiangxi and Fujian provinces, while semi-late rice and maize had been harvested in Jiangsu, Anhui and Zhejiang provinces.

The comparison of the current crop NDVI development curve with the 5YA indicates that the crop conditions were slightly below average. According to CropWatch agro-climatic indicators, the accumulated precipitation was 6% higher, while the photosynthetically active radiation and temperature were 10% and 0.6℃ lower as compared to the fifteen-year averages, respectively. Reduced solar radiation throughout this monitoring period resulted in a decrease in potential biomass (BIOMASS, -10%).

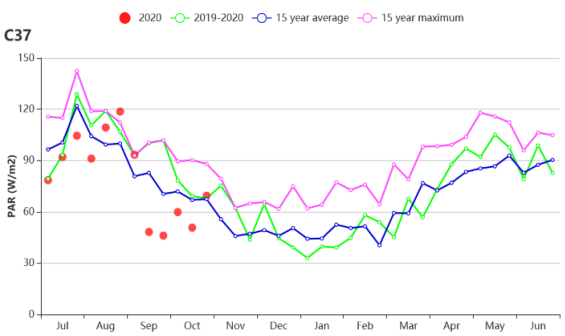
According to the BIOMASS map, the potential biomass production in most areas was lower than the 15YA. As shown in spatial NDVI patterns, 37.9% of the area, mostly distributed in the north of this region including Jiangsu, Anhui and Hubei provinces, presented average crop conditions compared to the five-year average. The crops in the remaining areas suffered from unfavorable conditions, which coincides with the situation depicted by the VCIx patterns. The average VCIx of this region is 0.94, and most area had VCIx values ranging from 0.8 to 1.

Overall, the continuously rainy and cloudy weather was detrimental to crop growth during this monitoring period, and the production of crops in the Lower Yangtze region is anticipated to be below average level.

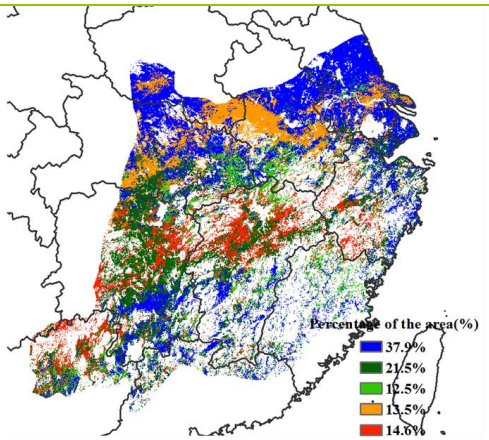
Figure 4.12 **Crop condition China Lower Yangtze region, July - October 2020**



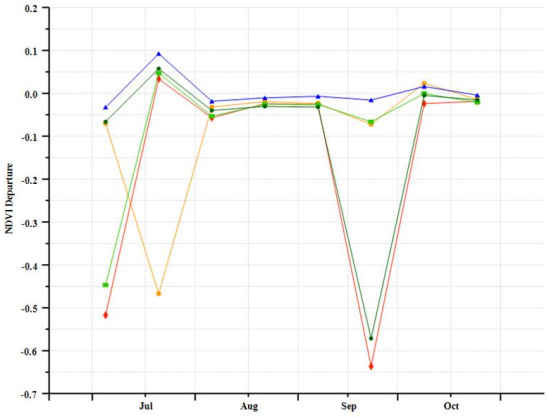
(a) Crop condition development graph based on NDVI



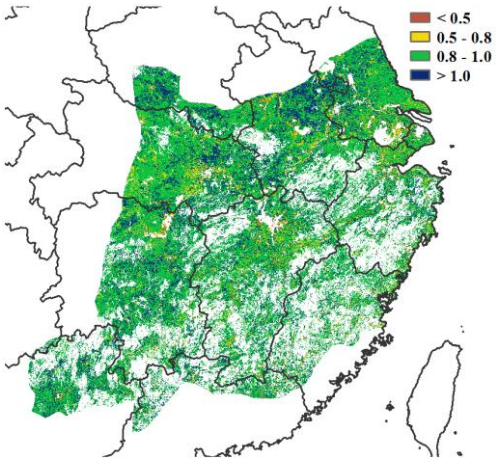
(b) Time series PAR profile



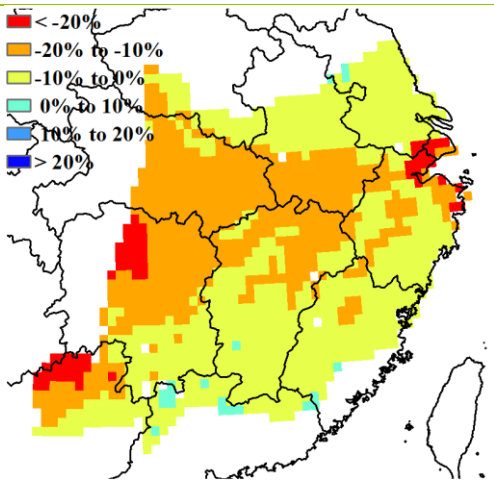
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



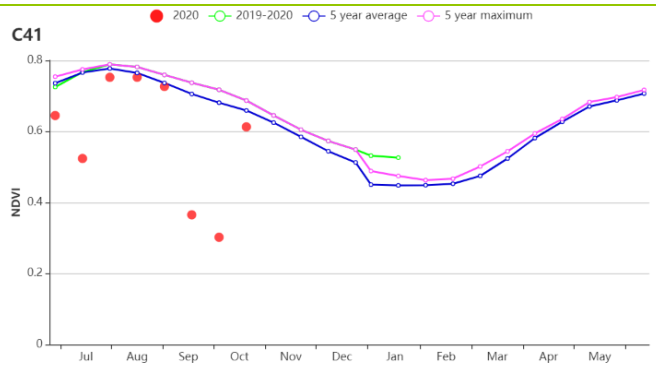
(e) Biomass departure

SouthWest region

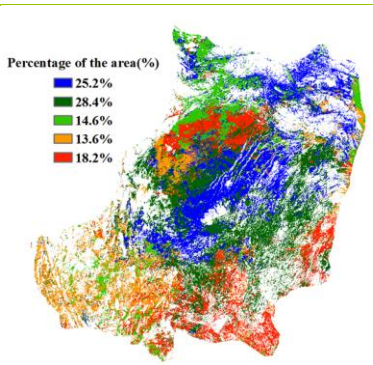
The reporting period covers the sowing of winter wheat in southwestern China, at a time when summer crops (including semi-late rice and maize) have reached maturity. According to the regional NDVI profile, crop condition was generally below the 5-year average, but close to average in late-August. On average, rainfall was above the fifteen-year average (RAIN +17%), whereas radiation was below (RADPAR -18%). Temperature was close to average (TEMP -0.4 °C). The resulting BIOMSS was 18% below average mainly due to less radiation and local floods. The cropped arable land fraction remained at the same level as in the previous five years, which indicated there was no change in crop planting for this period.

According to the NDVI departure clustering map and the profiles, values were close to average in July, except in Yunnan and neighboring areas in north-western Guizhou. In August, the overall NDVI in the region was close to the average level. RADPAR was below average for Guizhou (-21%) and Yunnan (-15%). Average NDVI throughout the monitoring period was observed in northern Sichuan and Chongqing, where radiation was below average and precipitation above average (See Annex A.11). The maximum VCI reached 0.96, indicating that peak conditions were comparable to the previous five years. At the level of major production zones, the negative impact of above-average rainfall and increased cloud cover is expected to be limited. Some local flooding and low radiation due to heavy precipitation and the mixture of positive, but predominantly negative departures from the long-term average indicate slightly below-average crop conditions.

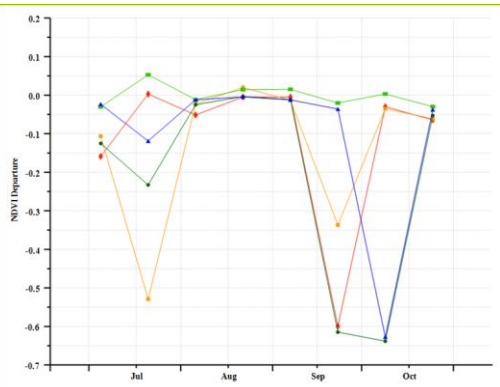
Figure 4.13 Crop condition China SouthWest region, July-October 2020



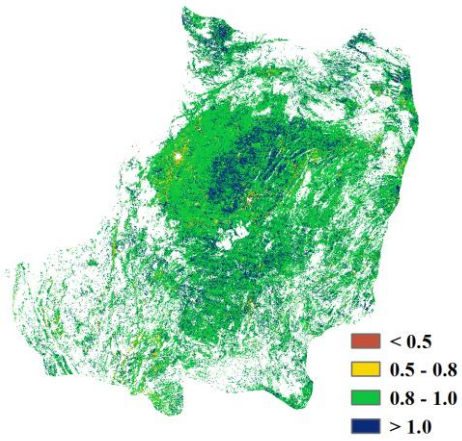
(a) Crop condition development graph based on NDVI



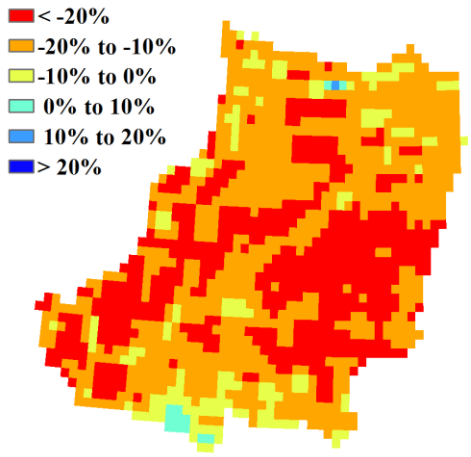
(b) Spatial NDVI patterns compared to 5YA



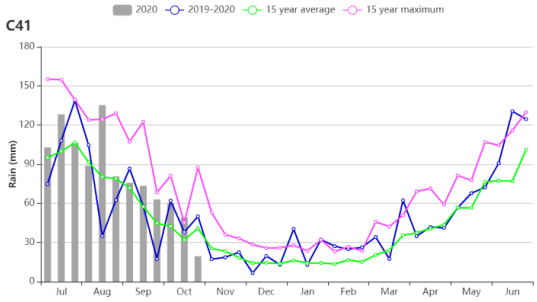
(c) NDVI profiles



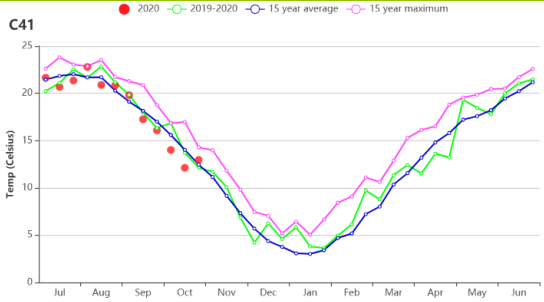
(d) Maximum VCI



(e) Biomass departure



(f) Time series rainfall profile



(g) Time series temperature profile

Southern region

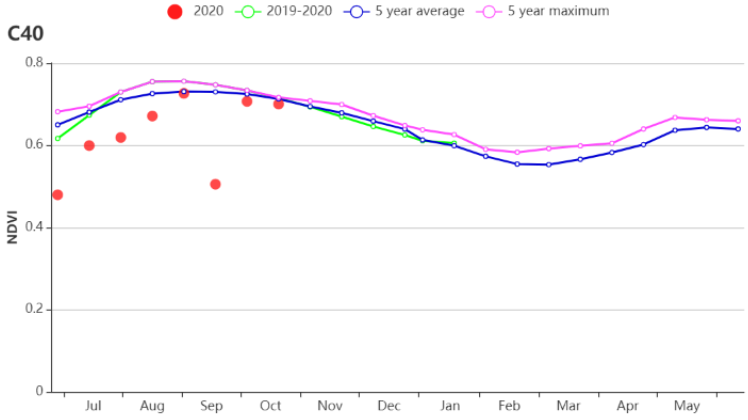
By October, late rice was maturing in Southern China. According to the regional NDVI profile, crop condition was generally below the 5-year average, but reached close to average levels by October.

On average, rainfall reached 1235 mm, which was 3% higher than the average; provincial departures were as follows: +26% in Yunnan, +5% in Guangxi, -17% in Guangdong, and -22% in Fujian. In Yunnan and Guangxi, RAIN exceeded 1100 mm, while in Fujian it was less than 800 mm. The average temperature during the monitoring period in Southern China was 22.7 °C, which was above average by 0.1°C. The average VCIx of the Southern China region during the monitoring period was 0.94, and almost all regions presented above 0.80 VCIx during this monitoring period. BIOMSS was 5% below average. The biomass indices of Yunnan, Guangxi, Guangdong, and Fujian were below average by 12%, 9% 2%, and 5%, respectively. At the provincial level, biomass changes followed RADPAR patterns. Abundant sunshine during rice heading and grain filling stages is conducive for high yields, whereas excessive rainfall increases the risk of pest and disease damage.

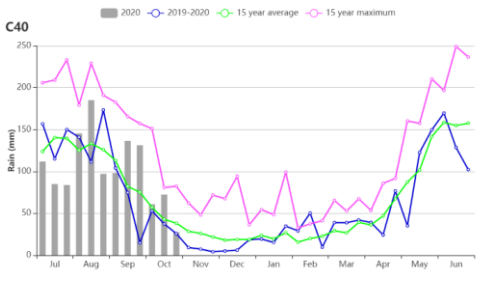
NDVI departure clustering analysis reveals that the continuously below-average crop conditions were mostly located in Yunnan, Guangxi, and Guangdong Province, covering 62.2% of the total cropland area. The above-mentioned patterns are also confirmed by the BIOMASS map. Only a few areas in Guangdong and Fujian were slightly higher than the average.

Overall, the crop conditions during the monitoring period were below average for this region.

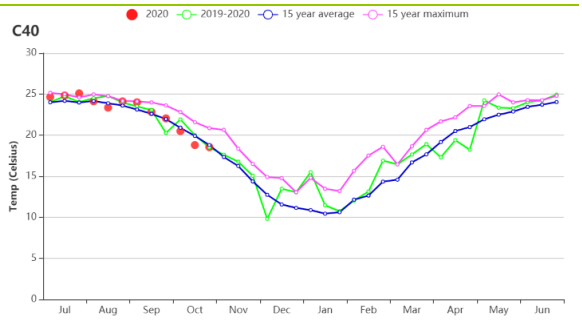
Figure 4.14 Crop condition China Southern region, July - October 2020



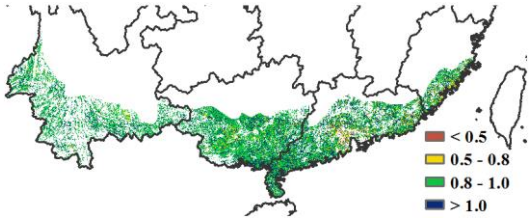
(a) Crop condition development graph based on NDVI



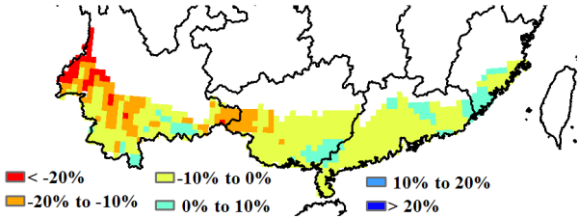
(b) Rainfall profiles



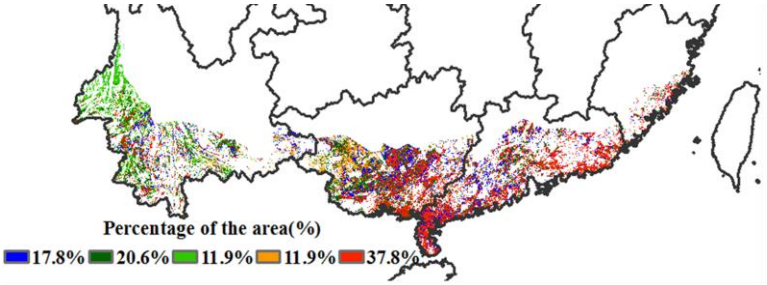
(c) temperature profiles



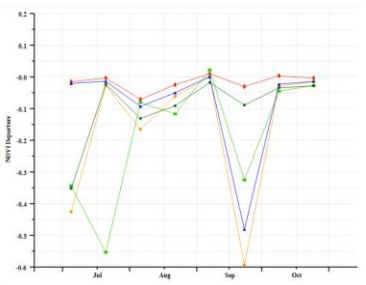
(d) Maximum VCI



(e) Biomass departure



(f) Spatial NDVI patterns compared to 5YA



(g) NDVI profiles