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. The chapter begins with a brief overview of the agroclimatic and agronomic conditions over the monitoring period (section 4.1), after which sections 4.2 and 4.3 present China winter crop production (4.2) as well as pests and diseases that have affected agricultural production over the reporting period (4.3). Next, section 4.4 presents an import and export outlook for China, and the chapter finishes with the CropWatch analysis for each of the seven individual regions (4.5). Additional information on the agroclimatic indicators for agriculturally important Chinese provinces is listed in table A.11 in Annex A.

4.1 Overview

In China, winter crops including winter wheat and rapeseed were growing during the current monitoring period. Overall, crop condition was favorable, according to above-average BIOMSS (+5%) on the national scale. CropWatch agroclimatic indicators show that rainfall and radiation for the whole country decreased by respectively 13% and 6% compared to average, while temperature increased 0.5°C (see table 3.1). At the regional level, as shown in table 4.1, rainfall was significantly above average in Inner Mongolia (RAIN, +60%), Loess region (+23%), and Huanghuaihai (+15%). In contrast, below-average precipitation occurred in the Lower Yangtze (RAIN, -21%), Southwest China (-17%), and Southern China (-7%). Rainfall for Northeast China was close to average (-1%). Compared to average, temperature increased in most regions of China except for Southwest China (-0.1°C) and Southern China (average). Radiation was significantly below average in Southwest China, with a very significant decrease of 13%. Less severe, but nevertheless significant RADPAR departures occurred in Southern China (-8%), Lower Yangtze (-7%), Loess region (-5%), and Huanghuaihai (-3%). The spatial distribution for the anomalies of agroclimatic indicators and their fluctuations over time are shown in figures 4.1 and 4.2.

According to figure 4.3, cropped areas were located in Huanghuaihai, Lower Yangtze, the southern part of the Loess region, and southern and southwestern China, while uncropped areas were in Northeast China, Inner Mongolia, and the northern part of the Loess region. Compared with the recent five-year average, the cropped arable land fraction (CALF) decreased in Huanghuaihai (CALF, -2 percentage points), Lower Yangtze (-2 percentage points), southern Loess region (-7 percentage points), and marginally in southwestern China (-1 percentage point); see also table 4.1. CALF for Southern China was average.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, January-April 2017, departure from 5YA and 15YA

Region	Agroclimatic indicators			Agronomic indicators		
	Departure from 15YA (2002-2016)			Departure from 5YA (2012-2016)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	15	0.9	-3	19	-2	0.79
Inner Mongolia	60	1.5	0	48	-	0.41
Loess region	23	0.4	-5	16	-7	0.51
Lower Yangtze	-21	0.4	-7	-6	-2	0.60
Northeast China	-1	1.9	1	9	-	0.70
Southern China	-7	0.0	-8	7	0	0.56
Southwest China	-17	-0.1	-13	-6	-1	0.69

The maximum VCI (VCIx) on the national level was only moderate, with the average value at 0.62. Among the regions, high VCIx (larger than 0.5) occurred in Huanghuaihai, Lower Yangtze, and China's southwestern and southern regions, while lower values occurred in the Loess region and Inner Mongolia (figure 4.4 and table 4.1). As shown in figure 4.5, high values for minimum Vegetation Health Index (VHIn) were mainly distributed in Huanghuaihai and Southwest China, with lower values occurring in Lower Yangtze and Southern China.

Figure 4.1. China spatial distribution of rainfall profiles, January-April 2017

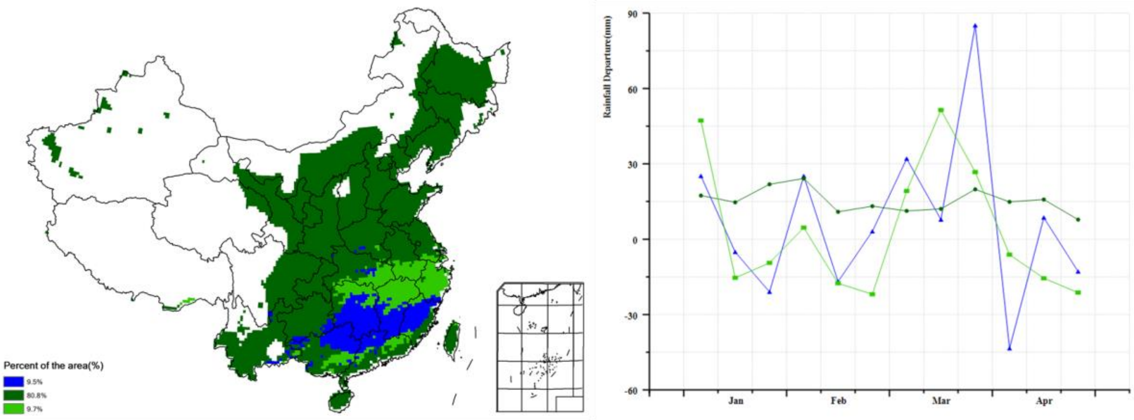


Figure 4.2. China spatial distribution of temperature profiles, January-April 2017

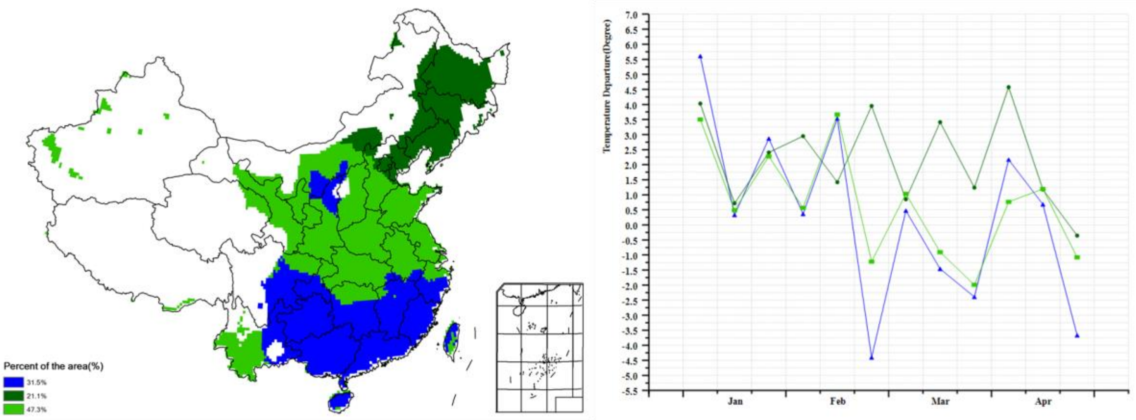


Figure 4.3. China cropped and uncropped arable land, by pixel, January-April 2017

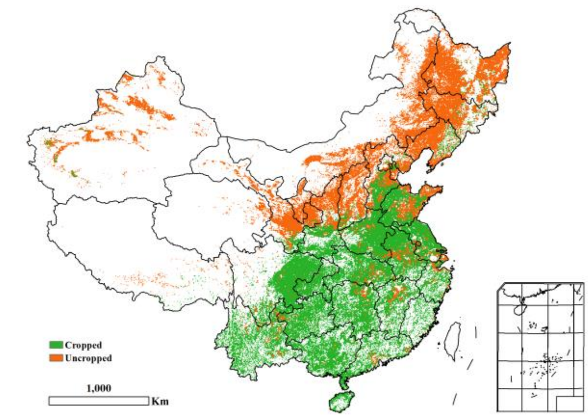


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, January-April 2017

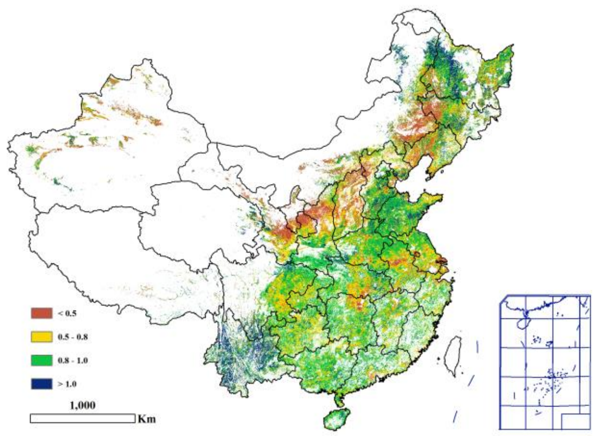
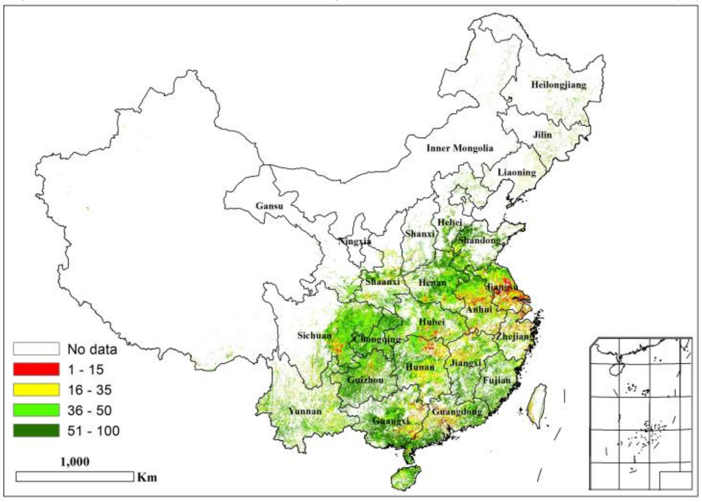


Figure 4.5. China minimum Vegetation Health Index (VHIn), by pixel, January-April 2017



4.2 Winter crop production

Overall favorable agroclimatic conditions benefited winter crops, resulting in a 2.2% increase of winter wheat yield at the national level. Winter wheat production is forecast at 116 million tons, an increase of 1.9 million tons or 1.7% up from the 2016 output (table 4.2). The total planted area is 23,548 thousand hectares, 2% down from 2016. GaoFen-1 (GF-1) satellite data show that the planted area decreased by 7.8% in Anhui (mostly in the center-east of the province) and 4.6% in Jiangsu (mostly in the center-west), which is equivalent to 299 thousand hectares in two major wheat producing areas (figure 4.6). Arable land that is uncropped in early 2017 compared with early 2016 is shown in figure 4.7.

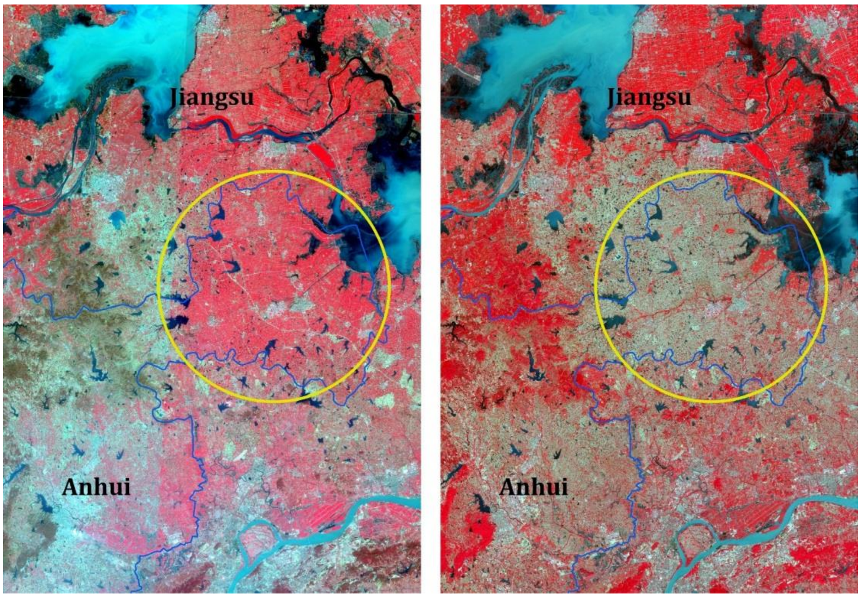
According to information from China Meteorological Administration, the large decrease resulted from unsuitable weather during the planting window in October to November 2016 for Anhui and Jiangsu provinces. Even if the winter wheat yield increased in Anhui and Jiangsu, wheat production still decreased by 5.2% and 1.9% compared with 2016. Other provinces with large production decreases include Hubei (-1.1%, due to both decreased planted area and yield), Chongqing (-1.9% because of decreased yield), and Shaanxi (-4.2%, due to both decreased planted area and yield). Yield increased in Hebei (+4.0%), Shanxi (+5.7%), Shandong (+3.3%), and Henan (+3.9%)

Table 4.2. China, 2017 winter wheat area, yield, and production and percentage difference with 2017, by province

	Area (kha)			Yield (kg/ha)			Production (thousand ton)		
	2016	2017	Δ(%)	2016	2017	Δ(%)	2016	2017	Δ(%)
Hebei	2048	2048	0.0%	5671	5898	4.0%	11615	12080	4.0%
Shanxi	520	517	-0.5%	4038	4289	6.2%	2099	2219	5.7%
Jiangsu	2057	1962	-4.6%	4730	4863	2.8%	9729	9540	-1.9%
Anhui	2624	2420	-7.8%	4322	4441	2.7%	11340	10747	-5.2%
Shandong	4076	4113	0.9%	5824	5963	2.4%	23741	24527	3.3%
Henan	4991	5115	2.5%	5041	5111	1.4%	25160	26142	3.9%
Hubei	1047	1040	-0.7%	4137	4117	-0.5%	4330	4281	-1.1%
Chongqing	357	350	-2.1%	3294	3299	0.2%	1177	1155	-1.9%
Sichuan	1299	1290	-0.7%	3577	3627	1.4%	4646	4677	0.7%
Shaanxi	1056	1027	-2.8%	3798	3740	-1.5%	4011	3841	-4.2%
Gansu	387	388	0.4%	3879	3858	-0.5%	1500	1499	-0.1%
Sub total	20462	20270	-0.9%	-	-	-	99349	100709	1.4%
Other provinces	3210	3278	2.1%	-	-	-	14690	15273	4.0%
National total*	**23672**	**23548**	**-0.5%**	**4817**	**4925**	**2.2%**	**114039**	**115981**	**1.7%**

*Note: * National total production does not include Taiwan province.*

Figure 4.6. Winter crops planted area changes in border areas between Anhui and Jiangsu as shown from 16m GF-1 imagery in 2016(a) and 2017(b)



(a) (b)

Winter wheat represents almost 91% of the total output for winter crops in China. For 2017, CropWatch puts the total winter crop production at 126 million tons, a 1.3% increase from 2016's low production (table 4.3). Due to the low income from for rapeseed cultivation and unfavorable climatic conditions during the planting window, the total planted area dropped by 0.8% compared to 2016. The most significant decrease of planted area occurred in Shanxi (-3.1%), Jiangsu (-6%), Anhui (-5.1%), and Shaanxi (-3.3%). Yield nevertheless increased by 2.1% at the national level as a result of favorable climatic conditions. Total winter crop output is estimated to increase from last year's low output in most provinces, except for Hubei (-0.2%), Shaanxi (-1.5%), and Gansu (-0.5%).

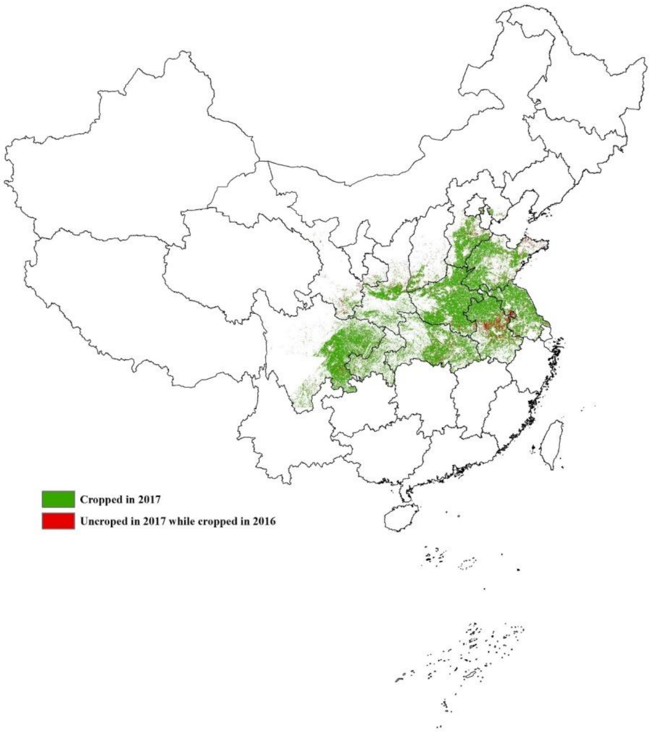
Considering the relatively severe impacts from pest and diseases (see section 4.3), however, production of winter wheat and total winter crops could be lower at final estimates. CropWatch will continue to monitor the crop condition and provide updates in future bulletins.

Table 4.3. China, 2017 winter crops production (thousand tons) and percentage difference with 2016, by province

	2015 (thousand ton)	2016			
		Area change (%)	Yield change (%)	Production change (%)	Production (thousand ton)
Hebei	11615	0.0	4.0	4.0	12077
Shanxi	2218	-3.1	4.7	1.5	2251
Jiangsu	9971	-6.0	2.3	-3.9	9585
Anhui	12044	-5.1	2.0	-3.2	11662
Shandong	24100	0.9	2.4	3.3	24898
Henan	25305	2.5	1.4	3.9	26293
Hubei	5875	-1.8	-0.2	-2.0	5756
Chongqing	2316	-1.5	0.4	-1.1	2289
Sichuan	5541	-1.7	1.2	-0.5	5513
Shaanxi	4085	-3.3	-1.5	-4.8	3889
Gansu	3002	0.4	-0.5	-0.1	2999
Sub total	106072	-	-	1.1	107211
Other provinces	18613	-	-	2.4	19064
National total*	**124685**	**-0.8**	**2.1**	**1.3**	**126275**

Note: * National total production does not include Taiwan province.

Figure 4.7. Winter crops planted area in 2017 and changes from 2016 based on 16m GF-1 imagery



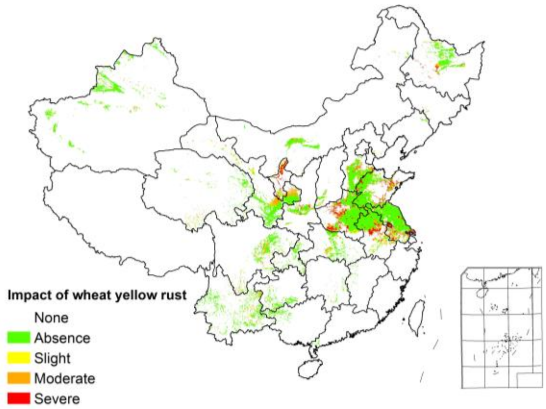
4.3 Pest and diseases monitoring

The impact of pests and diseases[2] was relatively severe in mid-May 2017 in the main wheat regions, at a time when the crop was mainly in the mid and late stages of grain filling in the Huanghuaihai and Lower Yangtze regions. According to the rainfall and irrigation data for southern Huanghuaihai and Southwest China, conditions were conducive to wheat yellow rust and sheath blight dispersal. In northern Huanghuaihai, high temperature and low precipitation provided conditions conducive for wheat aphid reproduction.

Wheat yellow rust

The mid-May distribution of wheat yellow rust is shown in figure 4.8 and table 4.4. The total area affected by the disease reached 3.7 million hectares, severely affecting central Ningxia, most of Henan, central Anhui, and central Shandong, but only moderately impacting eastern Gansu, eastern Anhui, and southern Jiangsu.

Figure 4.8. Distribution of wheat yellow rust in China (mid-May 2017)



[2] Please see Annex C on more information about the classification of pests and diseases.

Table 4.4. Statistics of wheat yellow rust in China (mid-May 2017)

Region	**Occurrence ratio (%)**			
	Absence	Slight	Moderate	Severe
Huanghuaihai	84	5	4	7
Inner Mongolia	88	4	4	4
Loess region	85	4	5	6
Lower Yangtze	86	4	4	6
Northeast China	90	4	4	2
Southern China	100	0	0	0
Southwest China	88	4	3	5

Wheat sheath blight

Wheat sheath blight—with distributions shown in figure 4.9 and table 4.5—damaged around 8.7 million hectares. The disease was found in most of Ningxia, most of Henan, and in central Anhui where impact was severe. In most of Shandong, eastern Gansu, southern Jiangsu, and eastern Sichuan, damage remained moderate.

Figure 4.9. Distribution of wheat sheath blight in China (mid-May 2017)

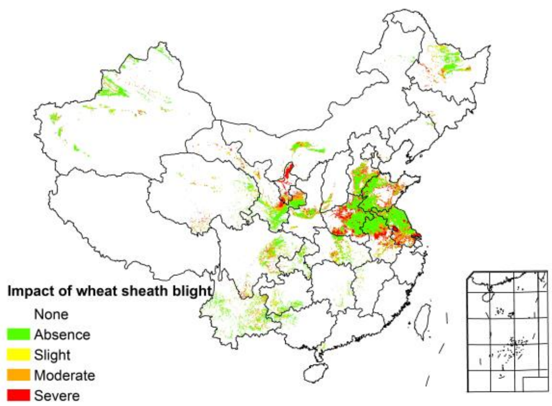


Table 4.5. Statistics of wheat sheath blight in China (mid-May 2017)

Region	**Occurrence ratio (%)**			
	Absence	Slight	Moderate	Severe
Huanghuaihai	61	7	14	18
Inner Mongolia	67	8	14	11
Loess region	65	5	13	17
Lower Yangtze	65	5	14	16
Northeast China	73	8	11	8
Southern China	86	5	7	2
Southwest China	73	6	13	8

Wheat aphid

Finally, wheat aphid (figure 4.10 and table 4.6) damaged around 12.7 million hectares, with the pest occurring in most of Henan, northern Shandong, and most of Heilongjiang with a severe impact. In northern Anhui, eastern Gansu, most of Yunnan, and eastern Sichuan, the impact was only moderate.

Figure 4.10. Distribution of wheat aphid in China (mid-May 2017)

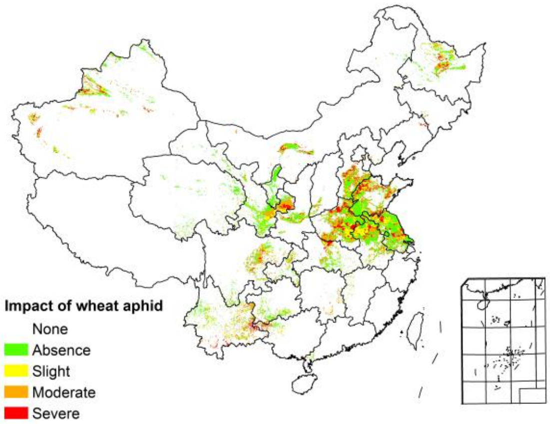


Table 4.6. Statistics of wheat aphid in China (mid-May 2017)

Region	Occurrence ratio (%)			
	Absence	Slight	Moderate	Severe
Huanghuaihai	47	16	19	18
Inner Mongolia	49	14	18	19
Loess region	50	16	19	15
Lower Yangtze	47	16	20	17
Northeast China	49	13	17	21
Southern China	46	14	19	21
Southwest China	52	14	17	17

4.4 China food imports and exports outlook for 2017

Analysis of food import and export in the first quarter of 2017

Wheat

Wheat imports for China in the first quarter of 2017 reached 1.08 million tons, an increase of 91.7% over the same period the previous year. Main sources of imported wheat were Australia (57.9% of total imports), the United States (26.7%), Kazakhstan (8.1%), and Canada (6.8%); the total value of the wheat imports amounted to US$ 227 million. Exports (21,100 tons) went mainly to Hong Kong and the Democratic People's Republic of Korea, which received respectively 79.7% and 12.6% of the total, the value of which amounted to US$ 11 million.

Rice

In the first quarter, 0.871 million tons of rice were imported, which was 3.0% less than the year before. The main sources of imported rice were Vietnam, Thailand, and Pakistan (accounting for 48.3%, 30.3%, and 11.0% of China's total rice imports, respectively), for a total value of US$ 412 million. Rice exports (0.2044 million tons worth US$ 119 million) went mainly to the Republic of Korea, Côte d'Ivoire, and Mozambique, respectively accounting for 34.0%, 22.6%, and 10.8% of exported rice.

Maize

China imported 306.6 thousand tons of maize in the first quarter, 52.5% less than the year before. The main sources of imports were Ukraine and the United States, respectively accounting for 93.6% and 5% of the total. The imports amounted to US$ 67 million in total. Exports were 1,344.85 tons (US$ 0.2978 million), of which most went to the Democratic People's Republic of Korea (94.5% of total exports).

Soybean

In the first quarter, soybean imports were 19.520 million tons, up 20.0%, mainly from the United States and Brazil (79.0% and 13.8%). The value of imports amounted to US$ 8,453 billion. Soybean exports were 32,500 tons, up 7.3%.

2017 prospects for imported food staples in China

The projections below are based on 2016-2017 global crop monitoring based on remote sensing data and a simulation model that takes into account major shocks and policies (based on the standard GTAP model).

- *Wheat.* China's wheat imports are estimated to grow 4.5%, while wheat exports will fall 10.2% in 2017. Domestic high-quality wheat production prospects were positively influenced by structural changes on the supply side. Overall, wheat imports are stable with a slight increase in 2017.
- *Rice.* In 2017, rice imports are expected to increase 8.7%, and exports will increase 1.5%. At present, domestic and foreign price differentials continue to exist; as a result, rice imports are predicted to continue an increase, but still within the quotas.
- *Maize.* Imports of the crop are expected to drop 30.6%, while exports of maize will increase 12.6%. The supply and demand situation of domestic maize is still loose, and maize imports are restricted.
- *Soybean.* In 2017, soybean imports are expected to increase 1.2%, while exports decrease 2.8%. Due to planting structure adjustment policies and low maize production, a growth in soybean import seems unlikely and soybean imports are expected to remain low in 2017.

4.5 Regional analysis

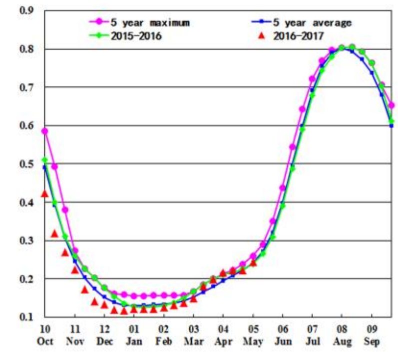
Figures 4.11 through 4.17 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Crop condition development graph based on NDVI, comparing the current season up to April 2017 to the previous season, to the five-year average (5YA), and to the five-year maximum; (b) Spatial NDVI patterns for January to April 2017 (compared to the (5YA); (c) NDVI profiles associated with the spatial patterns under (b); (d) maximum VCI (over arable land mask); and (e) biomass for January-April 2017. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A, table A.11.

Northeast region

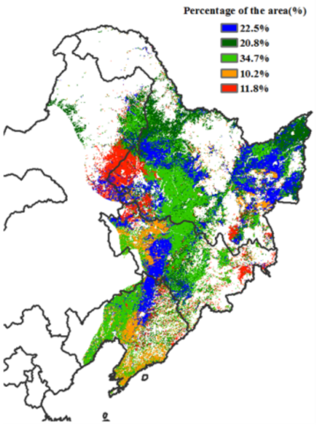
Agroclimatic conditions were favorable over the recent monitoring period of January-April, which covers the sowing period of crops in Northeast China. CropWatch agroclimatic indicators show average rainfall (RAIN, -1%) and slightly below average sunshine (RADPAR, -1%) associated with a significant positive temperature anomaly (TEMP, +1.9°C). The favorable agroclimatic conditions resulted in a 9% above average biomass potential (BIOMSS) in the region.

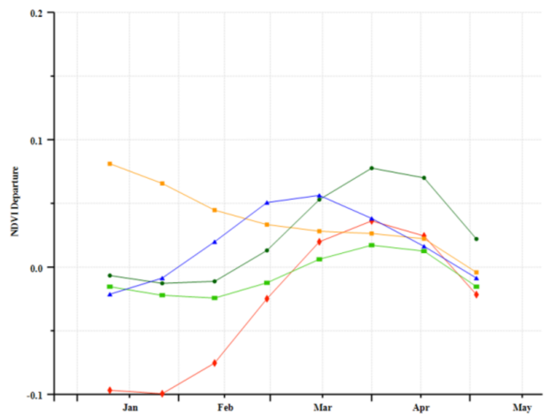
Crops have just been sowed in the region, and so far crop conditions are favorable for the early growing period of the crop.

Figure 4.11. Crop condition China Northeast region, January-April 2017

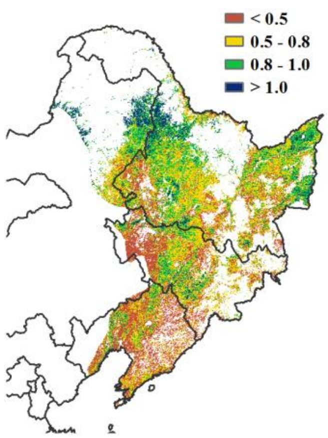


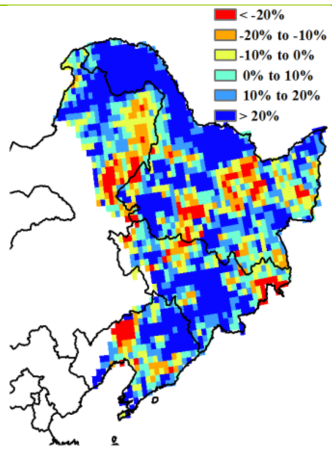
(a) Crop condition development graph based on NDVI





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



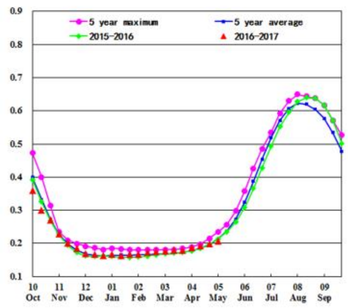


(d) Maximum VCI (e) Biomass

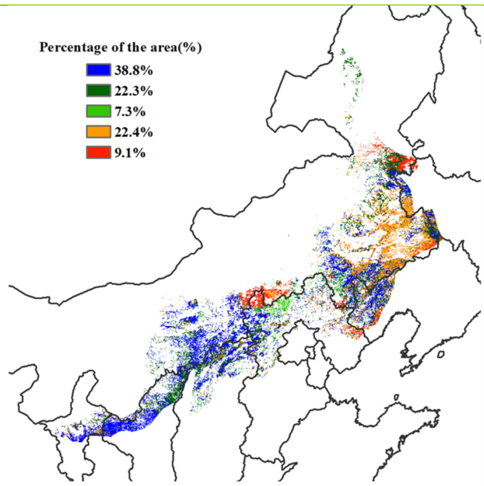
Inner Mongolia

No crops were cultivated in Inner Mongolia between January and April due to the seasonally low temperatures. The NDVI index in the crop condition development graph was very low before April. Along with gradually increasing temperatures, crops are starting to be sowed from April on. For the first four months of the calendar year, CropWatch rainfall and temperature indices were well above average (RAIN, +60% and TEMP, +1.5°C), while PAR accumulation was average. The resulting biomass increase measured by the BIOMSS indicator reaches 48%, with increases especially in central and northern areas. A record VCIx is observed in the north of the region. If favorable conditions continue over the whole crop cycle, the outcome may be an exceptionally good season.

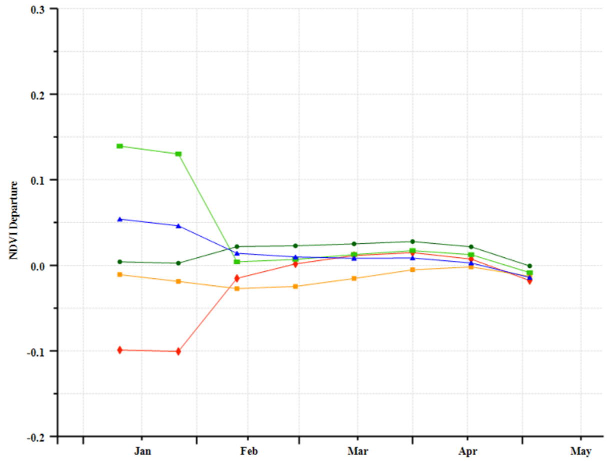
Figure 4.12. Crop condition China Inner Mongolia, January-April 2017



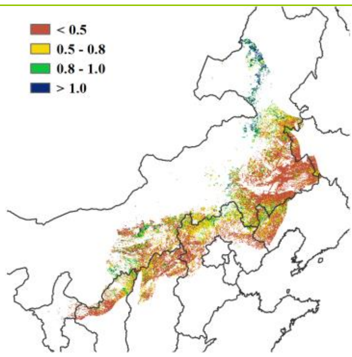
(a) Crop condition development graph based on NDVI



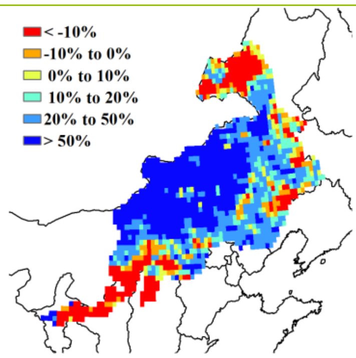
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

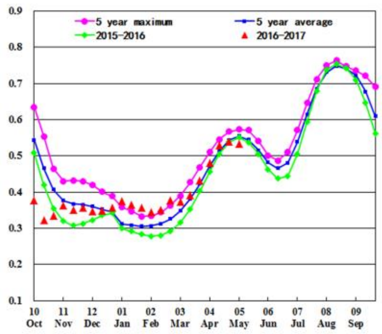


(e) Biomass

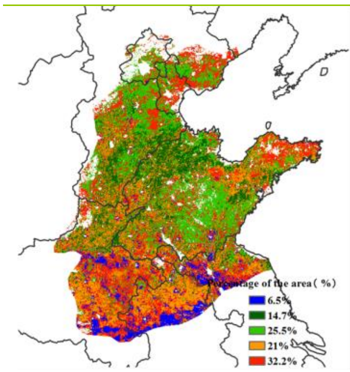
Huanghuaihai

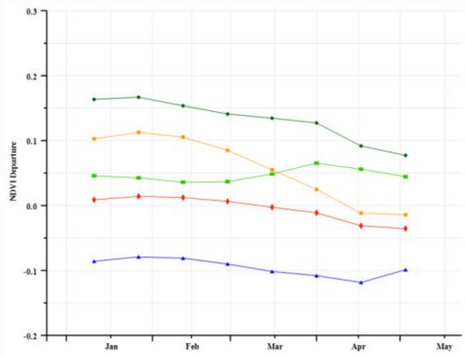
In Huanghuaihai, the harvesting of winter wheat will start in two months, while summer maize is going to be sowed immediately after. As shown by the NDVI development graph, crop condition was generally above the five-year average during the monitoring period and even better than the five-year maximum before March. According to the spatial NDVI patterns and profiles, the overall situation appears to be above average in most of the region, with the exception of some southern provinces (eastern Henan, northern Anhui, and Jiangsu) where crop condition was below average. Spatial NDVI patterns and the map indicating biomass production potential agree in showing below average conditions in the south. Satisfactory crop condition can be inferred also from the prevailing agroclimatic conditions in Huanghuaihai: 15% above average rainfall (RAIN), 0.9°C above average temperature (TEMP), and -3% below average PAR, resulting in a large improvement in the biomass production potential (BIOMSS, +19%) compared to the recent five-year average. The maximum VCI presents high values in almost the entire region, while low values occur in eastern Hebei. Overall, favorable climatic conditions will greatly benefit the development of winter wheat and the sowing of the forthcoming summer crop.

Figure 4.13. Crop condition China Huanghuaihai, January-April 2017

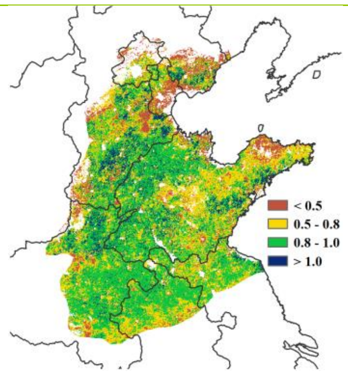


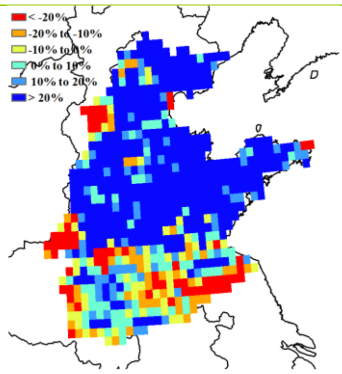
(a) Crop condition development graph based on NDVI





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



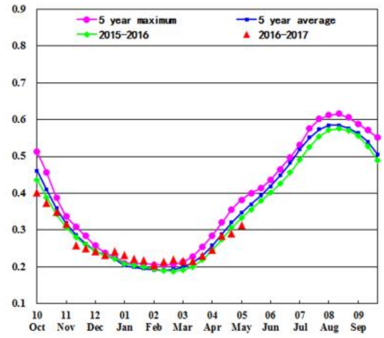


(d) Maximum VCI (e) Biomass

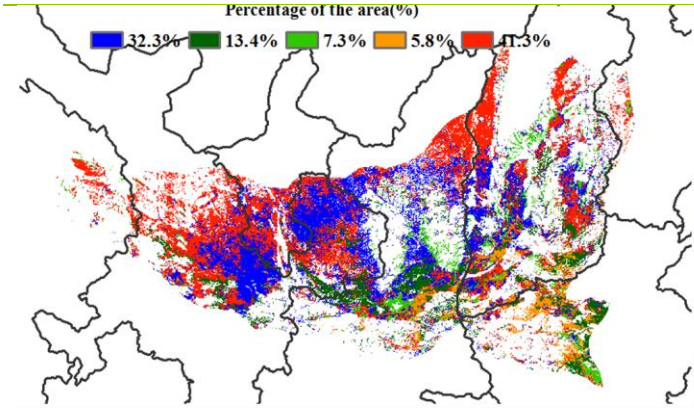
Loess region

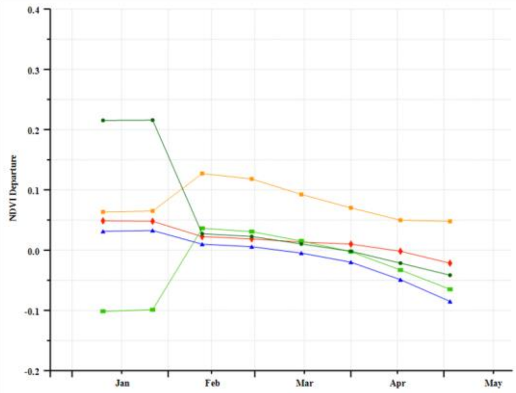
According to the crop condition development graph based on NDVI, crop condition was generally better than last year's in the Loess region except during the second half of April. The main crops in the region are spring wheat and winter wheat. Spring wheat was sowed during late March to early April, while winter wheat was sowed in October and will be harvested in early June. During the monitoring period, rainfall (RAIN) exceeded average by 23%, while temperature (TEMP) was 0.4°C above. Radiation (RADPAR) was 5% below average, which is consistent with the excess precipitation. The additional detail provided by the NDVI clusters and profiles shows that crop condition was close to average in most parts of the region until mid-April. It then deteriorated, and at the end of the monitoring period, crop condition was below average, especially in the middle and east of Gansu province. The fraction of cropped arable land (CALF) for the region decreased 7 percentage points when compared with the five-year average, which indicates less land is cropped. The potential biomass indicator (BIOMSS) was 16% above average, with above average values in particular reported in the south of Shanxi and eastern Shaanxi province. According to the VCIx map, with the exception of central Shaanxi, current crop condition in the region is unfavorable but deserves close monitoring.

Figure 4.14. Crop condition China Loess region, January-April 2017



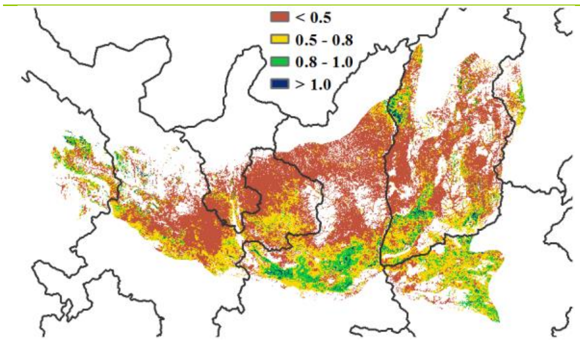
(a) Crop condition development graph based on NDVI

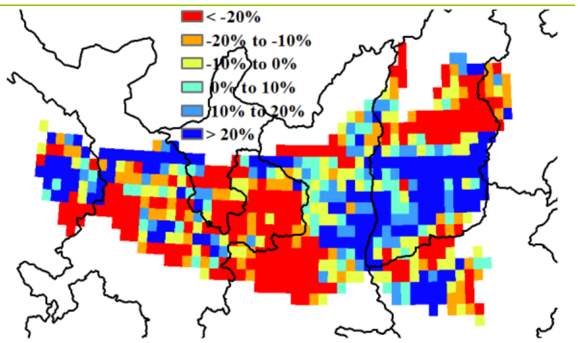




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





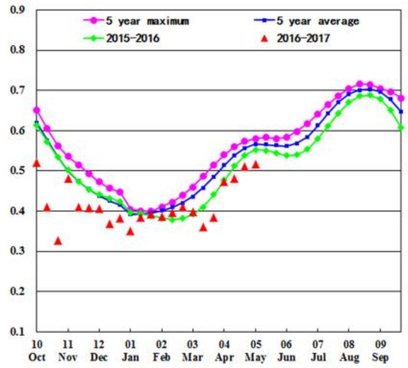
(d) Maximum VCI

(e) Biomass

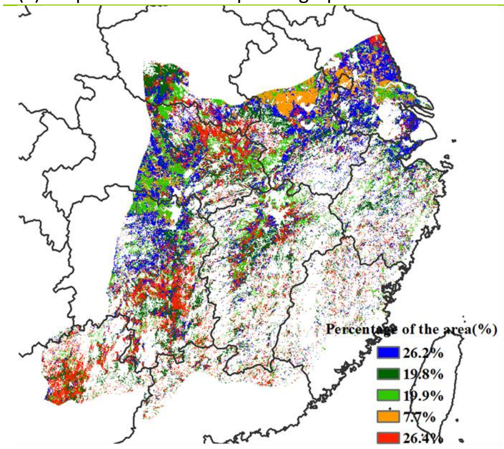
Lower Yangtze region

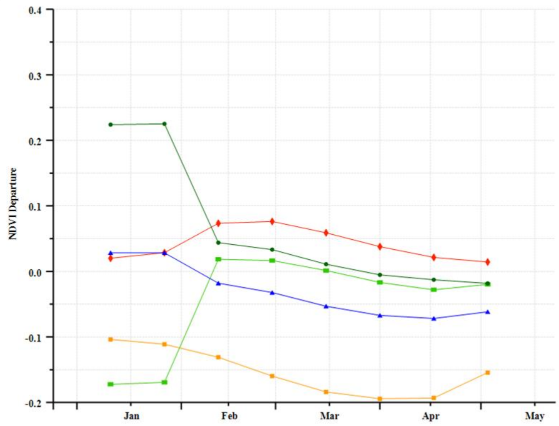
In the north of the region, winter wheat has reached the flowering stage, while in the south early rice was at transplanting. The harvest of rapeseed was completed in early April. Overall, crop condition in the region was below the five-year average, according to the crop condition development graph based on NDVI. As for the agroclimatic indicators, rainfall (RAIN, -21%) and radiation (RADPAR, -7%) were below average, while temperature was about average (+0.4°C). As a result, the BIOMSS index dropped 6% compared to the average for this region and period, and even as much as 20% in middle and southwest Jiangsu, middle of Jiangxi and Hubei, and in the east of Hunan. Considering that the fraction of cropped arable land (CALF) was 2 percentage points below the average of recent years, crop production is anticipated to be mostly unfavorable.

Figure 4.15. Crop condition Lower Yangtze region, January-April 2017



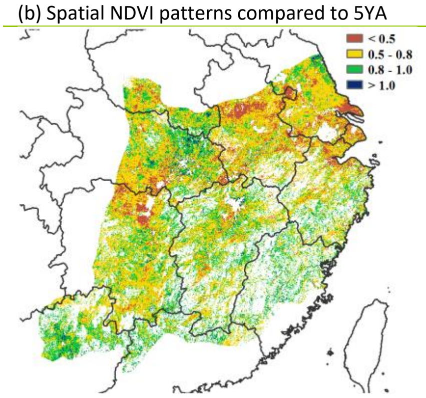
(a) Crop condition development graph based on NDVI

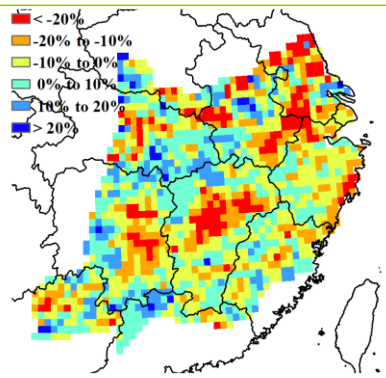




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

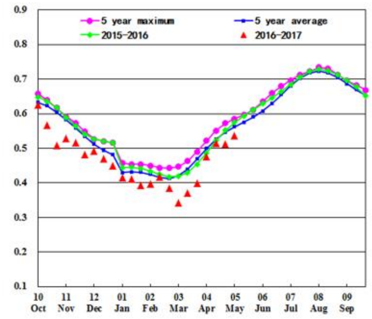
(e) Biomass

Southwest China

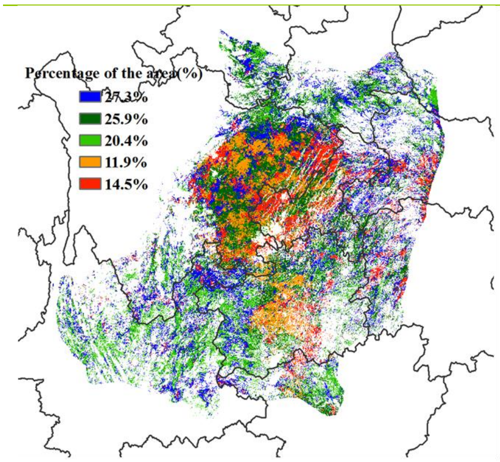
The monitoring period covers the planting of maize and single rice, as well as the growth of winter wheat in this region. Conditions were generally below average in January and March and close to average in February and April. Rainfall (RAIN, -17%) and radiation (RADPAR, -13%) indicators were below average for this monitoring period, while temperature was about normal (TEMP, -0.1°C).

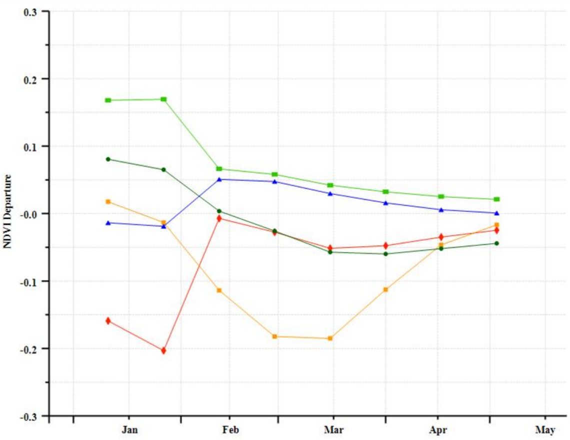
The maximum VCI for Southwest China (0.69) is just fair, and the fraction of cropped arable land (CALF) underwent a slight drop of 1 percentage point. The map of spatial NDVI patterns and associated profiles adds some spatial detail: below average conditions occurred in (i) parts of east Sichuan and west Guizhou in February and March, and also in (ii) parts of north and west Chongqing and east Sichuan in January. Compared to average, 37% and 30% below average rainfall were observed in Chongqing and Guizhou respectively. As this will probably negatively influence the outcome of the cropping season, close monitoring is required.

Figure 4.16. Crop condition Southwest China region, January-April 2017



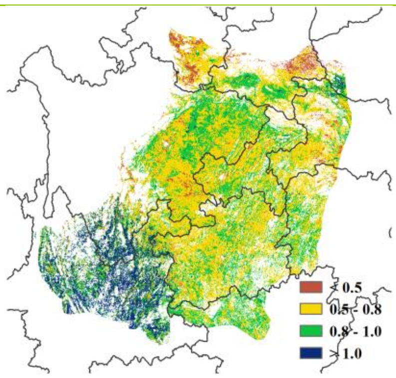
(a) Crop condition development graph based on NDVI

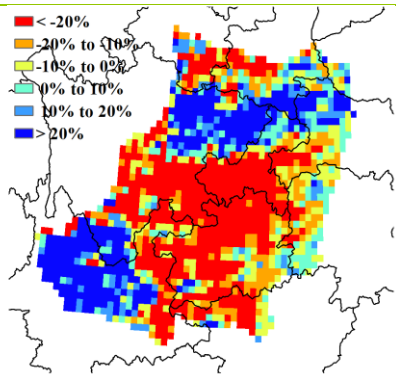




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





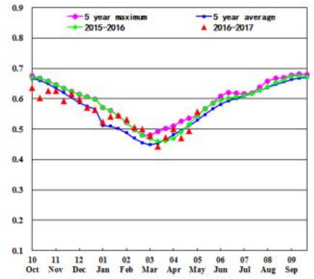
(d) Maximum VCI

(e) Biomass

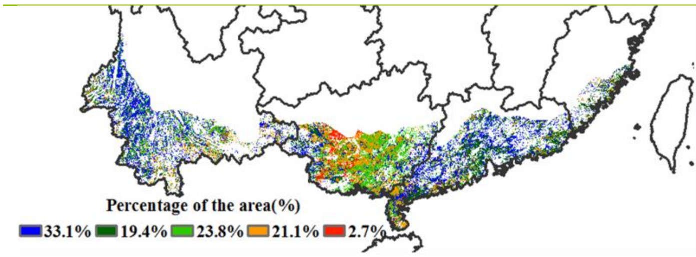
Southern China

This reporting period mainly covers the planting of early rice and the growing season of winter wheat in Southern China. Crop condition was mixed, with condition generally above average between January and February, then below average from March to April—possibly due to heavy rain and low temperature, and average again at the end of April. For the period as a whole, rainfall was almost double the average (RAIN, +99%), while the temperature departure was negative (TEMP, -1.1°C). Parts of southern Fujian and central Guangxi provinces showed below average crop condition in March and April according to the spatial NDVI patterns. This was brought about by the excess rain (+96% in Guangxi and +85% in Fujian), and the area will need close monitoring. Other areas in the region shows above average condition but with a mix of average and anomalous climate variables between provinces: in Yunnan, rain was below average (-10%) and TEMP and RADPAR were relatively low (-1°C and -8%, respectively); in Guangdong, rainfall and TEMP were average (RAIN, 0% and TEMP, 0%), while RADPAR was below average (-6%). Southern Yunnan and Guangxi also showed a significant drop in the biomass production potential (BIOMSS, -20%), further underlining the need for continued close monitoring. The excess precipitation is likely to negatively influence the current winter crops. Summer crops are likely to benefit from abundant soil moisture.

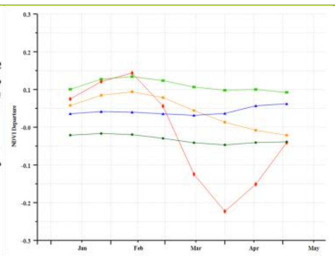
Figure 4.17. Crop condition Southern China region, January-April 2017



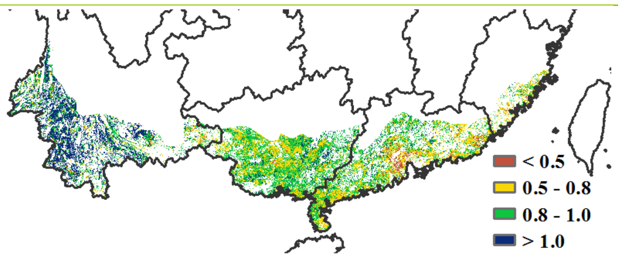
(a) Crop condition development graph based on NDVI



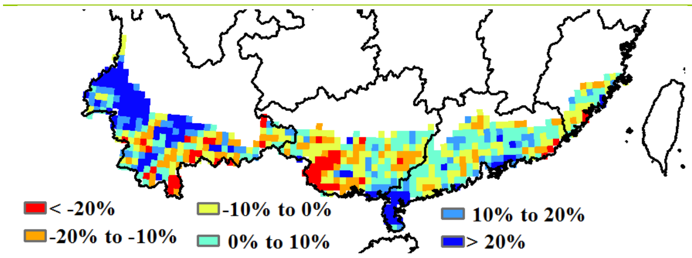
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass