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 agroclimatic and agronomic conditions over the monitoring period (section 4.1), sections 4.2 and 4.3 present an update on the 2017 import and export outlook for China (4.2) as well as the status of domestic prices for major crops (4.3). Section 4.4 presents CropWatch analysis for each of the seven individual regions. Additional information on the agroclimatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

Overall, China enjoyed crop conditions similar to last year's. At the national scale, the agrometeorological conditions that prevailed during the monitoring period (TEMP, +0.7°C and RADPAR, -12%) were quite close to the average. Together with favorable rainfall (RAIN, +12%), they resulted in above average potential biomass (BIOMSS, +25%). TEMP was quite close to average everywhere, with the largest—but still moderate—departures occurring in the Loess region (+1.3°C) and in Northeast China (-0.6°C). RAIN was much higher than expected in Inner Mongolia (+151%), while the Loess region and the Huanghuaihai region recorded increases of 121% and 107%, respectively. Abundant precipitation was also reported in several provinces, especially in Ningxia province (+182%). Some parts of the major agricultural areas of China suffered from relative low temperatures during early-November and mid-November, while some parts suffered from relative low rainfall during early-October, early-November, mid-December and late-January. Figures 4.1-4.4 and table 4.1 below illustrate the distribution of the various CropWatch indicators.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, October 2016-January 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	107	0.6	-13	99	-6	0.73
Inner Mongolia	151	0.7	-4	91	n.a.	0.55
Loess region	121	1.3	-9	101	-5	0.70
Lower Yangtze	-12	1.0	-21	6	-8	0.67
Northeast China	90	-0.6	-3	7	n.a.	0.70
Southern China	-7	1.0	-9	4	0	0.55
Southwest China	-5	0.9	-12	0	0	0.73

Note: n.a. = not applicable. Over the monitoring period, no crops are in the field in Northeast China and Inner Mongolia.

High VCIx values occurred mostly in China's southwest and southern regions. Low VCIx values mainly affected the Loess region, central and northeast China, and particularly the southeast of Henan province and northwest of Anhui province. At the regional scale, BIOMSS was above average in the six regions except Southwest China, with especially high values in the Loess (+101%), Huanghuaihai (+99%), and Inner Mongolia (+91%) regions. At the provincial level, the highest BIOMSS values occurred in Ningxia (+171%), Guangdong (+115%), and Shandong (+115%) provinces. Low BIOMSS was mainly recorded in southern areas such as Guangxi (-19%), Guizhou (-16%), and Yunnan (-11%) provinces.

Figure 4.1. China spatial distribution of rainfall profiles, October 2016-January 2017

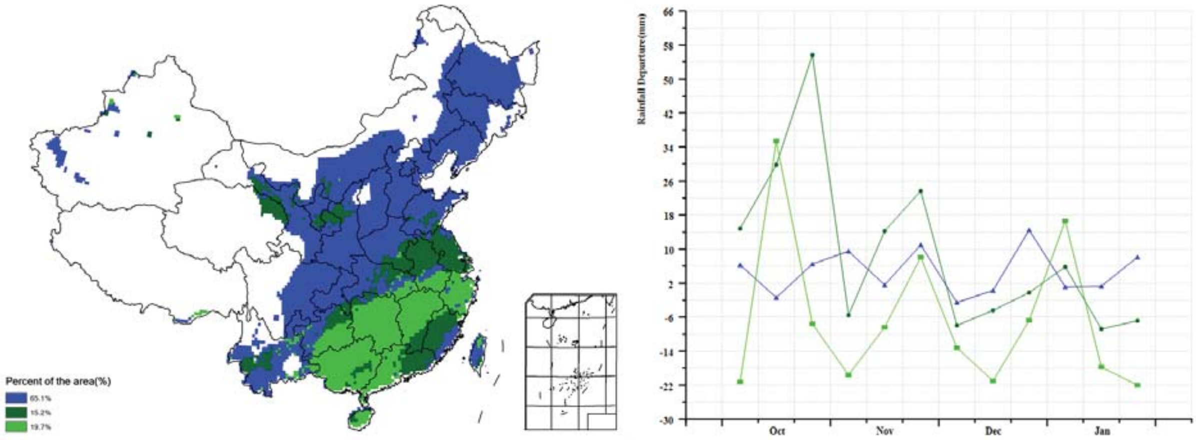


Figure 4.2. China spatial distribution of temperature profiles, October 2016-January 2017

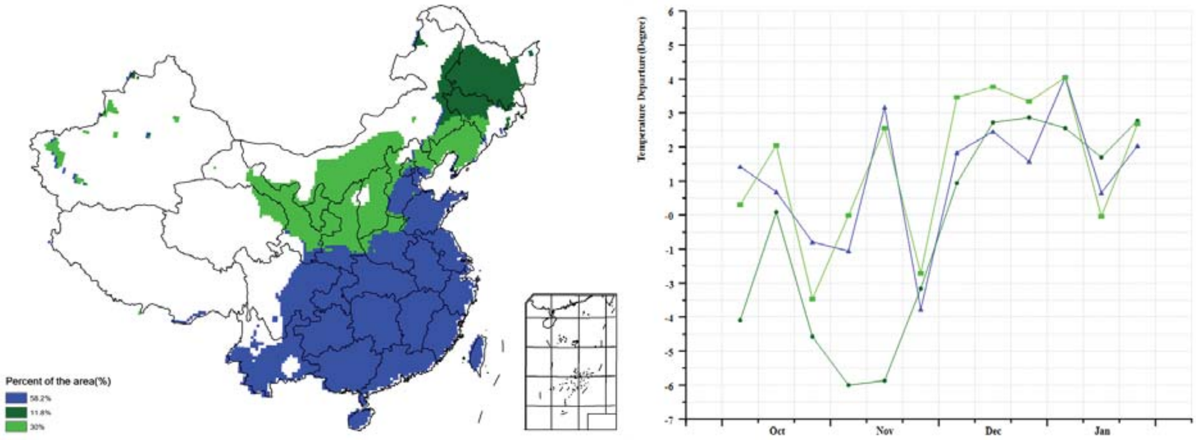


Figure 4.3. China cropped and uncropped arable land, by pixel, October 2016-January 2017

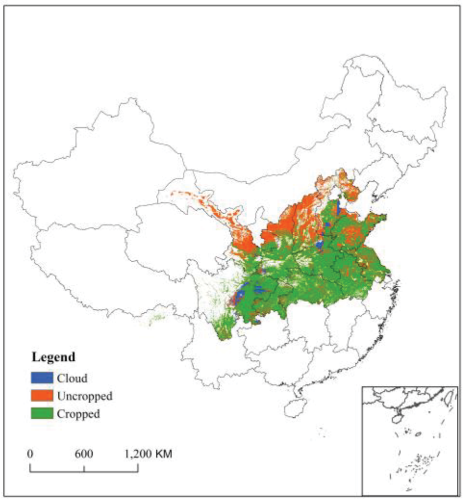
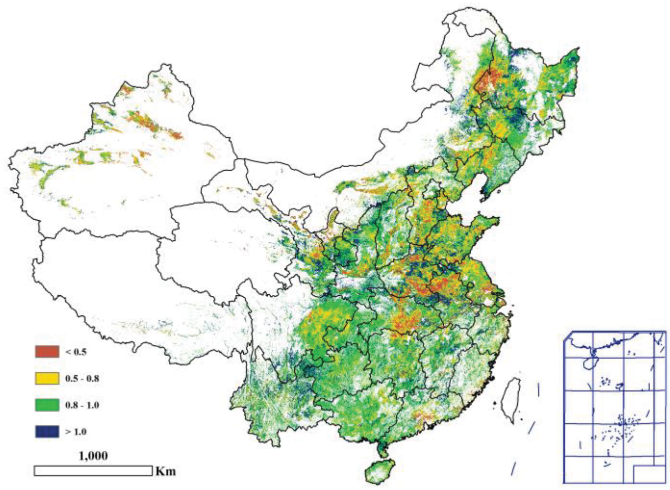


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, October 2016-January 2017



During the monitoring period, the cropped arable land fraction (CALF) overall had the tendency to a bit of decreasing in comparison with the previous five years' average. For two of the seven monitored regions, CALF was equal to the five-year average, while three relative negative values were recorded in the Huanghuaihai region (-6 percentage points), the Loess region (-5 percentage points), and the Lower Yangtze region (-8 percentage points). The uncropped land is mainly distributed in the north of Gansu, Shanxi, and Shaanxi, east of Ningxia, and central Shandong and Sichuan provinces.

4.2 China food imports in 2016 and export outlook for 2017

Previous year (2016)

Food

In 2016, China imported 21.997 million tons of cereals, 32.8% below the previous year's imports (Table 4.2). Main sources for imported grains were the United States, Australia, Ukraine, and Vietnam, accounting for, respectively, 31.6%, 25.4%, 13.7% and 7.4% of the total volume of imports. Their total value amounted to US$ 5.714 billion. Food exports were 636,000 tons, which was 19.5% more than the previous year. Exported grain mainly went to South Korea, Hong Kong, and Japan, respectively accounting for 29.8%, 16.4%, and 14.7% of the total exports. Exports amounted to US$ 505 million.

Wheat

Wheat imports in 2016 reached 3.412 million tons, an increase of 13.5% over the previous year. Main sources were Australia (40.8% of total imports), Canada (30.2%), and the United States (22.8%). Total wheat imports amounted to US$ 815 million. Exports (112,800 tons) went mainly to Hong Kong and the Democratic People's Republic of Korea, which received respectively 83.5% and 5.5% percent of the total, the value of which amounted to US$ 62 million.

Rice

In 2016, 3.563 million tons of rice were imported, up 5.5% over the previous year. The main sources of imports were Vietnam, Thailand, and Pakistan (45.4%, 26.9%, and 19.8% of the total, respectively), for a total value of US$ 1.614 billion. Rice exports (395,100 tons worth US$ 351 million) went mainly to the Republic of Korea, the Democratic People's Republic of Korea and Japan, respectively accounting for 44.4%, 10.6%, and 9.6%.

Maize

China imported 3.166 million tons of maize last year, 3.0% less than the year before. The main sources of imports were Ukraine, the United States, and Laos, respectively accounting for 84.0%, 7.0%and 4.4%ofthe total. Maize imports amounted to US$ 634 million. Exports were 3,457 tons, of which most went to the Democratic People's Republic of Korea (90.4% of total exports). Exports totaled $1.110 million.

Soybean

In 2016, soybean imports were 83.230 million tons, up 1.8%, mainly from Brazil, the United States, and Argentina (45.7%, 40.4%, and 9.6%). The value of imports amounted to US$ 34.018 billion. Soybean exports were 128,300 tons, down 4.2%.

2017 prospects for imported food staples in China

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

In 2017, the imports of major crop types are expected to increase. Figure 4.5 compares projected imports and exports of the main commodities.

Wheat.

Wheat imports will grow 5.0% while wheat exports will fall 7.2%. Although the comparative benefit of wheat is low, the overwintering conditions of winter wheat in the north and south of China have generally been good. Wheat imports are stable with a slight increase in 2017.

Rice

In 2017, rice imports are expected to increase 6.0%, while exports will decrease 1.5%. At present, domestic and foreign price differentials are still expanding, and rice imports are predicted to keep increasing in 2017, but still within the quotas.

Maize

Imports are expected to drop 8.6% and exports 4.3%. At present, the situation of domestic maize supply and demand is still loose; prices are low, and maize imports are restricted. Maize imports are stable with decreasing trend in 2017.

Soybean

In 2017, soybean imports are expected to increase 0.6%, while exports decrease 3.5%. Under the influence of planting structure adjustment policies and low maize prices, the soybean hectarage will slightly increase, and imported soybean growth will be reduced.

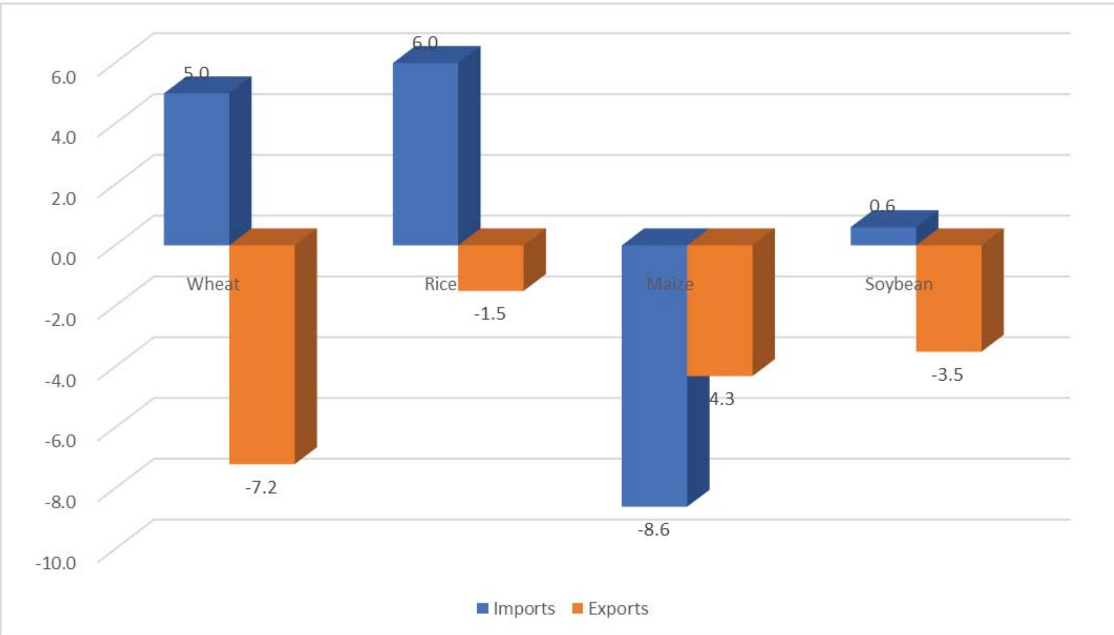


Figure 4.5. Change in import and export of four main crops in China, 2017 (percentage).

Table 4.2. Chinese imports and exports of main commodities in 2016 and 2017 (projections)

		2016		2017 projection	
		M tons	Δ%	M $	Δ%
Imports	Wheat	3.4119	+13.5	815	+5.0
	Rice	3.5628	+5.5	1614	+6.0
	Maize	3.1663	-33.0%	634	-8.6
	Cereals	21.9970	-32.8	5714	
	Soybean	83.2302	+1.8	34018	+0.6
Exports	Wheat	0.1128		62	-7.2
	Rice	0.3951		351	-1.5
	Maize	0.0035		1.1095	-4.3
	Cereals	0.6360	+19.5	505	
	Soybean	0.1283	-4.2		-3.5

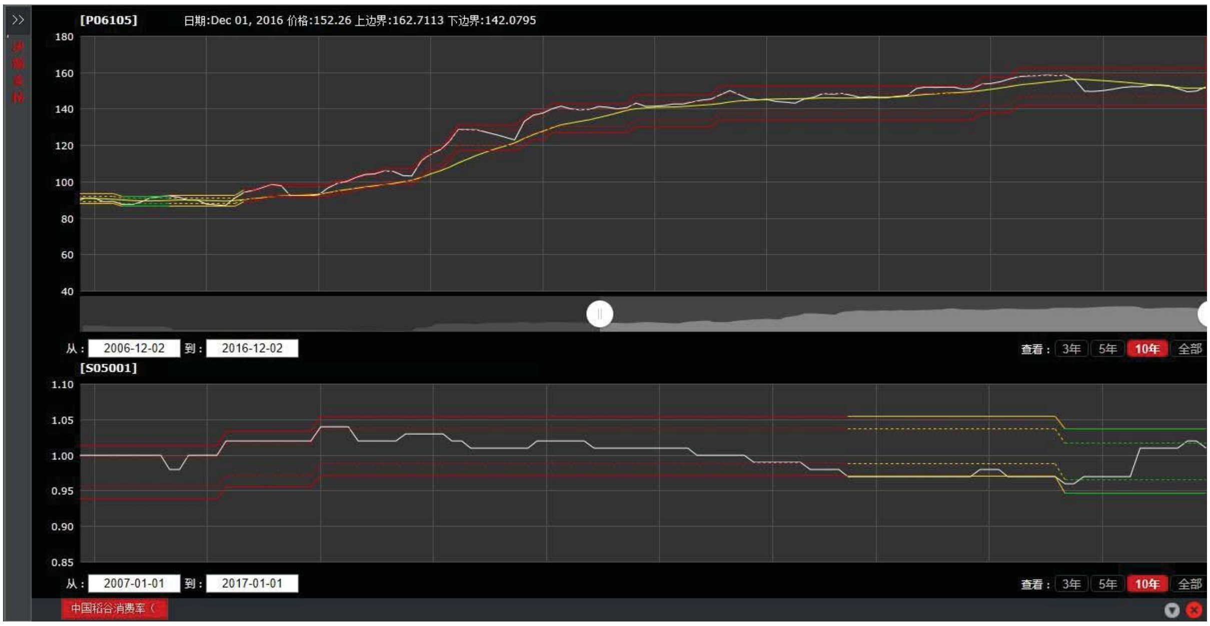
Δ% indicates percentage difference with previous year. M tons indicates amount in million tons; M$ indicates value in million US$.

4.3 Outlook for the domestic price of four major crops

The following analysis of domestic prices for soybean, maize, japonica rice, and wheat in China is based on (i) nationwide monthly grain price data between December 2006 and December 2016 provided by the price information center of China's National Development and Reform Commission (NDRC) and (ii) price trend forecasts and early warning obtained by Fang Jingxin's price-spiral model, in addition to other national and international ancillary data sources. The outlook is as follows:

- *Soybean.* According to data for the last six months, the international consumption ratio for soybean is at equilibrium. Domestic soybean prices are also at equilibrium but fluctuate around the trend line; fluctuations are expected to amplify.
- *Paddy rice.* As a result of the changing relationship between supply and demand, the recent downward trend for the price of paddy rice in China will slow down. For now, the price has returned above the trend line; if it can keep this position for five months, it is assumed the upward price trend will continue. (See figure 4.6.)
- *Maize.* Maize prices have hit bottom, and the consumption rate has entered the non-equilibrium interval. This shows that the supply and demand situation is conducive to recovery. An early warning is made for the reversal of the declining price trend.
- *Wheat.* Current prices and consumption rates are at equilibrium. It is expected that the decline will gradually calm down to above the trend line. Similar to the situation for paddy, if the price position can be maintained for five months, an upward trend for the price of maize is assumed.

Figure 4.6. Fluctuations in the price of paddy rice, December 2006 to December 2016



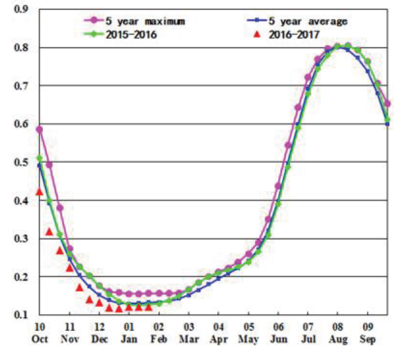
4.4 Regional analysis

Figures 4.7 through 4.13 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 January 2017 to the previous season, to the five-year average (5YA), and to the five-year maximum; (b) Spatial NDVI patterns for October 2016 to January 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 October 2016-January 2017. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A, table A.11.

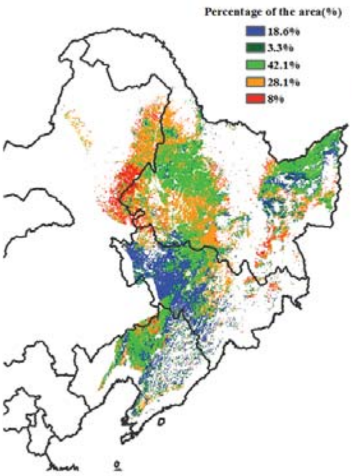
Northeast region

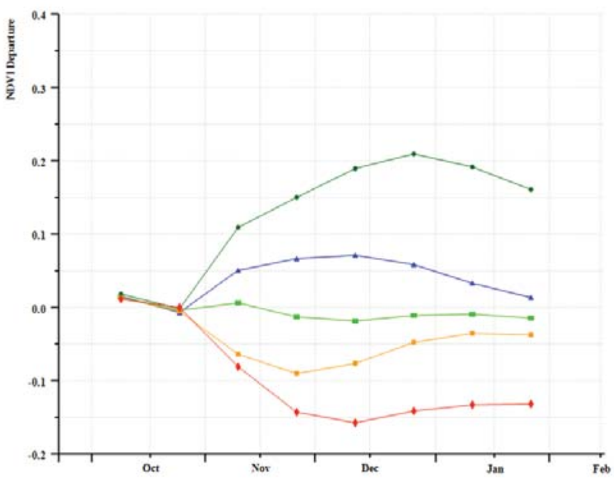
No crops are grown between late October and January in Northeast China due to the low temperatures. For the period under consideration, however, agroclimatic conditions were favorable for crops to be planted in April. The CropWatch agroclimatic indicators show markedly above average rainfall (RAIN, +90%) and a slight decrease in radiation (RADPAR, -3%). Temperature (TEMP, -0.6°C) was generally about average. These favorable agroclimatic conditions resulted in a 7% above average potential biomass production (BIOMSS) in the region. The only exception to these generally good conditions is a region west of Heilongjiang province (Xiaoxingan ranges), which shows below average NDVI due to heavy snow and extreme low temperature during the previous monitoring period; VCIx also shows this spatial pattern (with a VCIx <0.5 in this area). In general, abundant snow will ensure good soil moisture, which will benefit spring crops in 2017.

Figure 4.7. Crop condition China Northeast region, October 2016-January 2017



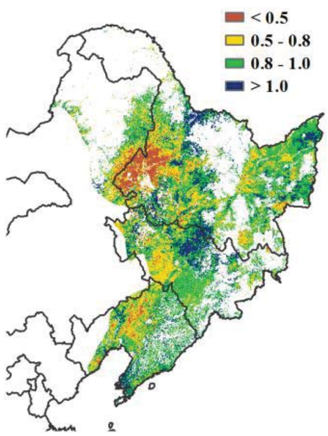
(a) Crop condition development graph based on NDVI

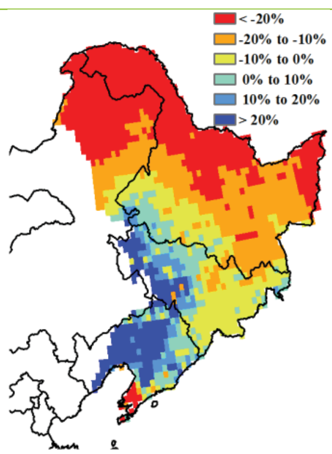




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

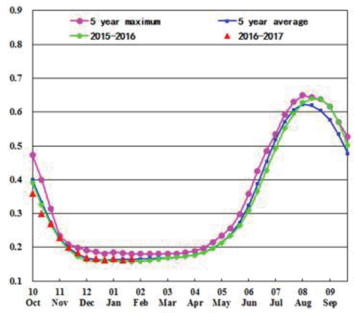
(e) Biomass

Inner Mongolia

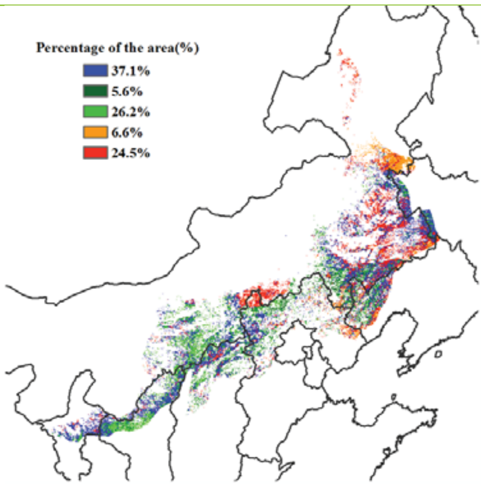
Over the reporting period, winter crops in Inner Mongolia cannot survive due to very low temperatures. Prevailing conditions nevertheless will influence the forthcoming spring crop season. Compared with average conditions, the CropWatch agroclimatic indicators show a very significant increase of RAIN (+151%) and a decrease of RADPAR (-4%), while TEMP was about average (+0.7°C). BIOMSS, however, was significantly above the five-year average for the same period (+91%).

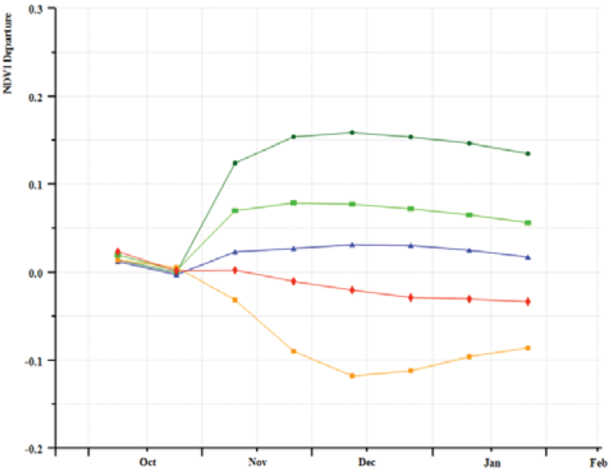
From October, below average conditions had little effect as the crops had reached maturity, even if excess rainfall locally hampered harvesting. Abundant snow since December will provide favorable soil moisture for the sowing of upcoming spring crops. Potential biomass during the monitoring period in most areas of Inner Mongolia was at least 20% above average, but 10% below average in the north. Some risk exists that higher than average temperature may have some influence on spring crops by prematurely depleting reserved soil moisture.

Figure 4.8. Crop condition China Inner Mongolia, October 2016-January 2017



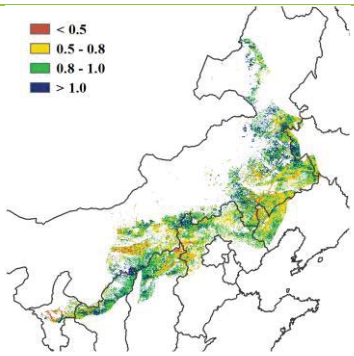
(a) Crop condition development graph based on NDVI

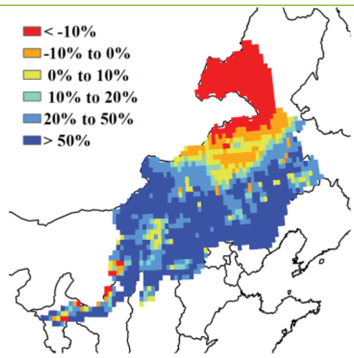




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

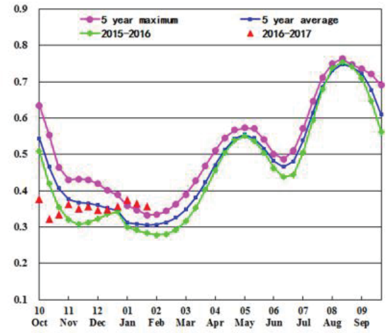
(e) Biomass

Huanghuaihai

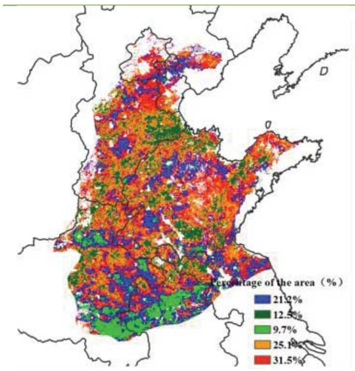
Crop condition in Huanghuaihai was generally below the recent five-year average, although it exceeded that level in January. Unfavorable meteorological conditions during the last monitoring period may have impacted crop sowing and crop development at early growing stages. In addition, dry weather from July to October hindered the germination of winter wheat, which is confirmed by the well below average NDVI value before January in the NDVI development graph. Significantly above average rainfall (RAIN, +107%) from October to January provides sufficient soil moisture for winter wheat to develop after the wintering period, resulting in a marked increase in the biomass production potential (BIOMSS, +99%).

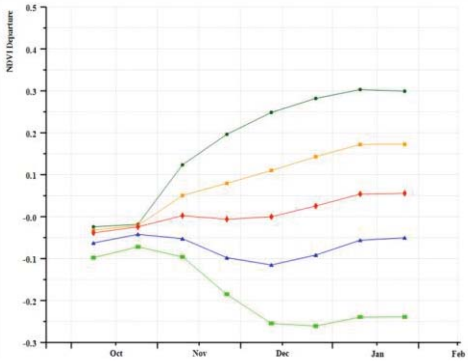
As shown in the spatial pattern of the NDVI departure map, crop condition was slightly below average before the middle of October in almost the whole region, and well below the average since November in scattered locations across the region, especially in eastern Henan and northern Anhui provinces. Since December, crops in the region have been recovering, turning to average condition by January, mainly due to abundant rainfall. The maximum VCI presents low values in eastern and northern Henan, northern Anhui, and central Hebei, which is consistent with the spatial distribution of the crop condition. Overall, climatic conditions so far will benefit the development of the winter wheat after dormancy.

Figure 4.9. Crop condition China Huanghuaihai, October 2016-January 2017



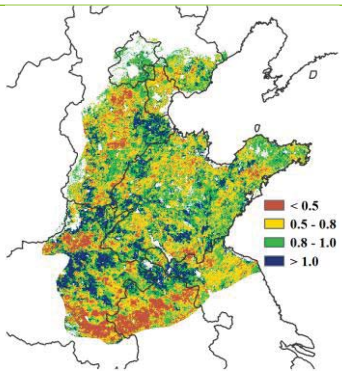
(a) Crop condition development graph based on NDVI

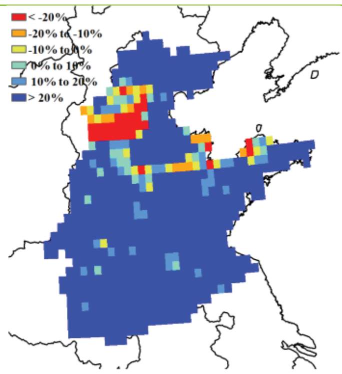




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

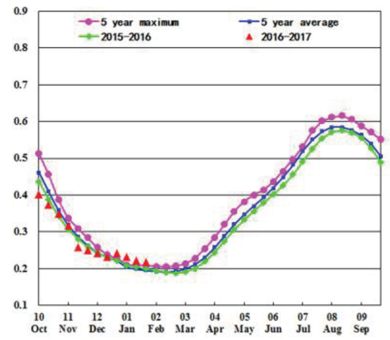
(e) Biomass

Loess region

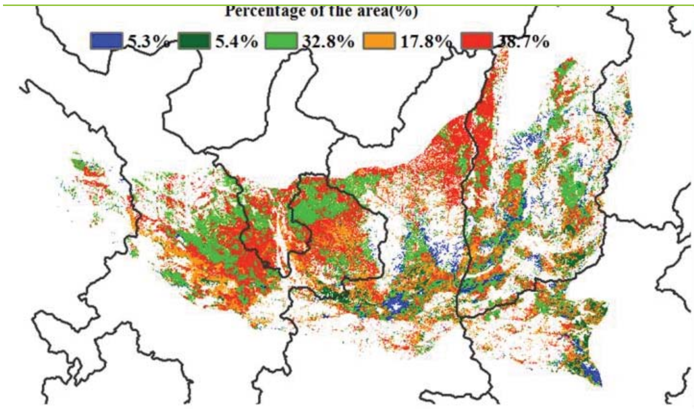
The most relevant crop during the monitoring period was currently hibernating winter wheat. From the beginning of October to early-December, crop condition was inferior to last year's and below the five-year average. However, from mid-December to the end of the monitoring period crop condition recovered to exceed both last year's and the five-year average. Radiation (RADPAR, -9%) was below average for the region, while temperature (TEMP, +1.3°C) was above and precipitation (RAIN, +121%) far above, which gave rise to a potential biomass (BIOMSS) far above average as well (+101%).

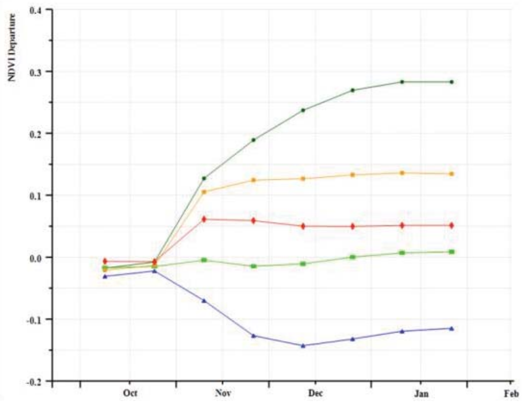
In most of the region, the analyses based on spatial NDVI clusters and profiles are consistent with VCIx. The most favorable conditions occurred mainly in the north of Shanxi and Shaanxi provinces and in the east of Gansu province, due to the abundant rainfall and suitable sunlight. On the contrary—and mostly because of drought during the monitoring period (as confirmed by the maps of potential biomass)—crops were in poor condition in the middle of Gansu and Shaanxi provinces and in the east of Shanxi. The seemingly above average crop condition in some areas from mid-December may be the result of rapid growth due to high temperature. Altogether, crop prospects in the region are favorable.

Figure 4.10. Crop condition China Loess region, October 2016-January 2017



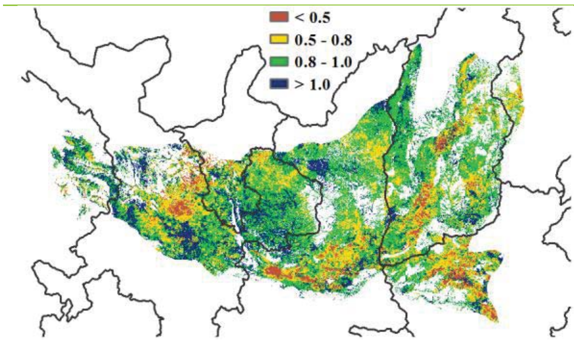
(a) Crop condition development graph based on NDVI

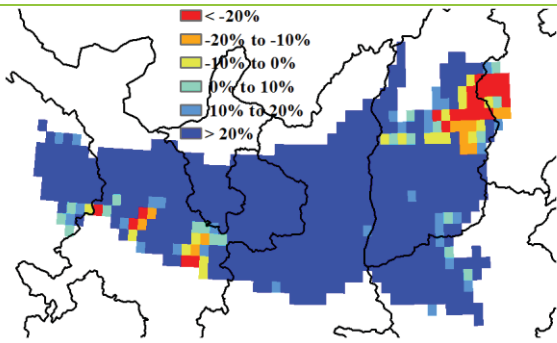




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





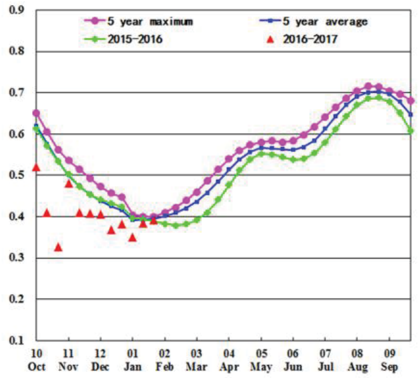
(d) Maximum VCI

(e) Biomass

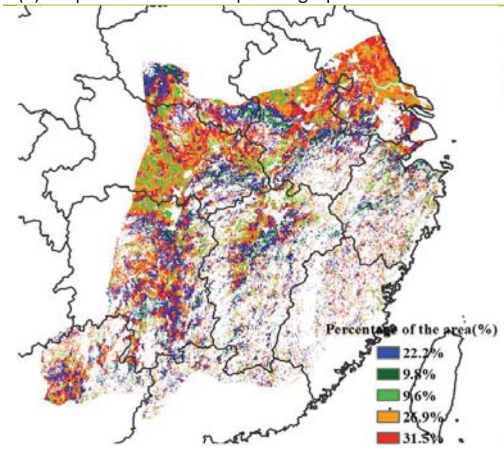
Lower Yangtze region

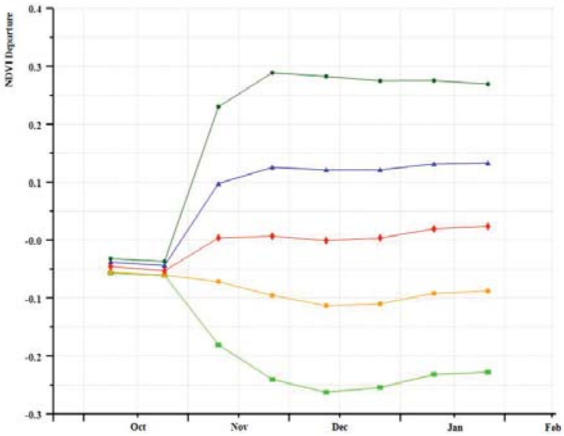
During the monitoring period, few crops were in the field except for winter wheat growing in the northeast and northern part of the region. Rainfall (RAIN, -12%) and radiation (RADPAR, -21%) were below average according to the CropWatch agroclimatic indicators, while temperature was above average (+1°C). Somewhat unfavorable rainfall and radiation and favorable temperature condition brought about a slight increase in the biomass production potential (BIOMSS, +6%). Based on NDVI, crop condition was below average compared to the five-year average. The BIOMSS map shows that almost half of the region suffered a marked decrease of 20% in BIOMSS this period, while an increase of 20% occurred in the north and southeast of the region. NDVI profiles show that the crop condition was predominantly poor in 36.5% of the region's cropped areas, located in the south of Jiangsu, middle of Anhui, and in Hubei province, which was confirmed by the VCIx maps. Prospects for crops in the region are mixed and vary spatially.

Figure 4.11. Crop condition Lower Yangtze region, October 2016-January 2017



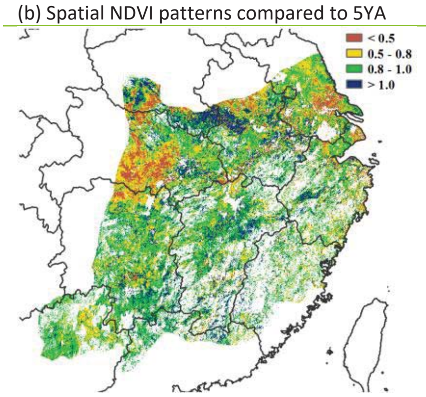
(a) Crop condition development graph based on NDVI

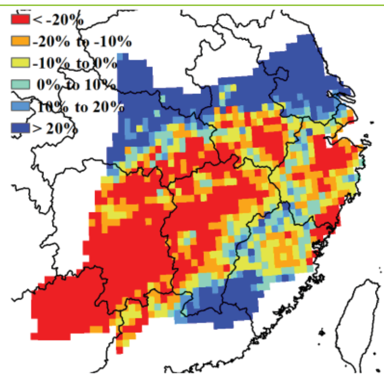




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

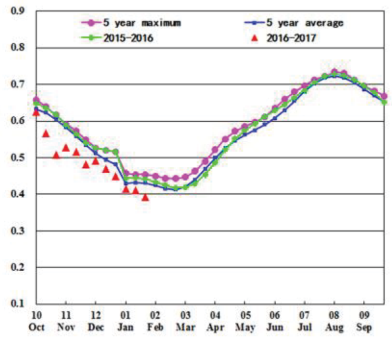
(e) Biomass

Southwest China

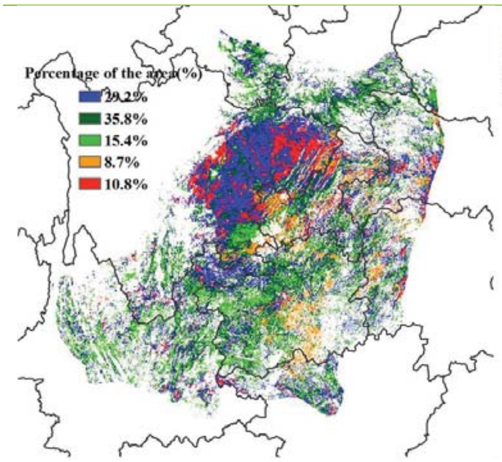
The overall crop condition in the region is locally below average compared with the recent five-year average, at a time that coincides with the planting season of winter wheat. NDVI was generally below average by about 0.1 units during most of the time. Agroclimatic indices show a 12% decrease of radiation (RADPAR), accompanied by a positive temperature (TEMP) anomaly of 0.9°C. The cropped arable land fraction (CALF) remains at the same level as the five-year average.

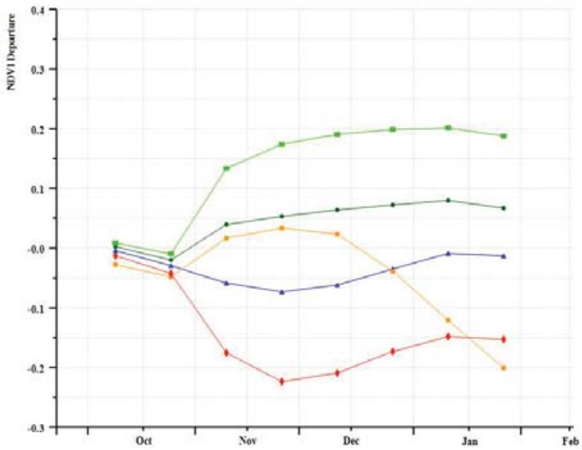
According to the spatial NDVI patterns and profiles, winter wheat condition is below average in western Chongqing, western Guizhou, parts of western Hubei, Hunan, and especially in eastern Sichuan areas, where the maximum VCI was mainly in the range of 0.5 to 0.8. This can probably be assigned to low RADPAR in Chongqing (-22%), Guizhou (-16%), Hubei (-22%), and Hunan (-24%), and increased air temperature (Sichuan: +0.9°C; Chongqing: +0.7°C; and Guizhou: +1.2°C). Crop condition is generally favorable, with the exception of the listed areas where the final outcome will depend on conditions prevailing during the coming months.

Figure 4.12. Crop condition Southwest China region, October 2016-January 2017



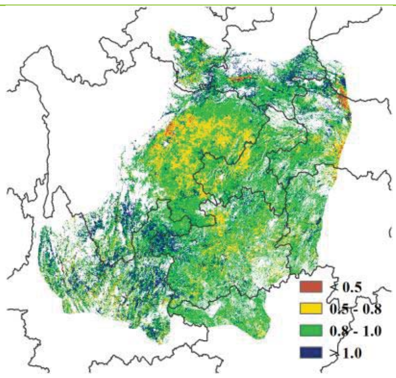
(a) Crop condition development graph based on NDVI

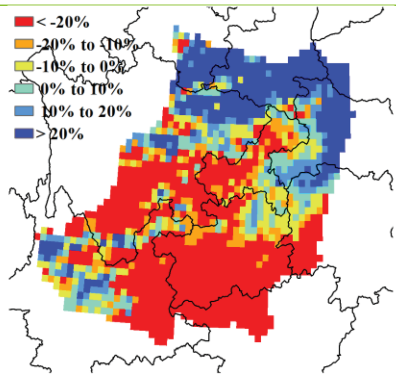




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

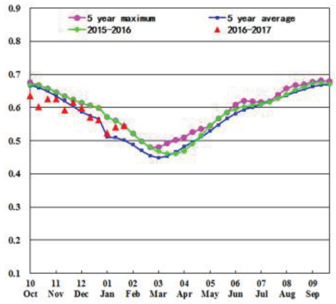
(e) Biomass

Southern China

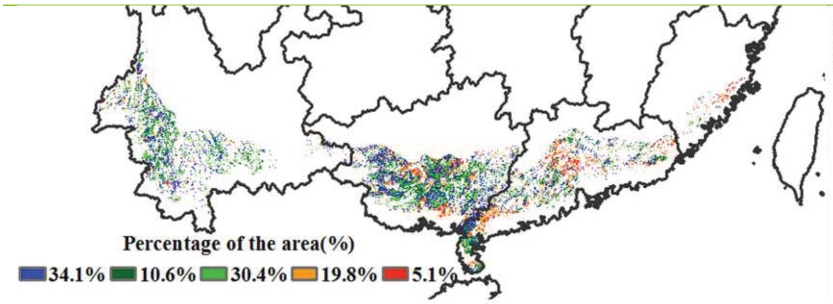
According to the NDVI-based crop condition development graph, the overall crop condition is slightly below average compared to the recent five-year average. The monitoring period covers the harvest of late rice and the planting of winter wheat. NDVI remained below average in October and the first half of November, then increased to average at the end of December, and finally reached even the five-year maximum level. Low radiation (RADPAR) (Fujian, -20%; Guangdong, -14%; and Guangxi,-11%) and high temperature (Fujian, +1.7°C; Guangdong, +1.0°C; Guangxi, +1.2°C; and Yunnan, +0.8°C) led to this partly below average situation. As a result, the general maximum VCI reached only 0.6 with the cropped arable land fraction (CALF) staying at the same level as the five-year average.

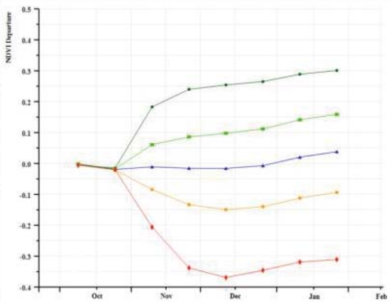
Crop condition in central Guangdong deserves close monitoring due to its obvious below average condition during the whole period, with maximum VCI below 0.5; this is also reflected by the NDVI spatial patterns and profiles. Overall expectations for the forthcoming winter wheat, however, remain fair.

Figure 4.13. Crop condition Southern China region, October 2016-January 2017



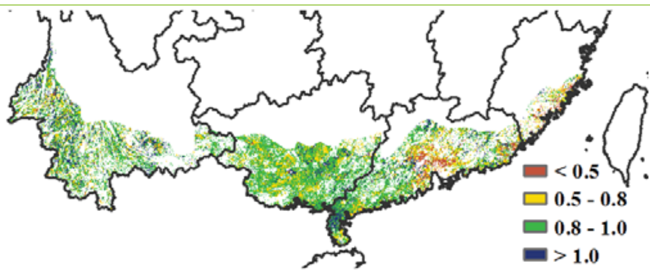
(a) Crop condition development graph based on NDVI



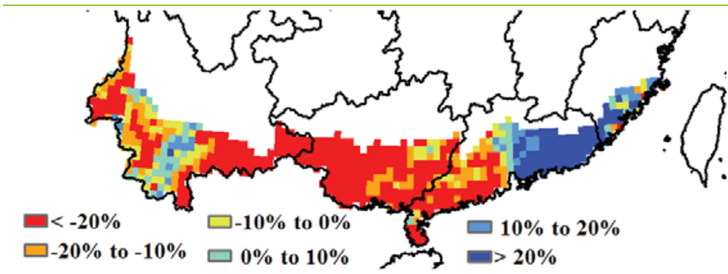


(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles



(d) Maximum VCI



(e) Biomass