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), a new bulletin section (4.2) describes the situation with pests and diseases that are affecting agricultural crops in China. Section 4.3 then presents an outlook for 2015 production of maize, rice, wheat, and soybean, while section 4.4 presents analyses by region. Additional information on the agroclimatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

Average conditions prevailed during the monitoring period (rainfall, +1%; temperature -0.7°C and RADPAR, -3%), resulting in average potential biomass (BIOMSS). TEMP was low in all seven regions in China; the largest decrease (-1.3°C) in the Lower Yangtze region was associated with abundant rainfall while in other regions, temperature was just slightly lower than average. RAIN was significantly lower than expected in in Huanghuaihai (-30%), the Northeast region (-24%) and the southern islands (Hainan, -41%; Taiwan, -25%) while extremely high precipitation was recoded over Xinjiang (+173%). Almost all of the major agricultural areas of China suffered from low temperatures during mid-August, September and late-October.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, July-October 2015, departure from 5YA and 14YA

Region	Agroclimatic indicators			Agronomic indicators			
	Departure from 14YA (2001-14)			Departure from 5YA (2010-14)			Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Cropping intensity (%)	Maximum VCI
Huanghuaihai	-30	-0.4	5	-23	-1	0	0.85
Inner Mongolia	5	-0.3	1	-5	0	-2	0.80
Loess region	0	-0.3	7	-5	5	2	0.80
Lower Yangtze	17	-1.3	-8	11	0	-2	0.89
Northeast China	-24	-0.1	1	-22	-1	0	0.83
Southern China	26	-0.4	2	6	0	-3	0.88
Southwest China	-3	-0.7	-7	3	0	1	0.90

Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the five (5YA) or fourteen-year average (14YA) for the same period (July-October).

Figures 4.1-4.6 illustrate the distribution and profiles of rainfall (RAIN) and temperature (TEMP) indicators, as well as the fraction of cropped arable land (CALF), maximum vegetation condition index (VCIx), cropping intensity, and minimum vegetation health index (VHIn). Indicator values are also provided in table 4.1.

Figure 4.1. China spatial distribution of rainfall profiles

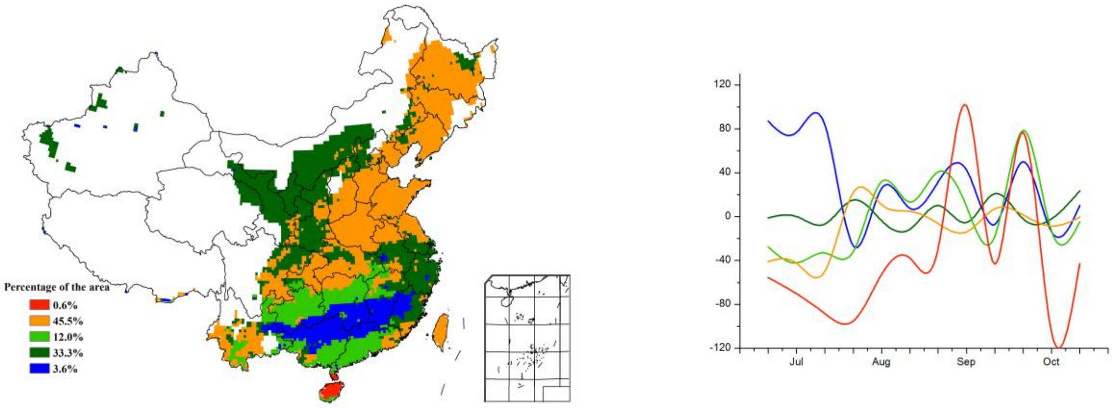


Figure 4.2. China spatial distribution of temperature profiles

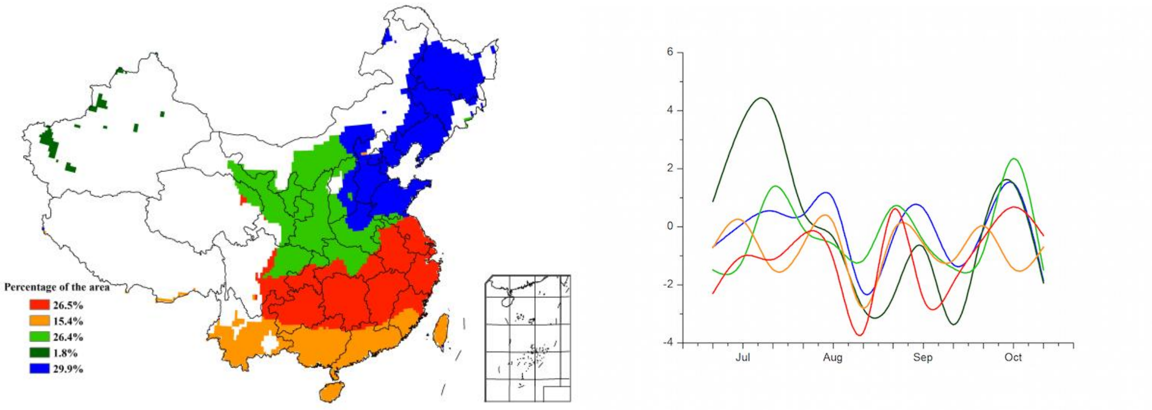


Figure 4.3. China cropped and uncropped arable land, by pixel

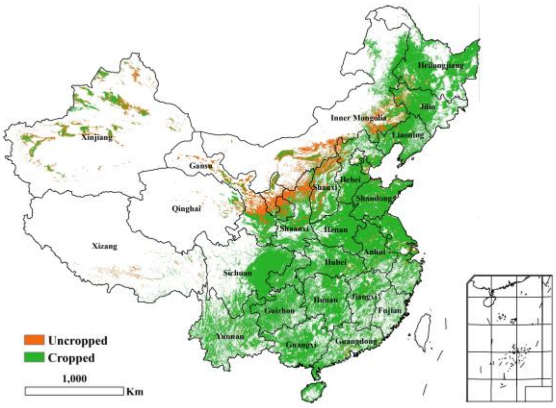


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel

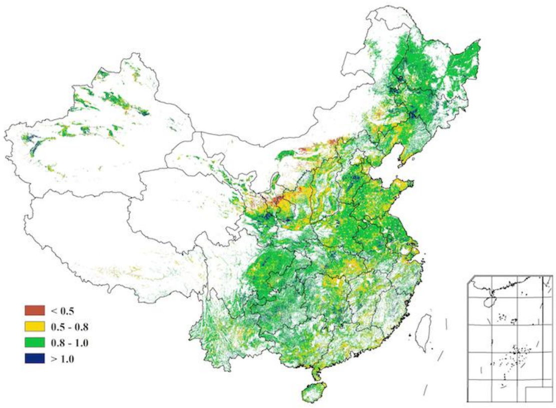


Figure 4.5. China minimum Vegetation Condition Index (VCIx), by pixel

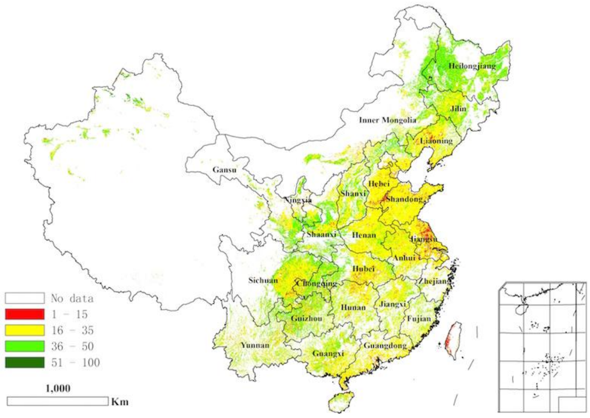
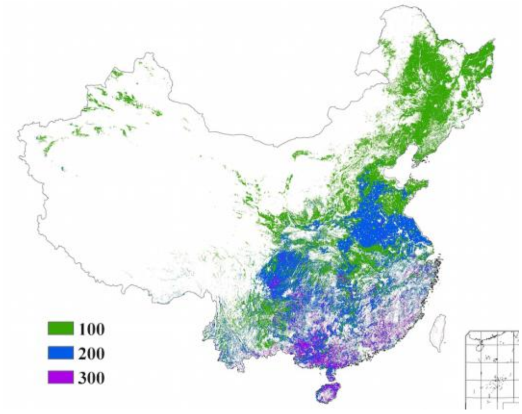


Figure 4.6. China cropping intensity



High VCIx values occurred mostly in southern China and in the north-east region. Low VCIx values occur mainly in central and northern China, particularly in the centre of Ningxia and the north of Shaanxi provinces. Crop condition in the north-east was above average (VCIx at 0.87), though agroclimatic conditions are average. At the regional and provincial scales, BIOMSS was above average in the Lower Yangtze (+11%) and low in the north-east (-22%), Huanghuaihai (-23%) and especially Hainan (-28%).

During the monitoring period the cropped arable land fraction (CALF) remained stable in comparison with last year; for four of the seven monitored regions, CALF was about equal to the five-year average; slightly negative values are only recorded for the north-east and Huanghuaihai regions (-1%); in the Loess region, the CALF increased by 5%, indicating that more arable land was cultivated. Cropping intensity increased by 2% and 1% in the Loess and south-western regions, respectively, but was average in the north-east and Huanghuaihai regions; it decreased in the other three regions. Uncropped land was mainly located in the northwest of China.

Minimum VHI indicates that almost all provinces in central and eastern China suffered from water stress, including the south-east of Sichuan, central Jiangsu, central Liaoning, and the west of Hebei (figure 4.6).

4.2 Impact of pests and diseases

The impact of pests and diseases was relatively moderate during September 2015 in the main rice regions of China. For Southern China and the middle and lower reaches of the Yangtze River, most of late rice is at milking or milk ripeness stages; therefore, migratory pests and epidemic diseases still constitute a threat to rice yield.

The distribution of the rice plant hopper during September 2015 is shown in figure 4.7 and table 4.2. The total area affected with plant hopper has reached 6 million ha, with the pest mostly occurring in Huanghuaihai, Southern China, middle and lower reaches of the Yangtze River. The most severely affected areas include central Hubei, southern and central Hunan, southern and central Jiangxi, and eastern Henan.

Figure 4.7. Distribution of the rice planthopper

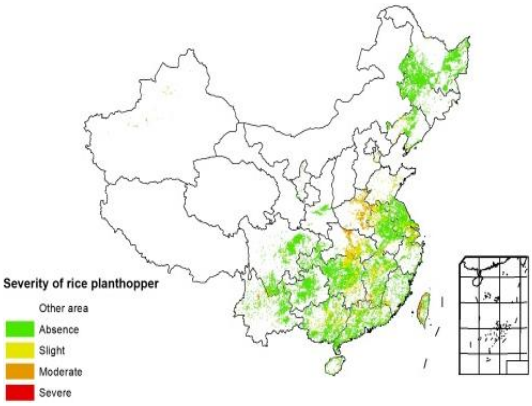


Table 4.2. Areas in China affected by rice planthopper, September 2015

Region	Area (thousand hectares)					
	Absence	Slight	Moderate	Severe	Total	Occurrence ratio
Huanghuaihai	593.3	689.3	330.7	4.7	1618.0	63.3%
Inner Mongolia	273.3	19.3	1.4	0	294.0	7.0%
Loess Region	131.3	10	2.0	0	143.3	8.4%
Lower Yangtze	5409.3	3395.3	636.0	28.7	9469.3	42.9%
Northeast China	4184.0	67.3	4.0	0	4255.3	1.7%
Southern China	1849.3	385.4	14.0	6	2254.7	18.0%
Southwest China	4537.3	219.4	57.3	10.7	4824.7	6.0%

Rice sheath blight (figure 4.8 and table 4.3) damaged around 8.6 million ha in the whole country, with the disease mostly found in Huanghuaihai, Southern China, and the middle and lower reaches of the Yangtze River. Damage was most severe in eastern and central Hubei, southern and central Hunan, southern and central Jiangxi, eastern and central Guangxi, northern and central Guangdong and eastern Henan.

Figure 4.8. Distribution of rice sheath blight in China, September 2015

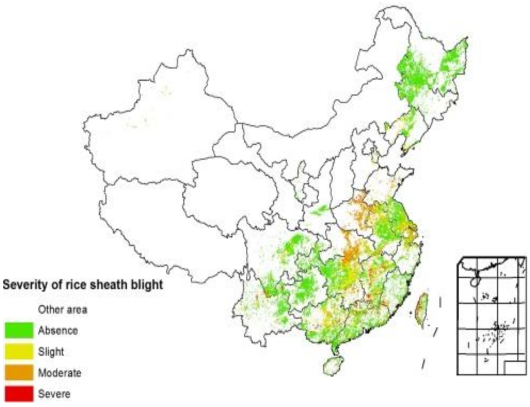


Table 4.3. Areas in China affected by rice sheath blight, September 2015

Region	Area (thousand hectares)					
	Absence	Slight	Moderate	Severe	Total	Occurrence ratio
Huanghuaihai	358.0	490.7	733.3	36.0	1618.0	77.9%
Inner Mongolia	238.7	48.6	6.7	0.0	294.0	18.8%
Loess Region	128.7	6.0	7.3	1.3	143.3	10.2%
Lower Yangtze	3439.3	3588.0	2102.7	339.3	9469.3	63.7%
Northeast China	4102.7	126.0	26.6	0.0	4255.3	3.6%
Southern China	1606.7	459.3	94.0	94.7	2254.7	28.7%
Southwest China	4277.4	373.3	144.0	30.0	4824.7	11.3%

Rice leaffolder (figure 4.9 and table 4.4) damaged around 5 million ha in the country, mostly in Huanghuaihai, as well as middle and lower reaches of the Yangtze River. Damage was most severe in central Hunan, most of Jiangxi and central Guangxi.

Figure 4.9. Distribution of rice leaffolder in China, September 2015

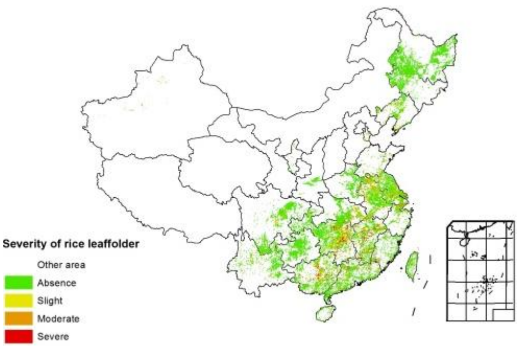


Table 4.4. Areas in China affected by rice leaffolder, September 2015

Region	Area (thousand hectares)					
	Absence	Slight	Moderate	Severe	Total	Occurrence ratio
Huanghuaihai	1125.3	235.4	241.3	16	1618	30.4%
Inner Mongolia	245.3	34.7	14	0	294	16.6%
Loess Region	137.3	2.7	2	1.3	143.3	4.2%
Lower Yangtze	5870	1970	973.3	656	9469.3	38.0%
Northeast China	4129.3	81.3	44.7	0	4255.3	3.0%
Southern China	1794	242	98	120.7	2254.7	20.4%
Southwest China	4450.7	260	89.3	24.7	4824.7	7.8%

4.3 Crop production

By the end of October, the harvest of maize, rice, wheat and soybean was over. Table 4.5 lists their revised 2015 production estimates. Table 4.6 provides additional detail about production for different rice cropping seasons.

Table 4.5. China, 2015 maize, rice, wheat and soybean production and percentage difference with 2014, by province

	Maize		Rice		Wheat		Soybean	
	2015	**Δ(%)**	**2015**	**Δ(%)**	**2015**	**Δ(%)**	**2015**	**Δ(%)**
Anhui	3598	-1	17369	1	11245	-1	1109	1
Chongqing	2162	3	4887	2	1118	0		
Fujian			2881	2				
Gansu	4815	5			1607	-1		
Guangdong			11037	0				
Guangxi			11268	3				
Guizhou	4952	-1	5219	1				
Hebei	17251	6			10730	1	180	5
Heilongjiang	25920	-1	20304	0			4581	0
Henan	16775	5	3940	1	25992	1	774	5
Hubei			16001	1	4328	-3		
Hunan			25353	0				
Inner Mongolia	14263	-1					827	-1
Jiangsu	2249	1	16970	2	9606	1	792	1
Jiangxi			17415	0				
Jilin	24295	1	5069	1			669	1
Liaoning	12755	-1	4831	3			516	1
Ningxia	1726	-4	542	-1				
Shaanxi	3640	-6	1053	1	3997	1		
Shandong	18824	3			22881	5	677	3
Shanxi	8771	-9			2109	1	173	-8
Sichuan	7178	1	14886	1	4673	2		
Xinjiang	6634	3						
Yunnan	5816	4	5316	0				
Zhejiang			6455	0				
Sub total	**181625**	**1**	**190795**	**1**	**98286**	**1**	**10298**	**1**
Other provinces*	12109	3	11531	-4	15639	2	2715	-5
National total*	**193734**	**1**	**202325**	**1**	**121613**	**2**	**13014**	**-1**

Note: * production of Taiwan province is not included.

The production of maize is revised to 193.7 million tons (an increase of 1% from 2014), about 900 thousand tons up from the CropWatch August forecast. Rice and wheat production remained the same as in the August forecast, with their production increased by 1% and 2% compared with the previous season, respectively. Soybean is revised up to 13.0 million tons (323 thousand tons higher than the previous CropWatch forecast) but this is still a decrease of 1% due to a reduction in planting area. For rice, single rice production is revised to 131.5 million tons, an increase of 1% compared with the previous year, and 1.34 million tons up from the previous forecast. The upward revision is mainly due to favorable conditions at late growing stages. Early rice and late rice production remain the same as in the forecast issued by CropWatch in August.

Compared to August, the forecast for maize production in Inner Mongolia, Jilin and Shandong was revised upwards by more than 200 thousand tons mainly due to the revised yield. In contrast, recent remote sensing data show a deterioration compared to the August estimates in Xinjiang and Shanxi where maize production was revised down by about 200 and 300 thousand tons. Rice production for most provinces was revised up from the August forecast except for Anhui and Jiangsu where rice was impacted by flooding and strong wide during mid-August. The unfavorable conditions harmed mainly single rice in Jiangsu and Anhui.

Driven by most up-to-date remote sensing data, CropWatch models foresee an increase in soybean yield for most provinces that produce except for Shanxi. New estimates show that the soybean production in Heilongjiang province - the top soybean producing province in China, representing nearly one third of the national soybean production - is at same level as 2014 and 168 thousand tons up from August forecast.

CropWatch revised the total annual output (including cereals, legumes, and tubers) to 568.1 million tons, 0.8% up from 2014 (a 4.3 million tons increase) and 0.4 million tons up from the August forecast. The total summer production is forecast at 407.3 million tons, a 0.6% increase (equivalent to 2.4 million tons) over last year's drought conditions and slightly above the 2013 summer crop production. The production estimates for early rice and winter crops remain unchanged compared with the August forecast.

Table 4.6. China, 2015 single rice, early rice, and late rice production and percentage difference with 2014, by province

	Early Rice		Single Rice		Late Rice	
	2015	**Δ(%)**	**2015**	**Δ(%)**	**2015**	**Δ(%)**
Anhui	1840	-4	13743	2	1787	0
Chongqing			4887	2		
Fujian	1733	3			1148	1
Guangdong	5305	2			5733	-2
Guangxi	5591	3			5676	2
Guizhou			5219	1		
Hebei						
Heilongjiang			20304	0		
Henan			3940	1		
Hubei	2320	-3	10880	2	2801	-1
Hunan	8207	-1	8532	2	8614	-2
Jiangsu			16970	2		
Jiangxi	7367	1	2873	0	7175	0
Jilin			5069	1		
Liaoning			4831	3		
Ningxia			542	-1		
Shaanxi			1053	1		
Sichuan			14886	1		
Yunnan			5316	0		
Zhejiang	821	-3	4747	1	887	-3
Sub total	**33184**	**0**	**123790**	**1**	**33821**	**-1**
Other provinces*	1940	-17	7716	-5	1874	21
National total *	**35123**	**-1**	**131507**	**1**	**35695**	**0**

Note: * production of Taiwan province is not included.

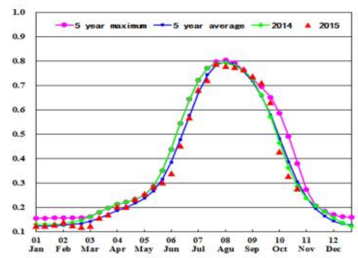
4.4 Regional analysis

Figures 4.10 through 4.16 present crop condition information for each of China’s seven regions. The provided information is as follows: (a) Crop condition development graph based on NDVI, comparing the current season up to July 2015 to the previous season, to the five-year average (5YA), the five-year maximum; (b) Spatial NDVI patterns from April to July 2015 (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 April-July 2015. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A, table A.11.

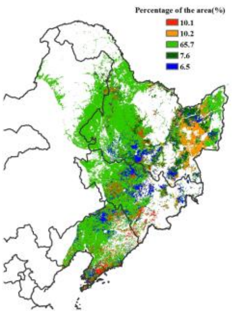
Northeast region

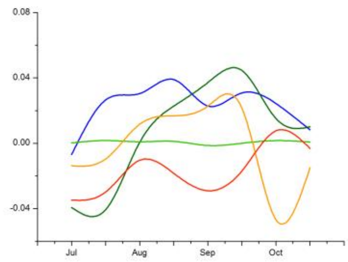
CropWatch agro-climatic and agronomic indicators describe around average conditions over most of the region during the reporting period (figure 4.10). The harvest of spring crops was concluded in October, while summer crops (including maize, rice and soybean) reached the grain filling to maturity stages from August to late September. As shown in the spatial NDVI patterns, compared to their recent five-year average and the corresponding cluster profiles, most (65.7%) crops were in average condition except east of Liaoning province. Significantly below average rainfall stressed crops in most of Liaoning province (-43%) and NDVI was well below the five-year average in the small area of the Liaodong peninsula. In the east of Heilongjiang province, NDVI also shows poor condition of crops due to the deficit of rain (-13%). However in the west of Jilin and Heilongjiang provinces, the crop condition was around and even better than average. However, more than half of the area suffered from a decreased biomass production potential (below -20%) when compared to the five-year average. The output expected from the region is average.

Figure 4.10. Crop condition China Northeast region, July-October 2015



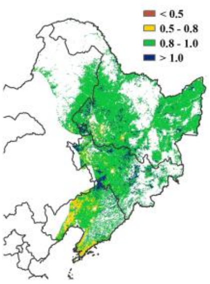
(a) Crop condition development graph based on NDVI

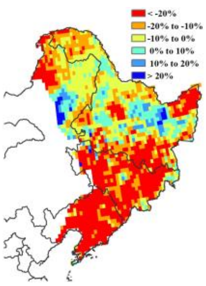




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





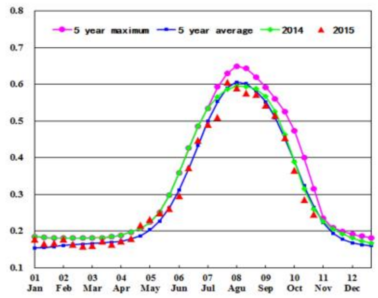
(d) Maximum VCI

(e) Biomass

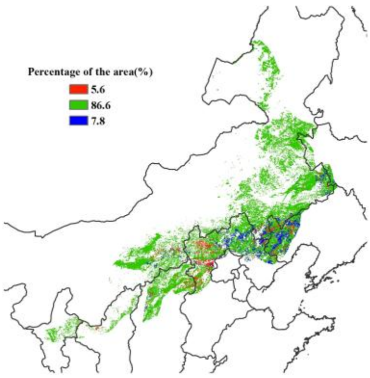
Inner Mongolia

The condition of maize and soybean, the main summer crops in Inner Mongolia, was generally unfavorable during the reporting period (figure 4.11): rainfall was above average by 5%, but poorly distributed; central and western areas were dry from June. TEMP was below average by 0.3°C, RADPAR above average by 1%, and BIOMASS below average by 5%. The crop development graph reflects poor crop condition throughout the monitoring period. Western and southern areas suffered from drought, which has significantly affected crop growth with troughs in the NDVI profiles starting in July in approximately 6% of the region. Western Liaoning, western Hebei, northern Shanxi and central and south-eastern Inner Mongolia all have poor vegetation conditions according to the VCIx map. In partly cropped land, the potential biomass was poor due to drought. According to the CropWatch indicators, maize and soybean production decreased to varying degrees compared with the previous season.

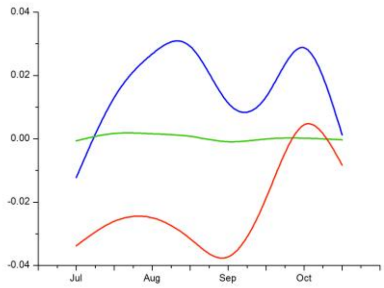
Figure 4.11. Crop condition China Inner Mongolia, July-October 2015



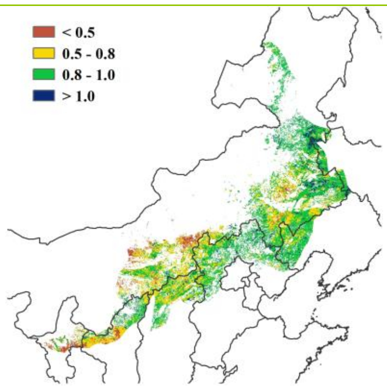
(a) Crop condition development graph based on NDVI



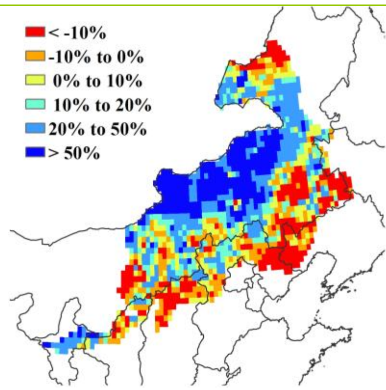
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

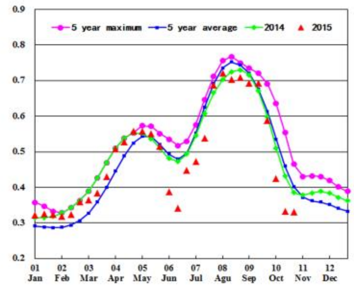


(e) Biomass

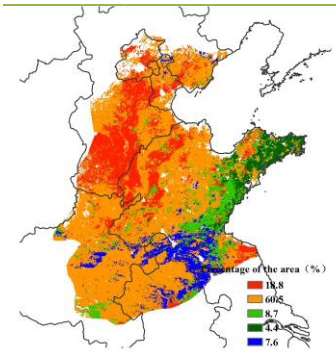
Huanghuaihai

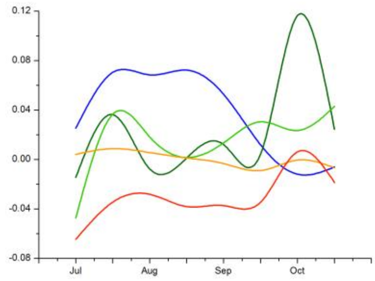
During the monitoring period, the harvest of summer crop, including maize, rice and soybean, has been completed in early October, and the winter wheat is currently in its tillering stage. From July to October adverse meteorological conditions prevailed in Huanghuaihai; precipitation dropped significantly below average (-30%) and RADPAR increased by 5%, even if temperature remained average. Below-average rainfall led to a dramatic decline of biomass (-23%). The maximum VCI presented high values in southern Hebei province. According to the spatial NDVI patterns (compared to the recent five-year average) and corresponding NDVI profiles, NDVI was above average in most areas, except southern Hebei province and northern parts of Shandong province. Overall, the spatial average NDVI graph indicates the crop condition is below average and initial growing conditions for winter crops are not optimistic either.

Figure 4.12. Crop condition China Huanghuaihai, July-October 2015



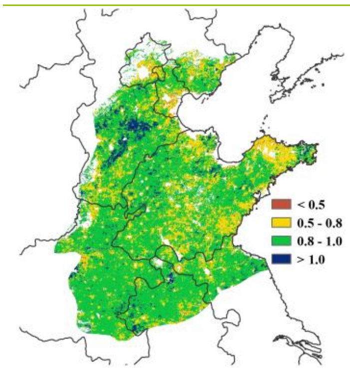
(a) Crop condition development graph based on NDVI

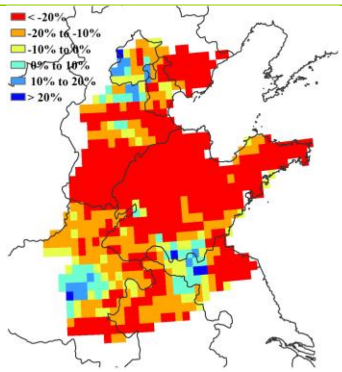




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

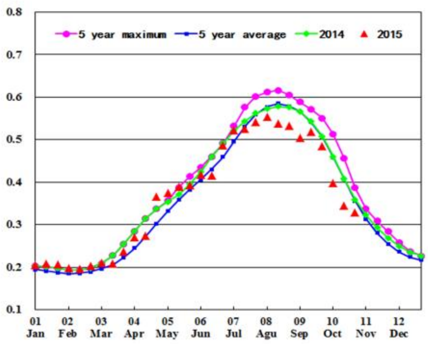
(e) Biomass

Loess region

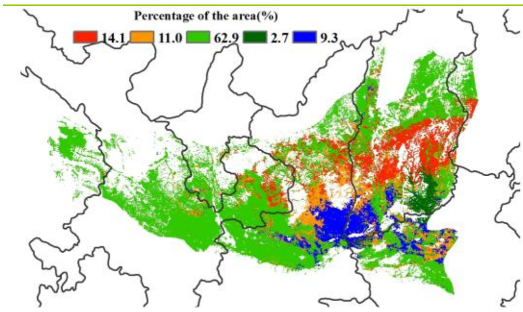
Maize in this area was harvested in late September and early October, and winter wheat has been planted during the monitoring period. From the beginning of July, crop condition was worse than last year's and below the five-year average (figure 4.13). Temperature, precipitation and PAR were average, resulting in potential biomass just slightly below average (-5%).

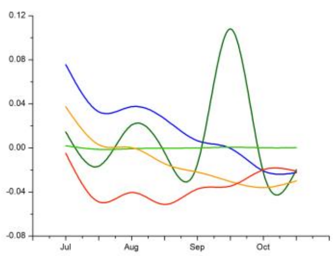
The analysis of spatial NDVI clusters and profiles indicates that most of the area's crop was (confirmed by the VCIx); the most favorable conditions occurred mainly in the east of Shaanxi and the south-west of Shanxi before September, due to the abundant rainfall and suitable sunlight. On the contrary - and mostly because of drought in August (as confirmed by the maps of potential biomass) - crops were in poor condition (compared to the five-year average) in the provinces of Shanxi and Shaanxi. The crop condition in some areas was apparently below average in late September, however, this may be as a result of early harvest rather than a poor crop. Due to suitable rainfall (+1%), more arable land was cropped than in recent years (CALF increased 5%).

Figure 4.13. Crop condition China Loess region, July-October 2015



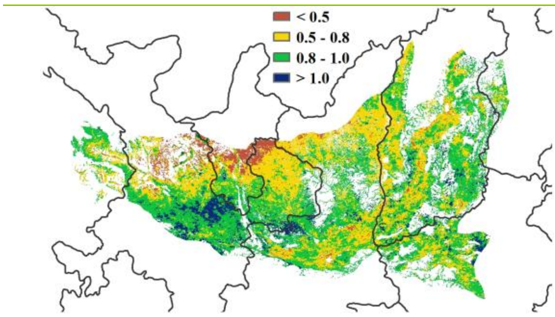
(a) Crop condition development graph based on NDVI

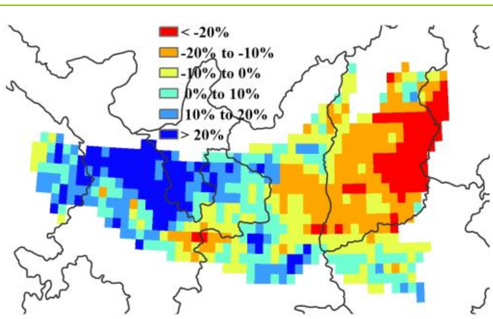




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





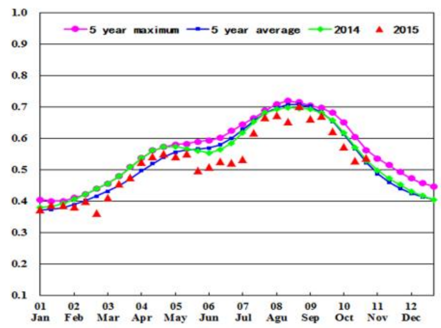
(d) Maximum VCI

(e) Biomass

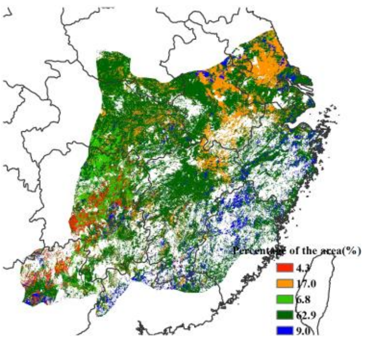
Lower Yangtze region

At the end of October, the harvest of semi-late rice was almost concluded while late rice was at the maturity stage in the region. In general, crop condition was below the recent five-year average between August and September according to the crop condition development graph. The CropWatch agroclimatic indicators show that rainfall was above average (+17%) whereas temperature and RADPAR were below (-1.3°C and -8%, respectively). Over the reporting period, the cropped arable land fraction (CALF) was stable, while the cropping intensity dropped slightly (-2%). The biomass production potential (BIOMSS) was above the five-year average (+11%), with the best conditions (>+20%) occurring in southern regions, such as Fujian, southern Jiangxi and Hunan, and northern Guangxi and Guangdong. The NDVI profiles and spatial NDVI patterns indicate that about 63% of croplands were continuously at the average level, mainly in the north-western and central parts of the region. The CropWatch estimates production in the Lower Yangtze region to be close to the recent five-year average (figure 4.14).

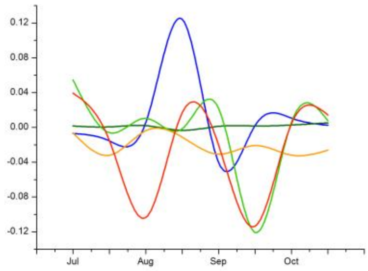
Figure 4.14. Crop condition Lower Yangtze region, July-October 2015



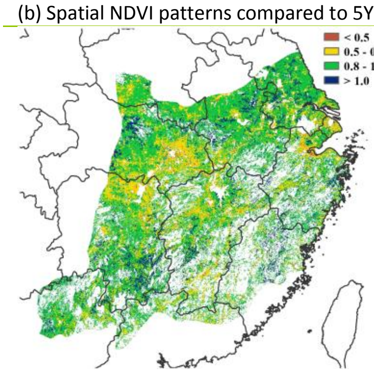
(a) Crop condition development graph based on NDVI



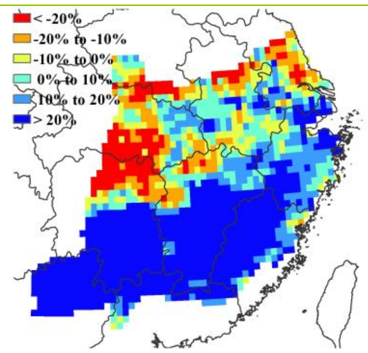
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



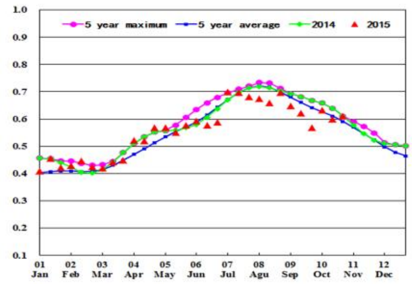
(e) Biomass

Southwest China

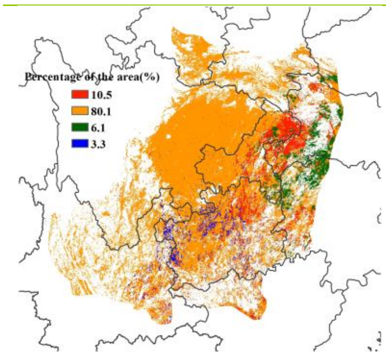
The overall condition of crops was partly below average in Southwest China between July and October (figure 4.15). The period coincides with the region's harvest season for maize and single cropped rice and the planting season for winter wheat. NDVI profiles were below average in July, somewhat recovered at the beginning of August, and then fell below average again in September. Since then, crops recovered a reached a level close to the five-year average in October.

The following regions should be paid attention to: south-western Hubei, north-western Hunan and south-eastern Chongqing because of poor potential biomass accumulation. CropWatch found below average precipitation in Chongqing (-11%) and Hubei (-31%), which will have a negative impact on the crop condition. The spatial NDVI patterns and profiles also show below average condition in the regions mentioned above during August and September. However CALF and cropping intensity in remained average during the monitoring period.

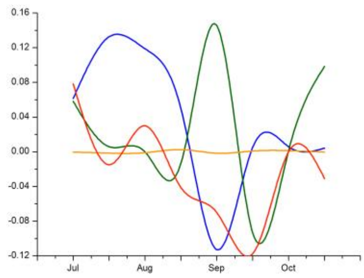
Figure 4.15. Crop condition Southwest China region, July-October 2015



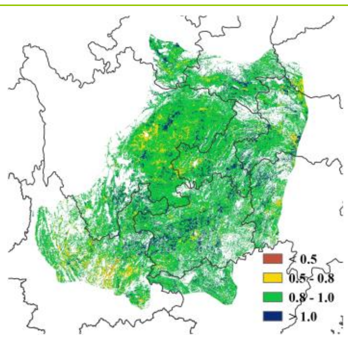
(a) Crop condition development graph based on NDVI



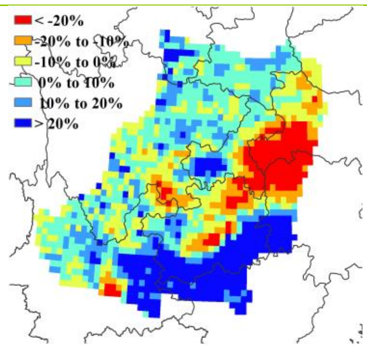
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



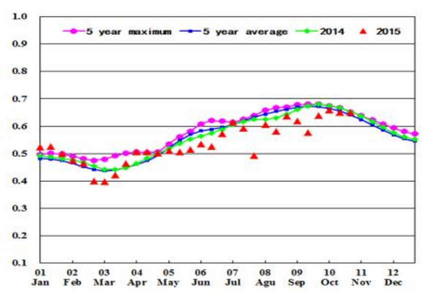
(e) Biomass

Southern China

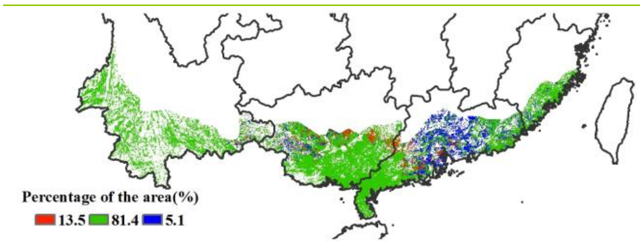
Partly below average crop conditions prevailed in southern China during the reporting period, which covered the end of the early rice harvest and the planting and harvest of late rice. The overall crop condition was average at the beginning of July, dropped to below average from July to the end of September, and recovered in October (figure 4.16).

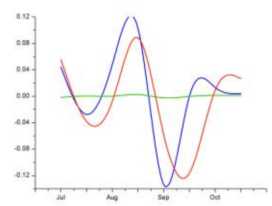
In south-eastern Fujian, south-western Guangxi, southern Guangdong and southern Yunnan, NDVI kept close to the average five-year level, indicating the average rice growth and harvest. Compared to the latest five-year average, CALF kept unchanged and the cropping intensity decreased little (3%) in southern China. The double-cropped and late rice in southern Guangdong should be paid attention to because of the unfavourable NDVI profile, possibly due to the decreased temperature that was recorded in Guangdong (-0.7°C) during the monitoring period, even if crops recovered from the middle of September.

Figure 4.16. Crop condition Southern China region, July-October 2015



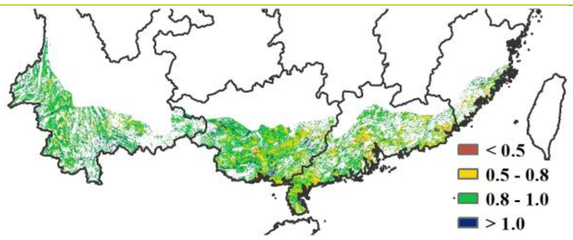
(a) Crop condition development graph based on NDVI



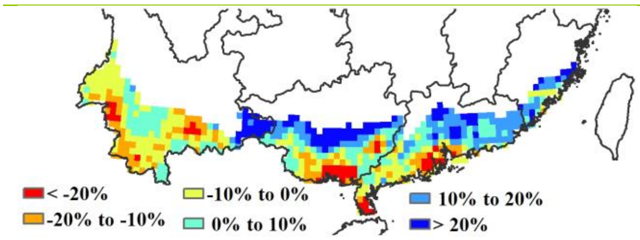


(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles



(d) Maximum VCI



(e) Biomass