Chapter 4. China

After a brief overview of the agro-climatic and agronomic conditions in China over the reporting period (section 4.1), Chapter 4 describes the situation by region, focusing on the seven most productive agro-ecological zones (AEZs) of the east and south (4.2): North-east China, Inner Mongolia, Huanghuaihai, Loess region, Lower Yangtze, Southwest China, and Southern China. Additional information on the agro-climatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

Agro-climatic conditions were generally below average in China from October 2018 to January 2019, with rainfall and radiation deficits of 7% and 6%, respectively. Temperature was average at 6.8℃. Low rainfall and temperature resulted in a 1% drop of potential biomass. Due to the large diversity of climatic zones in China, weather conditions over different agro-ecological zones or different agriculturally important provinces differ much. Inner Mongolia, Loess region, North-east China and Southwest China suffered from water shortage, with 42%, 18%, 34% and 18% lower rainfall compared to average. Low rainfall will potentially hamper the sowing and early growth of crops after winter. Temperature in Inner Mongolia and North-east China were 0.7℃ and 2.4℃ above average. Below average RADPAR needs to be highlighted in several regions, especially in the Lower Yangtze (-15%), Southern China (-8%) and South-west China (-7%). Even if potential biomass is a synthetic indicator taking into account rainfall and temperature, patterns of biomass departures from average present same pattern of rainfall departures over all the AEZs.

Rainfall departure clustering and temperature departure clustering show detailed spatial and temporal patterns. Rainfall was generally below average across China during the monitoring period except for Yunnan and western Guizhou in early January and an ellipse-shaped areas from Guangxi to Southern Jiangsu in early December. Interestingly, temperature is globally below average in most of China above average in the provinces of the North-east which are the coldest in the country. This behavior exists across other Central Asian areas and is compatible with climate change projections; in other words: it is likely to persist in future seasons.

Other Provinces with large rainfall anomalies include Hebei (-45%), Ningxia (47%), Yunnan (50%) and Shandong (55%). The largest positive temperature anomalies (in excess of 1.0°C) were recorded in Inner Mongolia, Heilongjiang, Jilin and Liaoning. If the above average temperature continue into the next monitoring period (January to April), early snow melt and spring sowing dates are likely.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, October 2018 to January 2019, departure from 5YA and 15YA

Region	Agroclimatic indicators			Agronomic indicators		
	Departure from 15YA (2004-2018)			Departure from 5YA (2014-2018)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	10	0.1	1	3	-1	0.87
Inner Mongolia	-42	0.7	3	-31	-3	0.83
Loess region	-18	-0.3	2	-18	-1	0.87
Lower Yangtze	1	-0.4	-15	11	-1	0.89
Northeast China	-34	2.4	4	-13	-8	0.85
Southern China	21	-0.2	-8	36	0	0.93
Soutwest China	-18	-0.5	-7	-7	0	0.93

Figure 4.1. China spatial distribution of rainfall profiles, October 2018 to January 2019

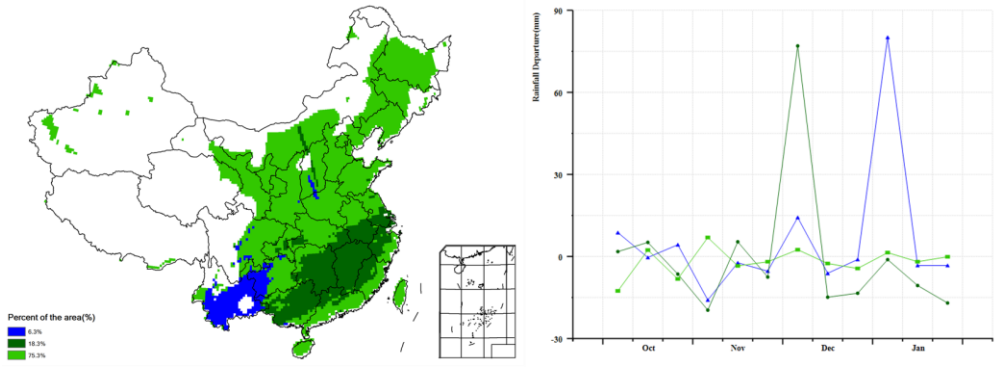


Figure 4.2. China spatial distribution of temperature profiles, October 2018 to January 2019

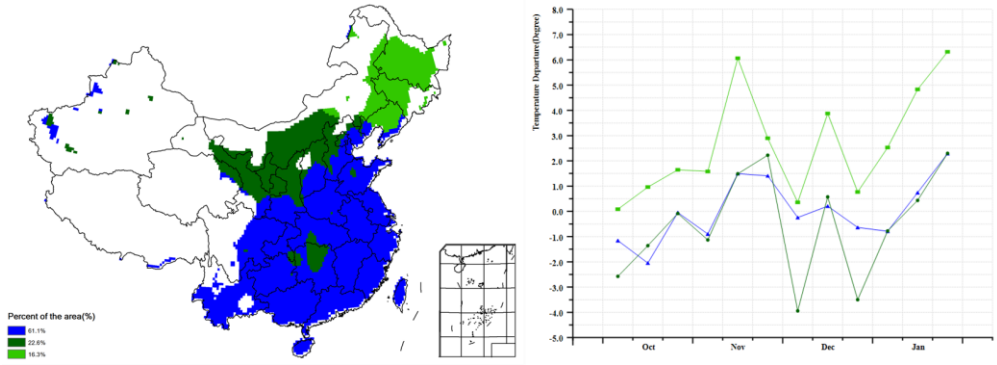


Figure 4.3. Cropped and uncropped arable land over winter crops producing provinces, by pixel, October 2018 to January 2019

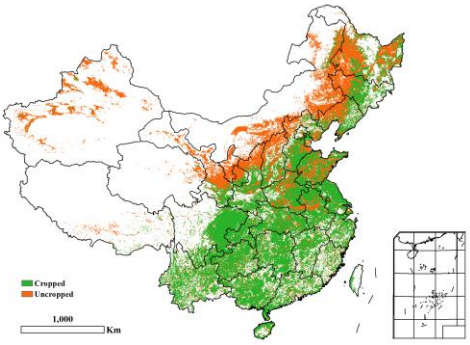
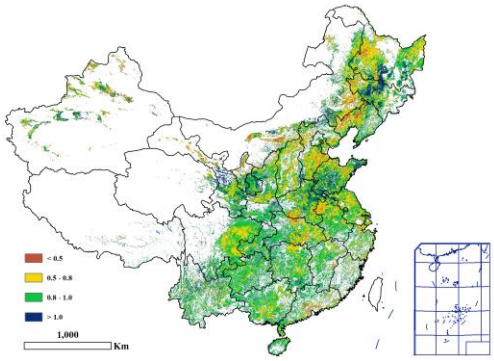


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, October 2018 to January 2019



4.2 Regional analysis

Figures 4.5 through 4.11 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Phenology of major crops; (b) Crop condition development graph based on NDVI, comparing the current season up to January 2019 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for October 2018 to January 2019 (compared to the (5YA)); (d) NDVI profiles associated with the spatial patterns under (c); (e) maximum VCI (over arable land mask); and (f) biomass for October 2018 to January 2019. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A.

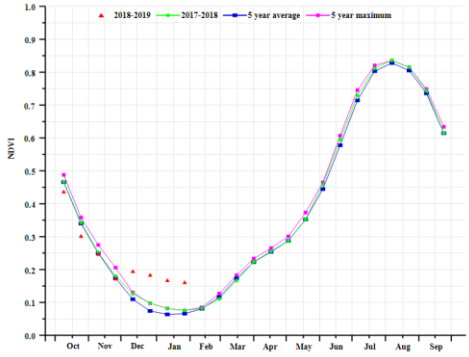
Northeast region

No crops are grown during the current monitoring season in Northeast China due to low temperatures, with nearly all farm land frozen or covered by snow (the average temperature was -5.7°C).

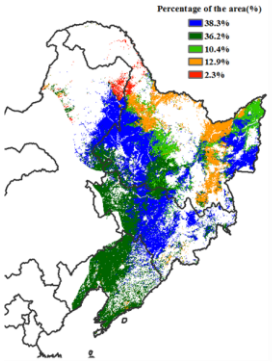
The region suffered a precipitation deficit of 34% (recorded RAIN reached 69 mm instead of 103 mm) but recorded significantly above average temperature (TEMP +2.4°C) and abundant sunshine (RADPAR +4%). A large area in the south of the region suffered a drop in BIOMSS exceeding 20% drop of biomass, directly resulting from the shortage of rainfall. In contrast, regions in northern Heilongjiang and north-east Inner Mongolia present positive BIOMSS departures larger than 20%.

More than abnormal water conditions, it is the relatively warm weather that is likely to affect the forthcoming season through early planting.

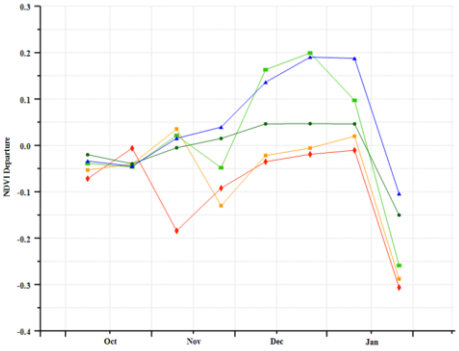
Figure 4.5. Crop condition China Northeast region, October 2018 to January 2019



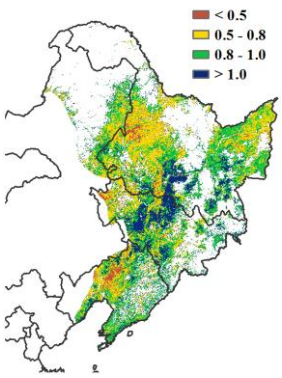
(a) Crop condition development graph based on NDVI



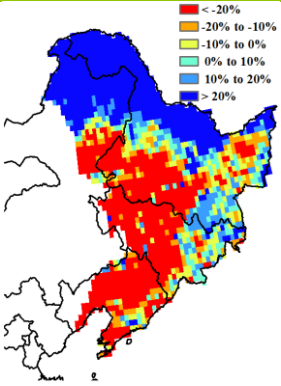
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

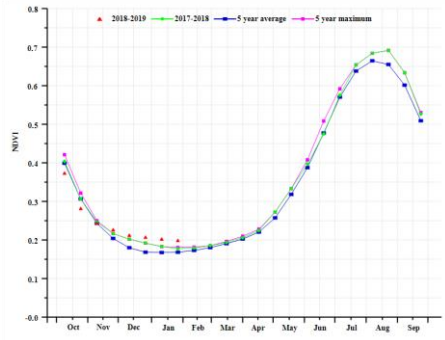
Inner Mongolia

No crops are in the field in Inner Mongolia from late of October to January due to low temperatures. However, weather conditions are relevant, in particular rainfall, as they control initial soil moisture available to spring sown crops. In October, below average conditions had little effect as the crops had reached maturity.

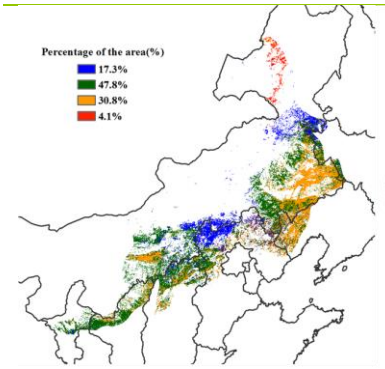
The reporting period recorded 47 mm of precipitation, which is 42% below the average of 82 mm. Although the deficit is large, it is not severe in terms of agricultural impacts, nor is the resulting drop in potential biomass accumulation (BIOMSS -31%.) Both sunshine and temperature were above average (RADPAR 3%, TEMP 0.7 °C.)

VCIx was below 0.5 in the west and southeast; the observation is consistent with the potential biomass distribution (values more than 10% below average). In general, however, less snow may not be able to provide adequate soil moisture for the land preparation and early growth of 2019 spring crops.

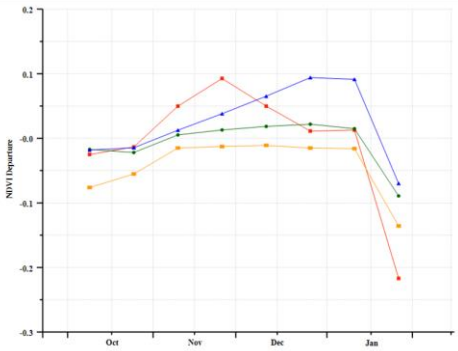
Figure 4.6. Crop condition China Inner Mongolia, October 2018 to January 2019



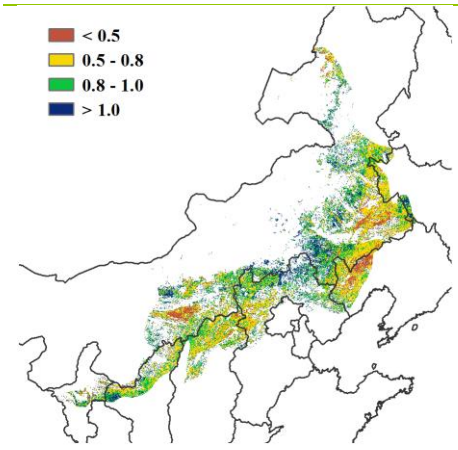
(a) Crop condition development graph based on NDVI



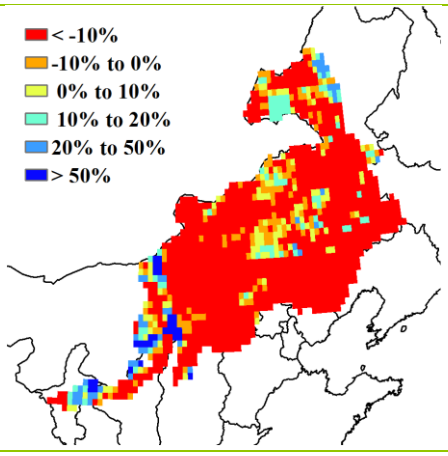
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



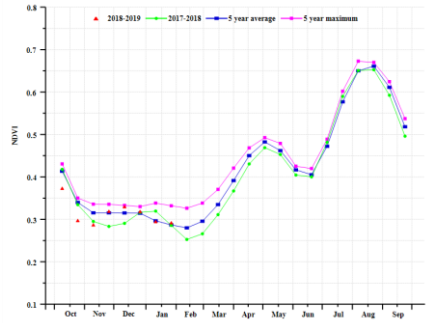
(e) Biomass

Huanghuaihai

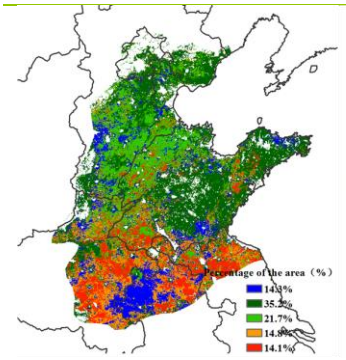
The monitoring period (October 2018 to January 2019) covers the sowing and early growth of winter wheat. Both precipitation and sunshine exceeded average values (RAIN +9%, RADPAR +10%) but temperature was just above (TEMP +0.1 „f). The cropped arable land fraction (CALF) underwent a slight decline of 1% compared to 5-year average. Weather condition led to an increase of 4% of the biomass production potential and were conducive to satisfactory growth of winter wheat.

As shown by the NDVI development graph, crop condition was at 5-year average during the monitoring period except for early November. The spatial distribution of crop condition in Huanghuaihai was heterogeneous. During October and mid-November, the NDVI departure values over the region were nearly all negative except for Shandong peninsula and eastern Hebei. The crop condition turned to good in December and the NDVI departure were positive except for a few areas in northwest Anhui. From early January, NDVI of the whole area began to decline, showing poor crop condition in northern Huanghuaihai, including Heibei, Shandong and northwest Anhui. The pattern is confirmed by the maps of maximum VCI and biomass departure. The maximum VCI value for Huanghuaihai is 0.87, which is a fair value that leaves all scenarios open for the final outcome of winter wheat.

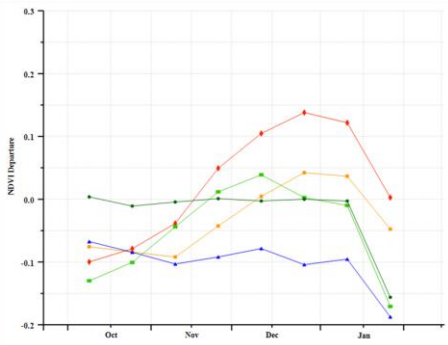
Figure 4.7. Crop condition China Huanghuaihai, October 2018 to January 2019



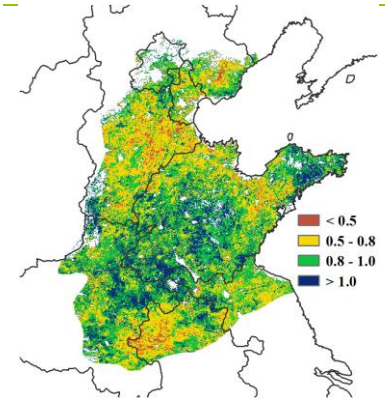
(a) Crop condition development graph based on NDVI



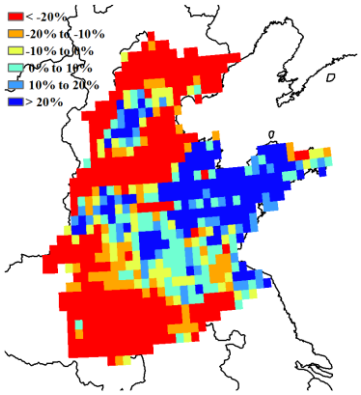
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

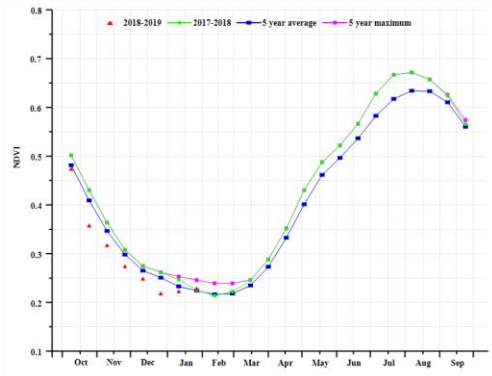


(e) Biomass

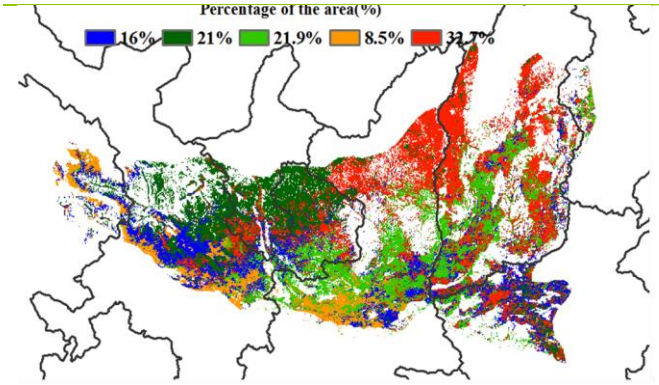
Loess region

The most relevant crop during the monitoring period was the currently hibernating Winter wheat. Crop condition was generally inferior to last year' s and the five year average except for late January. Precipitation (RAIN -18%) was below average, and so was temperature (TEMP -0.3 °C); radiation (RADPAR +2%) was slightly above average. The unfavorable agro-climatic condition resulted in below average potential biomass (BIOMSS, -18%). In most of the region, the analyses based on spatial NDVI clusters and profiles are consistent with VCIx: the most favorable conditions prevail in the center and east of Gansu province, and some parts in southern Ningxia and north-central Shaanxi, due to the relatively abundant rainfall. The cropped arable land fraction (CALF) decreased by 1% compared with recent years, which shows somewhat unfavorable crop prospect in the region.

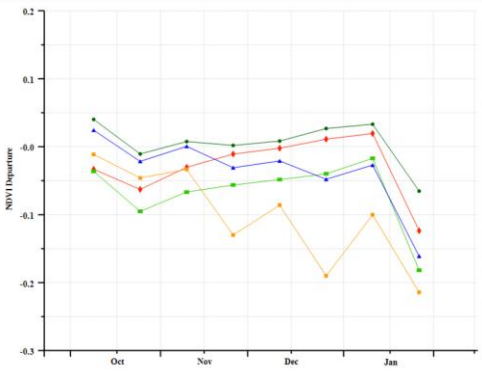
Figure 4.8. Crop condition China Loess region, October 2018 to January 2019



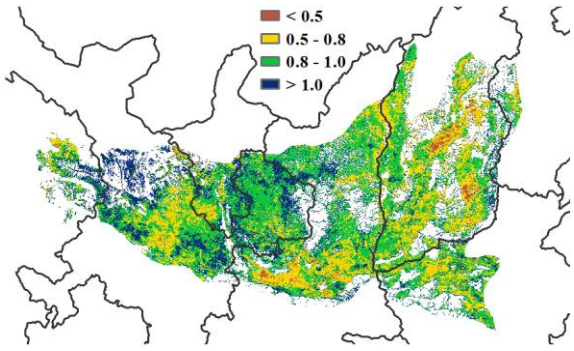
(a) Crop condition development graph based on NDVI



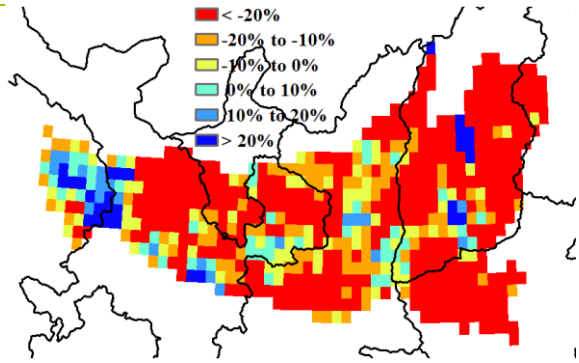
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

Lower Yangtze region

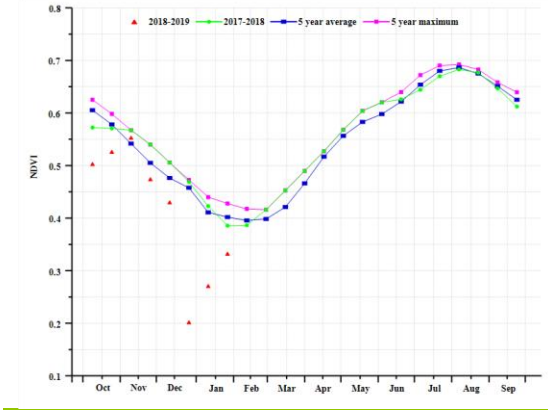
Only winter crops were present in the field during the monitoring period, essentially in the north of the region, including parts in Henan, Anhui and Jiangsu Provinces.

According to the CropWatch agro-climatic indicators, temperature was slightly cooler than average (TEMP -0.4°C) and precipitation was just average (RAIN, +1%); sunshine, however, was significantly below average (RADPAR -15%).

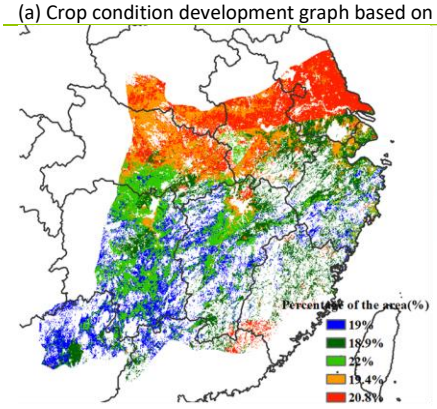
As shown in the NDVI development graph, crop condition was close to average before December when abnormally low values were probably brought about by snow. Although the biomass production potential increased 11% compared with the 5-year average, most of the northern wheat region of the AEZ suffered a significant decrease of BIOMSS (more than 20%) except in the East of Jiangsu and the West of Anhui Provinces.

The crop condition in the lower Yangtze region is currently assessed as average.

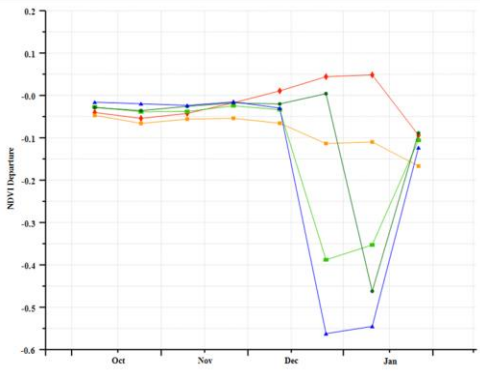
Figure 4.9. Crop condition Lower Yangtze region, October 2018 to January 2019



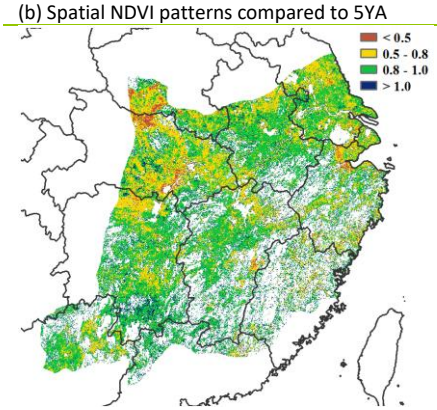
(a) Crop condition development graph based on NDVI



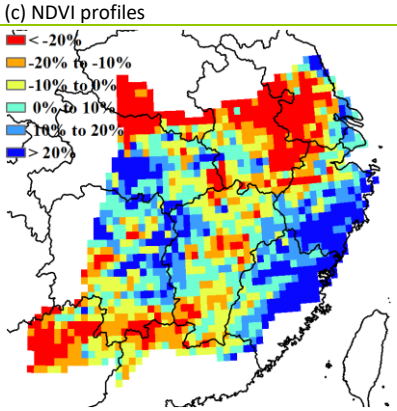
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

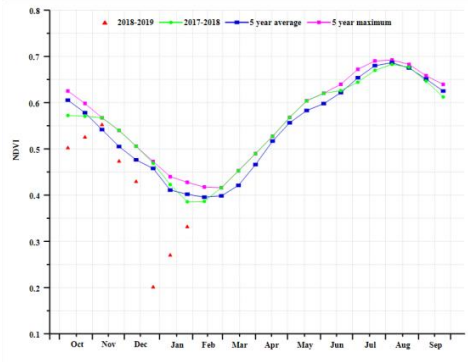
Southwest China

The reporting period covers the dormancy of winter wheat. According to the regional NDVI profile, crop condition was partly below average with a spell of above average values in early November.

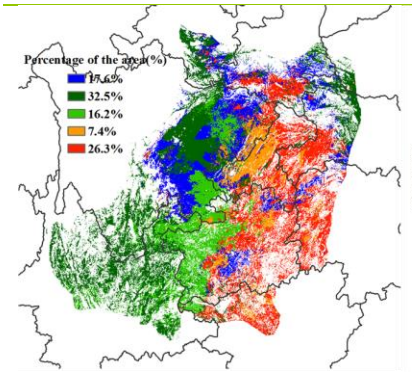
Rainfall was below average (RAIN -18%) and sunshine was low (RADPAR -7%) while the temperature was slightly lower than the average by 0.5 °C. Compared to the average of the past 5 years, the cropped arable land fraction has not changed and the potential biomass production index was low (BIOMSS -7%).

According to the spatial NDVI patterns (profiles and maps) values were usually close to average from late October to late November, except in Chongqing and neighboring areas in Eastern Guizhou. Both recorded very low NDVI due to low RAIN (-32% and -27%, respectively). The indicators of Sichuan Province were all below average but in Yunnan, both precipitation and sunshine were high (RAIN +50%, RADPAR +3%). The maximum VCI reaches at 0.93, indicating the crop growth status at peak of the growing season was still comparable with the previous five years. The mix of positive and negative indicators show an overall unfavorable crop condition.

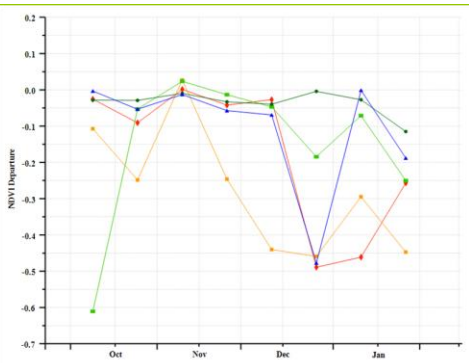
Figure 4.10. Crop condition Southwest China region, October 2018 to January 2019



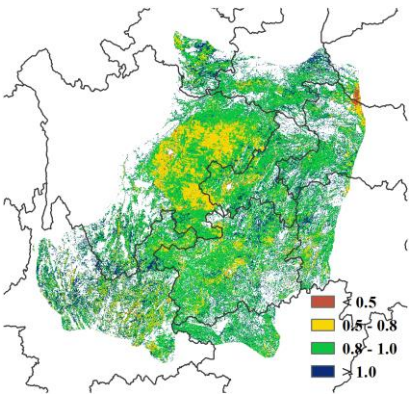
(a) Crop condition development graph based on NDVI



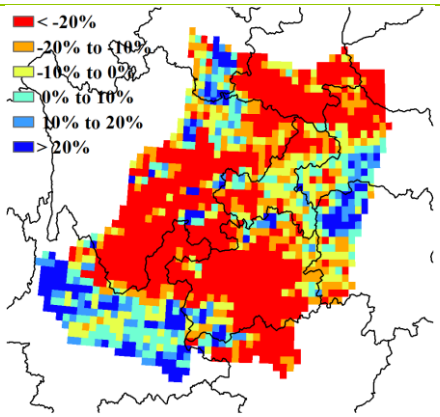
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

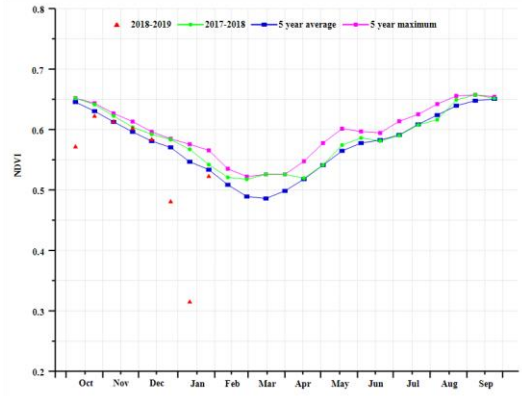
Southern China

During the monitoring period, NDVI was close to the previous five-year average except for early October, late December and early January. The rainfall was above average (RAIN +21%), while the temperature and radiation were below (TEMP -0.2℃, RADPAR -8%). The cropped arable land fraction was well above average (CALF, +29%) and so was the biomass accumulation potential (BIOMSS +36%). The maximum VCI (VCIx) reached 0.93.

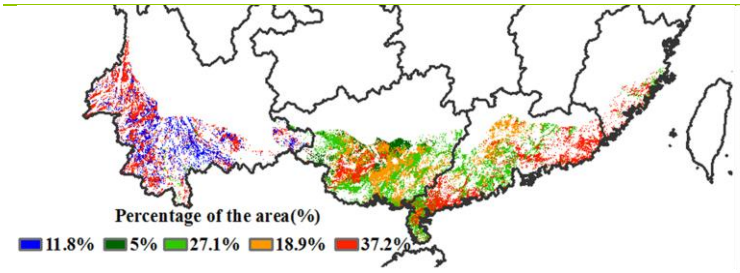
NDVI was close to and above average throughout the reporting period in Yunnan Province. Other Provinces (Guangxi, Guangdong and Fujian) had below average NDVI from late December to 2019. The potential biomass departure map shows below average values exceeding 20% in most of Guangxi and Southwest of Guangdong.

The good climatic conditions were favorable for the crop production.

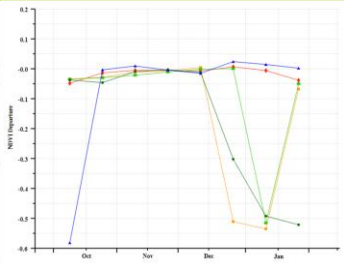
Figure 4.11. Crop condition Southern China region, October 2018 to January 2019



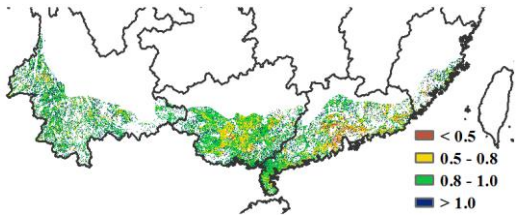
(a) Crop condition development graph based on NDVI



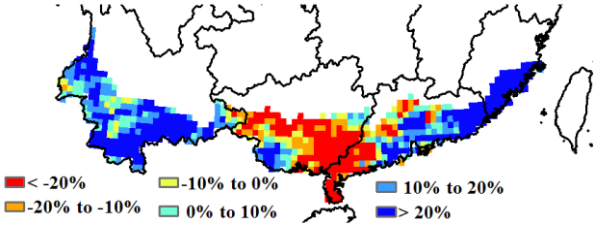
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass