Chapter 4. China

This chapter starts with a brief overview of the agro-climatic and agronomic conditions in China over the reporting period (section 4.1). Next it describes the situation by region, focusing on the seven most productive agro-ecological regions of the east and south: Northeast China, Inner Mongolia, Huanghuaihai, Loess region, Lower Yangtze, Southwest China, and Southern China (4.2). Section 4.3 describes trade prospects (import/export) of major crops. Additional information on the agroclimatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

Agro-climatic conditions were below average in China from October 2020 to January 2021, with rainfall, temperature and radiation deficits by 24%, 0.4°C and 3%, respectively, which resulted in a below-average potential biomass (-11%). Due to the complexity and variability of climatic conditions in China, weather conditions vary over different agroecological zones. Temperatures in six of the agroecological zones (AEZs) of China were below average, ranging from -1.5°C to -0.1°C. Only Northeast China had above-average temperatures. All AEZs except for Northeast China suffered from water shortage, and the departure of rainfall from the 15YA ranged from -44% to -3%. Drier conditions may potentially hamper the sowing and early growth of crops after winter. Since potential biomass is a synthetic indicator taking rainfall, radiation, and temperature into consideration, potential biomass in all seven AEZs was below average, with the biggest negative departure of -20% in Southwest China and the smallest negative departure of -4% in Southern China, indicating the unfavorable agroclimatic conditions.

Rainfall departure clustering and temperature departure clustering reveal detailed spatiotemporal patterns. Rainfall in 60% of the agricultural area was generally near average, and mainly located in northern China, and some areas in southwestern parts of China. Other regions in China went through some small fluctuation in rainfall. Relatively excessive rainfall (more than +30mm/dekad) occurred mainly in early October predominantly in the provinces of Chongqing, Anhui, Hubei, and some parts in adjacent provinces. Rainfall deficit (more than -30mm/dekad) mainly happend in early November in the provinces of Guangxi, Guangdong, Fujian, Jiangsu, and Hunan. Interestingly, the variations of temperature of two clustered regions were quite similar (marked in light green and blue), with temperatures below the average for most of the time during the monitoring period.

Only 9 provinces had positive rainfall anomalies such as Henan (+17%), Heilongjiang (+15%), and Jilin (+10%). The positive temperature anomalies were only recorded in 3 provinces of Heilongjiang (+0.4°C), Jiangsu (+0.3°C) and Zhejiang (+0.1°C). Winter wheat cultivated across northern China is going through the hibernation period, while there were hardly any crops grown in Northeast China and Inner Mongolia during this period. CropWatch will keep monitoring the agro-climatic and agronomic conditions in the following bulletins.

Table 4.1 CropWatch agro-climatic and agronomic indicators for China, October 2020 to January 2021, departure from 5YA and 15YA

Region	Agroclimatic indicators				Agronomic indicators	
	Departure from 15YA (2006-2020)				Departure from 5YA (2016-2020)	Current period
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	-3	-0.2	-3	-16	13	0.91
Inner Mongolia	-7	-1.5	0	-8		
Loess region	-8	-0.6	-4	-10	17	0.91
Lower Yangtze	-44	-0.2	-1	-7	4	0.96
Northeast China	13	0.1	-5	-6		
Southern China	-32	-0.1	4	-4	0	0.95
Southwest China	-7	-0.5	-8	-20	0	0.92

Figure 4.1 China crop calendar

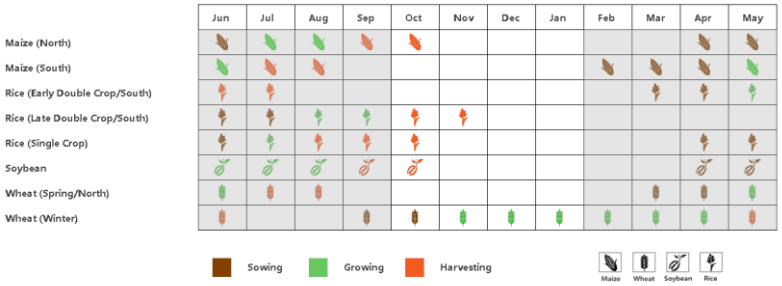


Figure 4.2 China spatial distribution of rainfall profiles, October 2020 - January 2021

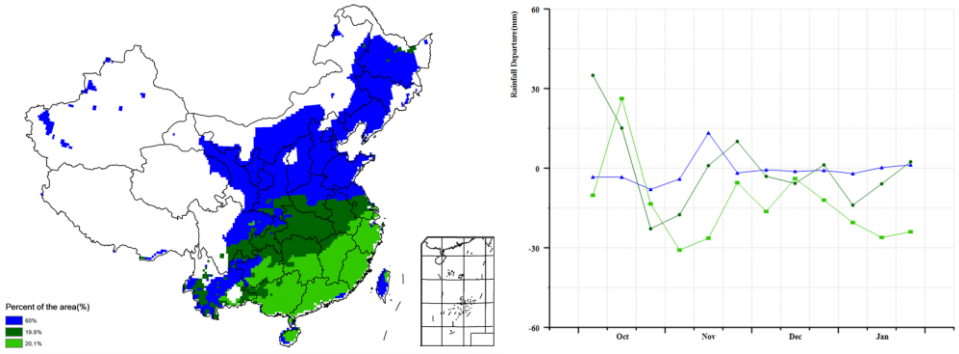


Figure 4.3 China spatial distribution of temperature profiles, October 2020 - January 2021

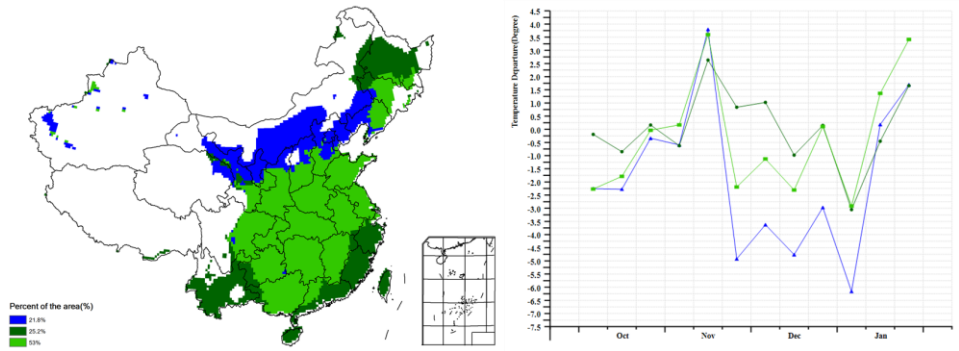


Figure 4.4 China cropped and uncropped arable land, by pixel, October 2020 - January 2021

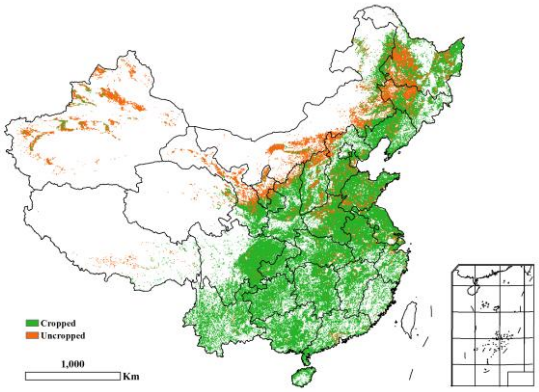


Figure 4.5 China maximum Vegetation Condition Index (VCIx), by pixel, October 2020 - January 2021

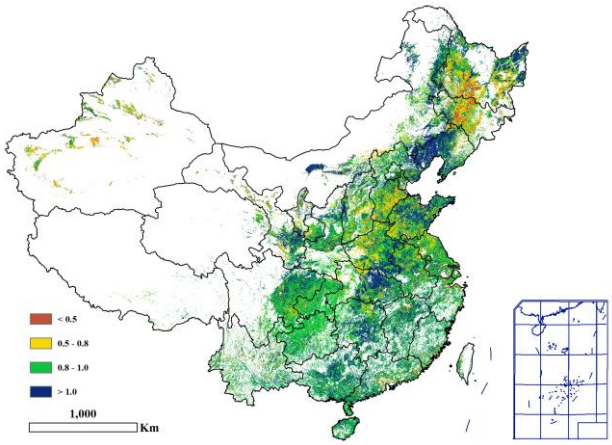
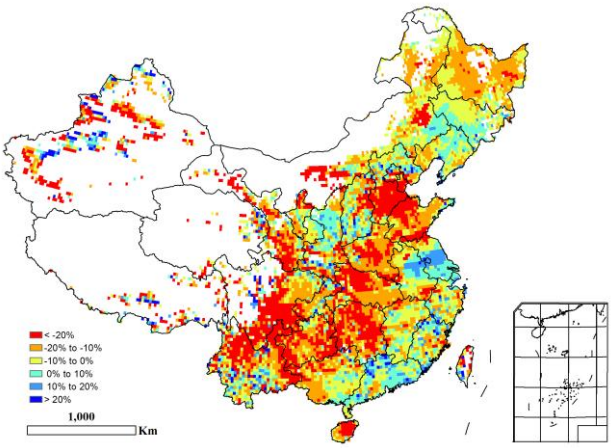


Figure 4.6 China biomass departure map from 15YA, by pixel, October 2020 - January 2021



4.2 Regional analysis

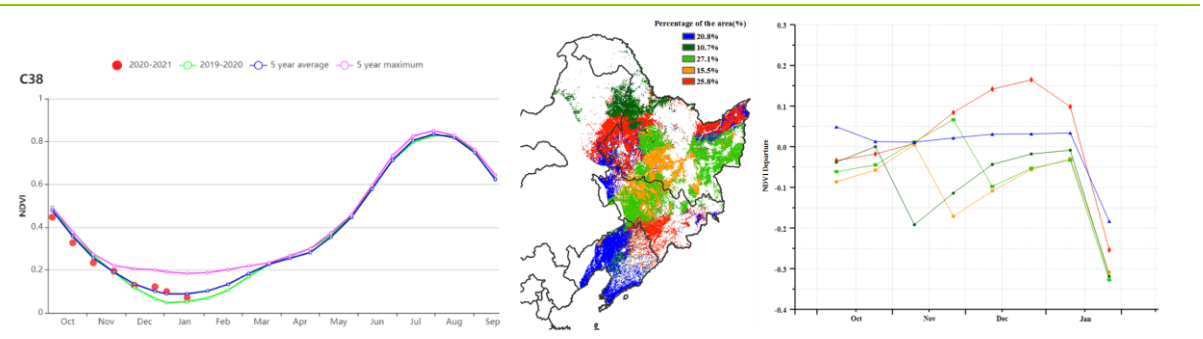
Figures 4.7 through 4.13 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Phenology of major crops; (b) Crop condition development graph based on NDVI, comparing the current season up to October 2019 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for October 2020 - January 2021 (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 2020 - January 2021. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

Northeast region

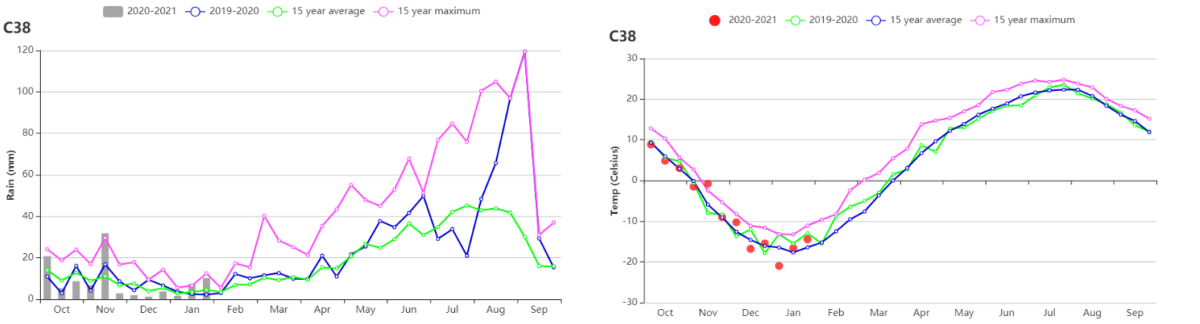
Due to the cold weather, no crops were growing in the northeast of China during this monitoring season (October 2020 to January 2021). CropWatch Agroclimatic Indicators (CWAIs) showed that the overall precipitation increased by 13%, and it was significantly above average in early October, mid-November and mid-January and late January. The photosynthetically active radiation decreased by 5%, and temperature increased by about 0.1°C. For the potential biomass, most areas were below the fifteen-year average level in the northeast China. Only a few areas in Jilin and Liaoning were slightly above average level, and the overall potential biomass was 6% below average.

If there are appropriate soil mositure, normal temperature and radiation in the sowing period, they will benefit the emergence and early growth of crops in spring.

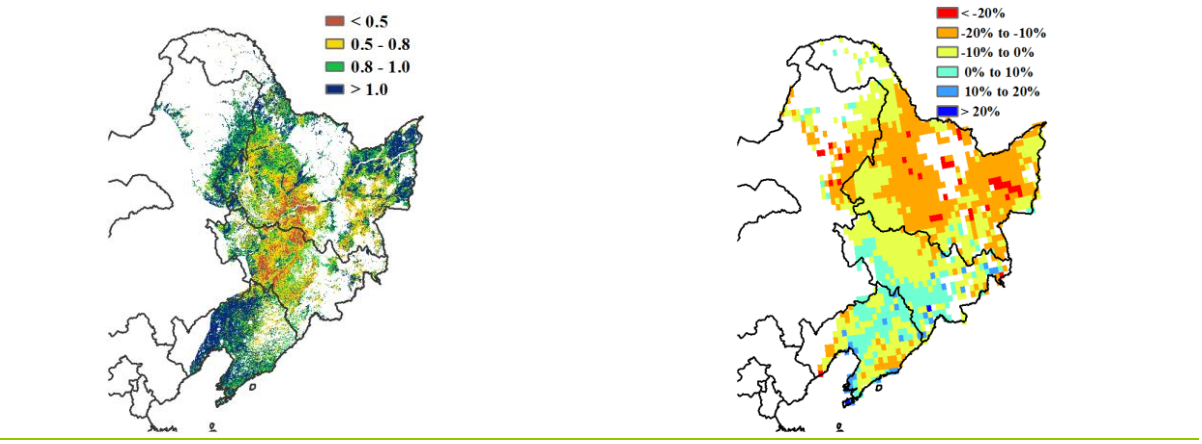
Figure 4.7 Crop condition China Northeast region, October 2020 - January 2021



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



(d)Time series rainfall profile (e)Time series temperature profile



(f) Maximum VCI (g) Potential biomass departure from 15YA

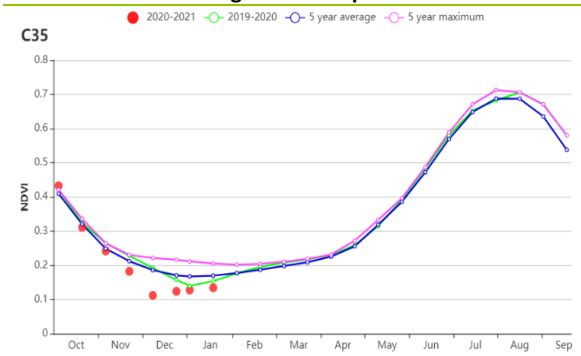
Inner Mongolia

In Inner Mongolia region, no winter crops are grown during this monitoring period, due to seasonal low temperatures. However, agroclimatic conditions in this period are relevant, particularly the rainfall, as it influences soil moisture availability for the spring-sown crops. The negative departures of NDVI starting in mid-November occurred after all the summer crops had been harvested.

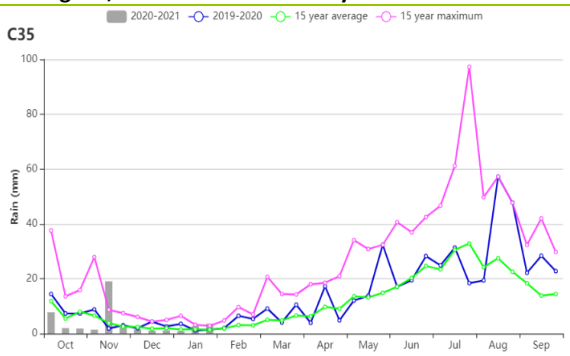
The reporting period recorded 45 mm of precipitation, which was 7% below average. The rainfall profile showed that it was below average in each month except for November. Together with significantly low temperature (TEMP, -1.5°C) and close to average radiation (+0.2%), potential biomass accumulation was simulated at 8% below average level.

The below-average indicators for VCIx and potential biomass are not relevant. Conditions in the next reporting period will be more critical for the land preparation and early growth of the 2021 spring crops.

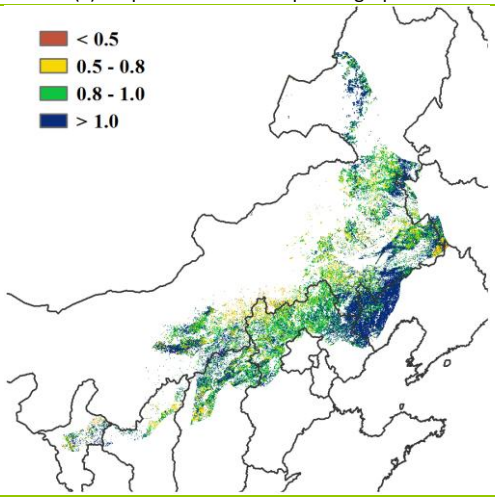
Figure 4.8 Crop condition in China Inner Mongolia, October 2020 - January 2021



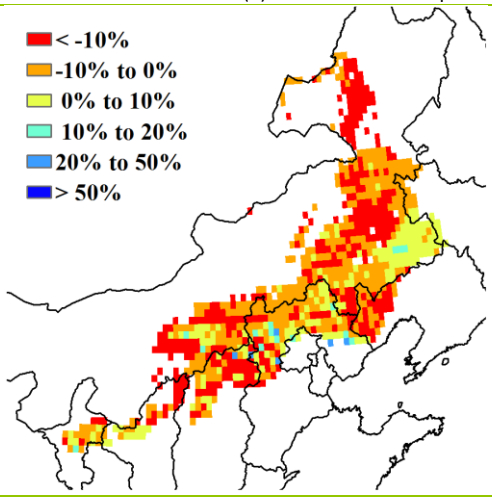
(a) Crop condition development graph based on NDVI



(b) Time series rainfall profile



(c) Maximum VCI



(d) Potential biomass departure from 15YA

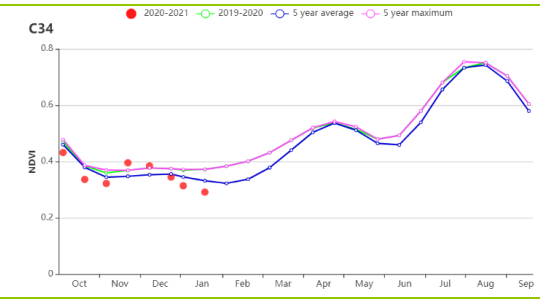
Huanghuaihai

The monitoring period (October 2020 to January 2021) covers the planting and early growth stages of winter wheat in Huanghuaihai.

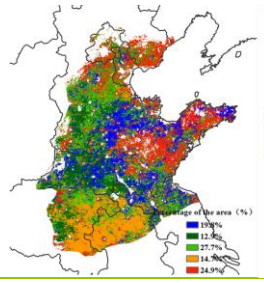
Agro-climatic indicators showed that both precipitation and radiation decreased by 3% and temperature fell by 0.2°C compared to the 15YA, which led to a 16% drop in BIOMSS compared to the 15YA. Wet and cold weather may influence the development of winter crops. The CALF exceeded 13% compared to the 5YA. The VCIx value was 0.91. The NDVI profiles showed that crop growth in the Huanghuaihai region was below the average level for most of the monitoring period except period from late November to mid-December. As shown by NDVI clusters and profiles, 14.7% of cropland over northern Anhui and eastern Henan were positive. 19.8% of cropland over Northern and southern Shandong were negative, indicating that crops in this area were in poor condition.

The maps of maximum VCI showed a similar trend to the spatial NDVI patterns. Overall, crop conditions in Huanghuaihai region during the monitoring period were more favorable in the southern and eastern part.

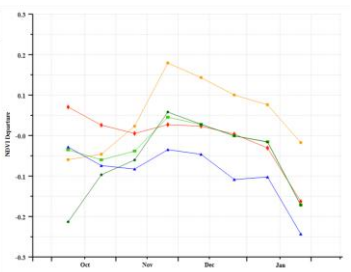
Figure 4.9 Crop condition China Huanghuaihai, October 2020 - January 2021



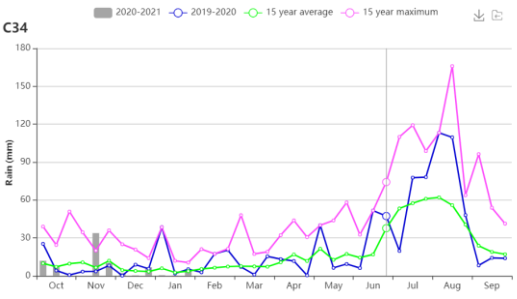
(a) Crop condition development graph based on NDVI



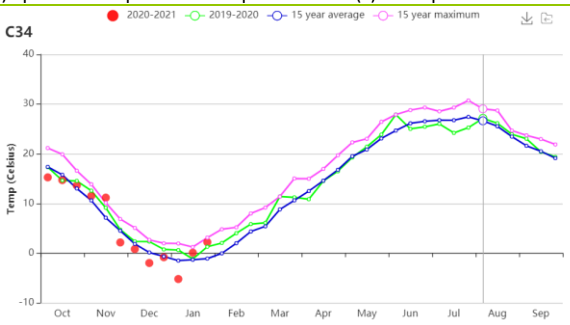
(b) Spatial NDVI patterns compared to 5YA



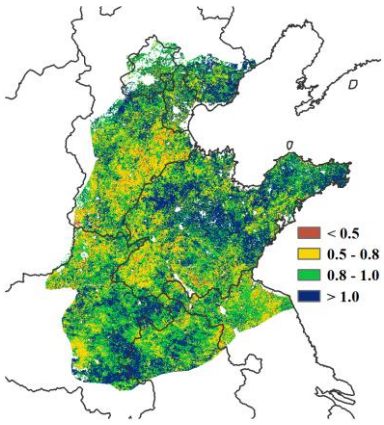
(c) NDVI profiles



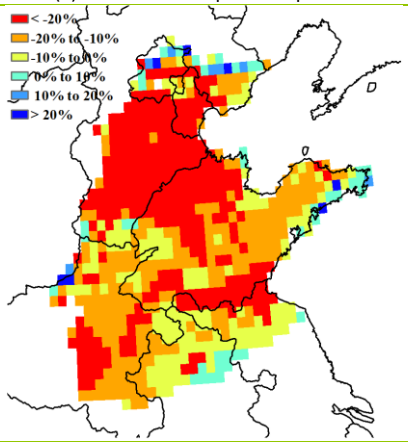
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI

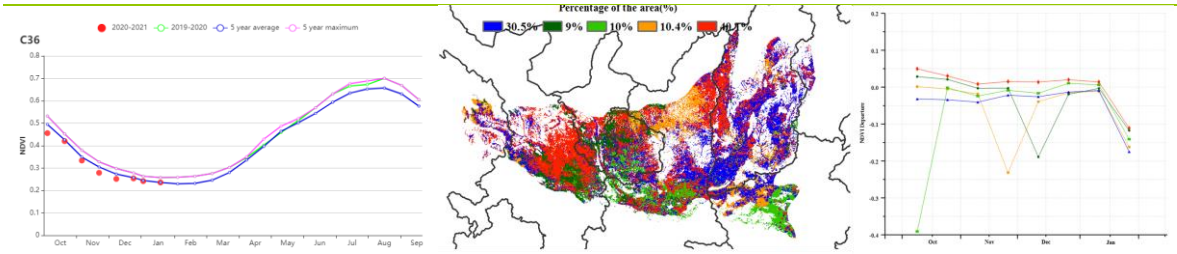


(g) Potential biomass departure from 15YA

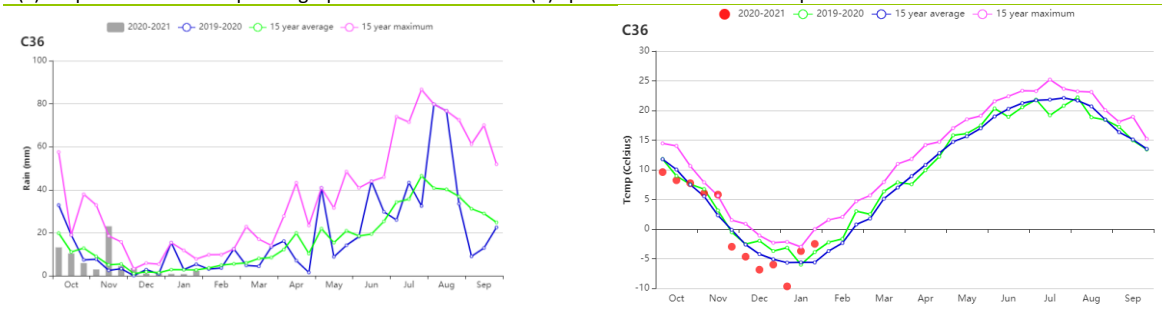
Loess region

Winter wheat is the predominant crop that is grown during this monitoring period in this region. Winter wheat sowing started in September and concluded in October. The CropWatch Agroclimatic Indicators (CWAIs) for this region were below the 15YA: Rainfall (RAIN) was below average by 8%, temperature (TEMP) was below average by 0.6°C, and radiation (RADPAR) dropped by 4%. Much colder-than-usual temperatures were observed in early January. Due to the decrease of precipitation, temperature and radiation, the potential biomass (BIOMSS) was 10% below average. According to the regional NDVI development graph, the crop conditions were slightly below the 5-year average between October and December, and they were average from December to January. As can be seen from the spatial patterns of NDVI departure clustering and the profiles, about 10% of the cropped area was below the 5-year average in early October, which occurred mainly in the northwest of Henan province, and the south of Shannxi and Ningxia. These negative departures were most likely due to cloud cover in the satellite images. The Maximum VCI map shows high values of VCIx (0.91) in most cropped areas of the region. Almost 83% of the farmland was cultivated according to CALF (+17%) as compared to the 5YA. In general, the crop conditions are favorable for this region.

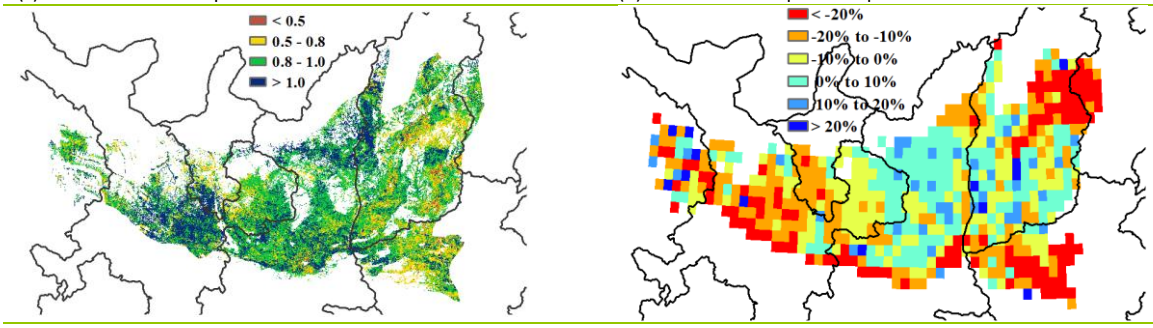
Figure 4.10 Crop condition China Loess region, October 2020 - January 2021



(a) Crop condition development graph based on NDVI (b) Spatial distribution of NDVI profiles



(c) Time series rainfall profile (d) Time series temperature profile



(e) Maximum VCI (f) Potential biomass departure from 15YA

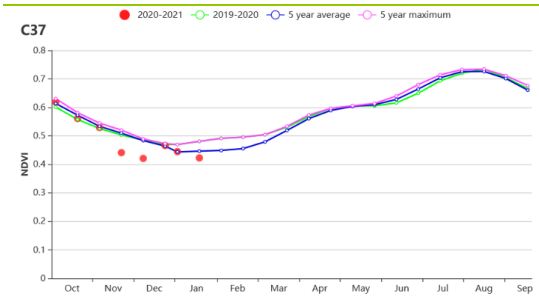
Lower Yangtze region

During this monitoring period, only winter crops like wheat and rapeseed were in the field, mostly in the north of the region, including parts in Hubei, Henan, Anhui, and Jiangsu provinces. There were no crops grown in Fujian and the southern Jiangxi and Hunan provinces. According to the CropWatch agro-climatic indicators, the temperature and photosynthetically active radiation were slightly below the 15YA average (TEMP -0.2°C, RADPAR -0.5%). However, the accumulated precipitation was significantly below average (RAIN -44%). The below-average agro-climatic conditions resulted in a 7% negative departure of biomass production potential. The potential biomass departure map shows the spatial variation of the weather impact on crops. Only southern Jiangsu and central Anhui had a positive anomaly of up to 20% above average. The potential biomass of other regions was lower than the average, especially in parts of Hunan and Hubei, which were more than 20% lower than the five year average.

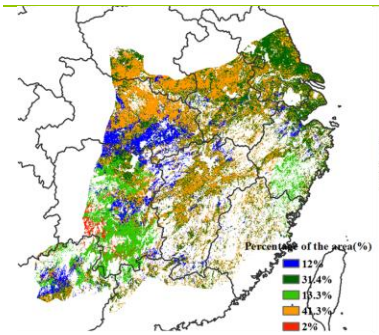
As shown in the NDVI development graph, crop conditions were near the 5-year average. However, 41.3% of the area, mostly distributed in the north and center of this region, including Jiangsu, Anhui, Hubei, Henan, and Jiangxi provinces, had a better crop condition compared to the five-year average. It basically coincided with the situation depicted by the VCIx patterns. The average VCIx of this region is 0.96, and most area had VCIx values ranging from 0.8 to 1.

The crop condition in the Lower Yangtze region is currently assessed as close to but below average.

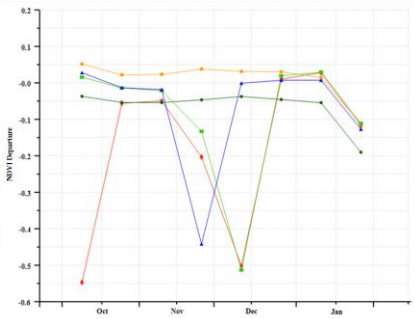
Figure 4.11 Crop condition China Lower Yangtze region, October 2020 - January 2021



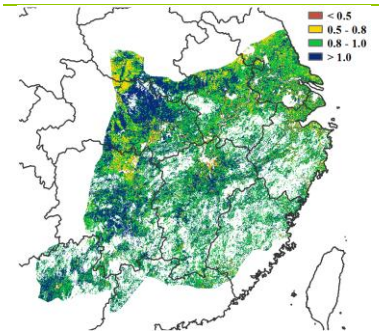
(a) Crop condition development graph based on NDVI



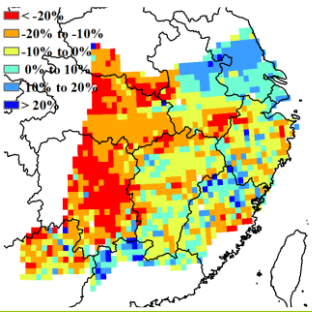
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Potential biomass departure from 15YA

Southwest region

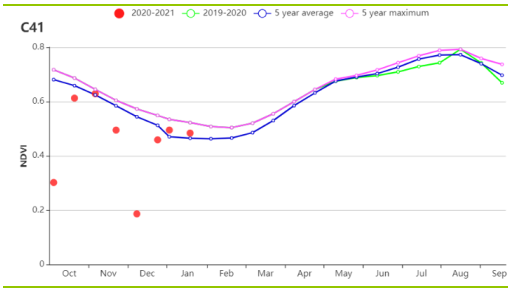
The reporting period covers the wintering period of winter crops in southwestern China. According to the regional NDVI profile, crop conditions were generally below the 5-year average, but slightly above average in January.

On average, rainfall and radiation were below the 15-year average (RAIN -7%, RADPAR -8%). Temperature was close to average (TEMP -0.5°C). The resulting BIOMSS was 20% below average mainly due to less rainfall and radiation. The cropped arable land fraction remained at the same level as in the last five years, which indicated there was no change in crop planting for this period.

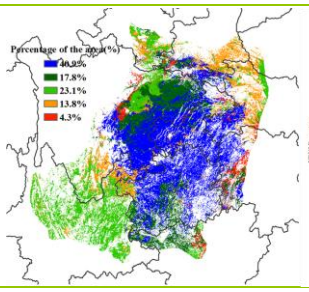
According to the NDVI departure clustering map and the profiles, values were close to average in November, except in Chongqing and neighboring areas in north-western Guizhou. In January, the overall NDVI in the region was close to the average level. Rainfall and RADPAR were below average for Chongqing (-4% and -6% respectively), as well as for Guizhou (RAIN -21%, RADPAR -6%). Average NDVI throughout the monitoring period was observed in eastern Sichuan and Yunnan, where radiation was below average and precipitation above average (See Annex A.11). The maximum VCI reached 0.92, indicating that peak conditions were comparable to the last five years. At the level of major production zones, the negative impact of below-average rainfall and increased cloud cover is expected to be limited.

Conditions were mixed, but generally close to average. Some pockets suffered from low rainfall. The predominantly negative departures from the long-term average of NDVI indicate slightly below-average crop conditions.

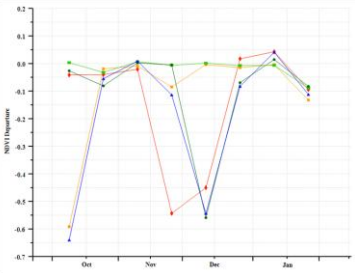
Figure 4.12 Crop condition China SouthWest region, October 2020 – January 2021



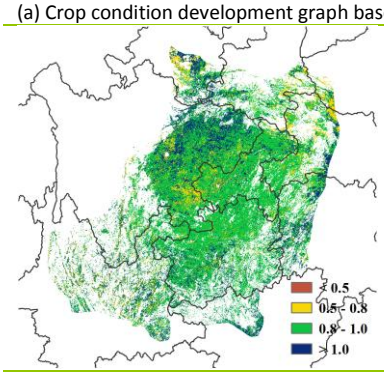
(a) Crop condition development graph based on NDVI



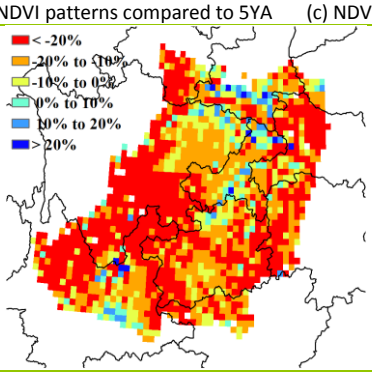
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles

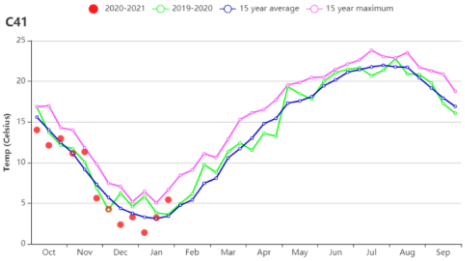


(d) Maximum VCI



(e) Potential biomass departure from 15YA

(f) Time series rainfall profile



(g) Time series temperature profile

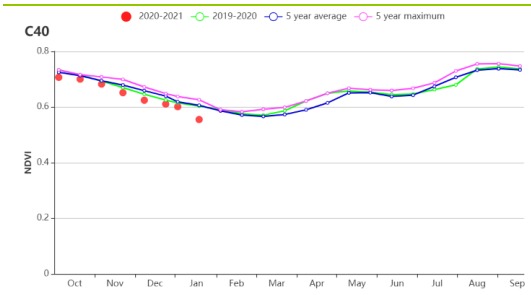
Southern China

Rice, the main crop grown in Southern China during this monitoring period, was harvested by November. Only a few crops are grown over the winter period. According to the NDVI profile, crop conditions were generally below the five-year average.

On average, rainfall was below the fifteen-year average (RAIN -32%), whereas radiation was slightly above (RADPAR +4%). Temperatures were close to average (TEMP -0.1°C). The drier-than-normal conditions in October and November were conducive to the harvest of late rice. The abnormally dry conditions continued until January, the end of this monitoring period. This may cause low soil moisture conditions for the planting of spring crops during the upcoming monitoring period. As shown by the NDVI departure clustering map and the profiles, values were slightly below average during the reporting period. According to the BIOMSS map, the potential biomass production in some areas was lower than the 15YA, which are mostly distributed in the middle of this region including Guangxi and eastern Yunnan. The average VCIx of the Southern China region during the monitoring period was 0.95, and almost all regions presented a VCIx above 0.80.

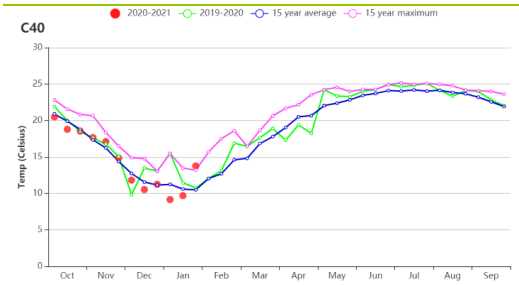
Overall, the crop conditions during the monitoring period were slightly below average for this region.

Figure 4.13 Crop condition Southern China, October 2020 - January 2021

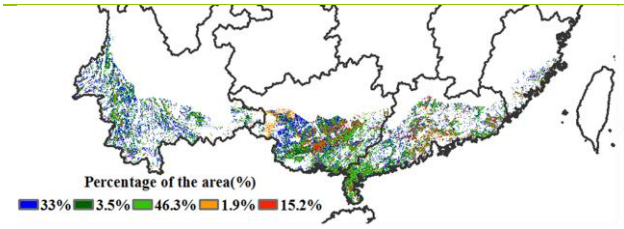


(a) Crop condition development graph based on NDVI

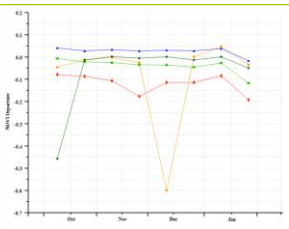
(b) Time series rainfall profile



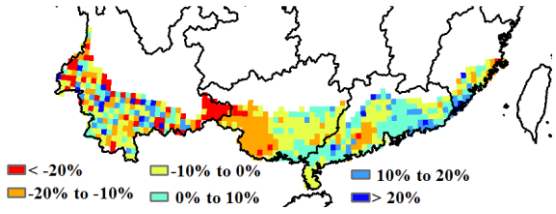
(c) Time series temperature profile



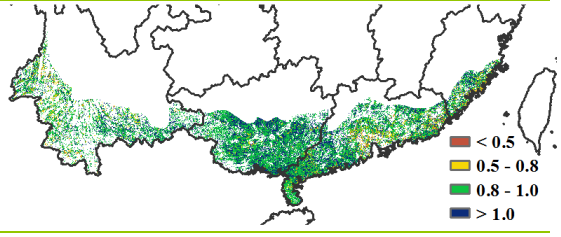
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Potential biomass departure from 15YA



(g) Maximum VCI

4.3 Major crops trade prospects

Based on remote sensing-based production prediction in major agricultural producing countries in 2021 and the Major Agricultural Shocks and Policy Simulation Model, it is predicted that the import of major grain crop varieties will increase slightly in 2021. The details are as follows:

Rice: Rice import will increase by 2.6% and its export will decrease by 1.3% in 2021. Affected by the COVID-19 pandemic, the efficiency of container turnover in the international shipping market has been greatly reduced, resulting in continuous shortage of containers and significant increase in freight rates. The gap of rice demand in major importing countries has increased, and China's import of rice in 2021 is expected to increase slightly.

Wheat: China's wheat import will decrease by 4.7% and its export will increase by 1.5% in 2021. Affected by the novel coronavirus disease and the export restrictions of main producers (such as Russia), the international wheat prices rose by 6.8% in the early 2021, but the import price after a 1% in-quota duty in China will still be lower than the domestic price, and its wheat import in 2021 is expected to decrease only slightly.

Maize: Maize import will increase by 1.6% and its export will decrease by 10.4% in 2021. After the conclusion of the phase-one economic and trade agreement between China and the United States, China's maize import increased sharply in 2020. Due to this and other factors such the COVID-19 pandemic, it is expected that the global maize prices will remain high in 2021, but they will still be lower than the domestic level in China, and its maize import will remain high.

Soybean: Soybean import will decrease by 1.4% and its export will increase by 2.3% in 2021. As the novel coronavirus disease and other uncertain factors continue to develop, the global soybean market is still on the rise. With a strong import demand, China's soybean import is expected to be basically flat in 2021.

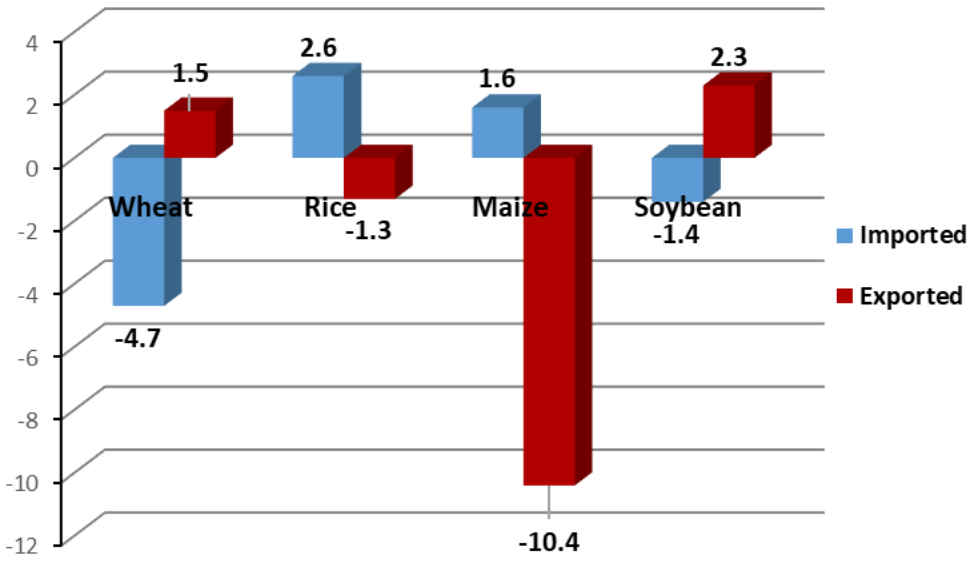


Figure 4.14 Rate of change of imports and exports for rice, wheat, maize, and soybean in China in 2021 compared to those for 2021(%)