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 quite favorable in China from October 2021 to January 2022. Rainfall and temperature had increased by 18% and 0.3°C over the 15YA, respectively. Radiation was 3% below the 15YA. The abundant rainfall resulted in the above-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 at or above average, ranging from 0.0°C to +1.0°C. Only Loess region had slightly below-average temperature (-0.1℃). All AEZs received above-average rainfall, and the departure of rainfall from the 15YA ranged from +9% to +113%. The potential biomass is a synthetic indicator taking rainfall, radiation, and temperature into consideration. Potential biomass in all seven AEZs was above average, with the smallest positive departure of +6% in Southern China and the biggest positive departure of +31% in Huanghuaihai and Loess region, indicating rather favorable agroclimatic conditions.

Rainfall departure clustering and temperature departure clustering reveal detailed spatiotemporal patterns. 65.9% of the agricultural area (marked in blue) had near-average rainfall, mainly covering Northeast, southern part of Northern China, Southwest, and northern part of Southern China, etc. Other regions in China went through some small fluctuation in rainfall. Excessive rainfall (more than +110 mm/dekad) occurred mainly in early October in the provinces of eastern Sichuan, southern Ningxia, central Shaanxi, Shanxi, southern Hebei, northern Guangxi, Guangdong and some parts in adjacent provinces. Cultivated area marked in dark green, mainly in Lower Yangtze region, also received largely above-average rainfall (almost +60 mm/dekad) in middle October, mainly in some parts of Anhui, Jiangsu, Hubei, Henan, Hunan, Jiangxi and Fujian. As for the temperature departure clustering, dark green marked region, mainly in Northeast, had the biggest fluctuation with the biggest positive departure (more than +6.5℃) in early December and biggest negative departure (almost -4℃) in late December. However, there was no crop in this area during the monitoring period, so the highly fluctuated temperatures had no impact on the crops.

Higher-than-usual rainfall, which caused localized flooding conditions and excessively wet soil in the field, delayed the sowing of winter wheat, especially in Loess region and Huanghuaihai. A record-breaking rainfall caused devastating floods and landslides, mainly located in the provinces of Shanxi and Shaanxi in October. The planted area of winter crops decreased by 2 percent in Shanxi and 1 percent in Shaanxi. On the other hand, the adequate soil moisture is beneficial for the growth of winter crops, so the crop conditions in these areas were quite favorable. Moreover, the areas along the Yellow River, especially near the cities of Zhengzhou and Kaifeng in Henan province, and Liaocheng and Dezhou in Shandong provinces, were flooded

for a long period and the planting of winter wheat was also delayed. The crop condition was below average in these areas, reflected by the maximum vegetation condition index (VCIx).

At the provincial level, only 4 provinces (Jiangxi -12%, Fujian -6%, Guangdong -4%, and Anhui -1%) had negative rainfall anomalies. The negative temperature anomalies were only recorded in 5 provinces, ranging from -0.5°C (Ningxia) to -0.1°C (Guangxi). Winter wheat cultivated across northern China is going through the overwintering period, while there were hardly any crops grown in Northeast China and Inner Mongolia during this period. Although the wet conditions in October caused a delay in winter wheat planting especially in the Loess and Huanghuaihai regions, good soil moisture condition is beneficial to the growth of winter crops after the wintering period. If the agroclimatic conditions during the greenup stage are favorable, it may be helpful to compensate for the impact of late sowing of winter wheat. In general, prospects for winter wheat production are still close to normal.

Table 4.1 CropWatch agroclimatic and agronomic indicators for China, October 2021 – January 2022, departure from 5YA and 15YA

Region	Agroclimatic indicators				Agronomic indicators	
	Departure from 15YA				Departure from 5YA	Current period
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	56	0.3	-4	31	6	0.80
Inner Mongolia	39	0.3	-2	16	60	0.96
Loess region	113	-0.1	-4	31	13	0.97
Lower Yangtze	9	0.3	-2	8	4	0.92
Northeast China	54	1.0	-5	21	18	0.85
Southern China	11	0.2	1	6	0	0.94
Southwest China	20	0.0	-7	9	0	0.97

Figure 4.1 China crop calendar

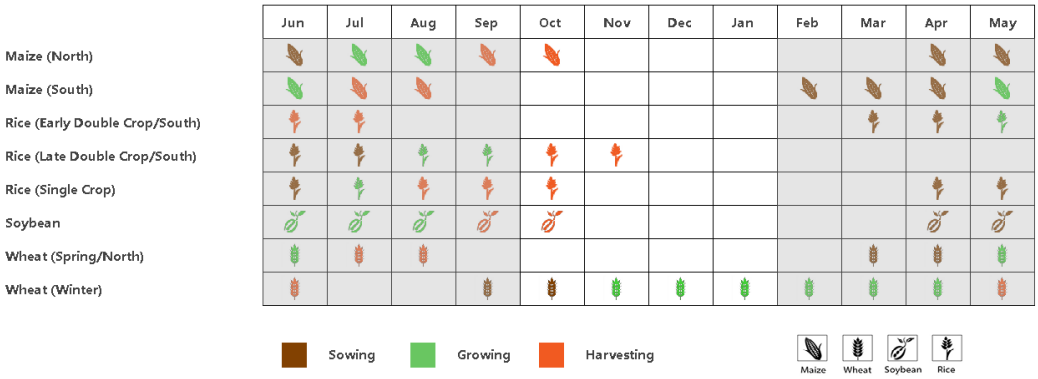


Figure 4.2 China spatial distribution of rainfall profiles, Oct 2021 to Jan 2022

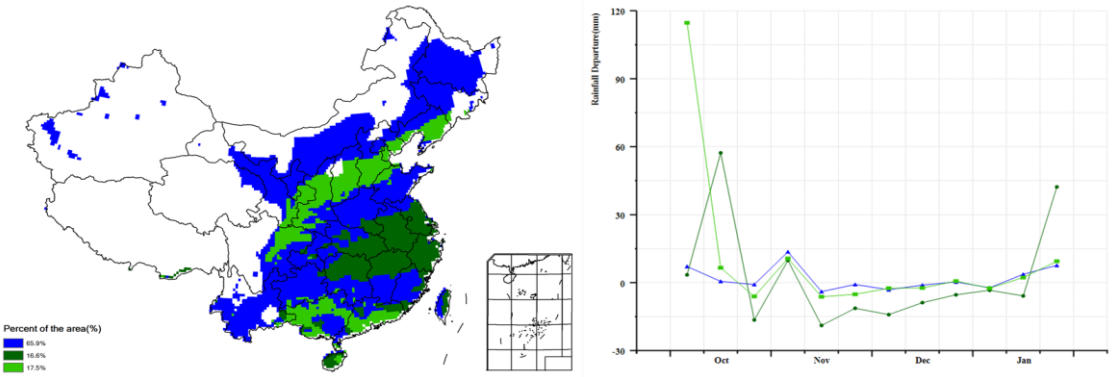
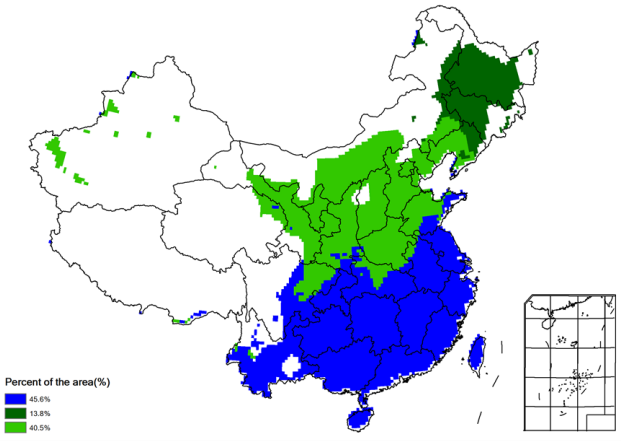


Figure 4.3 China spatial distribution of temperature profiles, Oct 2021 to Jan 2022



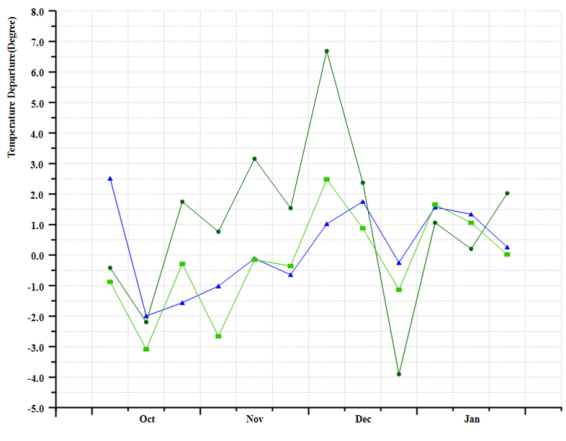
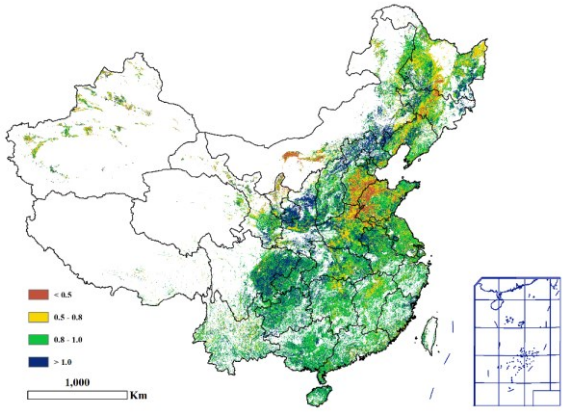
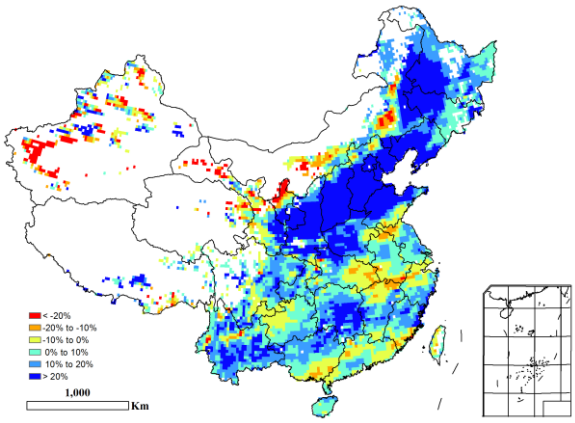


Figure 4.4 China maximum Vegetation Condition Index (VCIx), by pixel, Oct 2021 to Jan 2022

Figure 4.5 China biomass departure map from 15YA, by pixel, Oct 2021 to Jan 2022





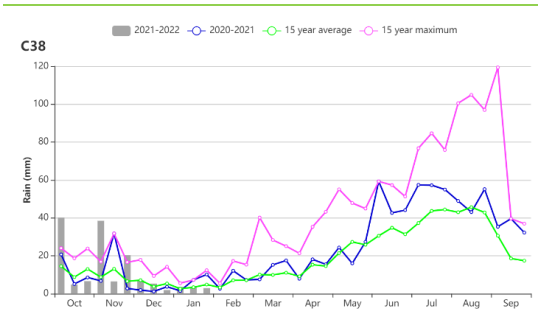
4.2 Regional analysis

Figures 4.6 through 4.12 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 (b) Spatial NDVI patterns for October 2021 to January 2022 (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 2021 to January 2022. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

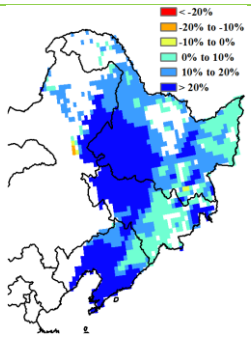
Northeast region

Due to the cold weather, no crops were growing in the northeast of China during this monitoring season (October 2021 to January 2022). CropWatch Agroclimatic Indicators (CWAIs) showed that the overall precipitation increased by 54%. It was significantly above average in early October, and early November. The favorable weather conditions was also reflected by the estimate of potential biomass, which was 21% above average. Almost all cropland in the area presented above-average BIOMSS.

Figure 4.6 Crop condition China Northeast region, October 2021 – January 2022



(a)Time series rainfall profile

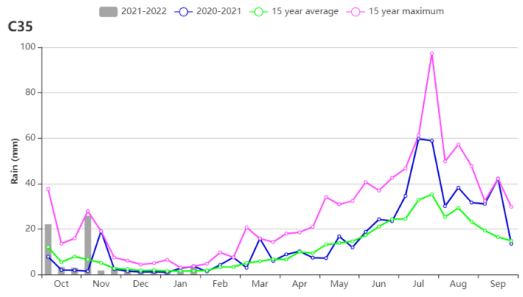


(b) Biomass departure

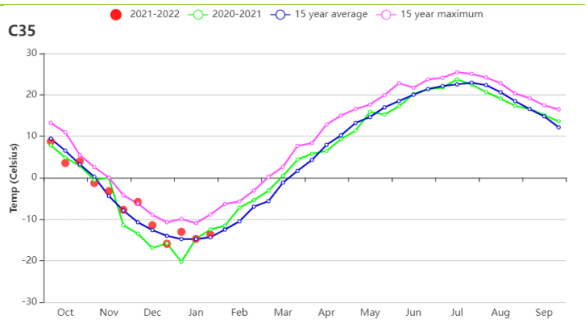
Inner Mongolia

During this monitoring period, no winter crops were grown in Inner Mongolia due to seasonal low temperatures. The weather conditions in this period were favorable, rainfall (+39%) was significantly above average, above-average snow and rainfall will help provide adequate soil moisture for the land preparation and establishment of the spring crops. CropWatch Agroclimatic Indicators showed TEMP (0.3°C) was slightly above average, while RADPAR (-2%) was below average. Biomass accumulation potential (BIOMSS) was simulated at 16% above the average level. Conditions in the next reporting period will be more critical for the 2022 production.

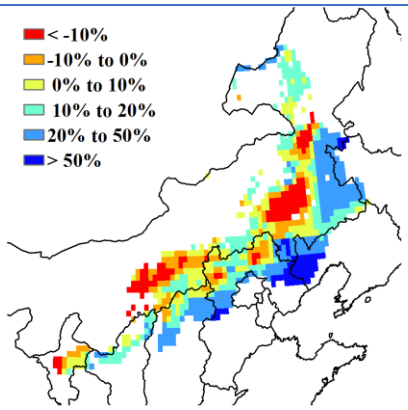
Figure 4.7 Crop condition Inner Mongolia, October 2021 – January 2022



(a)Time series rainfall profile



(b)Time series temperature profile



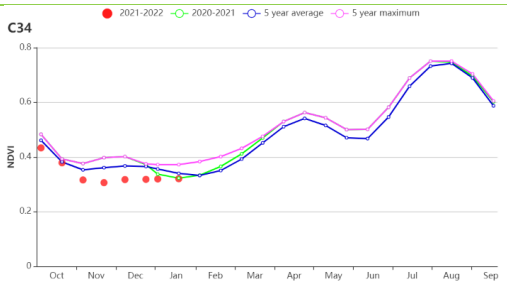
(c) Biomass departure

Huanghuaihai

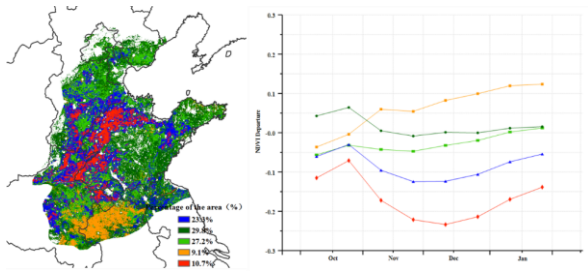
Winter wheat is the main crop that is being grown in this monitoring period (October 2021 to January 2022). Sowing took place mostly in October. Precipitation (+56%) and temperature (+0.3℃) in this area were above the 15 years average, but radiation (-7%) was below. The combination of these weather parameters led to an estimated increase of the potential biomass by 31%. The CALF exceeded the 5YA by 6%.

Based on the NDVI-based crop growth profile, the crop growth conditions were lower than the 5YA during the whole monitoring period. The main reason is the flooding along the Yellow River during the summer crops sowing in 2021 autumn resulted in the delay of winter wheat sowing. The crop condition was below average before the wintering period. As shown by NDVI clusters and profiles, only 9.1% of cropland over Northeastern Anhui were higher than the 5YA after mid-October, whereas crops in the areas of Northern Henan, Northwestern Shandong and Southern Hebei (blue and red color in NDVI departure clustering map) were at below average condition during the whole monitoring period due to the delayed sowing. The map of maximum VCI presented a similar trend as the spatial NDVI pattern. Overall, crop conditions in this important region were below average.

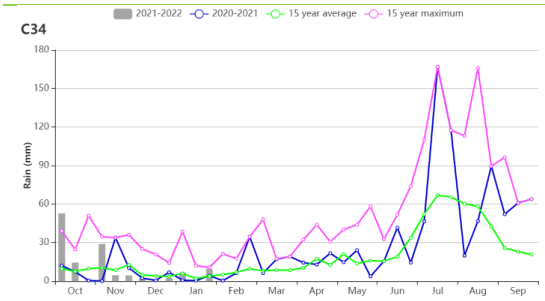
Figure 4.8 **Crop condition China Huanghuaihai, October 2021 – January 2022**



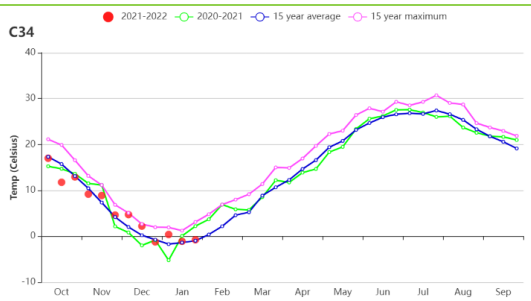
(a) Crop condition development graph based on NDVI



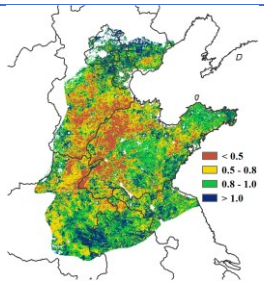
(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



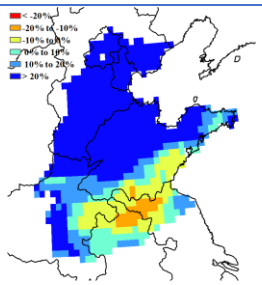
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure

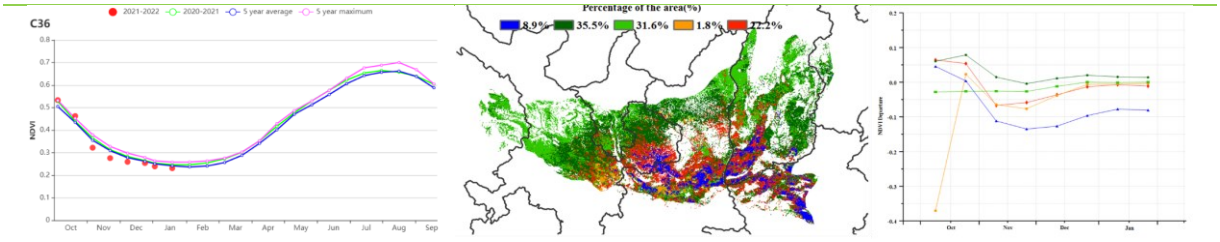
Loess region

Winter wheat is the predominant crop during this monitoring period in this region. Winter wheat sowing was started in September and completed in October. During the monitoring period, the crop conditions were close to the 5YA.

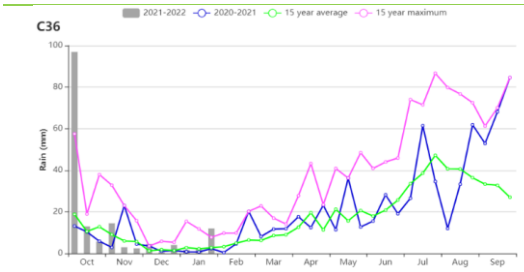
The CropWatch Agroclimatic Indicators (CWAIs) show that rainfall (RAIN) was above average by 113%, temperature (TEMP) decreased by 0.1°C, and radiation (RADPAR) was reduced by 4% compared to the 15YA. Benefited from significantly higher precipitation, the potential biomass (BIOMSS) was above average by 31%.According to the regional NDVI development graph, crop conditions in the Loess Region has been slightly below the 5YA since November 2021 after emergence. The region experienced record-breaking rainfall in early October, which triggered devastating floods and landslides in the Shaanxi and Shanxi provinces. Heavy rainfall in some areas continued for about 15 days, causing significant delay in winter wheat sowing, but the total planted area of summer crops were less affected, with the area decreasing by 1 percent in Shaanxi and 2 percent in Shanxi. NDVI clusters and profiles show that crop conditions in most part of the region were close to average. In eastern Gansu, southern Shaanxi, southern Shanxi and northwestern Henan (accounting for 8.9% of the total cropland area), the crop conditions were always lower than the average level. The average VCIx was 0.97 in the whole region; CALF was at 84%, higher than the average level but lower than the same period last year.

All in all, the Loess Region's overwintering crop conditions were close to average, despite the winter wheat sowing date being postponed in some areas of Shanxi and Shaanxi provinces.

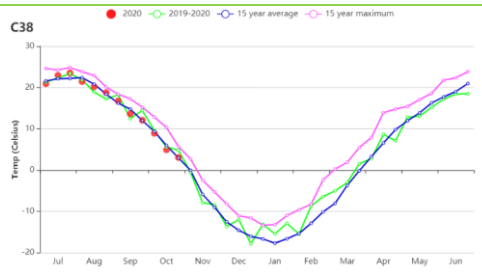
Figure 4.9 Crop condition China Loess region, October 2021 – January 2022



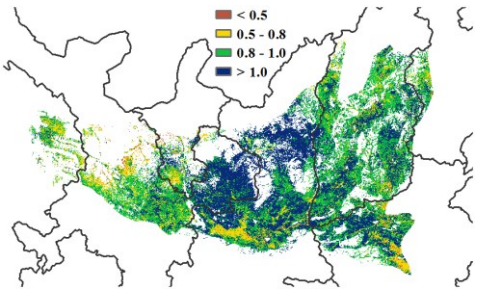
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



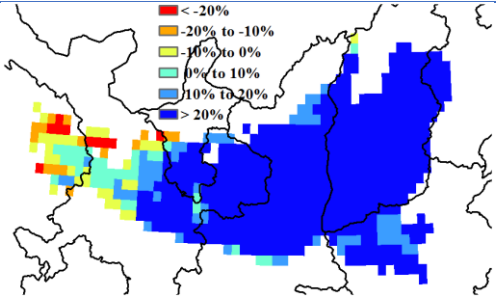
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure

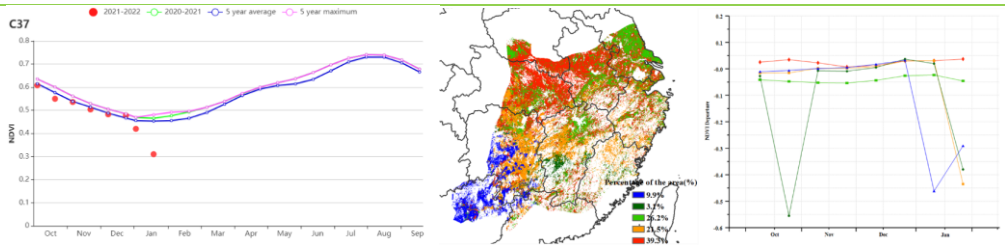
Lower Yangtze region

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. Limited winter crops were planted in Fujian, the southern Jiangxi and Hunan provinces.

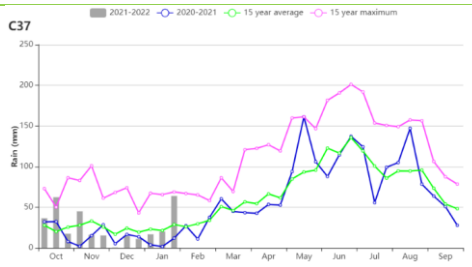
According to CropWatch agro-climatic indicators, the accumulated precipitation and temperature were 9% and 0.3℃ higher than the 15-year averages, respectively. The photosynthetically active radiation was slightly below average (RADPAR -2%) because of increased rainy days. The above average precipitation resulted in an 8% increase of biomass potential production compared to the 15YA. According to the NDVI-based crop development profiles, the crop growth was generally close to the average level during this period. The NDVI departure clustering analysis also reflected the overall normal crop growth condition, while 39.3% of the area, mostly distributed in the north of this region, including the southern Jiangsu, central Anhui, southern Henan and northern Hubei provinces, presented better crop conditions compared to the 5-year average. The crop condition in other areas was slightly below the average, including the central east of Jiangsu, the southern Anhui and the area around Poyang Lake in Jiangxi (light green area). However, the potential biomass departure map shews a different spatial pattern. Hubei presented lower than the average biomass, but the NDVI was higher than previous years, indicating the limited impact of unfavorable climatic conditions on crops. The average VCIx of this region was 0.92, and most area had VCIx values ranging from 0.8 to 1.

Overall, the crop conditions in the lower Yangtze region were normal.

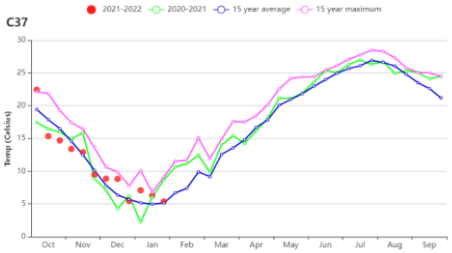
Figure 4.10 Crop condition China Lower Yangtze region, October 2021 – January 2022



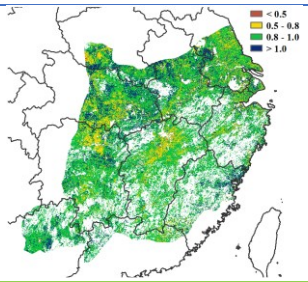
(a) Crop condition development graph based on NDVI (b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



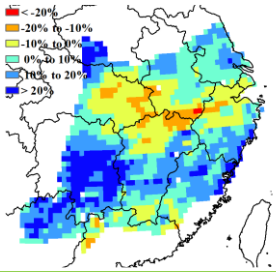
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure

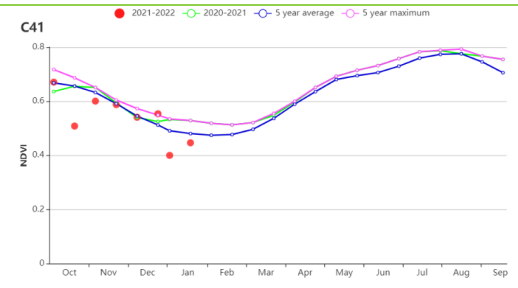
Southwest region

The reporting period covers the wintering period of winter crops (mainly winter wheat) in southwestern China. According to the regional NDVI profile, crop conditions were generally normal, but slightly below average in January.

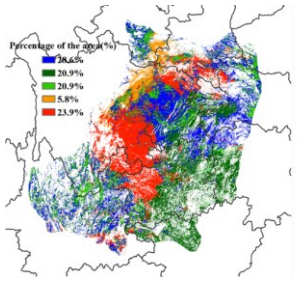
Rainfall was above the 15-year average (RAIN +20%) but solar radiation was below average (RADPAR -7%). Temperature was average (TEMP +0.0°C). The resulting BIOMSS was 9% above average mainly due to the above-average rainfall. The cropped arable land fraction remained at the same level as in the last five years.

According to the NDVI departure clustering map and the profiles, NDVI values were close to average in most regions. In Chongqing and northern Yunnan, the crop conditions were generally normal during the monitoring period. Crop condition in Guizhou was in general above average, mainly due to abundant precipitation (See Annex A.11), but crop growth was unfavorable in northwestern Guizhou in October and below average in central-eastern Guizhou in January. Abundant precipitation in Sichuan is generally favorable for crop growth, crop condition remained at or slightly above average. The VCIx reached 0.97. All in all, crop conditions were generally average.

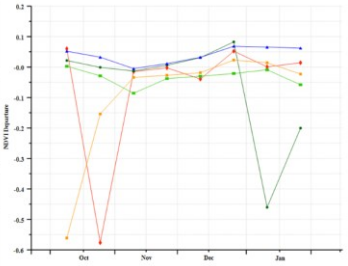
Figure 4.11 Crop condition China Southwest region, October 2021 – January 2022



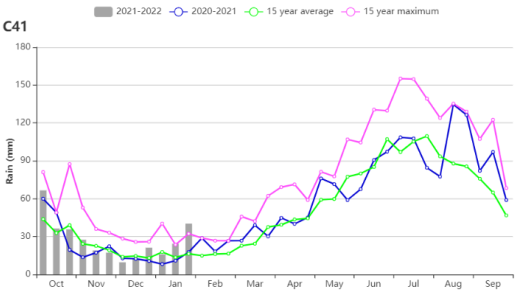
(a) Crop condition development graph based on NDVI



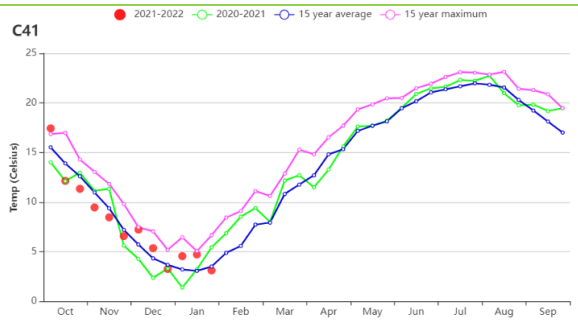
(b) Spatial NDVI patterns compared to 5YA



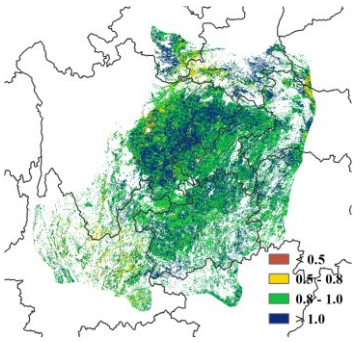
(c) NDVI profiles



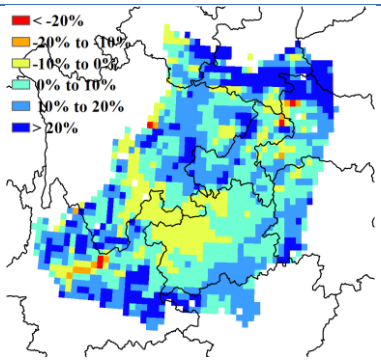
(d)Time series rainfall profile



(e)Time series temperature profile



(f) Maximum VCI



(g) Biomass departure

Southern China

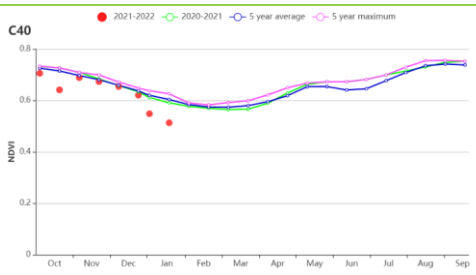
During this monitoring period in Southern China, rice was harvested in November. Only a few crops are grown over the winter period.

On average, rainfall was above the 15-year average (RAIN +11%). Temperature and radiation were near average (TEMP +0.2°C, RADPAR +1%). Lacking of rain in November favored the harvest of rice. BIOMSS was 6% above average mainly due to abundant rainfall. Affected by partial rainfall shortage, BIOMSS in eastern Guangdong, Gongxi and Fujian was below the 15YA. According to the NDVI profile, crop condition was slightly below the 5YA. The cropped arable land fraction remained close to the 5YA.

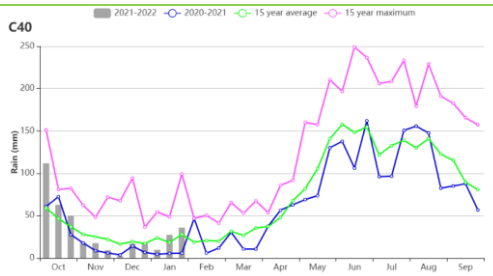
According to the NDVI departure clustering map and the profiles, values were slightly below average, which indicates that crops were in normal condition. 22.3% of cropland scattered in eastern Guangxi and southern Guangdong fell to below average levels. The average VCIx of the Southern China was 0.94, and almost all regions presented a VCIx above 0.80.

All in all, crop conditions were close to normal.

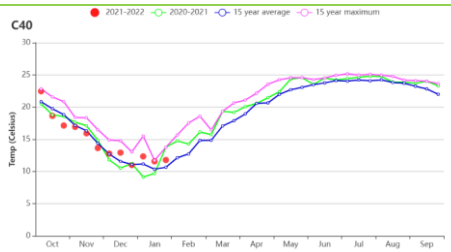
Figure 4.12 Crop condition Southern China region, October 2021 – January 2022



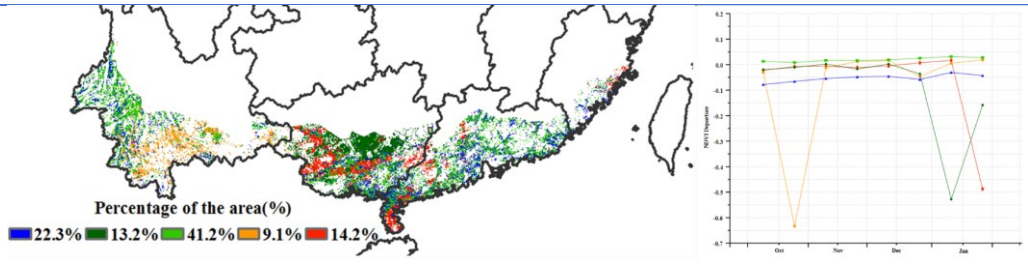
(a) Crop condition development graph based on NDVI



(b) Time series rainfall profile

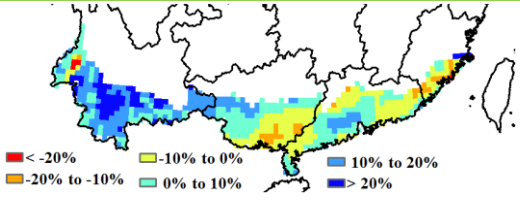


(c) Time series temperature profile

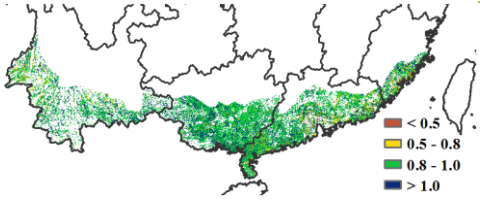


(d) Crop condition development graph based on NDVI

(e) NDVI profiles



(f) Biomass departure



(g) Maximum VCI

4.3 Major crops trade prospects

Trade prospects for major cereals and oil crop in China for 2021

Maize

In 2021, China imported 28.35 million tonnes of corn, 1.5 times the same period last year, the main source countries of imports were United States and Ukraine, accounting for 69.9% and 29% of the total import respectively.

Rice

In 2021, China imported 4.96 million tonnes of rice, an increase of 68.7% over the same period last year, with the main import sources being India, Vietnam, Pakistan, Myanmar and Thailand, accounting for 22.0%, 21.7%, 19.4%, 16.0% and 12.9% of the total import respectively. The domestic and international price difference and feed demand gap are the main factors for the increase of imports.

Wheat

In 2021, China imported 9.77 million tonnes of wheat, an increase of 16.6% over the same period last year. The main source countries of imports were Australia, the United States, Canada and France, accounting for 28.1%, 27.9%, 26% and 14.6% of the total import respectively.

Soybean

In 2021, China imported 96.518 million tonnes of soybeans, a decrease of 3.8% over the same period last year, and the main source countries of imports were Brazil, the United States and Argentina, accounting for 60.2%, 33.5% and 3.9% of the total import respectively.

Trade prospects for major cereals and oil crop in China for 2022

On the basis of 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 crops will decreased year-on-year and the export will increase slightly in 2022.

The global maize market maintains a relatively loose supply and demand pattern, but affected by climate, the dispute between Russia and Ukraine and other uncertain factors, the market price fluctuation intensifies. It is expected that China's maize import will fall in 2022 from this year's high, but it will remain at a relatively high level, with a year-on-year decrease of 15.6% and export will increase by 2.2%.

The global rice market has maintained a loose supply and demand pattern, and the relationship between domestic feed grain supply and demand has improved. It is expected that the growth rate of China's rice import will decline in 2022, with a year-on-year increase of 7.5% and export will decrease by 2.4%.

The supply-demand relationship in the global wheat market is tightening, and the price is bullish. However, the structure of China's wheat import is relatively stable, and the feed demand has a downward trend. It is expected that China's wheat import will decrease by 16.3% and export will increase by 3.2% in 2022.

Affected by La Nina, the global soybean supply and demand is tightening, and the domestic soybean consumption demand is relatively stable. It is expected that China's soybean import will be basically the same as last year, and the import will slightly increase by 1% and export will decrease by 6.8% in 2022.

Figure 4.13 Rate of change of imports and exports for rice, wheat, maize, and soybean in China in 2022 (%)