# 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 presents an updated estimate of national winter crop production (4.2) and 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 (4.3). Section 4.4 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

During the current monitoring period, winter wheat and rapeseed were still growing while most of other crops (i.e., maize, early rice, single season rice and soybean) were at sowing. Overall, agroclimatic condition were favorable and beneficial for crops growth. At the national scale rainfall and temperature increased respectively 20% and 0.6°C compared to average, whereas RADPAR declined by 4%. Consequently, BIOMSS was 10% above average and VCIx was relatively high, with a value of 0.90.

Spatially, 86.8% of arable land experienced average precipitation throughout the reporting period. Remaining areas (13.2% of crop land) in the south-eastern region, underwent rainfall fluctuations over time. The most pronounced high rainfall anomalies (more than 210 mm above average) affected 2.9% of agricultural areas from mid-April in the border area of Guangdong, Guangxi, Hunan and Jiangxi provinces. In contrast to rainfall, temperature anomalies were very variable over time especially in North-east China, including Heilongjiang, Jilin and Liaoning Province, where the anomalies ranged between -2.5 and +9.0°C, and exceptional value. Fortunately, the dramatic variations in temperature anomalies in North-east China might have little effect on crops because they occurred before the start of the growing season, as shown by the graph of cropped and uncropped land in China (Figure 4.4). In addition to North-east China, uncropped areas were also occurred in the North-west and northern parts of China.

The cropping season is well underway in southern and central China. According to the spatial VCIx patterns (Figure 4.5), southern and south-east China enjoy favorable crop condition (VCIx larger than 0.8); values between 0.5 and 0.8 appear in Central China. This is also where patches of extreme low values of VHIn (below 15; Figure 4.6) do occur, including central Anhui and Shaanxi Provinces and southern Jiangsu Province. High VHIn values (above 36) are widespread in China.

As for the main producing regions at the sub-national level, rainfall was significantly above average in all the regions, ranging between +15% and +43%, except for North-east China (-28%). Temperatures were close to average in Huanghuaihai, Loess region, Lower Yangtze, Southern China and South-west China, with the departures between -0.3°C and +0.6°C. In contrast, North-east China and Inner Mongolia experienced warm weather (+3.0°C and +1.6°C). RADPAR in all regions was close to average, except for Lower Yangtze, where it dropped 15% below average. BIOMSS increased in almost all the regions compared to average, with the anomalies ranging from +8% to +25%. CALF markedly fell below average in the Loess region (20%) and North-east China (66%), but was close to average in other regions. VCIx was relatively high for all the regions values between 0.80 and 0.98.

**Table 4.1 CropWatch agroclimatic and agronomic indicators for China, January to April 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** | 34 | 0.2 | -4 | 25 | -1 | 0.91 |
| **Inner Mongolia** | 25 | 1.6 | 0 | 21 | - | 0.93 |
| **Loess region** | 35 | 0.3 | -2 | 18 | -20 | 0.80 |
| **Lower Yangtze** | 21 | -0.3 | -15 | 8 | -2 | 0.93 |
| **North-east China** | -28 | 3.0 | 4 | -12 | - | 0.83 |
| **Southern China** | 43 | 0.6 | 0 | 15 | 1 | 0.98 |
| **Soutwest China** | 15 | 0.2 | -3 | 11 | 0 | 0.94 |

**Figure 4.1 China crop calendar**

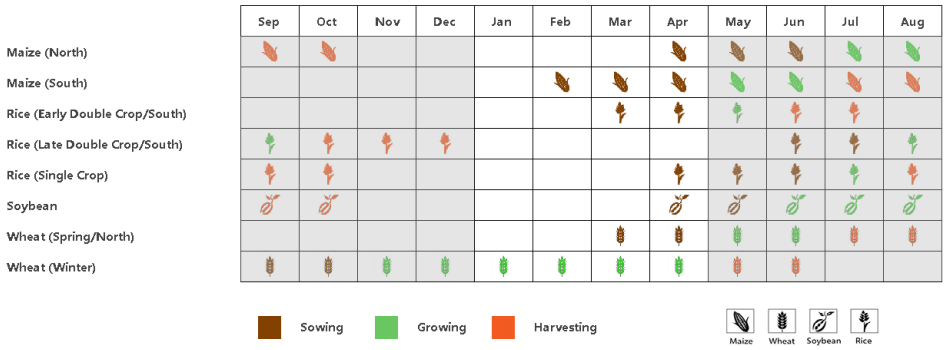



**Figure 4.2 China spatial distribution of rainfall profiles, January-April 2019**

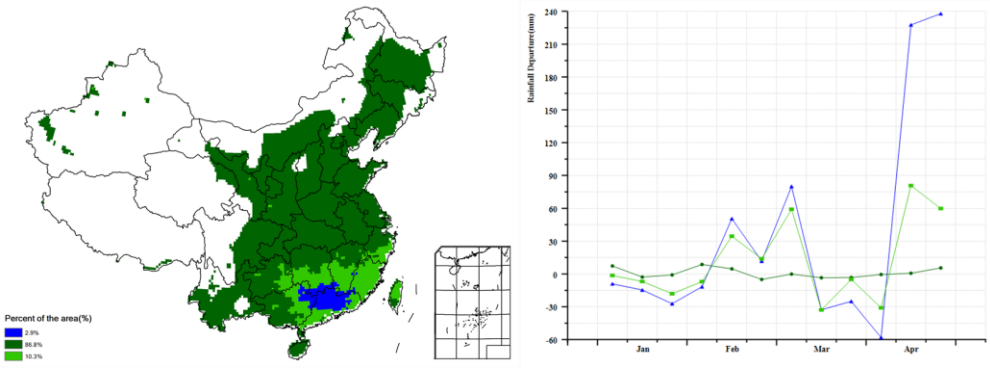



**Figure 4.3 China spatial distribution of temperature profiles, January-April 2019**

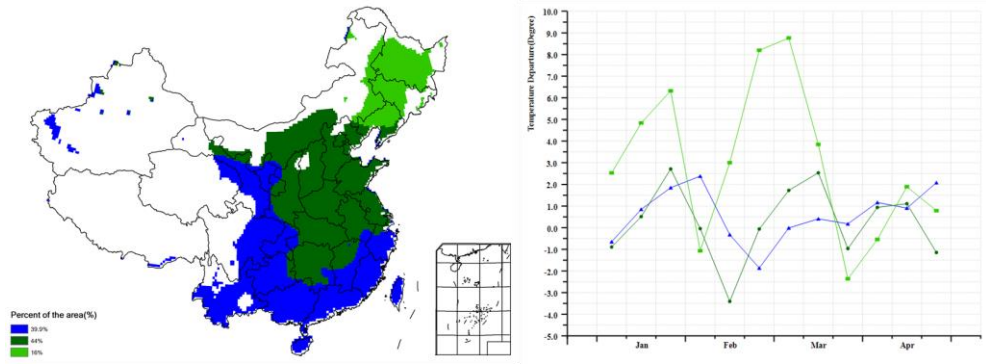


**Figure 4.4 Cropped and uncropped arable land by pixel, January-April 2019**

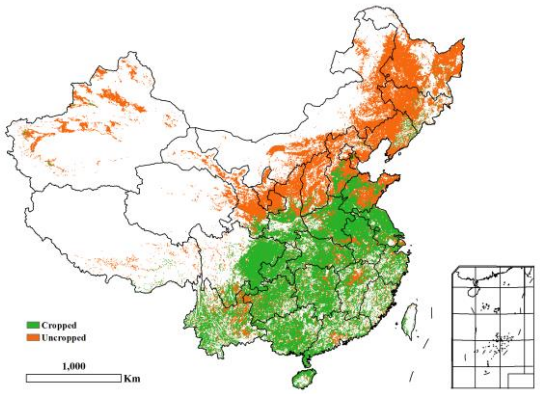



**Figure 4.5 China maximum Vegetation Condition Index (VCIx), by pixel, January-April 2019**

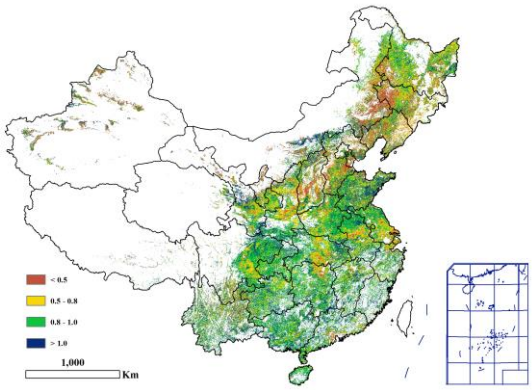
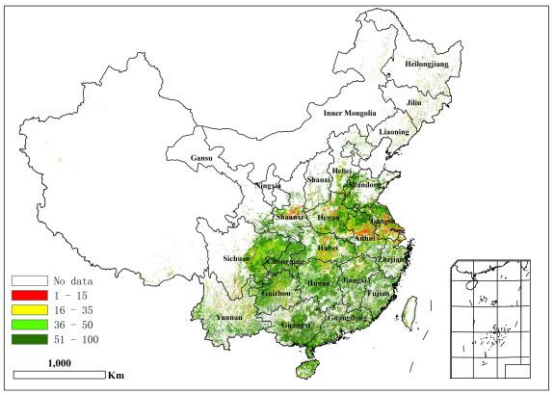



**Figure 4.6 China Vegetation Health Index Minimum (VHIn), by pixel, January-April 2019**




## 4.2 China's winter crops production

**Table 4.2 China, 2019 winter crops production (thousand tons) and percentage difference with 2018, by province**

| | 2018 | | | 2019 | |
|---|---|---|---|---|---|
| | production (thousand ton) | Area change (%) | Yield change (%) | Production change (%) | Production (thousand ton) |
| **Hebei** | 12654.9 | -1.3 | -1.6 | -2.8 | 12297 |
| **Shanxi** | 2418.6 | -2.4 | -2.7 | -5.1 | 2296 |
| **Jiangsu** | 10171.2 | 0.0 | 1.3 | 1.3 | 10304 |
| **Anhui** | 11839.3 | -1.1 | 3.0 | 1.9 | 12058 |
| **Shandong** | 23687.5 | 1.5 | 4.0 | 5.6 | 25010 |
| **Henan** | 26224.5 | 1.8 | 1.0 | 2.8 | 26952 |
| **Hubei** | 5755.4 | -2.5 | -0.9 | -3.4 | 5562 |
| **Chongqing** | 2319.4 | -0.2 | -1.8 | -2.0 | 2274 |
| **Sichuan** | 5507.4 | 0.5 | 1.0 | 1.5 | 5590 |
| **Shaanxi** | 4278.9 | -2.3 | -6.9 | -9.0 | 3895 |
| **Gansu** | 3211.1 | 10.2 | -2.6 | 7.3 | 3446 |
| **Sub total** | 108068.0 | - | - | 1.5 | 109685 |
| **Other provinces** | 18160.3 | - | - | -2.2 | 17768 |
| **National total*** | 126228.3 | 0.6 | 0.3 | 1.0 | 127453 |

* Production of Taiwan province is not included.

Winter wheat and total winter crops production were estimated by integrating several high resolution satellite images, agro-climatic indicators as well as sample surveys of winter wheat and rapeseed fieds in Anhui, Hubei, Shaanxi and other provinces.

Winter crop condition in the main producing areas was generally favorable. The overall precipitation in January to April was about 20% higher than the average, and the temperature was slightly above (+0.6 °C), were conducive to the development and growth of winter crops.

The total output of winter crops is estimated to be 127.45 million tons. Compared with 2018, the increase is about 1.23 million tons, up 1.0% from 2018 (Table 4.2).

Adverse weather conditions affected Hebei, Shaanxi, Shanxi, Hubei, and Chongqing Provinces where both yield and planted area were below 2018 values. The largest drop of winter crop production occurred in Hebei and Shaanxi provinces, with a reduction of 358 thousand tons and 384 thousand tons, respectively. Henan and Shandong provinces, the top two provinces in terms of winter crop production, both recovered from their poor situation in 2018, and produced 728 thousand tons and 1323 thousand tons more than 2018 respectively, with a year-on-year increase of 2.8% and 5.6%. Both planted area and average yield in Henan and Shandong have increased simultaneously. The output of winter crops in other provinces also increased over 2018.

**Table 4.3 China, 2019 winter wheat area, yield, and production and percentage difference with 2018, by province**

| | Area (kha) | | | Yield (kg/ha) | | | Production (thousand ton) | | |
|---|---|---|---|---|---|---|---|---|---|
| | **2018** | **2019** | Delta(%) | **2018** | **2019** | Delta (%) | **2018** | **2019** | Delta (%) |
| **Hebei** | 2026 | 2000 | -1.3 | 6150 | 5997 | -2.5 | 12456 | 11994 | -3.7 |
| **Shanxi** | 533 | 520 | -2.4 | 4472 | 4272 | -4.5 | 2384 | 2223 | -6.7 |
| **Jiangsu** | 1946 | 1955 | 0.5 | 5045 | 5154 | 2.2 | 9816 | 10076 | 2.7 |
| **Anhui** | 2422 | 2389 | -1.4 | 4655 | 4834 | 3.8 | 11275 | 11546 | 2.4 |
| **Shandong** | 4091 | 4154 | 1.5 | 5739 | 5969 | 4.0 | 23476 | 24794 | 5.6 |
| **Henan** | 5049 | 5138 | 1.8 | 5173 | 5225 | 1.0 | 26122 | 26846 | 2.8 |
| **Hubei** | 1044 | 979 | -6.2 | 4126 | 4085 | -1.0 | 4308 | 4000 | -7.2 |
| **Chongqing** | 349 | 345 | -1.2 | 3319 | 3256 | -1.9 | 1158 | 1123 | -3.1 |
| **Sichuan** | 1268 | 1295 | 2.1 | 3636 | 3693 | 1.6 | 4612 | 4781 | 3.7 |
| **Shaanxi** | 1076 | 1059 | -1.6 | 3872 | 3605 | -6.9 | 4165 | 3817 | -8.4 |
| **Gansu** | 390 | 430 | 10.2 | 4099 | 4010 | -2.2 | 1598 | 1722 | 7.8 |
| **Sub total** | 20193 | 20263 | 0.3 | 5020 | 5079 | 1.2 | 101371 | 102923 | 1.5 |
| **Other provinces*** | 3025 | 3052 | 0.9 | 4805 | 4698 | -2.2 | 14534 | 14336 | -1.4 |
| **National total*** | 23218 | 23315 | 0.4 | 4992 | 5029 | 0.7 | 115905 | 117259 | 1.2 |

* Production of Taiwan province is not included.

The total winter wheat production in 2019 is estimated to reach 117.26 million tons, an increase of 1.35 million tons or 1.2% from 2018. The national winter wheat area is 23,314.8 thousand hectares, an increase of 0.4% over the same period of last year, mainly due to the contributions of the two main winter wheat producing provinces of Henan and Shandong. The average winter wheat yield nationally was 5029 kg/ha, an increase of about 0.7% compared to 2018 (Table 4.3).

Both planted area and average yield of winter wheat in Henan, Shandong, Jiangsu, and Sichuan increased above 2018 values, leading to an increase of 724 thousand tons, 1318 thousand tons, 260 thousand tons and 169 thousand tons, respectively. Favorable weather conditions in Gansu where most winter crops are rain-fed benefited the sowing and crop development, resulting in a signficant increase of 10.2% in lanted area and 124 thousand tons increase of production. Water deficit in Shaanxi, Shanxi and Hebei leads to large yield drop and the winter wheat productions are 348 thousand tons, 462 thousand tons, and 161 thousand tons lower than 2018. It needs to be highlighted that the production drop in Shaanxi is 8.4%, the largest annual winter crop production drop in percentage since 2013. The winter wheat planted area in Hubei province is 6.2% down from 2018, the largest drop among all major producing provinces, leading to 7.2% production reduction.

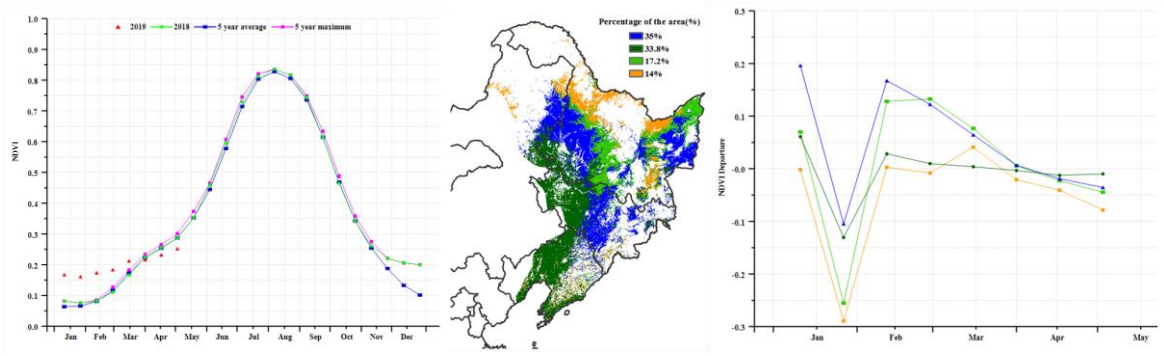
## 4.3 Regional analysis

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 April 2019 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for January to April 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 January to April 2019. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

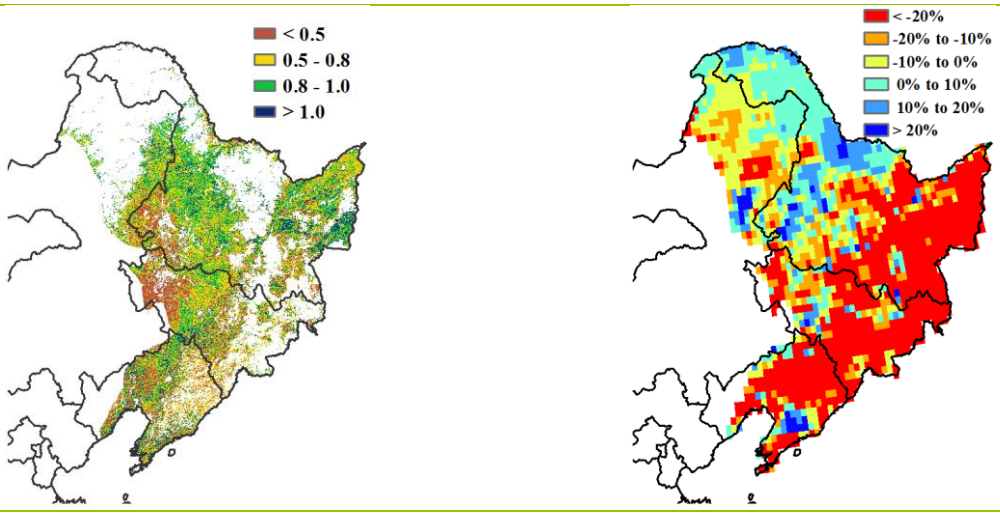
# Northeast region

Due to the cold weather in North-east China during the current monitoring season, there is no crop growing in the field, as indicated by low NDVI values in the crop development profile. The farmers start land preparation and sowing of spring crops in late April, including wheat, maize and soybean. Weather conditions so far were dry (RAIN -28%) and warm (TEMP +3°C), which has reduced soil moisture storage and reduced the biomass production potential by -12% on average, with larger reductions in the east of the region. Initial growing conditions are thus less than optimal as insufficient water supply may hamper the sowing, germination and early growth of the spring planted. CropWatch will keep tracking the agroclimatic and agronomic conditions in the future months.

**Figure 4.7 Crop condition China Northeast region, January - April 2019**




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

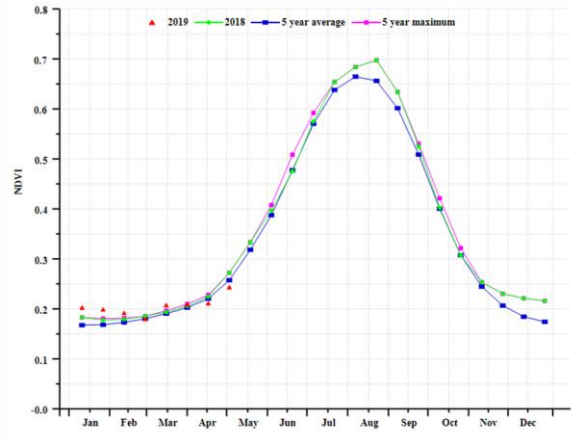



(d) Maximum VCI (e) Biomass departure

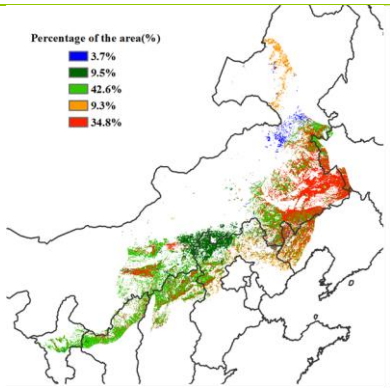
# Inner Mongolia

Most field crops have not been planted yet in Inner Mongolia due to the seasonally low temperature. Sowing started only from late April, along with gradually increasing temperatures. Considering agroclimatic indicators in the first four months of this year, rain and temperature indices were above average (RAIN +25 %, TEMP +1.6°C), and the RADPAR accumulation was just average, resulting in a potential biomass increase of 21%. Though the average of VCIx was 0.93 for the whole areas, it is of limited agronomic significance at this time of the year. Temperature was significantly higher than the historical average, which may cause early sowing. Stored soil moisture is abundant and will benefit the germination of crops and grazing lands alike. Current prospects for the region are favorable.

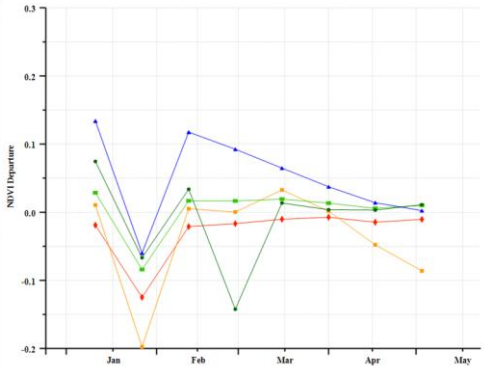
**Figure 4.8 Crop condition China Inner Mongolia, January - April 2019**



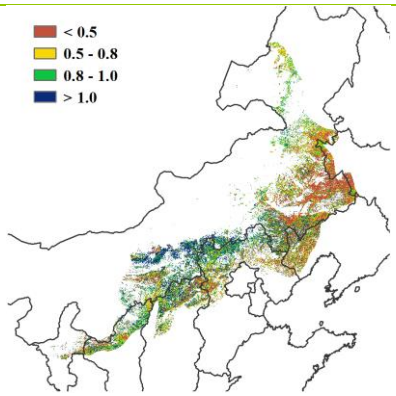

(a) Crop condition development graph based on NDVI



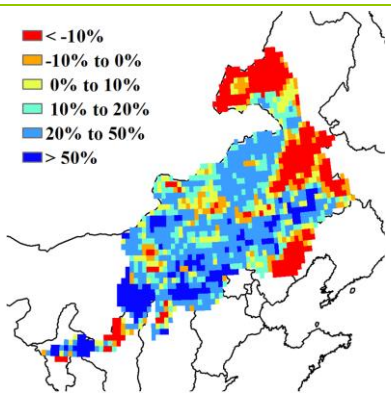

(b) Spatial NDVI patterns compared to 5YA




(c) NDVI profiles




(d) Maximum VCI

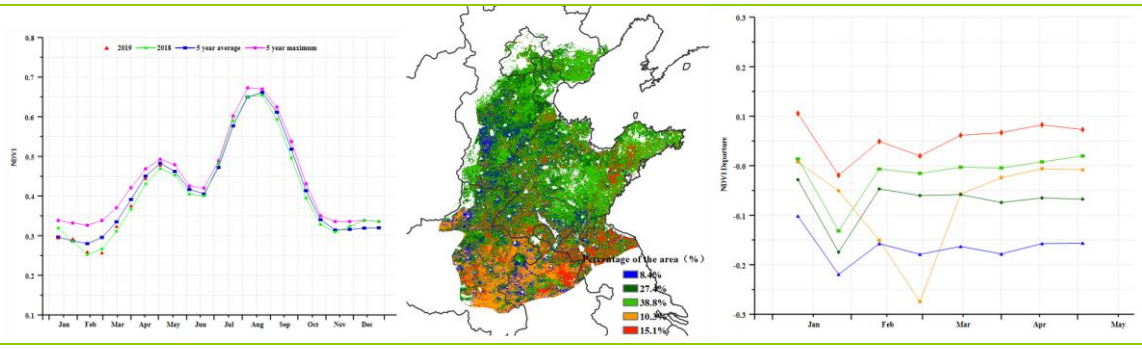



(e) Biomass departure

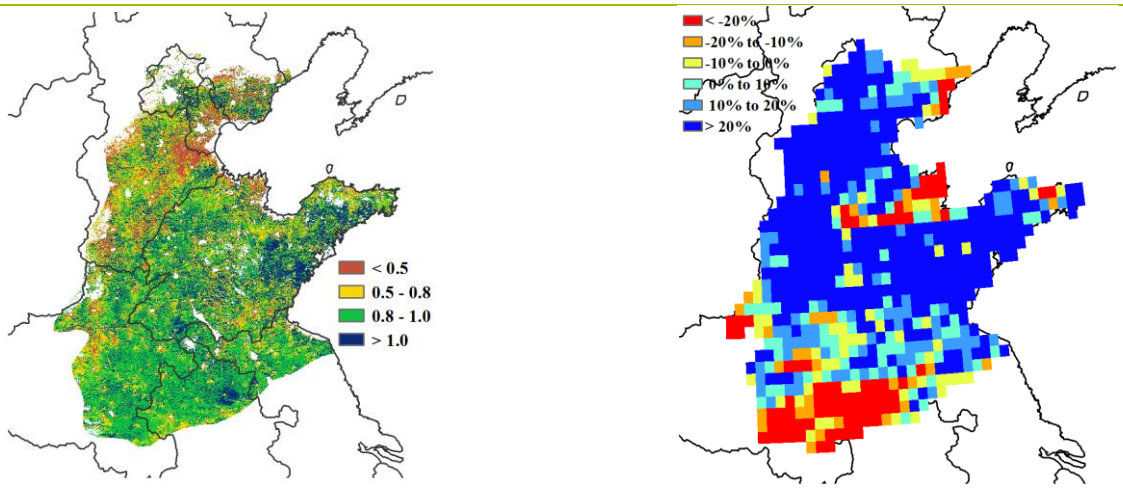
# Huanghuaihai

Huanghuaihai is part of the North China Plain and cultivates winter wheat and summer maize in rotation as its main crops. The bulletin monitored crop condition during January to April when the winter wheat started to revive and grow, with the harvest taking place in mid-June. According to the crop condition development graph based on NDVI, the crop condition of winter wheat was average during most of the monitoring period, with a sight drop in February. The maximum VCI value was 0.91 which confirms the good crop condition. As assessed by CropWatch indicators, the agro-climatic and agronomic conditions were generally favorable. Compared to average, the precipitation (RAIN) increased greatly by 34% and the temperature (TEMP) rose slightly (+0.2°C), while the radiation (RADPAR) showed a reduction of 4%. The favorable growing environment contributed to a significant increase of 25% in potential biomass compared to average. The cropped arable land fraction (CALF) was on 5-year average. The whole region displayed NDVI values that are below but close to average. As shown by NDVI clusters and profiles, north of Jiangsu and some clustered areas displayed above-average values, which is about 15.1% of the region. 38.8% of cropland across Heibei and Shandong Provinces showed negative departures during late January and early February, while on average at other times. For other areas of the region, the crop condition was below average to varying degrees, especially in the East of Henan and North of Anhui. The biomass departure map confirms the distribution of NDVI clusters, with increases in the North of the region and decreases in south.

**Figure 4.9 Crop condition China Huanghuaihai, January - April 2019**




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

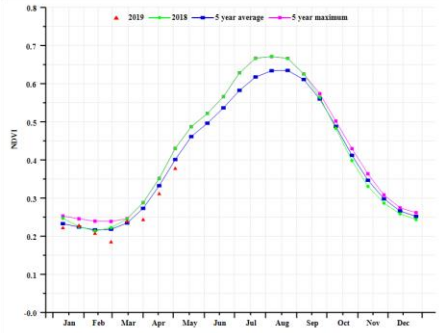



(d) Maximum VCI (e) Biomass departure

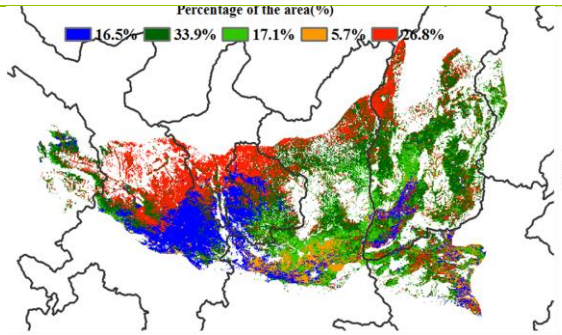
# Loess region

According to the regional NDVI development graph, crop condition was generally fair in the Loess region. The main crops in the region are currently winter wheat, spring wheat, and spring Maize. Winter wheat was sowed during late September to middle October and will be harvested in June. Spring wheat and Maize were just sowed during late March to April. During the monitoring period, rainfall (RAIN) exceeded average by 35%, while temperature (TEMP) was 0.3°C above. Radiation (RADPAR) was 2% below average, which may adversely affect the process of photosynthesis. In most of the area, the analyses based on spatial NDVI clusters and profiles are consistent with VCIx. NDVI clusters and profiles show that crop condition was close to average in some parts of the region, such as northwestern Shanxi, south central Ningxia, and central and eastern Gansu, while the crop condition was below average and underwent some fluctuation during late January to late February in south central Gansu, southern Ningxia, and southwestern Shanxi, etc. The fraction of cropped arable land (CALF) for the region decreased 20 percentage points when compared with the five-year average, which indicates about one fifth of the land is uncropped. The potential biomass indicator (BIOMASS) was 18% above average, with above average values in every province within the Loess region. According to the VCIx map, current crop condition of the region is quite unfavorable, especially in most parts of Shanxi, and central Shaanxi.

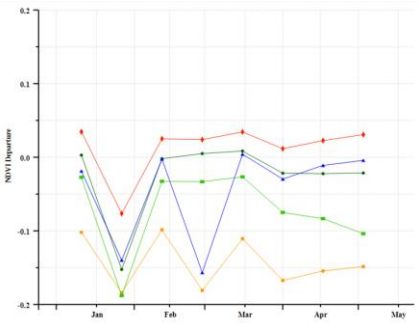
**Figure 4.10 Crop condition China Loess region, January - April 2019**



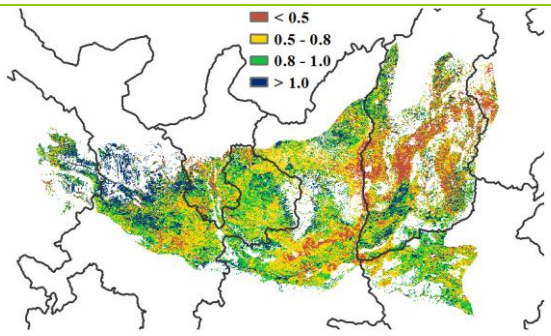

(a) Crop condition development graph based on NDVI



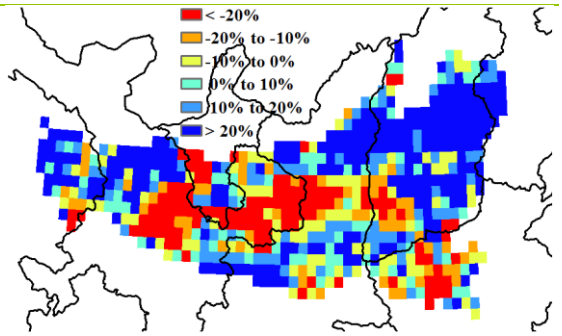

(b) Spatial NDVI patterns compared to 5YA




(c) NDVI profiles




(d) Maximum VCI

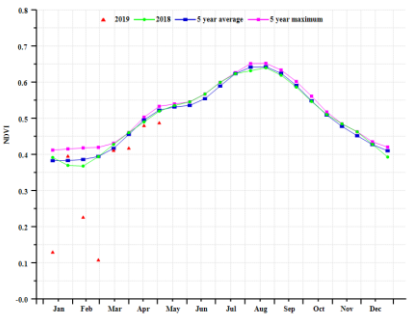



(e) Biomass departure

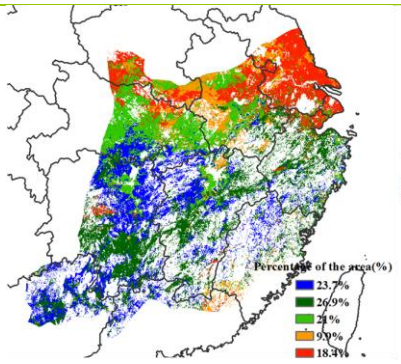
# Lower Yangtze region

During this monitoring period, only winter crops like wheat and rapeseed are in the field, essentially in Henan, Anhui, Jiangsu and Hubei provinces. According to the CropWatch agro-climatic indicators, Lower Yangtze experienced a wet winter. Temperature (TEMP -0.3°C) and sunshine (RADPAR -15%) were below average while precipitation was significantly above (RAIN, +21%), which resulted in an increase of the biomass production potential by 8%. As shown in the NDVI development graph, crop condition was close to but slightly below average. The abnormally low values that occurred in February may be due to the effect of clouds. Although the biomass production potential increased, most of the northern wheat region of the lower Yangtze suffered a significant decrease of BIOMSS (more than 20%) including the west of Jiangsu, the middle of Anhui Provinces north of Hubei and South of Henan province. According to the NDVI profile, the crop condition in the winter cropped area was slightly below average, including Henan, Anhui, Jiangsu, and Hubei province, which is confirmed by the VCIx map. Overall, considering the favorable VCIx value of 0.93, the crop condition was assessed as close to but below average.

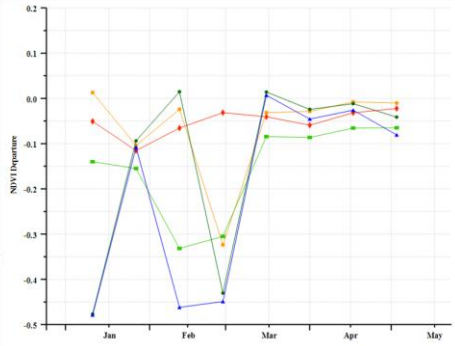
**Figure 4.11 Crop condition Lower Yangtze region, January - April 2019**



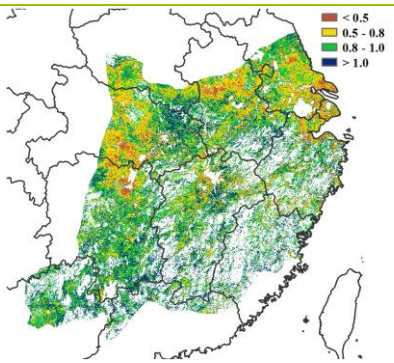

(a) Crop condition development graph based on NDVI



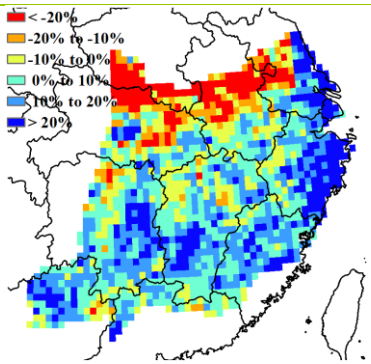

(b) Spatial NDVI patterns compared to 5YA




(c) NDVI profiles




(d) Maximum VCI

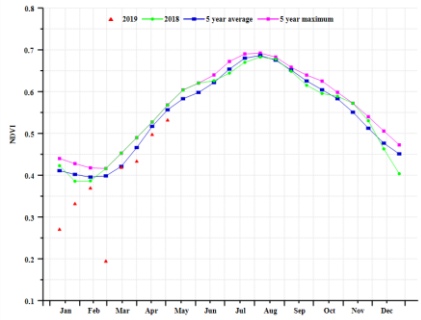



(e) Biomass departure

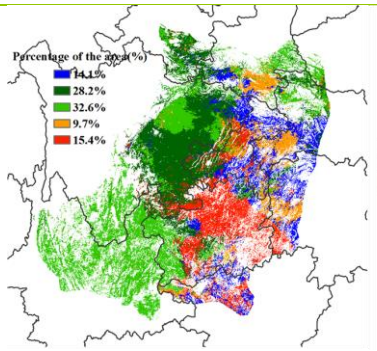
# Southwest China

The reporting period covers late dormancy and post-dormancy to flowering of winter wheat. According to the regional NDVI profile, crop condition was generally below the 5-year average, although it improved gradually after mid-March. Rainfall was above average (RAIN +15%) and radiation and temperature were close to average (RADPAR -3%, and TEMP at +0.2°C). Favorable weather conditions resulted in 11% above 15YA BIOMSS. The cropped arable land fraction remained at the same average level as the previous five years. According to the spatial NDVI profiles, values were close to average from mid-March to late April, except in Chongqing and neighboring areas in Eastern Sichuan, which recorded very low NDVI due to low RAIN (-7% and -9%, respectively). Average NDVI throughout the monitoring period was observed in western Guizhou and Yunnan, in spite of both precipitation and radiation being significantly above average (See Annex A.11). The maximum VCI reached 0.94, indicating the crop growth status at the peak of the growing season was comparable with the previous five years. The mixture of positive and negative departures of indicators show overall unfavorable crop condition.

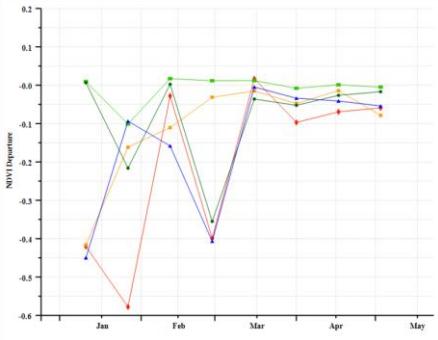
**Figure 4.12 Crop condition Southwest China region, January - April 2019**



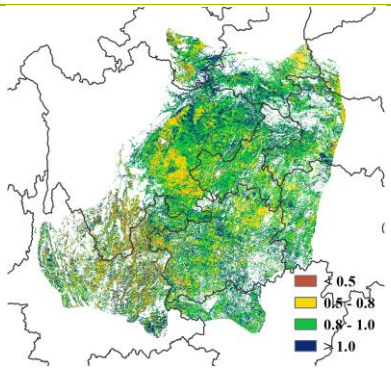

(a) Crop condition development graph based on NDVI



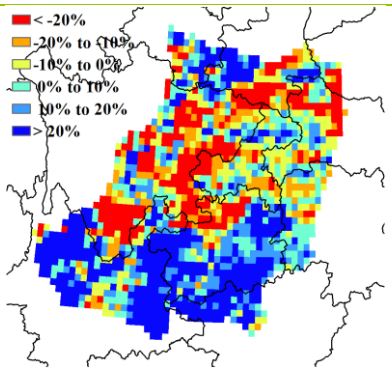

(b) Spatial NDVI patterns compared to 5YA




(c) NDVI profiles




(d) Maximum VCI

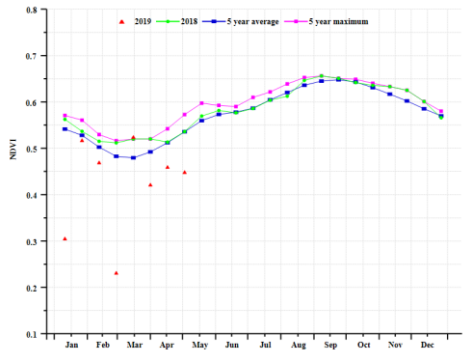



(e) Biomass departure

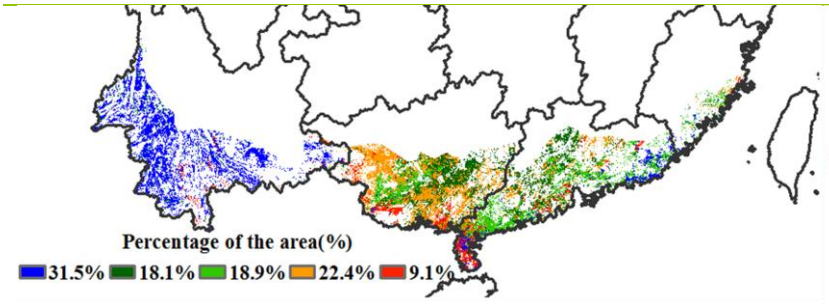
# Southern China

In Southern China, winter wheat was approaching maturity and the sowing of early rice was concluded during the reporting period. The NDVI was below the previous five-year average except for mid-March, indicating overall below average crop condition. The rainfall and temperature were above average (RAIN +43%, TEMP +0.6°C), while the sunshine was average. The cropped arable land fraction was average (CALF +1%), and the biomass was above average (BIOMSS +15%). Although all provinces within the region received significantly above average rainfall (Guangdong +69%, Guangxi +39%, Yunnan +42%, Fujian +27%), the impacts vary widely. The heavy rainfall in January in Yunnan provided suitable soil moisture for winter wheat while excessive rainfall in April in Guangdong, Guangxi and Fujian hampered transplanting and growth of early rice. The NDVI departure clustering also confirms the above mentioned patterns (Figure 4.12, b, c): the NDVI was close to or above average during the reporting period in Yunnan while the other three provinces present below average NDVI. The region needs closer monitoring in the coming months.

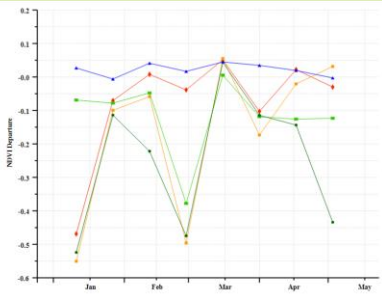
**Figure 4.13 Crop condition Southern China region, January - April 2019.**



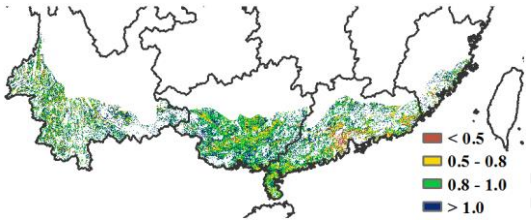

(a) Crop condition development graph based on NDVI



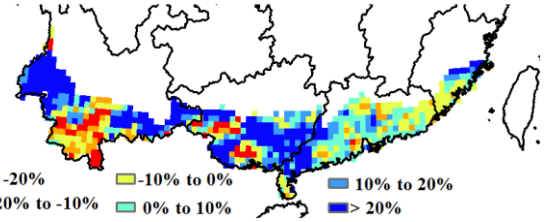

(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles




(d) Maximum VCI




(e) Biomass departure

## 4.4 Major crops trade prospects

This section analyzes the import and export situation of the maize, rice, wheat, and soybean in the first quarter of 2019 in China.

**Maize**

In the first quarter of 2019, maize imports reached 981.9 ktons, an increase of 76.2% over 2018. The main suppliers were Ukraine and Russia, accounting for 97.7% and 1.7% of imports respectively. Imports amounted to 212 million USD. The Democratic People's Republic of Korea was the only destinations of Chinese maize exports, which reached 1.5 ktons. The value of the export was 389.6 thousand USD.

**Rice**

In the first quarter, the total import of rice in China was 586.4 ktons, a decrease of 24.4% compared to the previous year. The imported rice mainly stems from Thailand, Pakistan, Cambodia and Vietnam, accounting for 41.0%, 33.6%, 12.9% and 4.7% of imports respectively. The expenditure for rice import was 328 million USD. Total rice exports over the period were 479.2 ktons, mainly exported to Egypt, Cote d'Ivoire, Turkey and the Republic of Korea (accounting for 38.6%, 13.4%, 9.7% and 7.5%, respectively). The value of the exports was 190 million USD.

**Wheat**

Chinese wheat and wheat products imports in the first quarter of 2019 totaled 1 million tons, up by 60.8% year-on-year. The main sources include Canada (65.5%), Kazakhstan (9.8%), and the United States (4.1%). Imports amounted to 318 million USD. Wheat and wheat products exports 70.6 kilotons went mainly to the Democratic People's Republic of Korea (70.1%) and Chinese Hong Kong (22.7%). The generated income for wheat and wheat products exports was 27 million USD.

**Soybean**

In the first quarter of 2019, the total import of soybean decreased by 14.4% to 16.75 million tons in China. Brazil, the United States and Argentina respectively contributed 58.0%, 15.2% and 12.8%, for a total value of 7279 million USD. Soybean exports were 33.5 ktons, up 8.8%.

**Trade prospects for major cereals and oil crop in China for 2019**

Based on the latest monitoring results, China crop imports are projected to increase. The projections are based on remote sensing data and the Major Agricultural Shocks and Policy Simulation Model, which is derived from the standard GTAP (Global Trade Analysis Project).

**Maize**

According to the model forecast, maize imports will increase by 12.4% in China in 2019, while its exports will be basically flat. At present, the global maize supply and demand situation continues to maintain the loose posture, the price continues to drop. Domestic maize prices have stopped falling and stabilized recently, with a rising trend in the later stage. It is expected that China's maize imports will further increase in 2019.

**Rice**

According to the model forecast, rice imports and exports will increase by 8.1% and 15.6% respectively in 2019. With the increase of labor and other production costs, China's rice production competitiveness continues to decline, which directly affects the amount of rice imports. It is expected that China's rice imports will slightly increase in 2019, but still within the quota range.

**Wheat**

According to the model forecast, wheat imports will increase by 19.7%, while exports will decrease by 5.2%. Wheat imports are expected to increase slightly in 2019 as global supplies remain ample, prices continue to weaken and the spread between domestic and foreign prices widen. However, with the further improvement of domestic wheat quality, wheat imports will continue to decline in the future.

**Soybean**

According to the model forecast, China's soybean imports will decrease by 2.4% in 2019, while exports will slightly increase by 1.1%. Affected by the supply-side structural reform of agriculture, China's soybean planted area should continue to increase, and the external dependence will further decrease. However, soybean imports will remain high. In 2019, China's soybean imports are expected to decline, but will be affected by economic and trade friction and other factors of uncertainty.

**Figure 4.14 Rate of change of imports and exports for rice, wheat, maize, and soybean in China in 2019 compared to those for 2018(%).**