



Introduction of CropWatch Cloud & CropWatch Processing

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AIR, CAS

9th August, 2023

**Regional training workshop for satellite crop monitoring using the CropWatch system
7 - 10 August 2023, Palmar Conference Center, Ambre Hotel, Mauritius**

CropWatch Cloud

- CropWatch is a satellite-based hierarchical method of crop monitoring, including 4 agro-climatic indicators and agronomic indicators, area, yield and production at different scales
- CropWatch Cloud provides APIs access to all functions of indicators and thematic maps.
- Release Quarterly and annually bulletins on global crop monitoring, covering 173 countries and regions down to provincial scales, with special focus on 43 key agricultural countries



Cropwatch Pro

Enter

CropWatch-Pro

- An online tool for people to produce crop monitoring products at any time and anywhere.



CropWatch Explorer

Enter

CropWatch-Explore

- An online interface for people to explore and analysis all the crop information data easily.



Cropwatch Project

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CropWatch-Project

- An online platform for people to create and write the crop bulletin.

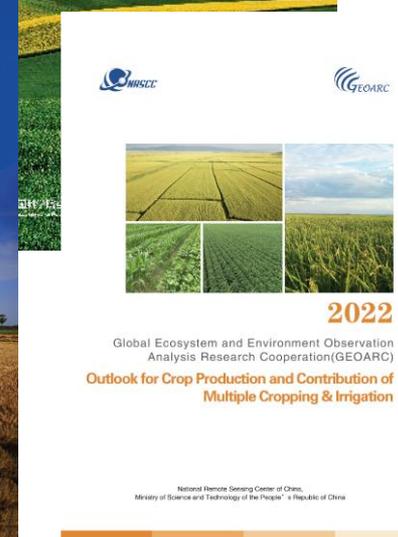


Cropwatch Bulletin

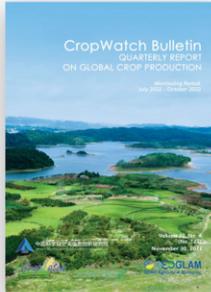
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CropWatch-Bulletin

- An webpage for people to read CropWatch bulletin.



Where to access to CropWatch Pro

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<http://cloud.cropwatch.com.cn/>

November 2022 CropWatch Bulletin

November 2022 CropWatch Bulletin is based mainly on current remote sensing inputs in addition to detailed and spatially accurate reference data about crops and their management. Focusing on the months of July to October 2022, chapters cover global, national, and regional level agroclimatic conditions and the condition of crops that were growing during this time. For China, the bulletin presents crop conditions for each of seven key agro-ecological zones, an updated estimate of trade prospects (import/export) of major crops. The focus section reports on the estimate by CropWatch for maize, rice, wheat and soybeans production in 2022, recent disaster events with an impact on agriculture, and the possibility of an El Niño event.

[Bulletin](#) →

CropWatch Sub System



CropWatch **Pro** dev

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CropWatch **Explorer**

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CropWatch **Analysis**

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CropWatch **Bulletin**

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After registration and activation, please use 'CropWatch Pro' Component

Component 1: CropWatch Processing



CropWatch Cloud



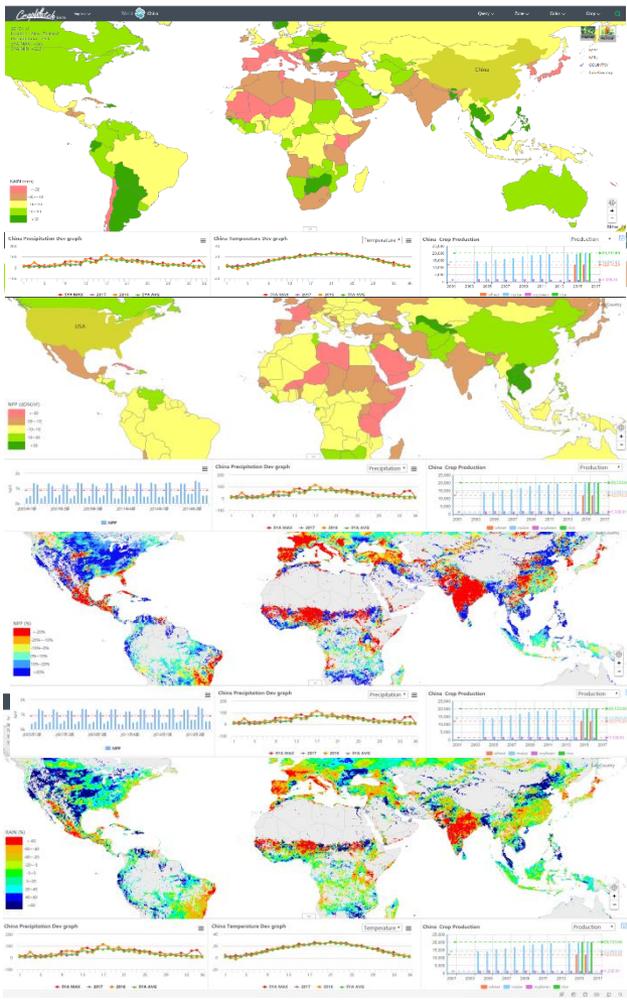
| | | | |
|---------------------------------|------------------------------------|--|--------------------------------------|
| Rainfall index | Maximum VCI | Normalized Difference Vegetation Index | Crop Condition based on NDVI anomaly |
| Temperature Index | Minimum Vegetation health Index | Leaf Area Index | Index Based Crop Development |
| Photosynthetic Active Radiation | Cropped Arable Land Classification | Fraction of Absorbed PAR | Crop condition clustering |
| Potential Biomass | Cropping intensity | Normalized Difference Water Index | Crop Condition Classification |

The screenshot displays the CropWatch Pro web interface. On the left, there's a sidebar with navigation options like 'Cropped arable land classification', 'Task Center', and 'System Management'. The main content area is divided into three panels:

- Cropped arable land classification:** Shows settings for 'Starting time' (2018), 'End time' (2018), and a 'Region' dropdown.
- Task Center:** A table listing tasks with columns for No., User, Model, Creating Time, Starting Time, Progress, Status, and Operation. The table shows several tasks in 'Finished' status.
- Preview Thematic Map:** Displays a map of China with a legend for 'Cropped' (green) and 'Non-cropped' (white) areas. It includes input fields for 'Model Name', 'Start Year', 'Start day', 'End year', 'End day', and 'Region'.

Component 2: CropWatch-Explorer

CropWatch-Explorer provide a web service for users to conveniently explore and visualize our data.



CropWatch-Explorer

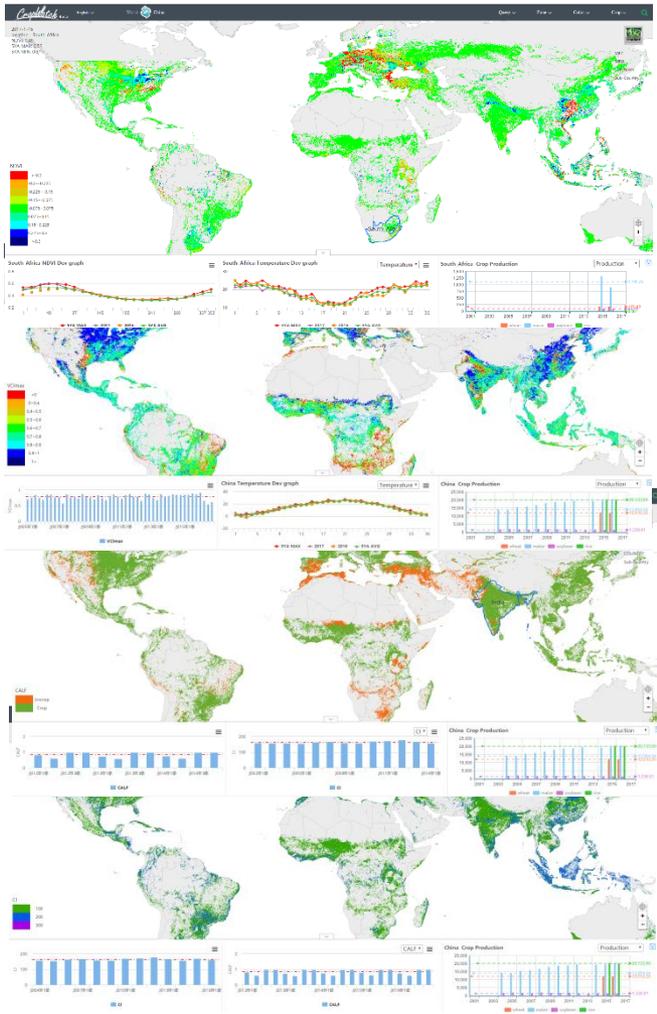
Visual Type Scale Type Crop Type

- Vector
- Raster
- Cluster
- MPZ
- MRU
- Country
- Sub-Country
- Wheat
- Maize
- Rice
- Soybean

RAIN TEMP PAR BIOMASS

NDVI VCIx VHI CALF CI

Area Yield Production Early warning



Component 3: CropWatch-Analysis

CropWatch

- Reports
- Report
- Work
- Settings
- Auth
- Tag

English

Home > Reports > November 2017 CropWatch bulletin

November 2017 CropWatch bulletin Publish View Update Create Chapter

tanshen created at 2017-11-01 16:37:57. current status is Created.

Chapter 1. Executive summary

| # | Section | Author | Status | Options |
|---|--|--------|-----------|---|
| 1 | Executive summary 2 | rene | Submitted | ↶ ✓ ✖ |

Chapter 2. Global agroclimatic patterns

| # | Section | Author | Status | Options |
|---|---|----------------|-----------|---|
| 1 | Overview 1 | rene, zhuliang | Submitted | ↶ ✓ ✖ |

Chapter 4. Crop and environmental conditions in major production zones

| # | Section | Author | Status | Options |
|---|---|--------------------|-----------|---|
| 1 | Overview 2 | yanan, luweigun | Submitted | ↶ ✓ ✖ |
| 2 | West Africa 2 | ephan, luweigun | Submitted | ↶ ✓ ✖ |
| 3 | North America 2 | zenghongwei, yanan | Submitted | ↶ ✓ ✖ |
| 4 | South America 2 | Miao | Submitted | ↶ ✓ ✖ |
| 5 | South and Southeast Asia 2 | zhaof, jparihar | Submitted | ↶ ✓ ✖ |
| 6 | Western Europe 2 | zhuwewei, mingchao | Submitted | ↶ ✓ ✖ |
| 7 | Central Europe to Western Russia 2 | zhuwewei, mingchao | Submitted | ↶ ✓ ✖ |

Chapter 9. Main producing and exporting countries

| # | Section | Author | Status | Options |
|----|---|---------------------------------|-----------|---|
| 1 | Overview 2 | rene, zhaodan | Submitted | ↶ ✓ ✖ |
| 2 | Country analysis 2 | crop_tony | Submitted | ↶ ✓ ✖ |
| 3 | Argentina 2 | Miao | Submitted | ↶ ✓ ✖ |
| 4 | Australia 2 | xingqiang | Submitted | ↶ ✓ ✖ |
| 5 | Bangladesh 2 | Changsheng, HEZhaoxin, jparihar | Submitted | ↶ ✓ ✖ |
| 6 | Brazil 2 | Miao, zenghongwei | Submitted | ↶ ✓ ✖ |
| 7 | Canada 2 | zenghongwei, zhaodan | Submitted | ↶ ✓ ✖ |
| 8 | Germany 2 | zhuwewei, zhangjun | Submitted | ↶ ✓ ✖ |
| 9 | Egypt 2 | mshibeny, luweigun, Mohsen | Submitted | ↶ ✓ ✖ |
| 10 | Ethiopia 2 | mach, Olopa, luweigun | Submitted | ↶ ✓ ✖ |
| 11 | France 2 | zhuwewei, xiongjie | Submitted | ↶ ✓ ✖ |
| 12 | United Kingdom 2 | zhuwewei, Bulgan | Submitted | ↶ ✓ ✖ |
| 13 | Indonesia 2 | xingqiang, mingchao | Submitted | ↶ ✓ ✖ |
| 14 | India 2 | Changsheng, jparihar, gasoww | Submitted | ↶ ✓ ✖ |

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Component 4: CropWatch-Bulletin

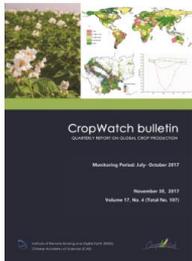


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November 2017 CropWatch bulletin (Vol. 17, No. 4)

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November 2017 CropWatch bulletin. This bulletin features the latest and final CropWatch estimates for 2017 production of maize, rice, wheat, and soybean. Focusing on the months of July-October, chapters cover global, national, and regional-level agroclimatic conditions and the condition of crops that were growing or harvested during this time. For China, the bulletin presents 2017 crop production and crop conditions for each of seven key agro-ecological areas, as well as regional impacts of pests and diseases. The focus section reports on recent disaster events with an impact on agriculture, the possibility of a La Niña event, and an analysis of rangeland management in Africa.

[Full report](#)

[报告全文](#)



Key messages from the report:

- Global agroclimatic patterns. Disasters took a heavy toll on all continents; key events included (1) the continuation of the complex emergency situation with drought component in the Horn of Africa, (2) heat waves around the Mediterranean and in North America, (3) more than ten tropical storms and cyclones, essentially in Asia and the Caribbean, and (4) exceptional floods in southern Asia.
- Updated and final 2017 global production estimates. CropWatch presents its revised and final estimates for 2017 production; they include estimates of 2,509 million tons of total 2017 output for major grains and 326 million tons of soybeans.
- Total cereal production of the three major cereal producers. The total 2017 cereal output of China reached 519,584 thousand tons (down -1.9% compared with 2016), while estimates are 435,918 thousand tons for the United States (+0.1%) and 275,676 thousand tons for India (+5.4%).
- China total production. The final CropWatch estimate for 2017 total summer crops production in China is 403.0 million tons, a significant decrease (-3.0%) compared to 2016. The total annual crop production (including cereals, tubers, and legumes) is put at 562.3 million tons (-1.0%).
- China production of maize, wheat, rice and soybean. The combined production of winter and spring wheat in China increased 0.3% compared to 2016, while maize production was reduced by 5.2%, mainly resulting from a 3.7% decrease in planted area for maize. Overall rice output for China did not change from 2016. Soybean production is up 3.4% over last year.

Introduction

This CropWatch bulletin summarizes global crop condition developments and agroclimatic factors from July 1 to October 31, 2017. Chapters 1 through 4 zoom in from a global overview of agroclimatic indicators (Chapter 1) to detailed descriptions of crop and environmental conditions in large production zones (Chapter 2), to individual country analyses covering 30 major producers and exporters including sub-national agro-ecological regions (Chapter 3) and China (Chapter 4). A special focus section is included in Chapter 5, covering this time revised and final 2017 CropWatch food production estimates, disaster events, focus on rangeland management in Africa, and an update on El Niño. This first part of the report includes the cover, table of contents, abbreviations, and a short overview of the different sections of the bulletin

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[Introduction](#)

Chapter 1. Global agroclimatic patterns

Chapter 1 describes the CropWatch agroclimatic indicators for rainfall (RAIN), temperature (TEMP), and radiation (RADPAR), along with the agronomic indicator for potential biomass (BIOMSS) for sixty-five global Mapping and Reporting Units (MRU). Indicator values for all MRUs are provided in Annex A.

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[Chapter 1. Global agroclimatic patterns](#)

Chapter 2. Crop and environmental conditions in major production zones

Chapter 2 presents the same indicators—RAIN, TEMP, RADPAR, and BIOMSS—used in Chapter 1 and combines them with agronomic indicators—cropped arable land fraction (CALF), maximum vegetation condition index (VCIx), and minimum vegetation health index (VHIn)—to describe crop and environmental conditions in six global major production zones (MPZ): West Africa, North America, South America, South and southeast Asia, Western Europe, and Central Europe to western Russia. (See also Annex C for more information about these zones.)

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[Chapter 2. Crop and environmental conditions in major production zones](#)

Chapter 3. Main producing and exporting countries

Building on the global patterns presented in previous chapters, this chapter assesses the situation of crops in 30 key countries that represent the global major producers and exporters or otherwise are of global or CropWatch relevance. First, the overview section (3.1) pays attention to all countries worldwide, to provide some spatial and thematic detail to the overall features described in section 1.1. In section 3.2, more detail is provided for each of the CropWatch monitored countries, including analyses by key agro-ecological regions within the country. For each country, maps are included illustrating NDVI-based crop condition development graphs, maximum VCI, and spatial NDVI patterns with associated NDVI profiles. Additional information about indicators per country is provided in Annex A, while Annex B provides 2017 production estimates for select countries.

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[Chapter 3. Main producing and exporting countries](#)

Chapter 4. China

After a brief overview of the agroclimatic 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 presents the results of ongoing pests and diseases monitoring, while sections 4.5 and 4.6 describe trade prospects (import/export) of major crops (4.5) and an updated outlook for domestic prices of maize, rice, wheat and soybean (4.6). Additional information on the agroclimatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

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[Chapter 4. China](#)

Chapter 5. Focus and perspectives

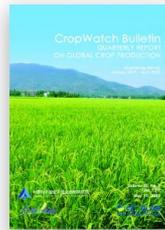
Building on the CropWatch analyses presented in chapters 1 through 4, this chapter presents revised CropWatch food production estimates for 2017 (section 5.1), as well as sections on recent disaster events (5.2), the rangeland management in Africa (5.3), and an update on El Niño (5.4).

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[Chapter 5. Focus and perspectives](#)

Annex A. Agroclimatic indicators

Home page



May 2023 CropWatch Bulletin

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May 2023 CropWatch Bulletin is based mainly on current remote sensing inputs in addition to detailed and spatially accurate reference data about crops and their management. Focusing on the months of January to April 2023, chapters cover global, national, and regional level agroclimatic conditions and the condition of crops that were growing during this time. For China, the bulletin presents crop conditions for each of seven key agro-ecological zones, an updated estimate of trade prospects (import/export) of major crops. The focus section reports on the production outlook of major cereal and oil crops countries in the Southern Hemisphere and some tropical and sub-tropical countries, the impact of recent disaster events, regional conflict on global food security is analyzed and an update on El Niño or La Niña.

• <http://cloud.cropwatch.com.cn/> Bulletin →

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CropWatch **Analysis**

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About

CropWatch is China's leading crop monitoring system. Using remote sensing and ground-based indicators the system assesses national and global crop production.

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Bulletin

Each quarter, CropWatch findings are published in the CropWatch bulletin. The bulletin is issued in English and Chinese.

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Publications

The CropWatch system and methodologies are described in various articles published in international and Chinese journals.

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CropWatch Cloud

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Username



Password

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Forgot password?

- Or -

[Click here to register](#)
Register

Didn't receive confirmation message?

Sign up

| | | |
|---|----------|---|
|  | Username | After type in your user name, email address and set your password as left graph, click the green button to finish the registration |
|  | Email | |
|  | Password | |

SIGN UP

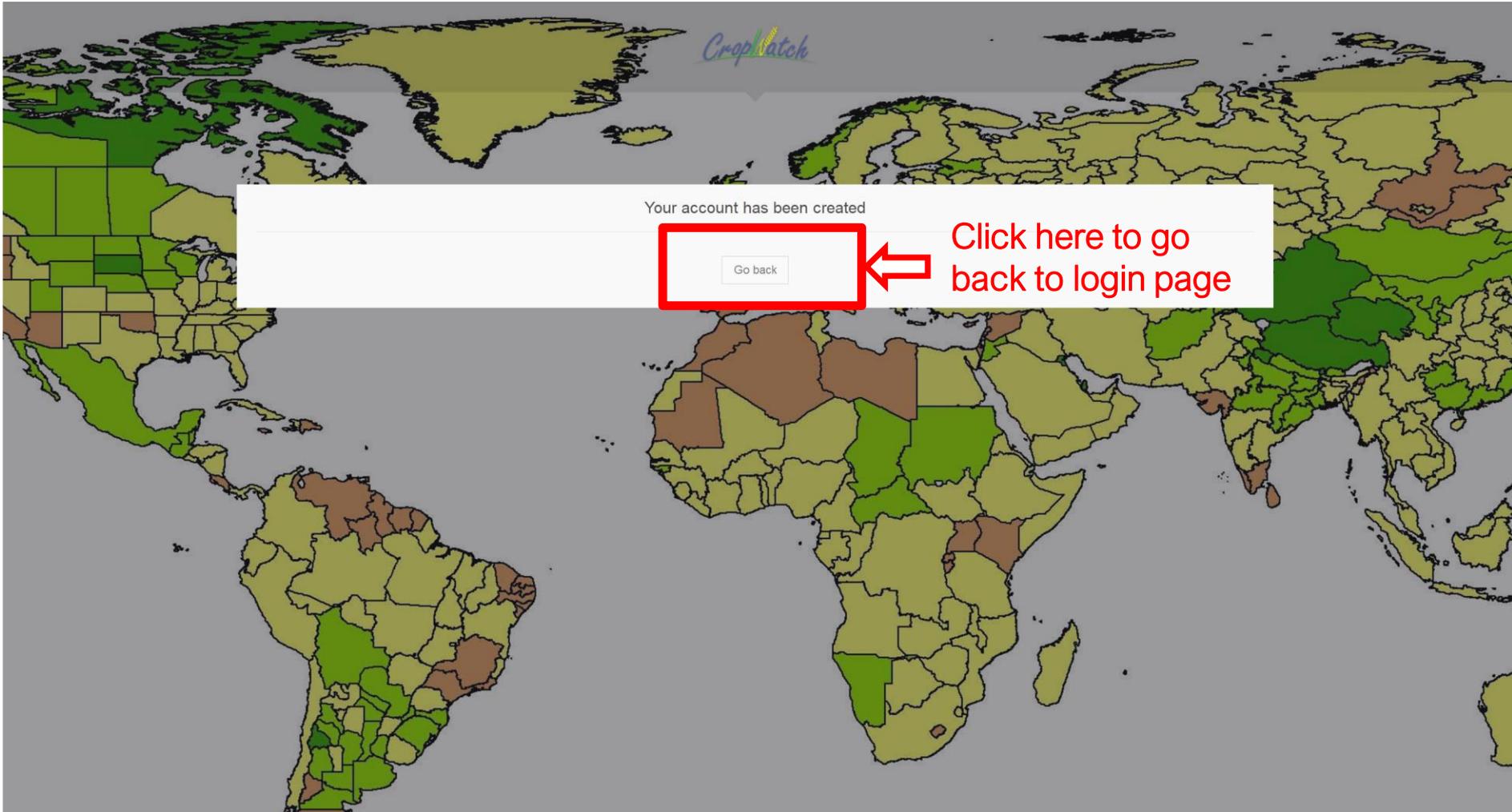
Already registered? Sign in!

Didn't receive confirmation message?

Better to use your name as username

!Do remember your username and password!

Registration



Your account has been created

Go back

Click here to go
back to login page

Login

- Please share with me your username so that we can track all your account.
- Only user name and password are needed to login

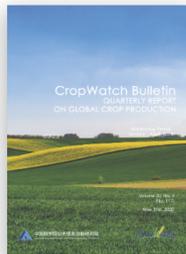
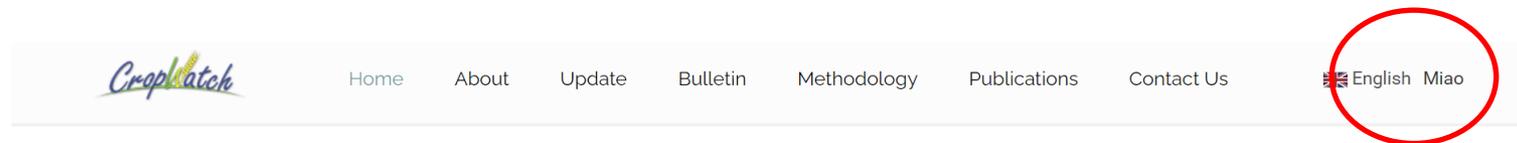
The screenshot displays the CropWatch Cloud login interface. At the top, the navigation bar includes the CropWatch logo, 'Home', 'About', 'Conditions', 'Contact Us', and a language selector set to 'English'. A red box highlights the 'Login' button in the top right corner. The main content area features a 'Login' form with the following elements:

- A 'Username' input field with a red annotation: "Type in your username".
- A 'Password' input field with a red annotation: "Enter your password".
- A green 'LOGIN' button, which is highlighted with a red box.
- A 'Forgot password?' link below the password field.
- A '- Or -' separator.
- A 'Register' button below the separator.
- A link for 'Didn't receive confirmation message?' at the bottom.

On the left side of the page, there is a 'CropWatch Bulletin' cover for the May 2022 issue, titled 'CROPWATCH BULLETIN QUARTERLY REPORT ON GLOBAL CROP PRODUCTION'. The cover features a landscape image and text including 'Volume 20, No. 2', 'May 2022', and 'ISSN 1574-7170'.

Account configuration

- If login successfully, you will see your username on top right
- Click ‘CropWatch Pro’ Component (blue box below)



May 2020 CropWatch Bulletin

May 2020 CropWatch Bulletin is based mainly on current remote sensing inputs in addition to detailed and spatially accurate reference data about crops and their management. Focusing on the months of January to April 2020, chapters cover global, national, and regional level agroclimatic conditions and the condition of crops that were growing during this time. For China, the bulletin presents crop conditions for each of seven key agro-ecological zones, an updated estimate of national winter crop production and trade prospects (import/export) of major crops. The focus section reports on the first early outlook of crop production for 2020, as well as sections on recent disaster events, Drought impacts on rice production in lower Mekong river, and an update on El Niño.

[Bulletin](#) →

CropWatch Sub System



CropWatch **Pro** dev

Enter »



CropWatch **Explorer**

Enter »



CropWatch **Analysis**

Enter »



CropWatch **Bulletin**

Enter »

Account configuration

- For the users who login for the first time, you may define the system interface according to your own interests
- A popup window to ask you to configurate your own interface.

The screenshot shows a web interface titled "My Profile" with a "Settings" section. The settings are as follows:

| | |
|----------------------------|---|
| Province/state of interest | ALL |
| System title | CropWatch Cloud |
| Institute/Organization | |
| Role | 超级管理员 |
| Remarks | Remarks |
| Menu | <ul style="list-style-type: none"><input checked="" type="checkbox"/> Menu<ul style="list-style-type: none"><input checked="" type="checkbox"/> Data Preparation<input checked="" type="checkbox"/> Agro-climatic Index<input checked="" type="checkbox"/> Agronomic Indicators<input checked="" type="checkbox"/> Production Indicators<input type="checkbox"/> Warning Indicators<input checked="" type="checkbox"/> Crop Condition Monitoring<input checked="" type="checkbox"/> Zonal Statistics<input checked="" type="checkbox"/> Thematic Map<input checked="" type="checkbox"/> Task Center<input checked="" type="checkbox"/> System Management<input type="checkbox"/> Self Defined Area of Interests<input type="checkbox"/> Batch Processing |

At the bottom right of the settings area, there are "Save" and "Reset" buttons.

Note: The system can be used normally after your requests are reviewed

Practice

1. Account Registration
2. Account Configuration

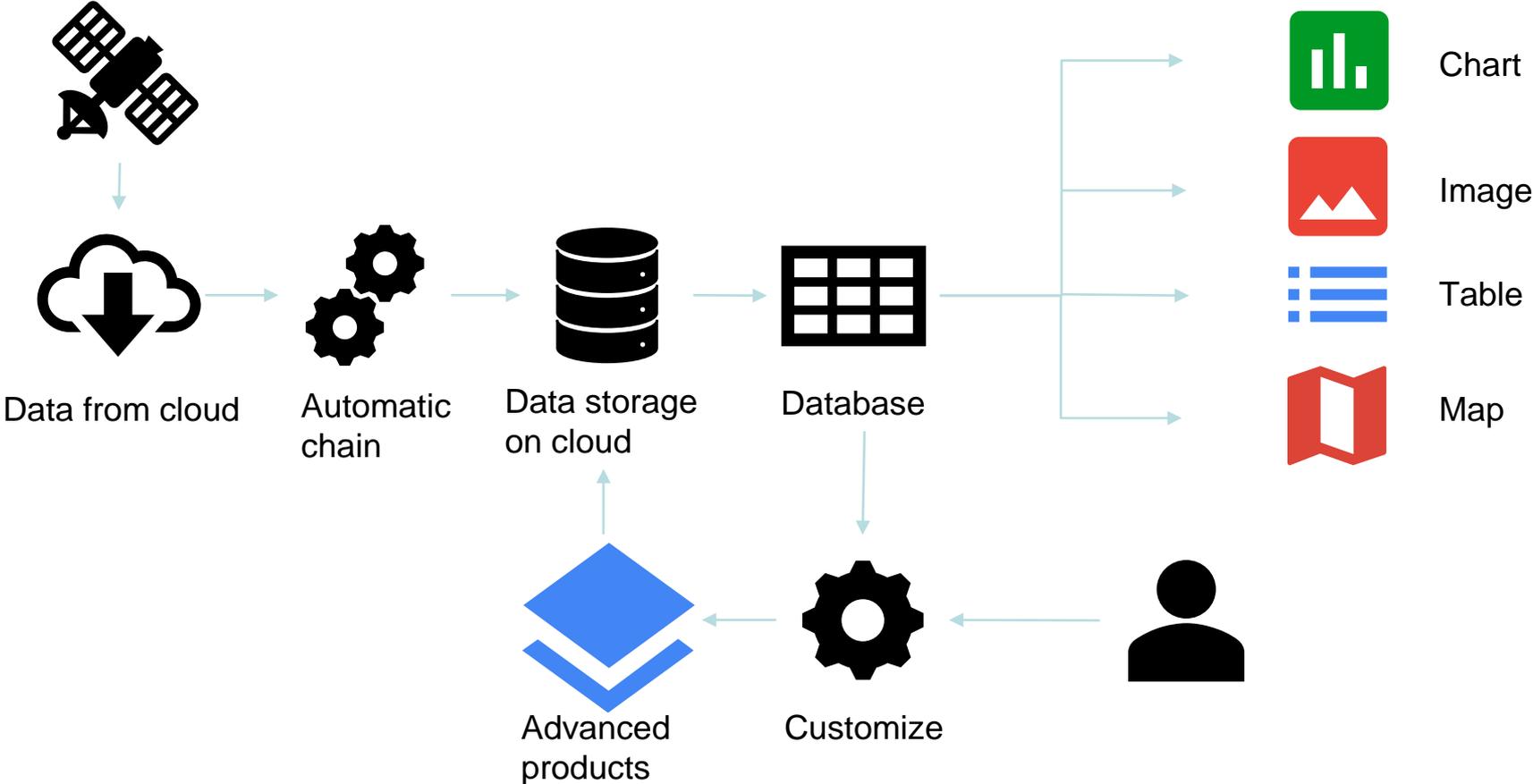
CropWatch Indicators

CropWatch is expanding its agro-climatic and agronomic indicators considering the commonly used indicators from 13 existing global and national systems

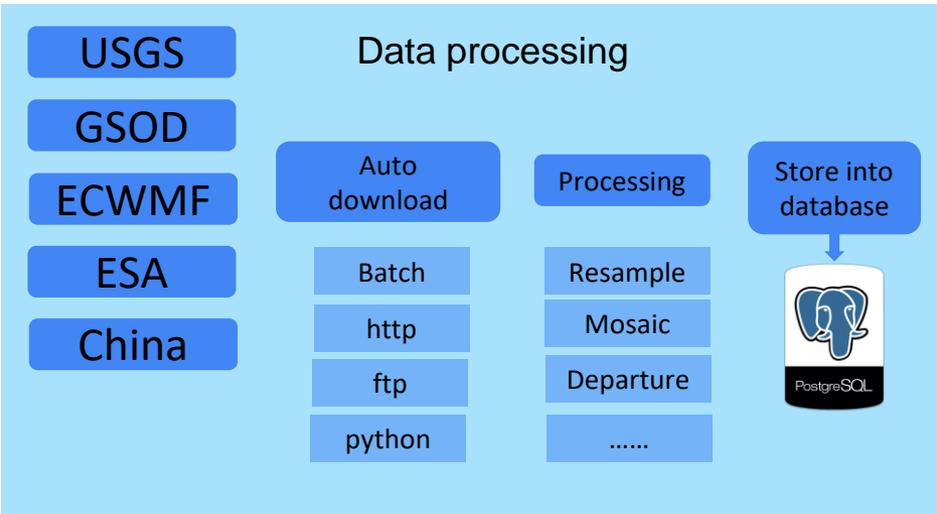
| System | Coverage | AgroClimate | Crop condition | | Crop production | | | Independent drought monitor | Food security | Reference | |
|------------------------------|---------------------------|--|---|--|---|--|---|--|---|---|---|
| | | | Status | Stress analysis | Crop types | Crop area | Yield | | | | |
| ASIS ^[26] | Global | P profile & P departure from average; Accumulative P and profiles | NDVI anomaly and profiles and VCI | ASI, weighted VHI over Gaul2 and mean VHI | Cropland and grassland masks | n.a. | n.a. | ASI, drought intensity and frequency | CCBS | https://www.fao.org/giews/ | |
| China, CAS & CAAS | CropWatch ^[27] | P, T, PAR and potential biomass anomalies over 15 years and profiles | NDVI anomaly and VCIx over the last five years, NDVI development and clustering | VHI, flooding, diseases and pests | Grains, wheat, maize, rice and soybean | Remote sensing-based crop type mapping, CPTP | Agro-meteo, RS index, Biomass + harvest index | SPI, VCI, TCI, VHI, NDWI, and soil moisture | Supply trend | http://cropwatch.cn | |
| | CHARMS | China | Anomaly maps and profiles | NDVI anomaly maps and development | n.a. | Wheat, maize, rice, and soybean | Areal sampling and crop classification | RS index WOFOST model | NDDI, TVDI, and anomaly of actual ET | n.a. | Personnel communication, offline |
| European Union | ASAP ^[28] | Global | SPI1, SPI3, and GWSI | zNDVIC and mNDVID | SPI, GWSI and zNDVIC anomalies | Crop and rangeland masks | n.a. | Work in progress ^[29] | GWSI, NDVI, and automatic drought warning | CAF threshold | https://mars.jrc.ec.europa.eu/asap/ |
| | MARS ^[30] | Europe & neighbours | SPEI, ASI, Wofost, and PET | VCI, VPI, and CNDVI | AOC maps and warning index | MARS crops | From EUROSTAT with a specific calendar | CoBo & BioMa | WSI and precipitation anomaly | n.a. | |
| USDA, NASS, FAS/FPAD & USMID | Crop Explorer | Global | AgroClimate for Crop Explorer | NDVI departure from average, previous year and previous decade | Soil moisture and T thresholds for particular crops | CADRE crops | Unknown | Crop water production functions from CADRE | SPI, P and ET anomalies, heat damage and stress | Balance sheet | https://fpad.fas.usda.gov/cropexplorer/ |
| | NASS, VegScope | USA | P and T departures from normal | NDVI, VCI, RVCI, MVCI, and RMVCI | n.a. | Wheat, corn, soybeans, cotton, and potatoes | June area survey with CDL | Monthly objective yield survey | n.a. | n.a. | https://nassgeodata.gmu.edu/VegScope |
| | FEWS-NET | 30 countries | Rainfall assumptions: average and accumulative | NDVI and NDVI anomaly (%) with 2001-2018 mean, accumulative values and 8-day time series | ESI, actual ET, SMI, and SWI anomalies | n.a. | n.a. | n.a. | WRSI, VHI, and P anomaly | SD and IPC | https://fews.net/ |
| | GLAM ^[31] | Global | P, T and ET departures from normal | NDVI and NDVI anomaly (%) with 2001-2018 mean, accumulative values and 8-day time series | ESI, actual ET, SMI, and SWI anomalies | Cultivated cropland mask | n.a. | n.a. | NDVI, SWI, and P anomaly | n.a. | https://glam.nasaharvest.org/ |
| Crop Monitor ^[32] | Global | Anomalies of P and T sums | | | Crop-specific masks | n.a. | n.a. | n.a. | n.a. | https://cropmonitor.org/ | |
| WFP Seasonal Explorer | Global | P accumulation, anomalies and ranking since 1981 | NDVI percentage average; development of NDVI and average | n.a. | Cropland and rangeland mask | n.a. | n.a. | P anomaly, NDVI percentage average and T ranking | n.a. | https://dataviz.vam.wfp.org/seasonal_explorer/reports | |
| OZ-wheat ^[33-37] | Australia | n.a. | n.a. | n.a. | Wheat, sorghum | n.a. | n.a. | Simulated crop stress with meteorological data | n.a. | | |
| AAFS ^[33-37] | Australia | Seasonal P & T and their comparisons to average; P percentiles | NDVI anomaly | VHI provided by FAO ASIS | Up to 158 commodities | From ABS | Statistical forecasting methods | RSMP | Balance sheets | | |
| PAK-SCMS | Pakistan | Monthly P v. previous year, maximum and minimum T v. last two years | NDVI, anomaly maps and profiles | Water supply, pests, and nitrogen | Rice, wheat, cotton, sugarcane | Crop classification | Remote sensing-based statistical model | Anomaly of precipitation; water supply situation | n.a. | https://suparco.gov.pk/crop-management/ | |
| FASAL | India | Anomaly map | VI anomaly map and development | n.a. | Rice, wheat, potato, rapeseed/mustard | Crop classification with in situ samples | Remote sensing-based statistical model | n.a. | n.a. | | |
| VEGA ^[38] | Russia | Maps and profiles of cumulated P | NDVI anomaly map and development, MVCI, RVCI, and NDVI normalized on GDD | n.a. | Cropland, winter crops, summer crops, clean fallows | Remote sensing-based crop type mapping | Remote sensing-based statistical model | Comparison with cumulated average precipitation | n.a. | http://vega.geoglam.ru/?lang=eng | |
| CALMS ^[39] | Canada | Agro-climatic models | NDVI anomaly map and development | Soil moisture and anomaly maps | Spring wheat, barley, canola | Crop classification with in situ samples | Statistical forecast with NDVI, WDI, and GDD | SM and SM anomaly | n.a. | | |

Abbreviations: AAFS=Australian Agricultural Forecasting System; ABS=Australia Bureau of Statistics; AgroClimate for Crop Explorer=percent of normal P at the 5-day, weekly and monthly scales, average, maximum and minimum T and departure from normal, extreme maximum and minimum T, snow depth and cover; AOC=areas of concern indicating excessive or deficit rain, radiation deficit, heat wave, temperature accumulation surplus or deficit, and fAPAR; ASAP=anomaly hot spots of agricultural production; ASI=Agricultural Stress Index; ASIS=Agricultural Stress Index System of the Food and Agriculture Organization of the United Nations (FAO); BioMa=crop growth modelling platform incorporated with WOFOST, CropSYS, STICS, CaneGro for sugarcane and WARM for rice; CAAS=Chinese Academy of Agricultural Sciences; CADRE=crops=wheat, rice, and coarse grains (corn, barley, sorghum, and oats), oilseeds (soybeans, rapeseed, and palm), and cotton; CADRE=Crop Assessment Data Retrieval & Evaluation; CAF=critical area fraction; CALMS=Canadian Ag-Land Monitoring System; CAS=Chinese Academy of Sciences; CCBS=country cereal balance sheet; CDL=cropland data layers; CHARMS=China agriculture remote sensing monitoring system; CNDVI=accumulated NDVI from the start of the growing season; CoBo=control board with different statistical methods to produce yield forecasts; CPTP=crop-planting proportion and crop type proportion method; ESI=evaporative stress index; ET=evapotranspiration; EVI=enhanced vegetation index; fAPAR=fraction of absorbed photosynthetically active radiation; FAS=Foreign Agricultural Service; FASAL=forecasting agricultural output using space, agrometeorological and land based observations of India; FEWS-NET=famine early warning systems network; GAUL level-Global Administrative Units Layers of the FAO; GDD=growing degree days above 5°C; GLAM=global agricultural monitoring; GWSI=Global Water Requirement Satisfaction Index; IPC=Integrated Food Security Phase Classification; LAI=leaf area index; MARS=monitoring agricultural resources; MARS Crops=wheat, barley, maize, rice, triticale, rapeseed, sugar beet, potato, sunflower, and soybean; mNDVID=mean of the difference between NDVI and its long-term average over the growing season; MVCI=relative change in NDVI compared to the mean NDVI; NASS=National Agriculture Statistics Service; NDVI=normalized difference vegetation index; NDWI=Normalized Difference Water Index; P=precipitation; PAK-SCMS=Pakistan satellite-based crop monitoring system; PASG=percent of average seasonal greenness; PET=potential evapotranspiration; RMVCI=relative change in NDVI compared to the median NDVI; RSMP=Relative Soil Moisture Percentiles; RVCI=Relative NDVI change compared to the previous year; SD=Scenario Development for Food Security Early Warning; SMI=soil moisture index; SPI=Standard Precipitation Index; SWI=soil water index; T=temperature; USDA=United States Department of Agriculture; VCI=vegetation condition index; VHI=vegetation health index; VPI=vegetation productivity indicator; WDI=water deficit index; WFP=UN World Food Programme; WRSI=crop water requirement satisfaction index; zNDVIC=standardized anomaly of cumulative NDVI over the growing season.

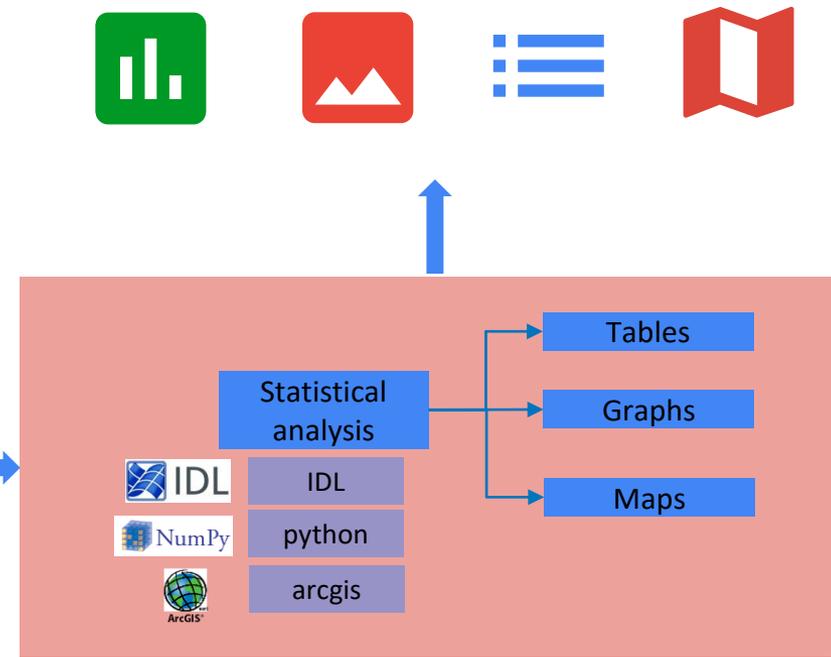
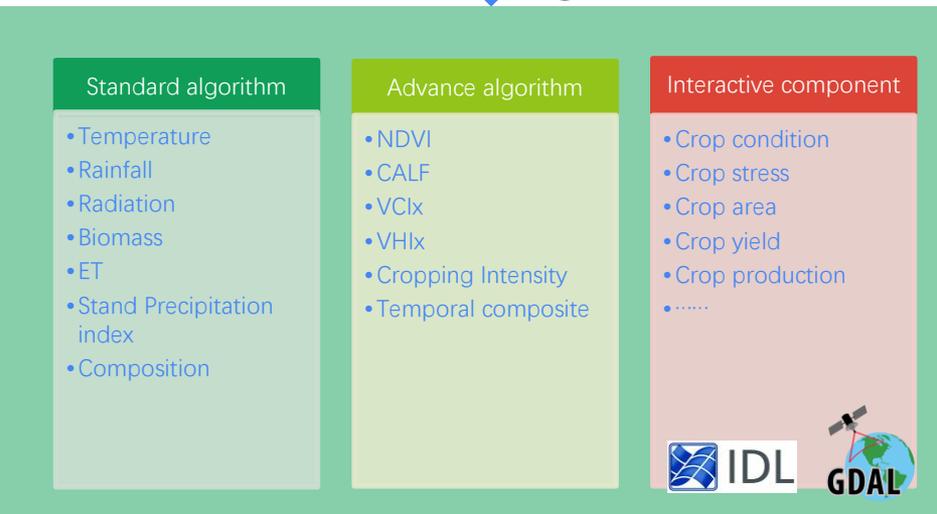
Data flowchart



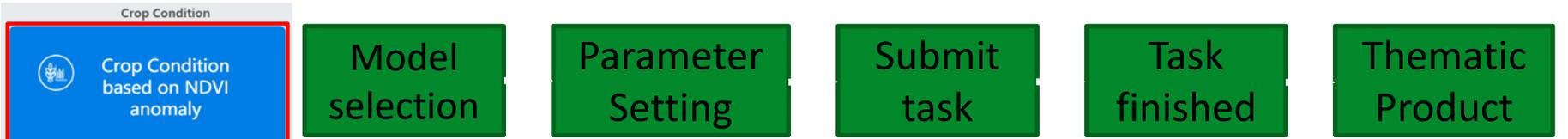
Architecture



↓ Algorithms



VI Anomaly analysis



Crop Condition based on NDVI anomaly

Settings

Region Type: Key Countries

Region Name: SouthAfrica

Starting time: 2017

End Time: 2017

Reference Year: Previous 5 year 1 average

Buttons: Run, Save

Parameter Setting

Task Center

| No. | User | Model | Creating Time | Starting Time | Progress | Status | Operation | Logs |
|-----|-------------|--------------------------------------|---------------------|---------------------|----------|-----------------|--------------|----------|
| 1 | zenghongwei | Crop Condition based on NDVI anomaly | 2017-05-11 08:58:41 | 2017-05-11 08:58:41 | 100% | To be processed | Pause/Cancel | Task Log |
| 2 | zenghongwei | Crop Condition based on NDVI anomaly | 2017-05-11 08:55:30 | 2017-05-11 08:55:40 | 100% | Finished | | Task Log |
| 3 | zenghongwei | Rainfall Index | 2017-05-11 08:30:39 | 2017-05-11 08:30:40 | 100% | Finished | | Task Log |
| 4 | zenghongwei | Crop Condition based on NDVI anomaly | 2017-05-11 07:56:15 | 2017-05-11 07:56:20 | 100% | Finished | | Task Log |
| 5 | miao | Index Statistics | 2017-05-10 18:52:44 | 2017-05-10 18:47:40 | 100% | Finished | | Task Log |
| 6 | miao | Index Statistics | 2017-05-10 18:52:17 | 2017-05-10 18:47:30 | 100% | Finished | | Task Log |
| 7 | miao | Index Statistics | 2017-05-10 18:51:47 | | 0% | Cancelled | | Task Log |
| 8 | miao | Index Statistics | 2017-05-10 18:33:21 | 2017-05-10 18:47:20 | 100% | Finished | | Task Log |
| 9 | miao | Index Statistics | 2017-05-10 18:32:51 | 2017-05-10 18:47:10 | 100% | Finished | | Task Log |
| 10 | miao | Index Statistics | 2017-05-10 17:50:52 | 2017-05-10 18:10:20 | 100% | Finished | | Task Log |

Queue in task list

Task Center

| No. | User | Model | Creating Time | Starting Time | Progress | Status | Operation | Logs |
|-----|-------------|--------------------------------------|---------------------|---------------------|----------|-----------|-----------|----------|
| 1 | zenghongwei | Crop Condition based on NDVI anomaly | 2017-05-11 08:58:41 | 2017-05-11 08:58:50 | 100% | Finished | | Task Log |
| 2 | zenghongwei | Crop Condition based on NDVI anomaly | 2017-05-11 08:55:30 | 2017-05-11 08:55:40 | 100% | Finished | | Task Log |
| 3 | zenghongwei | Rainfall Index | 2017-05-11 08:30:39 | 2017-05-11 08:30:40 | 100% | Finished | | Task Log |
| 4 | zenghongwei | Crop Condition based on NDVI anomaly | 2017-05-11 07:56:15 | 2017-05-11 07:56:20 | 100% | Finished | | Task Log |
| 5 | miao | Index Statistics | 2017-05-10 18:52:44 | 2017-05-10 18:47:40 | 100% | Finished | | Task Log |
| 6 | miao | Index Statistics | 2017-05-10 18:52:17 | 2017-05-10 18:47:30 | 100% | Finished | | Task Log |
| 7 | miao | Index Statistics | 2017-05-10 18:51:47 | | 0% | Cancelled | | Task Log |
| 8 | miao | Index Statistics | 2017-05-10 18:33:21 | 2017-05-10 18:47:20 | 100% | Finished | | Task Log |
| 9 | miao | Index Statistics | 2017-05-10 18:32:51 | 2017-05-10 18:47:10 | 100% | Finished | | Task Log |
| 10 | miao | Index Statistics | 2017-05-10 17:50:52 | 2017-05-10 18:10:20 | 100% | Finished | | Task Log |

Task status updating/finished

Preview Thematic Map

Model Name: Crop Condition based on NDVI anomaly

Region Type: Country

Region Name: ZAF

Start Year: 2017

Start day: 1

End year: 2017

End day: 1

Reference Year [1]: 1

Preview thematic product and output to database

Demonstration

[http://process.cropwatch.com.cn/
CropWatch/](http://process.cropwatch.com.cn/CropWatch/)

Crop condition monitoring-NDVI anomaly

The image displays two screenshots of the CropWatch Cloud web application. The top screenshot shows the 'Settings' page for 'Crop Condition based on NDVI anomaly'. The bottom screenshot shows the 'Preview Thematic Map' page for the same indicator, with a map of the ZWE region and a color scale for NDVI anomalies.

CropWatch Cloud

Crop Condition based on NDVI anomaly

Settings

CropWatch Cloud

专题图生产

Preview Thematic Map

| | |
|--------------------|--------------------------------------|
| Model Name | Crop Condition based on NDVI anomaly |
| Indicator Type | Ndvi |
| Region Type | Country |
| Region Name | ZWE |
| Start Year | 2023 |
| Start day | 161 |
| End year | 2023 |
| End day | 161 |
| Reference Year:[1] | 1 |

The thematic map displays the NDVI anomaly for the ZWE region. The color scale ranges from -0.25 (red) to 0.25 (blue), with 0 being white. The map shows a mix of colors, indicating varying levels of anomaly across the region.

Task center



- Data Preparation
 - Agro-climatic Index >
 - Agronomic Indicators >
 - Production Indicators >
 - Warning Indicators >
 - Crop Condition Monitoring >
 - Zonal Statistics >
 - Thematic Map >
 - Task Center**
 - System Management >
 - Self Defined Area of Interests
 - Batch Processing >
- Server Status (Details)
- CPU Usage 0%
- Memory Usage 0%

Task Center

Key Words

| No. | User | Model | Creating Time | Starting Time | Progress | Status | Operation | Logs |
|-----|------|--|------------------------|------------------------|---|----------|-----------|-----------------------------------|
| 1 | miao | Crop condition clustering | 2023-07-04 23:23:19 | 2023-07-04 23:23:20 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 2 | miao | Crop condition clustering | 2023-07-04 23:15:45 | 2023-07-04 23:15:50 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 3 | miao | Crop condition clustering | 2023-07-04 23:03:22 | 2023-07-04 23:03:30 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 4 | miao | Crop condition clustering | 2023-07-04 22:51:50 | 2023-07-04 22:52:00 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 5 | miao | Crop Condition Classification | 2023-07-04 22:49:28 | 2023-07-04 22:49:30 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 6 | miao | Crop Condition based on NDVI anomaly | 2023-07-04 22:48:00 | 2023-07-04 22:48:10 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 7 | miao | Remote Sensing Index Model | 2023-07-04 22:32:36 | 2023-07-04 22:37:10 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs Preview |
| 8 | miao | Site yield estimation | 2023-07-04 22:26:09 | 2023-07-04 22:37:00 | <div style="width: 100%;"><div style="width: 100%;"></div></div> 100% | Finished | | Task Logs |

Agro-climatic Indicator

CropWatch

- Data Preparation
- Agro-climatic Index >
- Agronomic Indicators >
- Production Indicators >
- Warning Indicators >
- Crop Condition Monitoring >
- Zonal Statistics >
- Thematic Map** >
 - Thematic Map
 - Archive thematic maps
- Task Center
- System Management >
- Self Defined Area of Interests
- Batch Processing >

Server Status (Details)
CPU Usage 0%

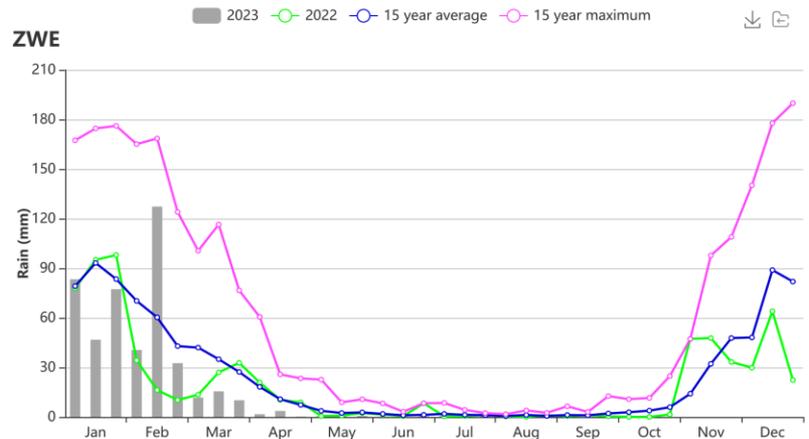


CropWatch Cloud

Produce Thematic Map

Settings

| | |
|------------------------------|----------------|
| Types of map to be produced | NDVI profiles |
| Type | Rainfall index |
| Region Type | Countries |
| Region Name | Zimbabwe |
| Sub Regions of Key Countries | Whole country |
| Starting time | 2023-01-01 |
| End Time | 2023-07-31 |
| Crop Type | All Crop |
| Bulletin | 3 |



Run Reset

Rainfall profiles

Agro-climatic Indicator

CropWatch Cloud

Produce Thematic Map

Settings

| | |
|------------------------------|-------------------|
| Types of map to be produced | NDVI profiles |
| Type | Temperature Index |
| Region Type | Countries |
| Region Name | Zimbabwe |
| Sub Regions of Key Countries | Whole country |
| Starting time | 2023-01-01 |
| End Time | 2023-07-31 |
| Crop Type | All Crop |
| Bulletin | 3 |

ZWE

Temp (Celsius)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

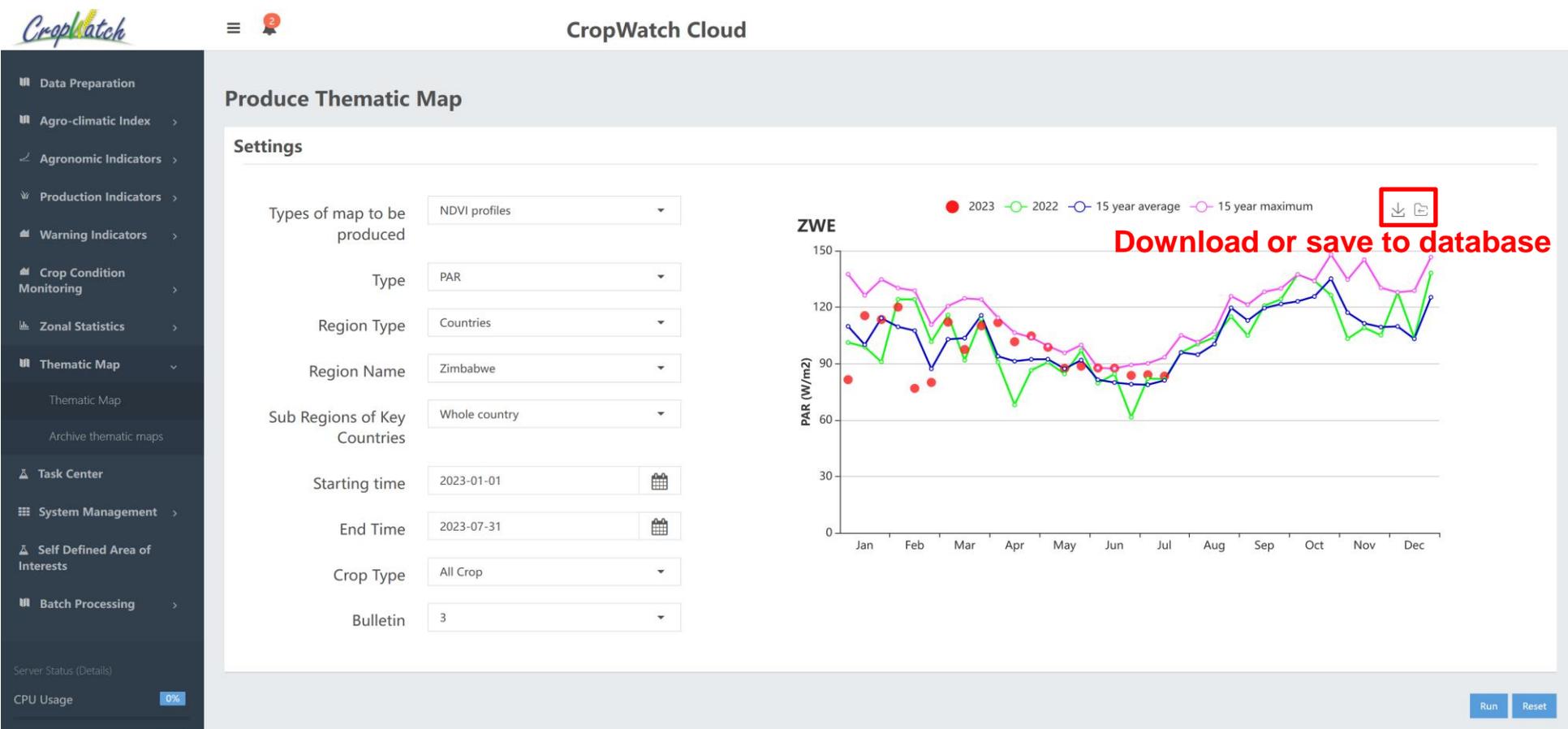
● 2023 ■ 2022 ○ 15 year average □ 15 year maximum

Run Reset

Server Status (Details)
CPU Usage 0%

Temperature profiles

Agro-climatic Indicator



Radiation profiles

Agro-climatic Indicator

CropWatch Cloud

Produce Thematic Map

Settings

| | |
|------------------------------|-------------------|
| Types of map to be produced | Raster |
| Type | Biomass departure |
| Region Type | Countries |
| Region Name | Thailand |
| Sub Regions of Key Countries | Whole country |
| Starting time | 2023-01-01 |
| End Time | 2023-04-30 |
| Bulletin | 2 |

Run Reset

Potential biomass departure map

Agro-climatic Indicator

Produce Thematic Map

Settings

Types of map to be produced

Raster

Type

Standardized Precipitation Index

Region Type

Countries

Region Name

Cameroon

Sub Regions of Key Countries

Whole country

Time

2023-07-31

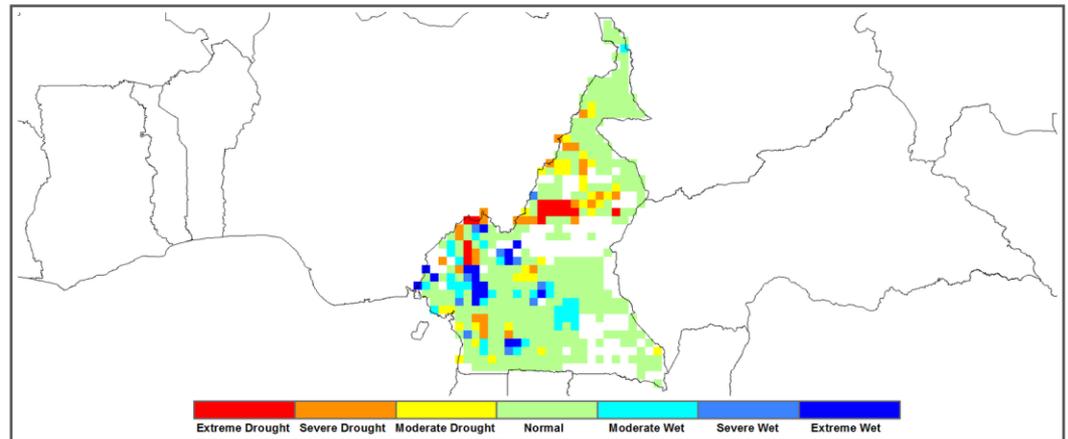


Time scale

Three months

Bulletin

3



Run

Reset

Standard precipitation index

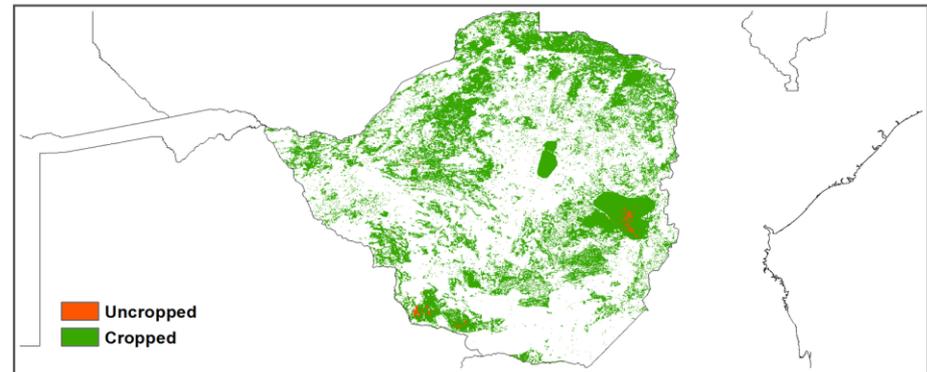
Agronomic Indicator

 ☰ 2 **CropWatch Cloud**

Produce Thematic Map

Settings

| | |
|------------------------------|---|
| Types of map to be produced | <input type="text" value="Raster"/> |
| Type | <input type="text" value="Cropped arable land classification"/> |
| Region Type | <input type="text" value="Countries"/> |
| Region Name | <input type="text" value="Zimbabwe"/> |
| Sub Regions of Key Countries | <input type="text" value="Whole country"/> |
| Year | <input type="text" value="2023"/>  |
| Bulletin | <input type="text" value="2"/> |



Uncropped
Cropped

[Run](#) [Reset](#)

Cultivated and fallow cropland map

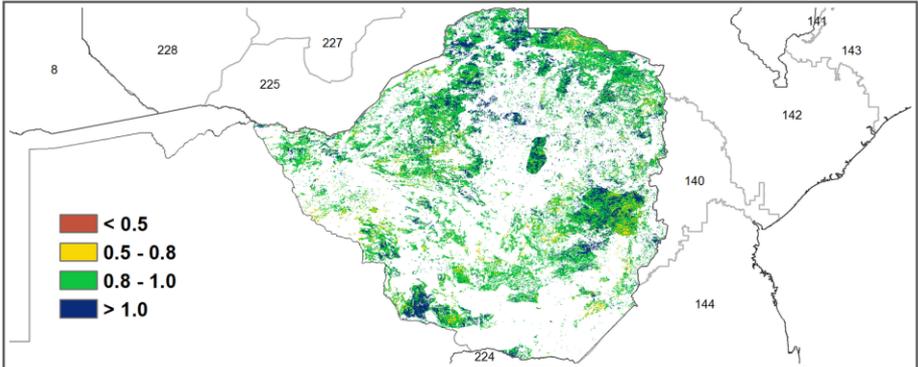
Agronomic Indicator

 ☰ 🔔 **CropWatch Cloud**

Produce Thematic Map

Settings

| | |
|------------------------------|--|
| Types of map to be produced | <input type="text" value="Raster"/> |
| Type | <input type="text" value="Maximum VCI"/> |
| Region Type | <input type="text" value="Countries"/> |
| Region Name | <input type="text" value="Zimbabwe"/> |
| Sub Regions of Key Countries | <input type="text" value="Whole country"/> |
| Starting time | <input type="text" value="2023-01-01"/> 📅 |
| End Time | <input type="text" value="2023-04-30"/> 📅 |
| Bulletin | <input type="text" value="2"/> |



Legend:

- < 0.5
- 0.5 - 0.8
- 0.8 - 1.0
- > 1.0

[Run](#) [Reset](#)

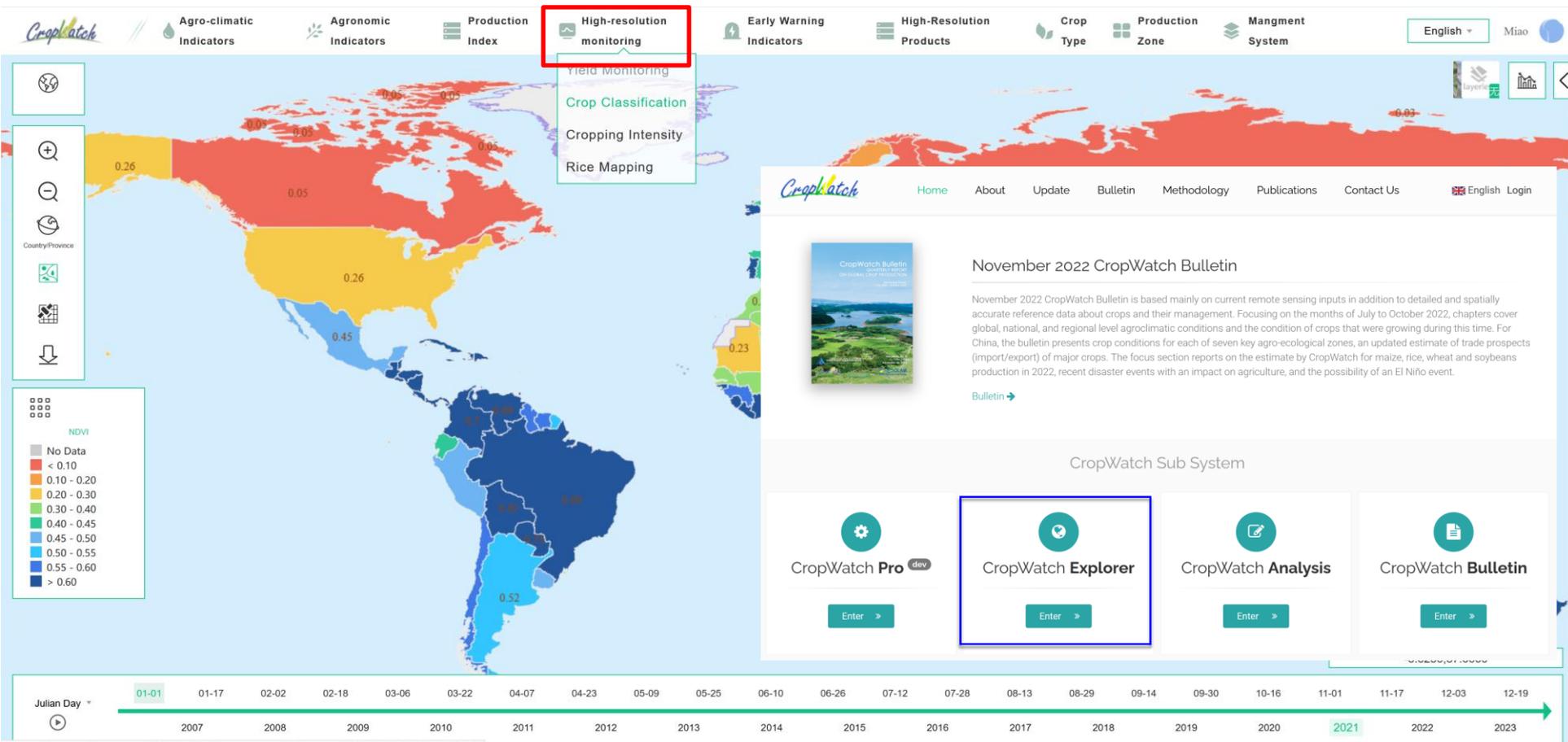
Server Status (Details)

Seasonal maximum vegetation condition index

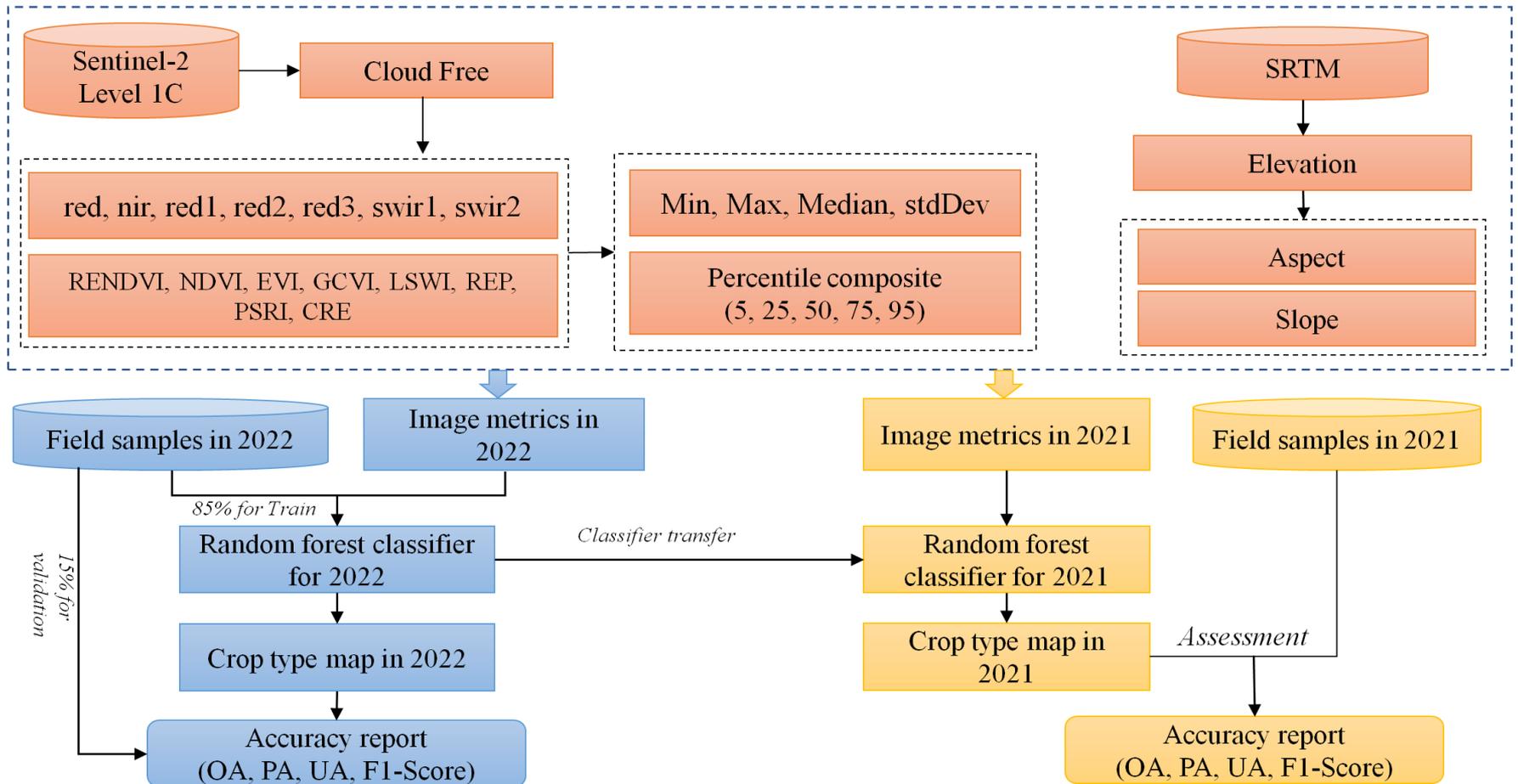
High resolution components

➤ Crop classification

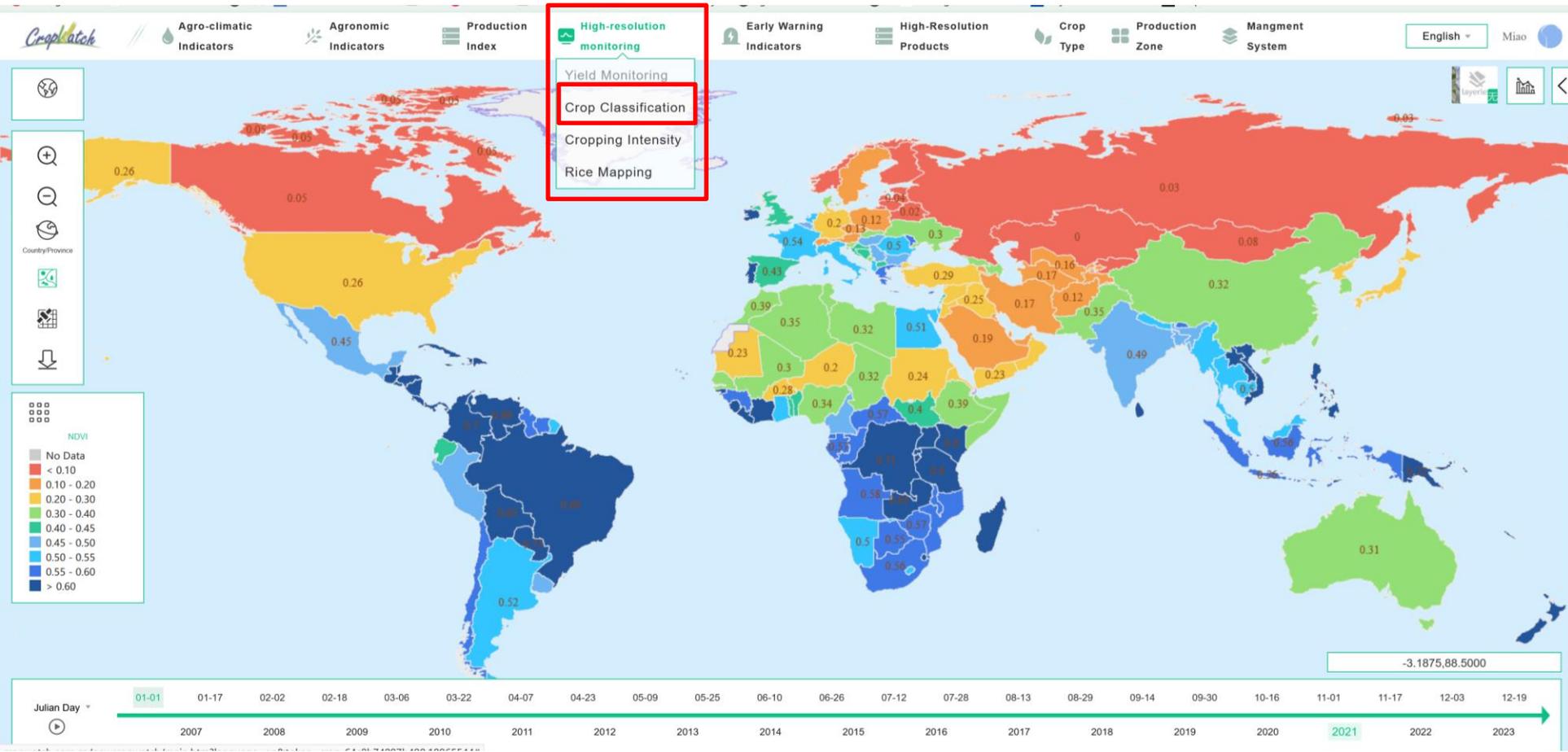
➤ Rice mapping



1. Crop type classification



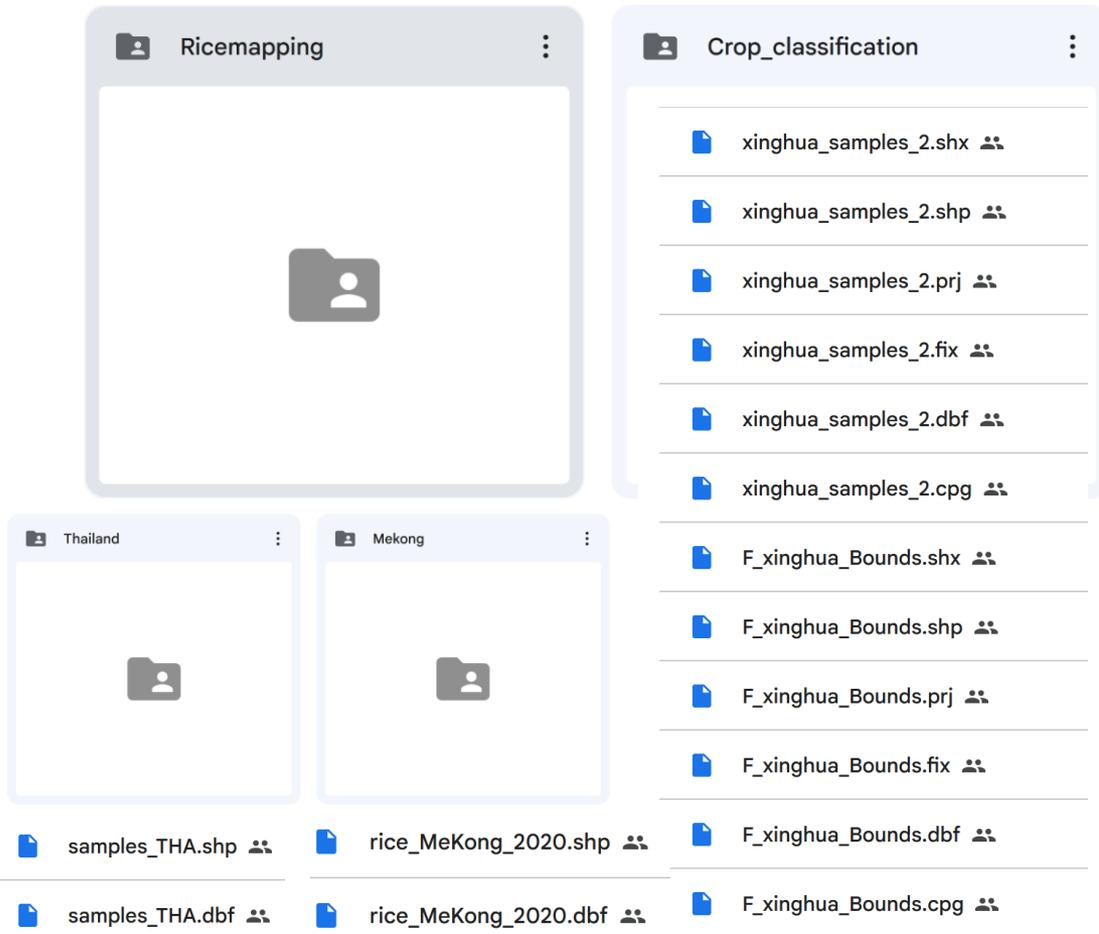
Practice: Crop type mapping



<http://ci.cropwatch.com.cn:5000/crop>

Demo data to use the components

<https://drive.google.com/drive/u/1/folders/1HYy5IFWqibpSwjX0U2KI663jZJ1eoCs0>



Data preparation and upload

The screenshot displays a web application interface for data preparation and upload. The background is a satellite map of a rural area with circular agricultural plots. A toolbar at the top contains several buttons: 'POI Upload' (highlighted with a red box), 'ROI Upload', 'Create', 'Task', 'Clear', 'Add', 'Move', 'Delete', and 'Save'. A 'File Upload' dialog window is open in the foreground, showing a file explorer view of a folder named 'crop_samples_20230801'. The dialog lists four files:

| 名称 | 修改日期 | 类型 |
|---|---------------|--------|
| <input type="checkbox"/> F_xinghua_Bounds.dbf | 2023/8/1 9:15 | DBF 文件 |
| <input type="checkbox"/> F_xinghua_Bounds.shp | 2023/8/1 9:15 | SHP 文件 |
| <input checked="" type="checkbox"/> xinghua_samples_2.dbf | 2023/8/1 9:15 | DBF 文件 |
| <input checked="" type="checkbox"/> xinghua_samples_2.shp | 2023/8/1 9:15 | SHP 文件 |

The two selected files, 'xinghua_samples_2.dbf' and 'xinghua_samples_2.shp', are highlighted with a red box. A red text overlay in the center of the dialog reads: **Select two files, shp and dbf**. The dialog also shows a file name input field containing 'xinghua_samples_2.shp' and 'xinghua_samples_2.dbf', and buttons for '打开(O)' (Open) and '取消' (Cancel).

Define the area of interests

The screenshot displays a web application interface for defining areas of interest. The main map area shows a satellite view with a blue polygon and several yellow markers. A toolbar at the top contains buttons for 'POI Upload', 'ROI Upload', 'Create', 'Task', 'Clear', 'Add', 'Move', 'Delete', and 'Save'. A 'File Upload' dialog box is open, showing a file named 'F_xinghua_Bounds.shp' selected. A 'Background Layers' panel at the bottom right shows 'Tian Ditu Map', 'Tian Ditu Image', 'Google Map', and 'Marker'.

Option 1

Background Layers

Google Images

Define the area of interests



Submit crop type classification tasks

↓ POI Upload ↓ ROI Upload **□ Create** ≡ Task 🗑️ Clear ⚙️ Add 📏 Move 🗑️ Delete 🏠 📄 ✓ Save ✖️

Task Creation [X]

* Name:

* Date: →

* Field: * Value:

* Machine Learning Algorithm:

* Earth Observation Data:

Optical Indices: NDVI EVI LSWI GCVI

SAR Indices: VV + VH

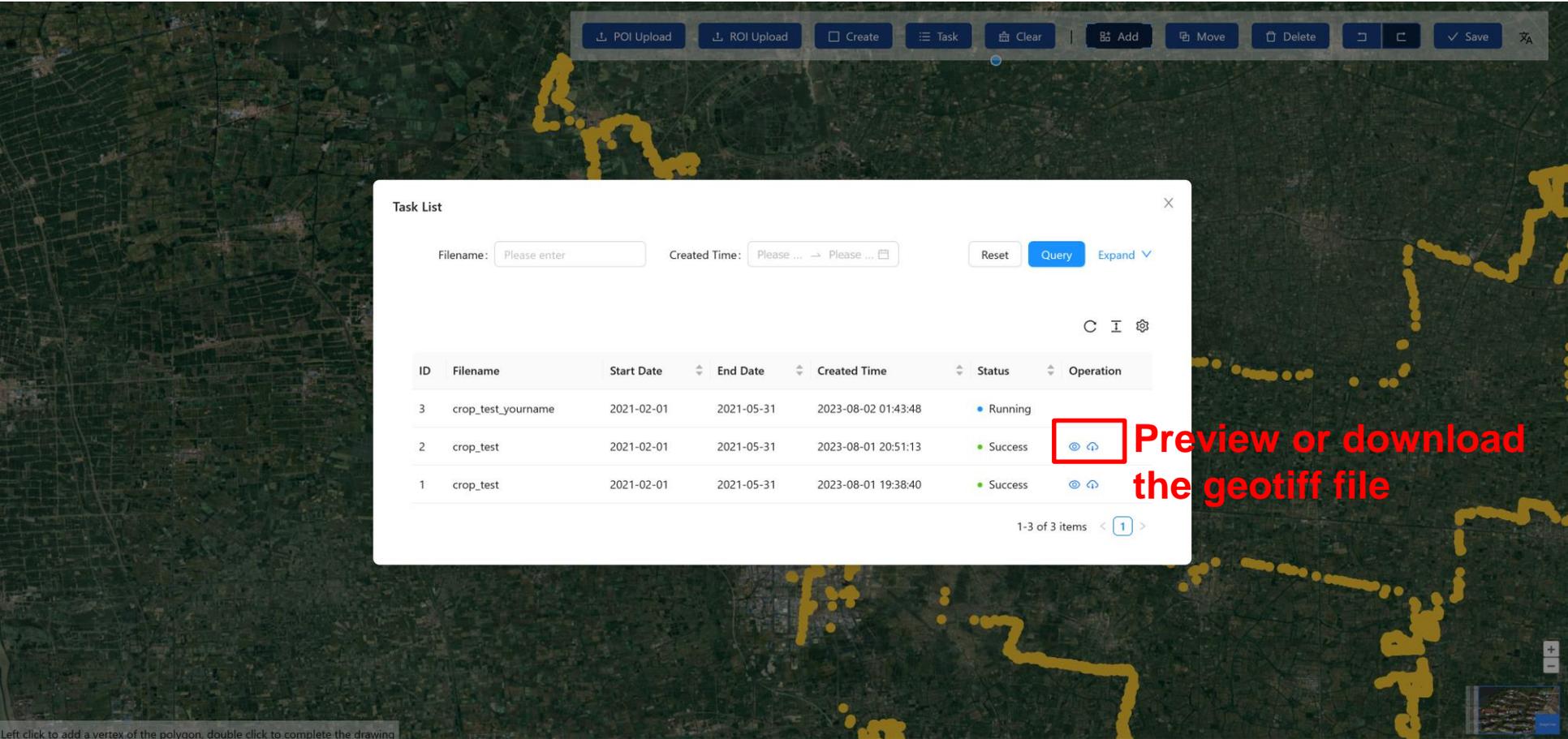
Terrain Indices: Elevation Slope

Submit Cancel

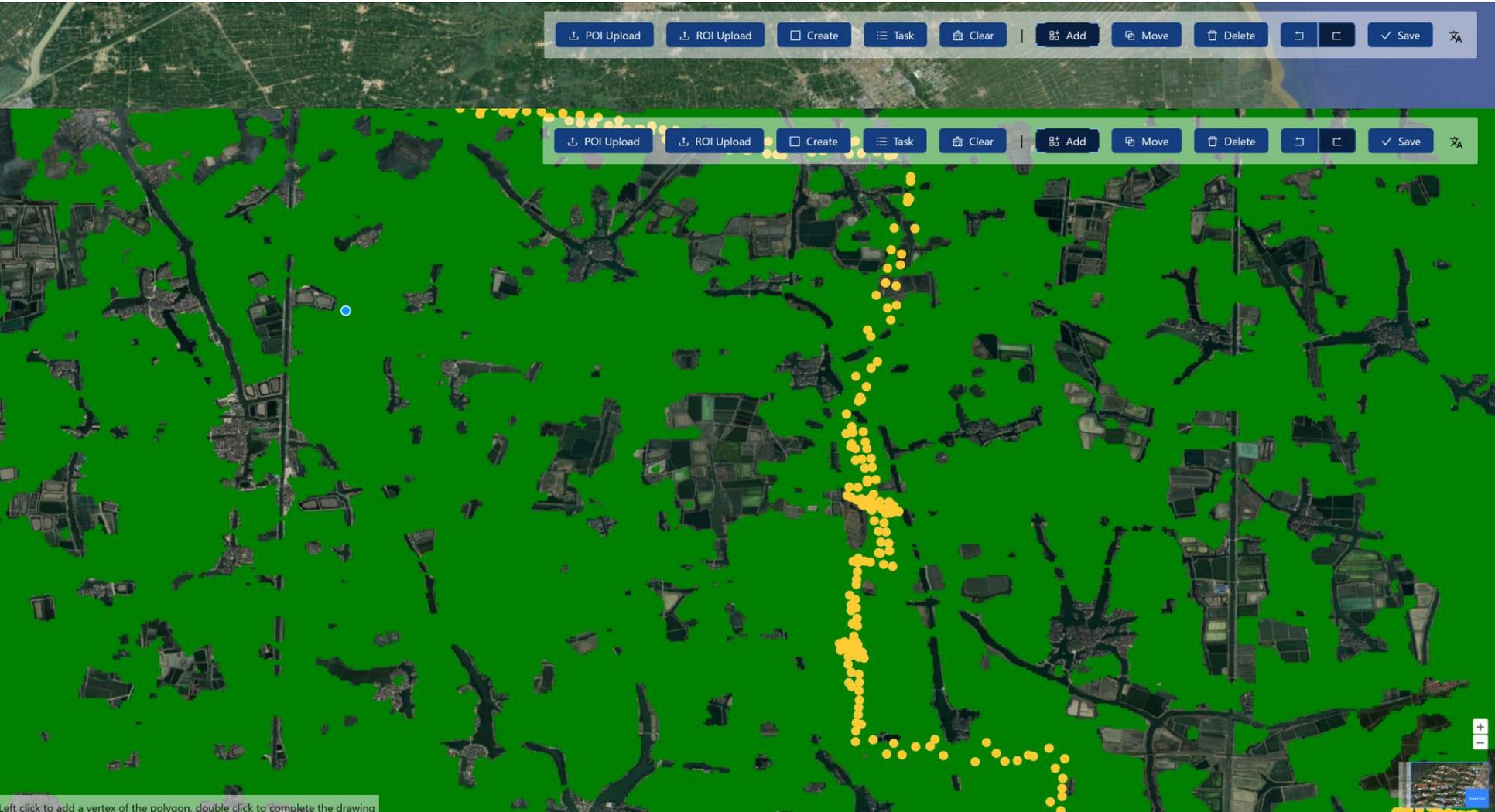
dd a vertex of the polygon, double click to complete the drawing

Properties defining the classes

Classification and results



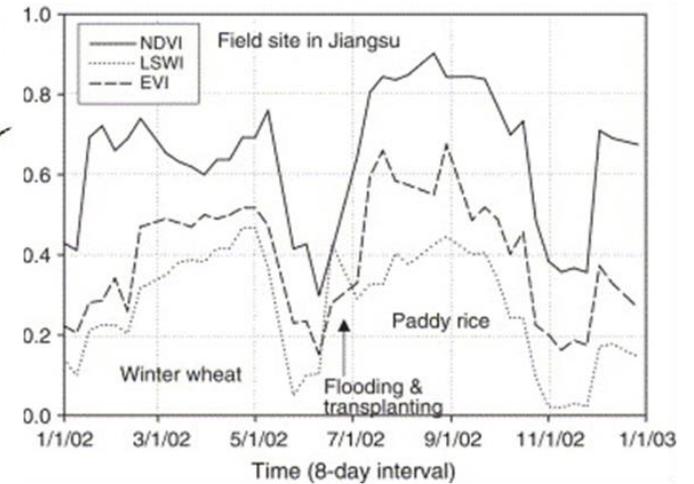
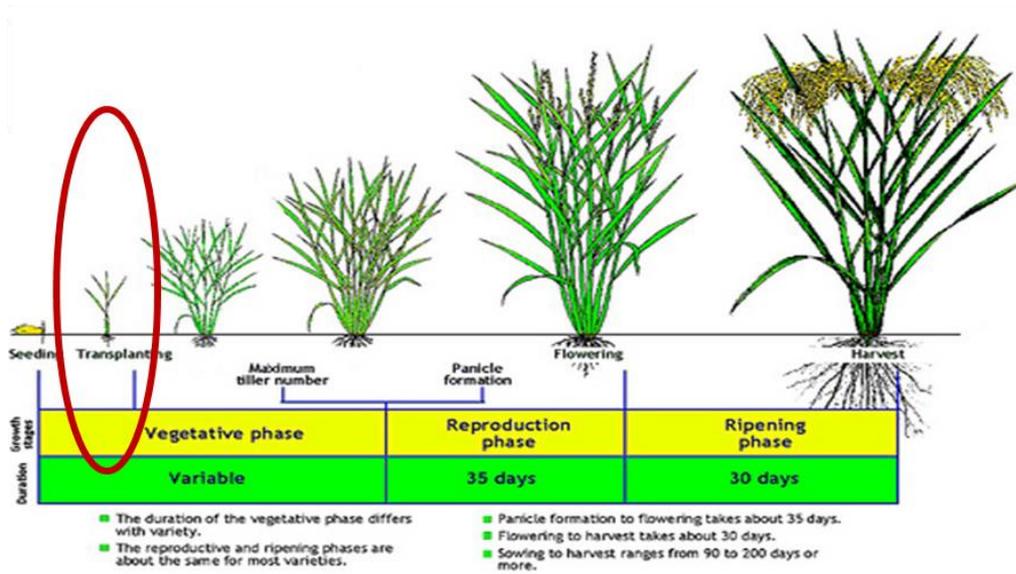
Preview the results



Left click to add a vertex of the polygon, double click to complete the drawing

Potential rice area

Phenology- and Pixel-based Paddy Rice Algorithm (PPPM)



(Xiao et al., 2005, 2006 RSE)



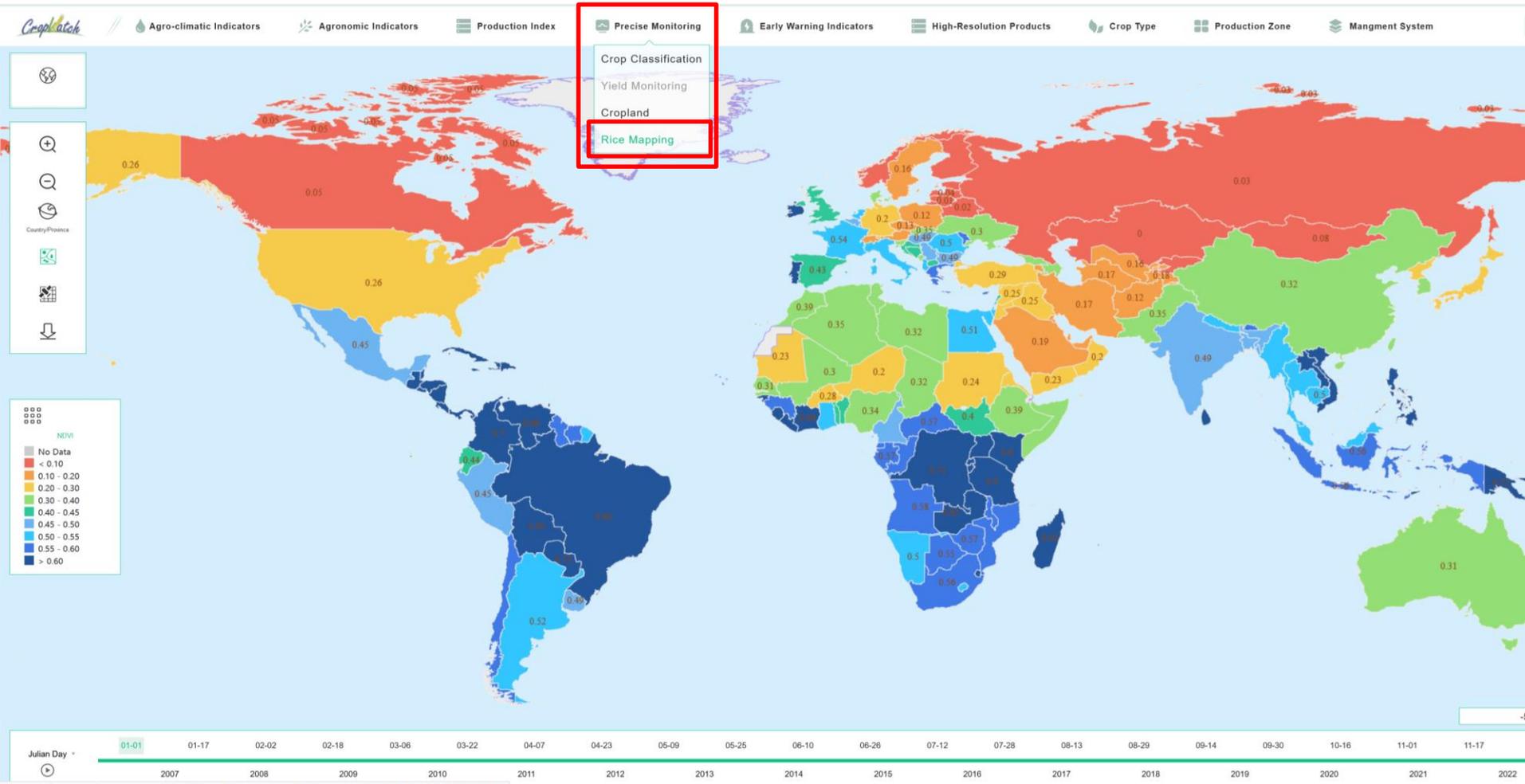
Seedling

Transplanting

Reproduction to
mature

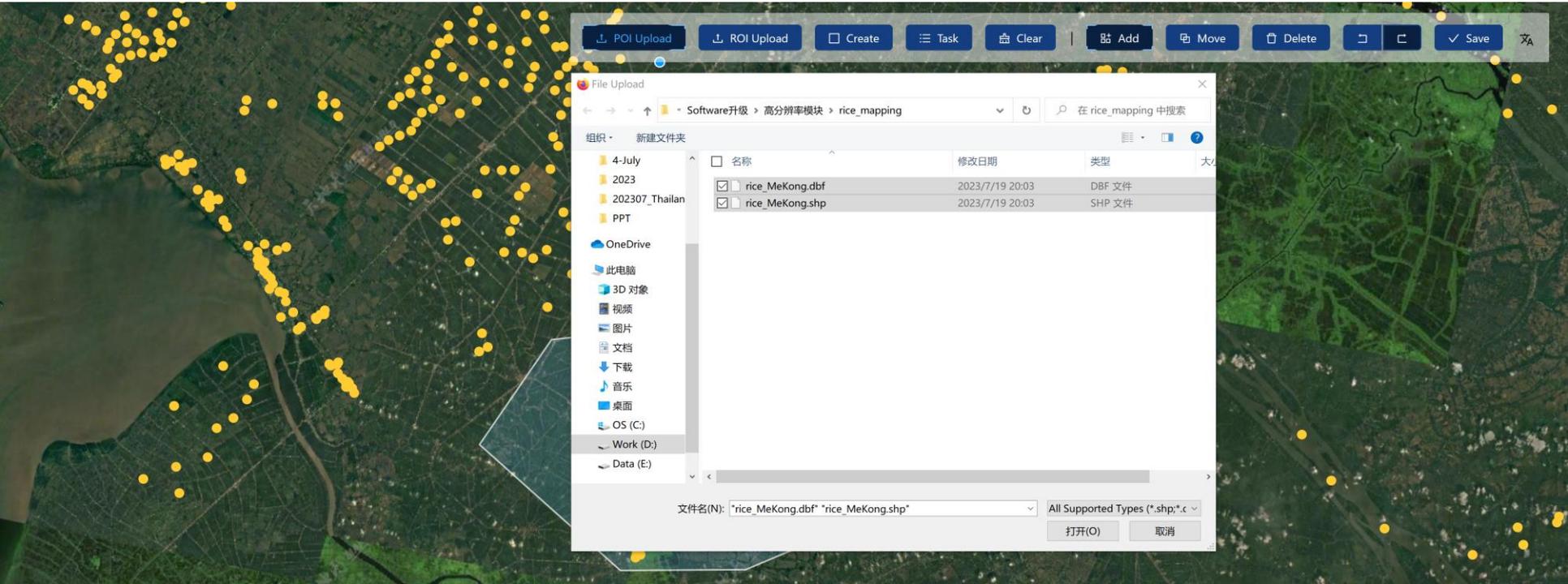
Harvest

Practice: Rice mapping



<http://ci.cropwatch.com.cn:5000/rice>

Data configuration



Define the area of interests

rice - Demo

不安全 | ci.crowwatch.com.cn:5000/rice

↓ POI Upload ↓ ROI Upload □ Create ≡ Task 清除 添加 移动 删除 保存

Option 1

| 名称 | 修改日期 | 类型 | 大小 |
|------------------|-----------------|--------|--------|
| nonrice_sample | 2023/7/19 20:03 | 文件夹 | |
| rice_sample | 2023/7/19 20:03 | 文件夹 | |
| rice_MeKong.shp | 2023/7/19 20:03 | SHP 文件 | 50 KB |
| roi_MeKong_8.shp | 2023/7/19 20:04 | SHP 文件 | 127 KB |

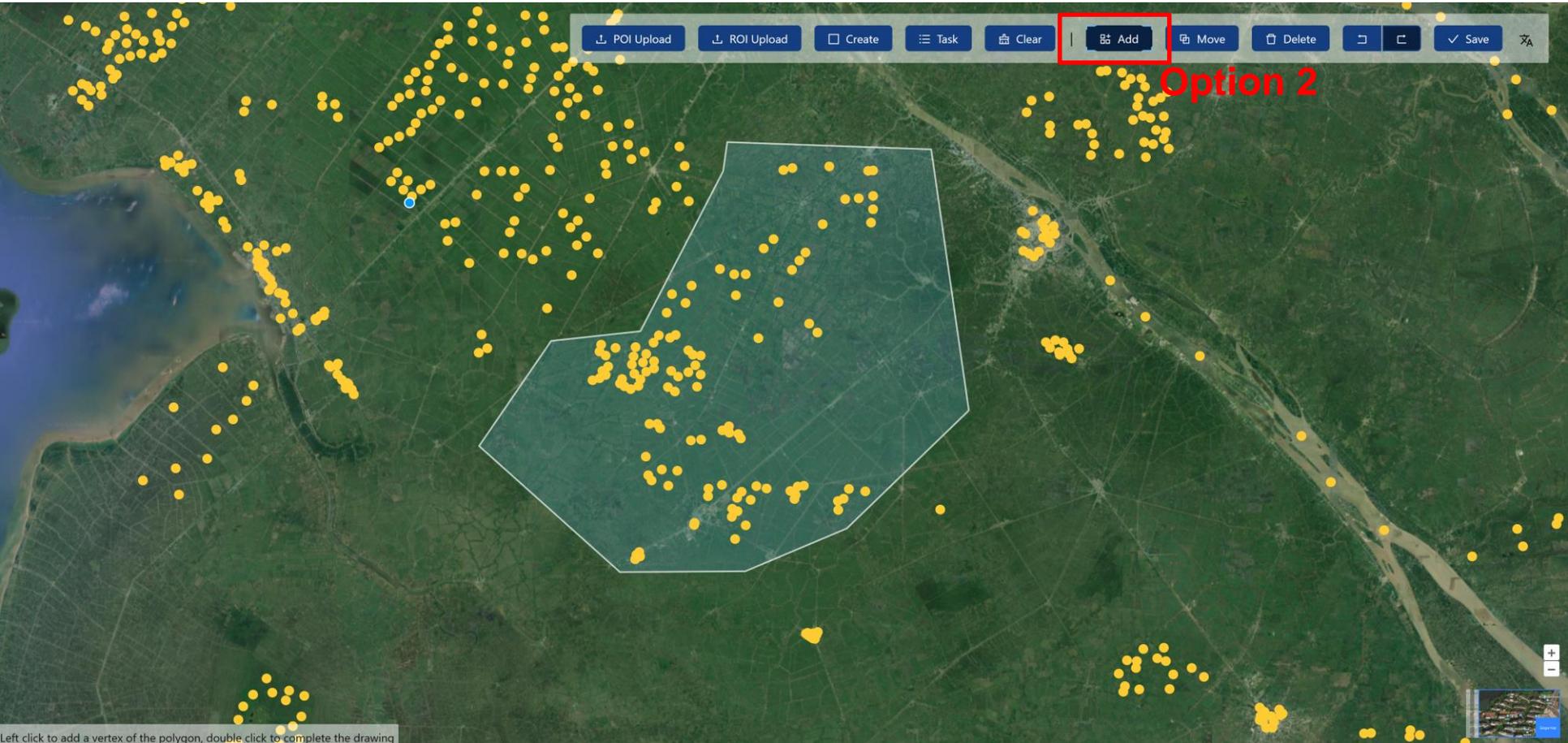
文件名(N): roi_MeKong_8.shp SHP 文件 (*.shp)

背景层: Tian Ditu Map Tian Ditu Image Google Map Marker

Background Layers

Google Images

Define the area of interests



Submit classification tasks

The screenshot shows a web browser window with the URL `ci.cropwatch.com.cn:5000/rice`. The interface features a toolbar with buttons for 'POI Upload', 'ROI Upload', 'Create', 'Task', 'Clear', 'Add', 'Move', 'Delete', 'Save', and a search icon. A 'Task Creation' dialog box is open, containing the following fields:

- * Name:
- * Year:
- * Field:

The 'Submit' button is highlighted with a red box. A red text overlay on the right side of the image reads: 'Properties defining the classes Just need rice and non-rice classes'.

Classification and results

Task List

Filename: Created Time:

⌂ ⓘ ⚙

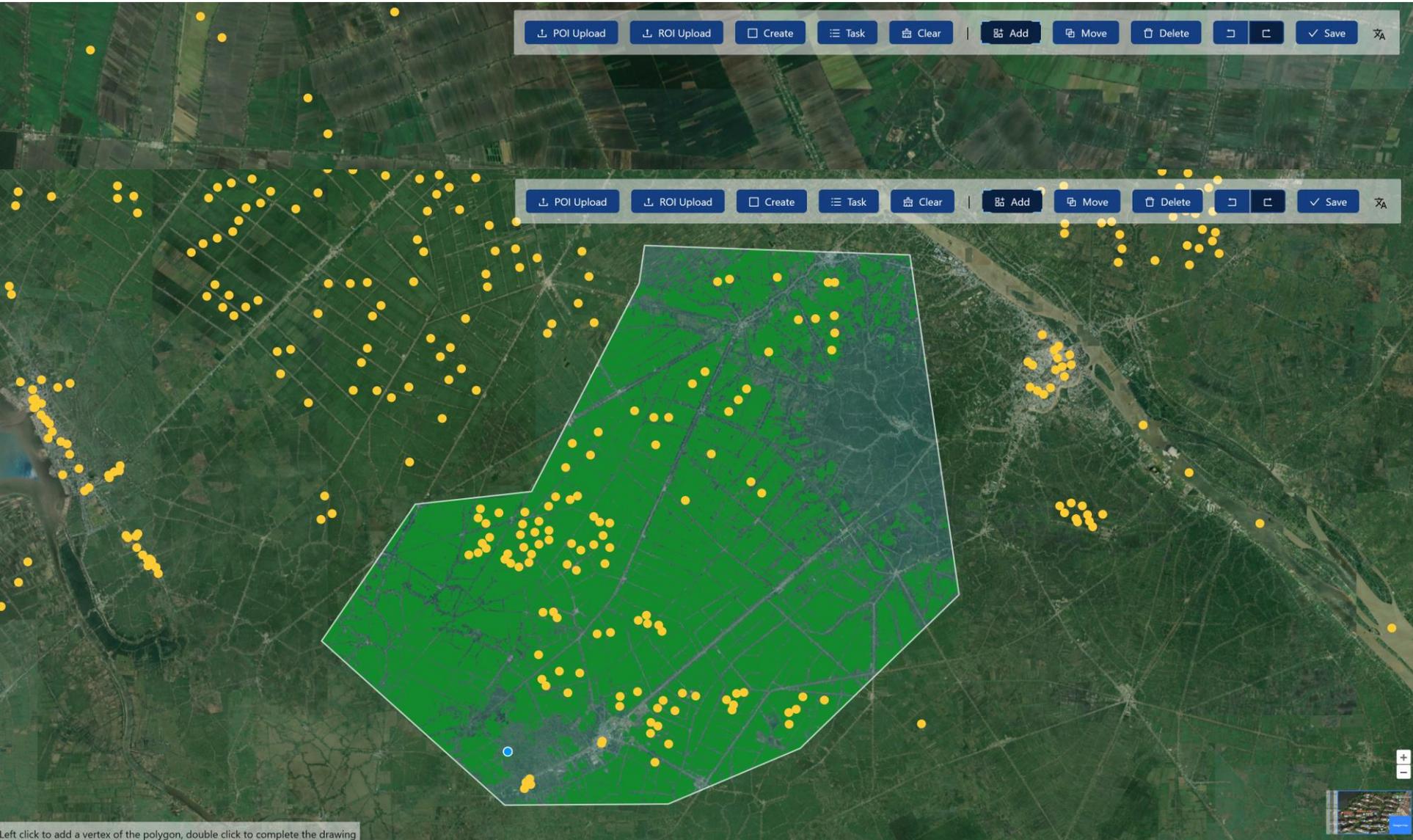
| ID | Filename | Created Time | Updated Time | Status | Operation |
|----|------------------|---------------------|---------------------|---------|--|
| 4 | rice_test2022 | 2023-07-20 07:18:48 | 2023-07-20 07:18:48 | Running | |
| 3 | rice_test | 2023-07-20 07:18:29 | 2023-07-20 07:18:29 | Running | |
| 2 | rice_test_2020_2 | 2023-07-20 05:57:13 | 2023-07-20 06:10:30 | Success | <input type="button" value="Preview"/> <input type="button" value="Download"/> |
| 1 | rice_test_2020 | 2023-07-20 05:45:50 | 2023-07-20 05:50:30 | Success | <input type="button" value="Preview"/> <input type="button" value="Download"/> |

1-4 of 4 items < 1 >

Preview or download tiff

left click to add a vertex of the polygon, double click to complete the drawing

Preview the results



Home work

- For each country
 - Phenology map from April to July
 - Four profiles including rainfall, temperature, radiation and vegetation index starting from January 1st to end of July 2023
 - Standard precipitation index by the end of July (1 month, 3 months, half year, & year)
 - Crop condition based on NDVI anomaly for early July (July 25th)
 - Seasonal vegetation index map during April 1st to July 25th
- Save the graphs and maps into database and export to your laptop



Thank you for your attention!

contacts: zhangmiao@aircas.ac.cn