



Regional training workshop for satellite crop monitoring using the CropWatch system

07 - 10 August 2023, Palmar Conference Center, Ambre Hotel, Mauritius

# Introduction to CropWatch Explore

Dr. Hongwei Zeng, Dr. Miao Zhang, Prof. Bingfang WU

On behalf of CropWatch Team of AIR CAS



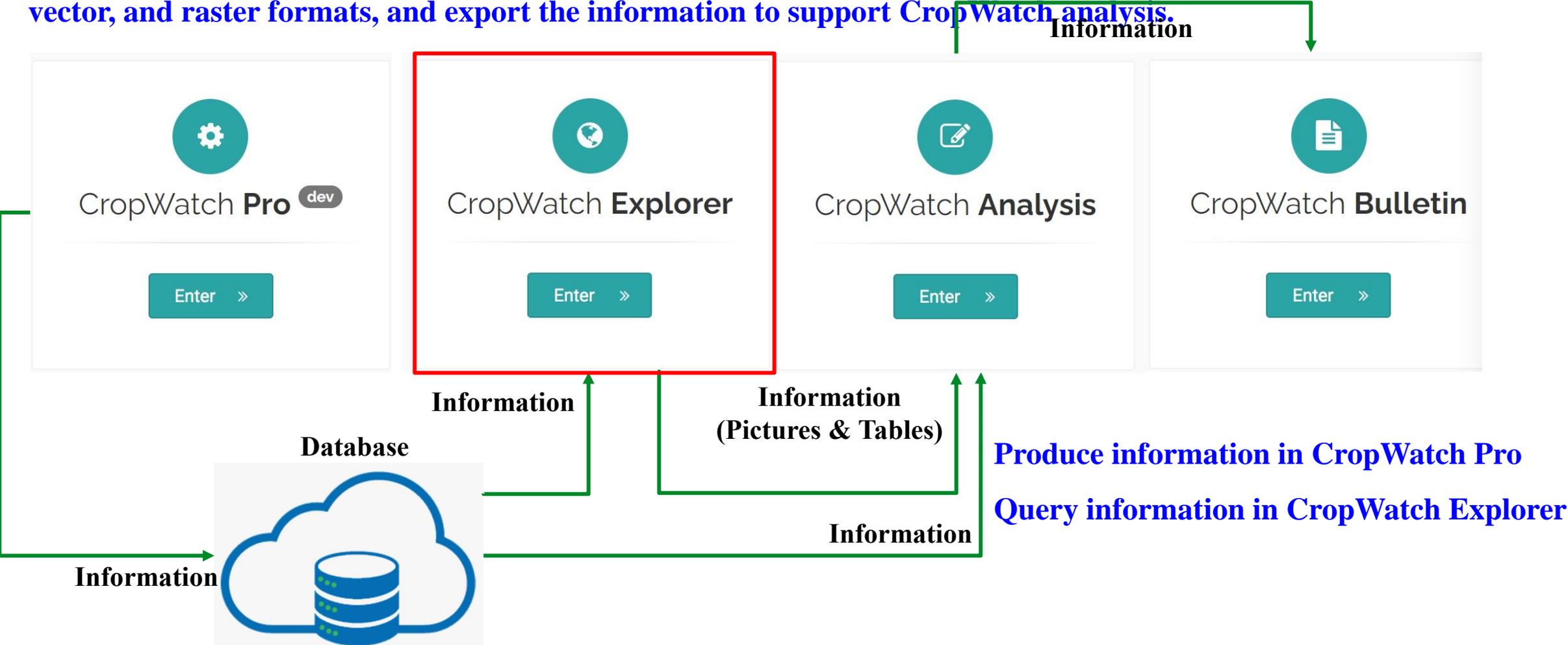
# Outline

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- **What' s the CropWatch Explorer**
- Special products within CropWatch Explorer
- Information at MPZ level
- Information at MRU level
- Information at Countries level
- Customize information for special Country
- Conclusion and Outlook

# CropWatch Explorer

- CropWatch Explorer is an agricultural information display and query system based on Web-GIS technology.
- Users can use CropWatch Explorer to read the information generated by CropWatch Pro, display it in tabular, vector, and raster formats, and export the information to support CropWatch analysis.



# CropExplorer's mission

**1**

Provide data-based service for agricultural analysis of CropWatch Bulletins

**2**

Provide customized agricultural information (information + knowledge) for users' decision making

**3**

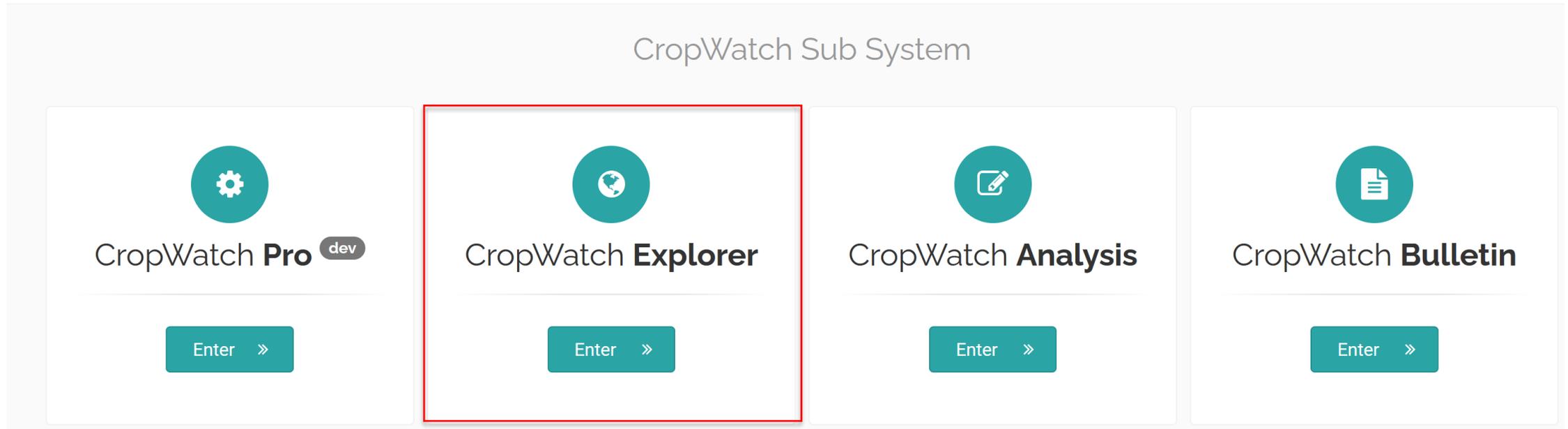
Change from information provider to food security solution provider

# CropWatch Explorer

- Visiting address[**Training Course**]

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

CropWatch Sub System

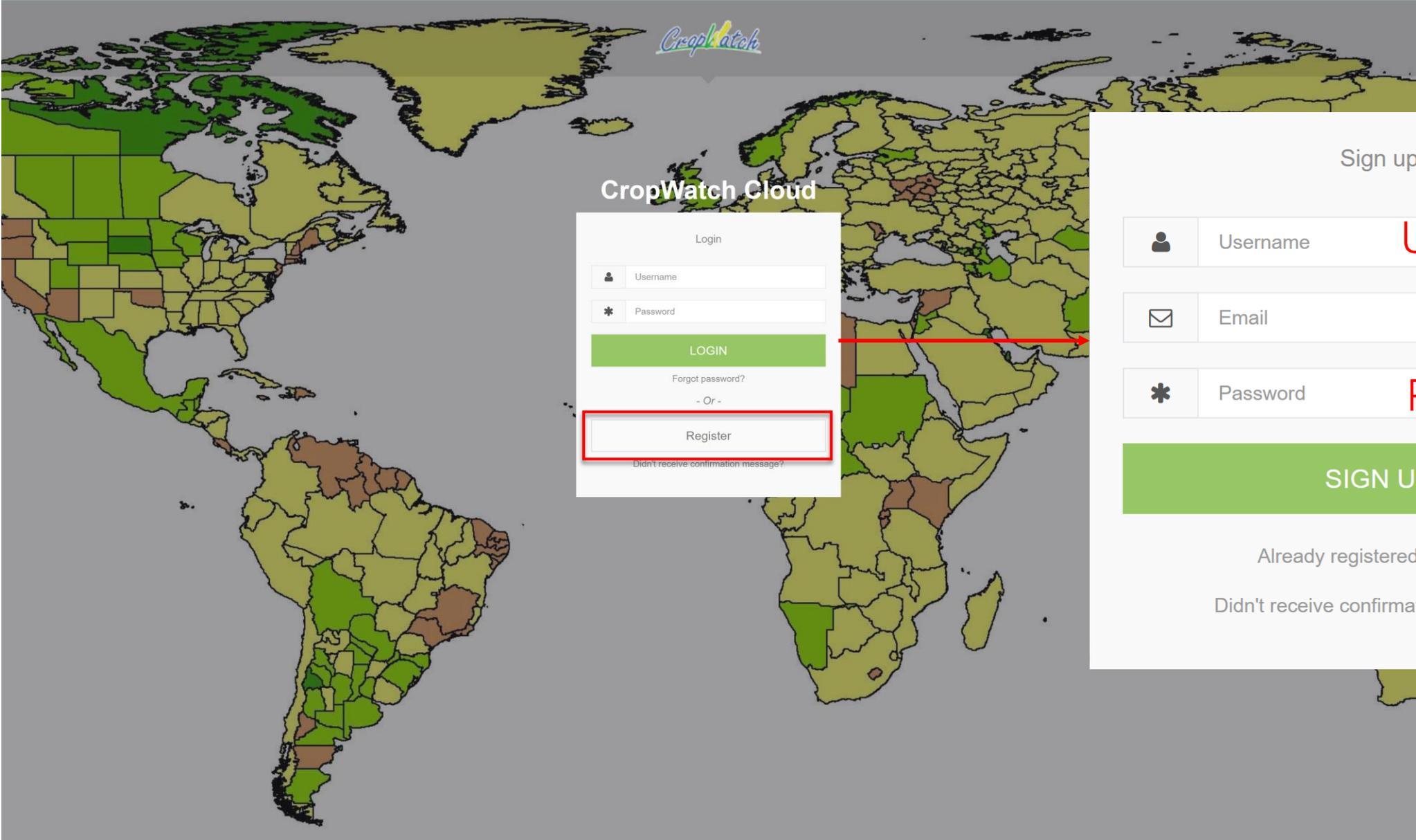


The screenshot displays a dashboard titled "CropWatch Sub System" with four service tiles. Each tile contains an icon, a title, and an "Enter >>" button. The "CropWatch Explorer" tile is highlighted with a red border.

Service	Icon	Label	Action
CropWatch Pro	Gear	CropWatch <b>Pro</b> <small>dev</small>	Enter >>
CropWatch Explorer	Globe	CropWatch <b>Explorer</b>	Enter >>
CropWatch Analysis	Clipboard	CropWatch <b>Analysis</b>	Enter >>
CropWatch Bulletin	Document	CropWatch <b>Bulletin</b>	Enter >>

Click

# CropWatch Explorer-Register



Sign up

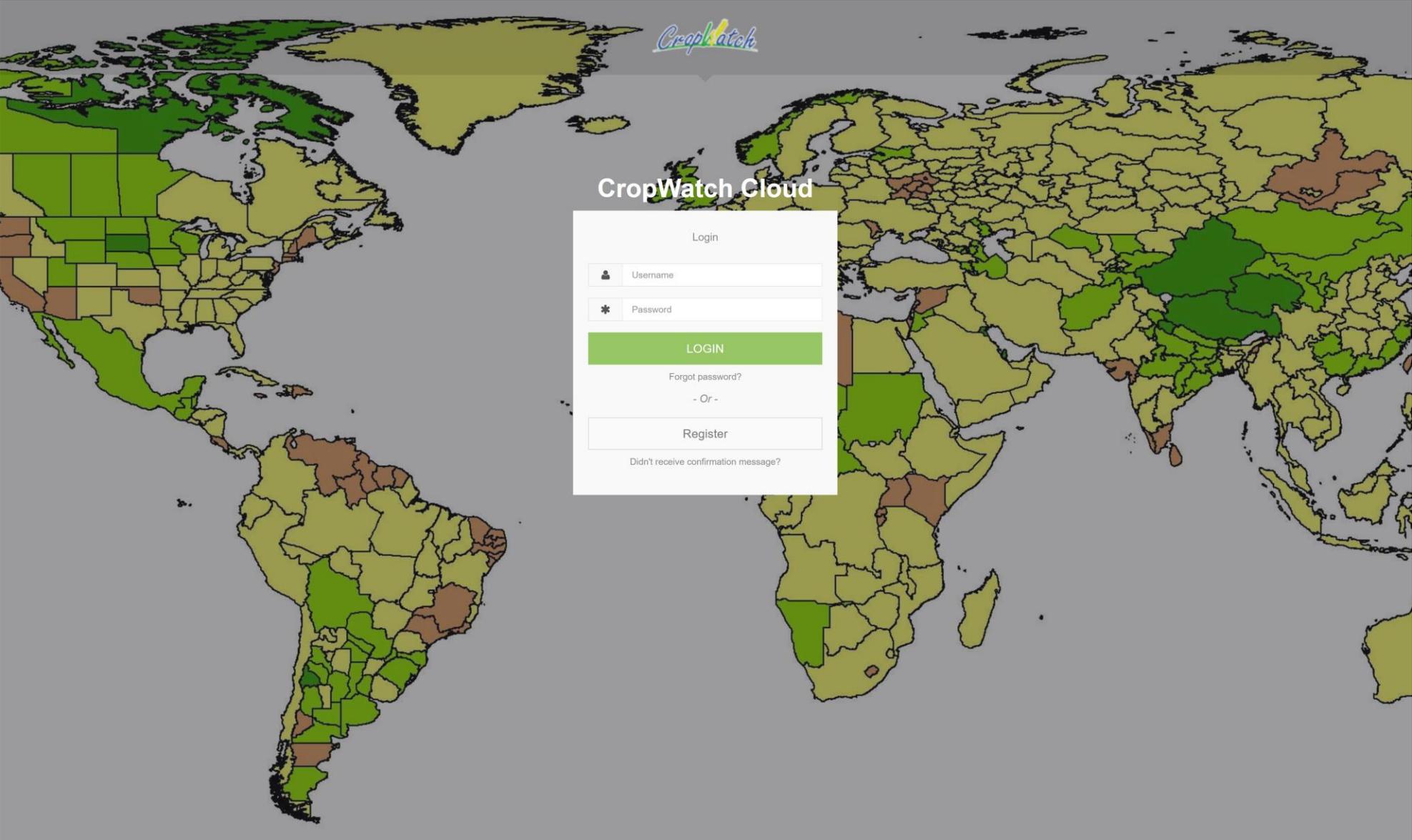
	Username	Username
	Email	Email
	Password	Password

**SIGN UP**

Already registered? Sign in!

Didn't receive confirmation message?

# CropWatch Explorer-Log in



Username  
Password

# CropWatch Explorer-Main Interface

Indices

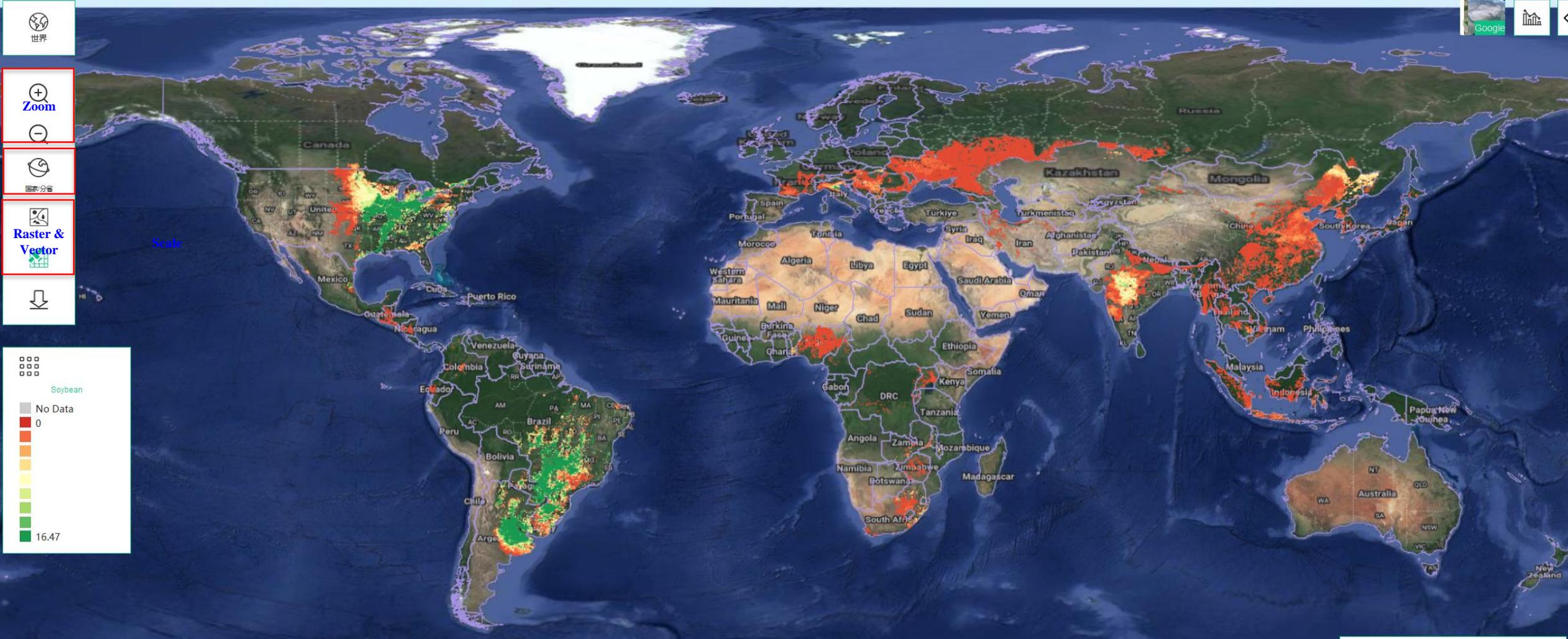
language



- Agro-climatic Indicators
- Agronomic Indicators
- Production Index
- High-resolution monitoring
- Early Warning Indicators
- High-Resolution Products
- Crop Type
- Production Zone
- Management System

English zengh.

- World (世界)
- Zoom (+/-)
- Scale
- Raster & Vector
- Download



-26.1523,62.3146



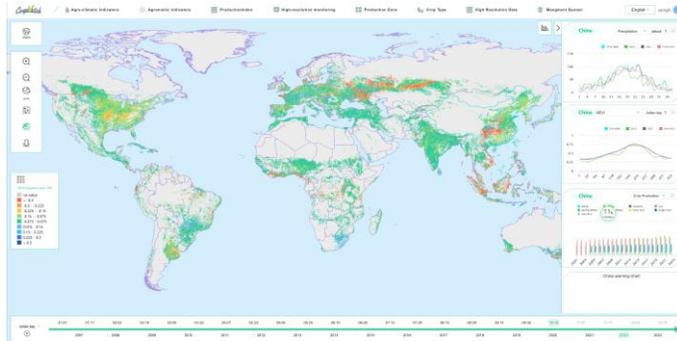
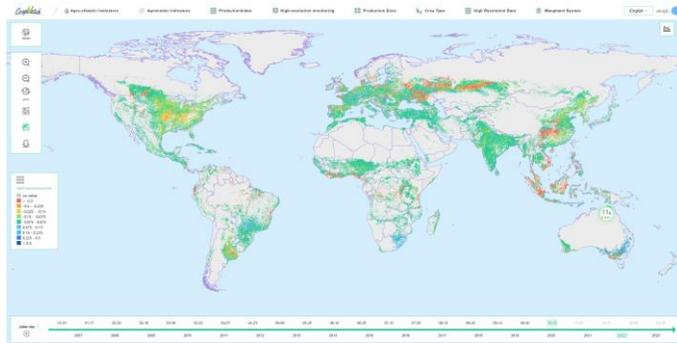
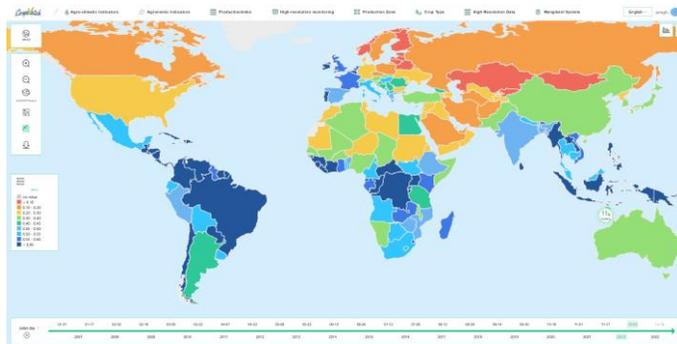
Time axis

# Information types of CropWatch-Explorer

Information categories: agri-climatic, agronomic, production

Type of information visualization: vector, raster, cluster

4 spatial scale: major production zones, map reporting unit, countries, sub-countries



## CropWatch-Explore

Scale Type

Crop Type

Visual Type

MPZ

MRU

Country

Sub-Country

Wheat

Maize

Rice

Soybean

Vector

Raster

Cluster

RAIN

TEMP

PAR

BIOMASS

NDVI

VCIx

VHI

CALF

CI

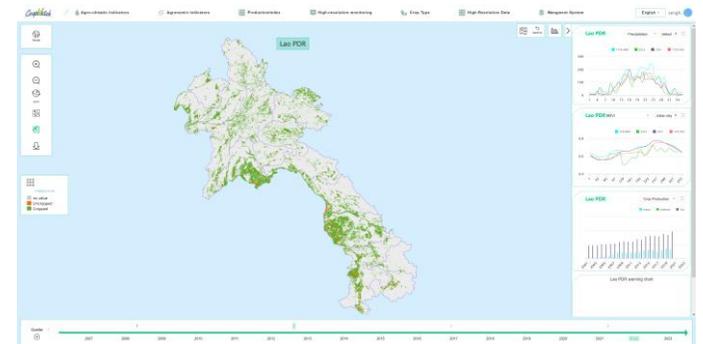
Area

Yield

Production

Early warning

Price





# CropWatch Explorer-Raster(Pixel)

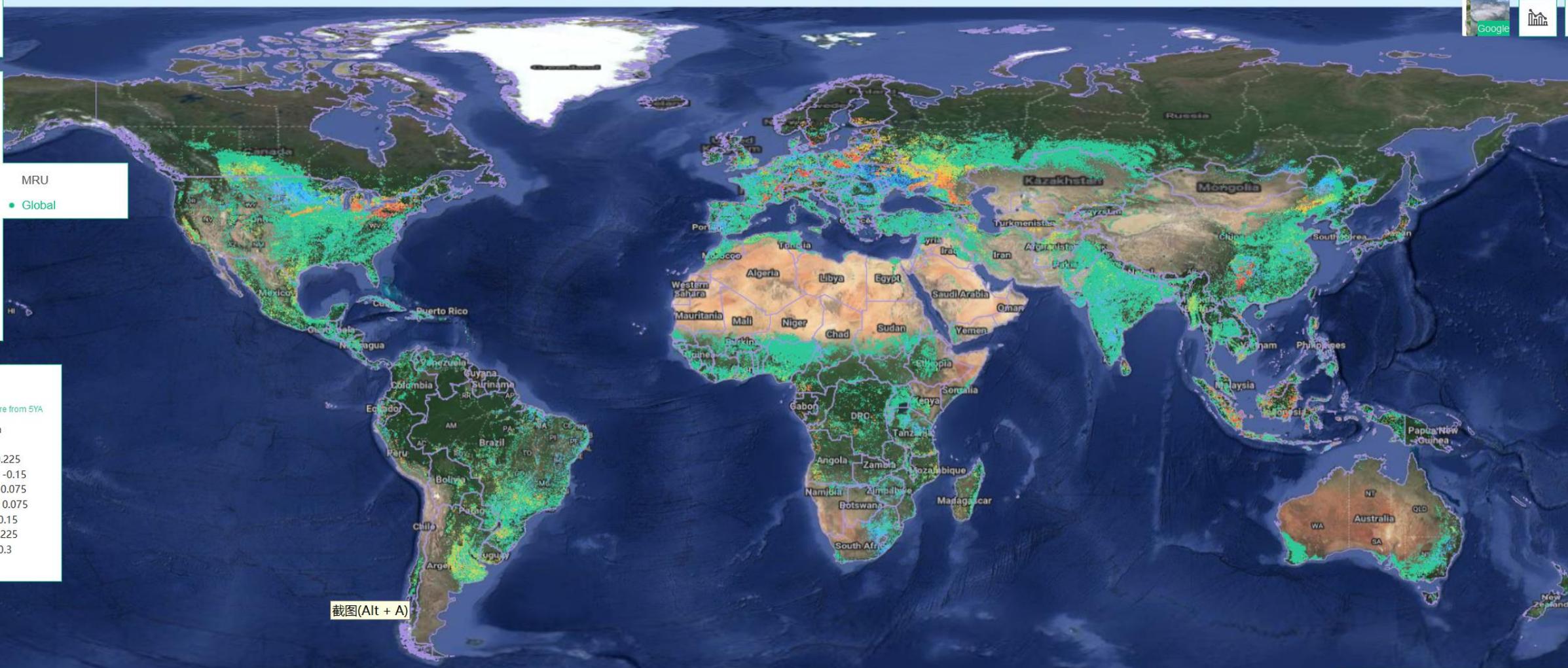


Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.

- 世界
- +
- 
- MRU
- Global
- Global
- +
- +
- +
- +



截图(Alt + A)

38.4361,-81.1579

Julian Day

01-01 01-17 02-02 02-18 03-05 03-21 04-06 04-22 05-08 05-24 06-09 06-25 07-11 07-27 08-12 08-28 09-13 09-29 10-15 10-31 11-16 12-02 12-18

2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

# CropWatch Explorer-Cluster



Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

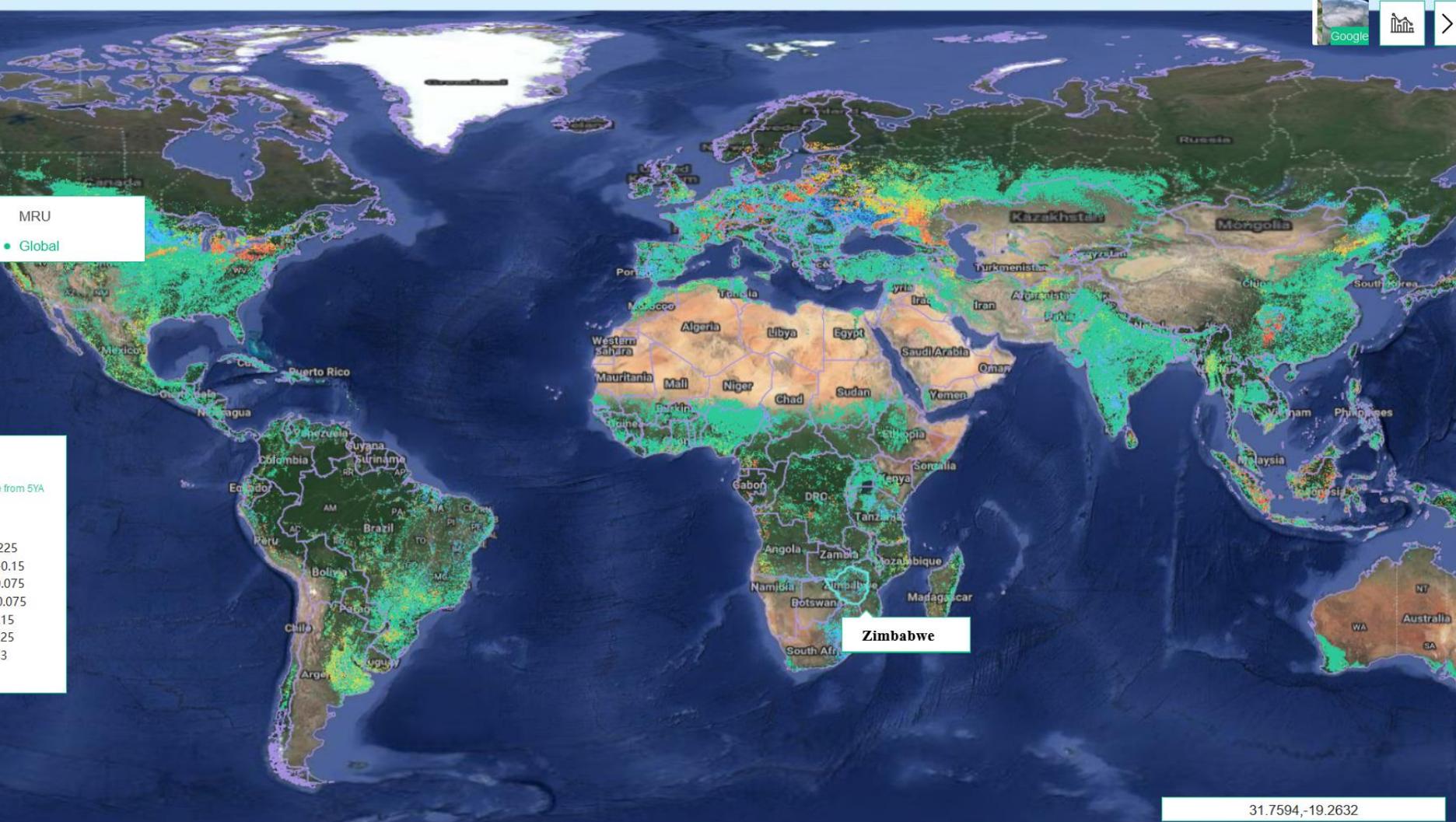
English

zengh.

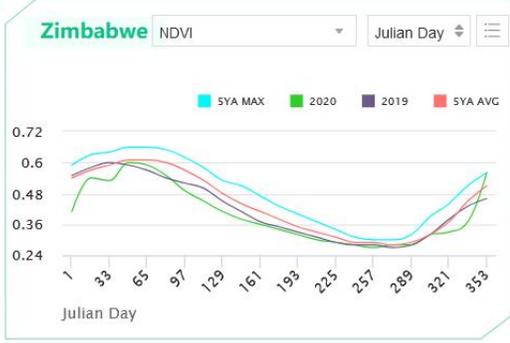
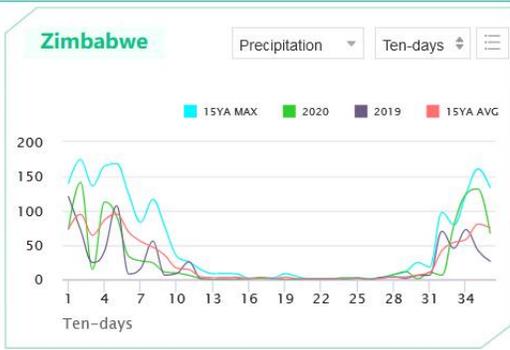
- 世界
- +
- 
- MRU
- Global
- Global
- Grid
- Download

NDVI Departure from 5YA

- No Data
- < -0.3
- 0.3 - -0.225
- 0.225 - -0.15
- 0.15 - -0.075
- 0.075 - 0.075
- 0.075 - 0.15
- 0.15 - 0.225
- 0.225 - 0.3
- > 0.3



Google



### Zimbabwe

Crop Production

**Raster + Profile**  
**Vector + Profile**

31.7594,-19.2632

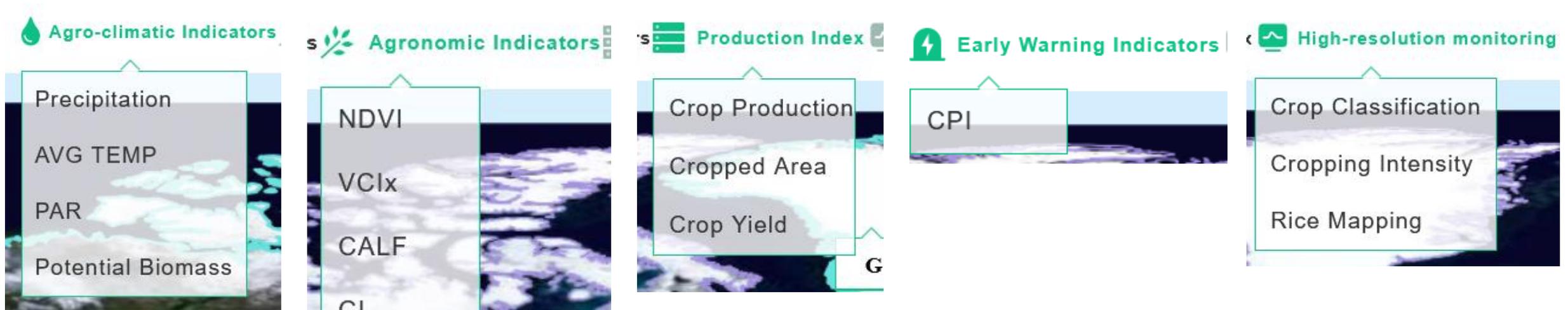
Julian Day

01-01 01-17 02-02 02-18 03-05 03-21 04-06 04-22 05-08 05-24 06-09 06-25 07-11 07-27 08-12 08-28 09-13 09-29 10-15 10-31 11-16 12-02 12-18

2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

# Summary of Indicators

- Agri-climatic Indicators: RAIN, TEMP, PAR, BIOMASS
- Agronomic Indicators: NDVI, VCIx, CALF, CI, LAI, FPAR
- Production Index: Crop production, cropped area, crop yield
- Early Warning Indicators: CPI
- High-resolution monitoring: crop classification, cropping intensity, rice mapping



# Agri-climatic indicators

**RAIN:** accumulated rain within reporting period, departure of the rain is percent departure of the value for the reporting period compared to the recent 15 years average.

- Departure > 10%, meaning wet condition
- Departure < 10%, meaning dry condition
- Departure is between -10% and 10%, meaning close to normal

$$Rain_{Dep} = \frac{Rain_{cur\_season} - Rain_{15years\_avg}}{Rain_{15years\_avg}} \times 100\%$$

**TEMP:** average temperature (°C) within reporting period, departure of temp is the difference between TEMP value over the reporting period compared with the average of the recent 15 years average.

- Departure > 0.5°C, meaning heat stress
- Departure < 0.5°C, meaning cold stress
- Departure is between -0.5°C and 0.5°C, meaning abnormal

$$TEMP_{Dep} = TEMP_{cur\_season} - TEMP_{15years\_avg}$$

**RADPAR :** accumulated PAR within reporting period (W/m<sup>2</sup>,) departure of PAR is the percent departure of the RADPAR value for the reporting period compared to the recent 15 years average. [ENERGY stress]

$$PAR_{Dep} = \frac{PAR_{cur\_season} - PAR_{15years\_avg}}{PAR_{15years\_avg}} \times 100\%$$

**Biomass:** accumulated Biomass (dry gram, g/m<sup>2</sup>), is shown as the percent departure of the Biomass value for the reporting period compared to the recent 15 years average.

$$BIO_{Dep} = \frac{BIO_{cur\_season} - BIO_{15years\_avg}}{BIO_{15years\_avg}} \times 100\%$$

# Agronomic indicators

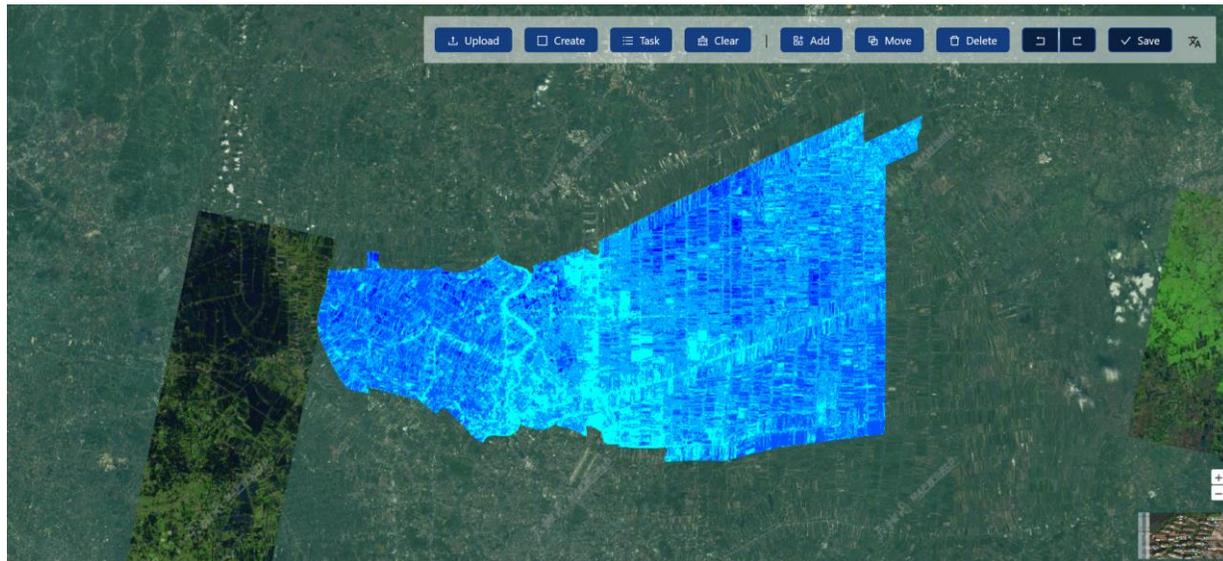
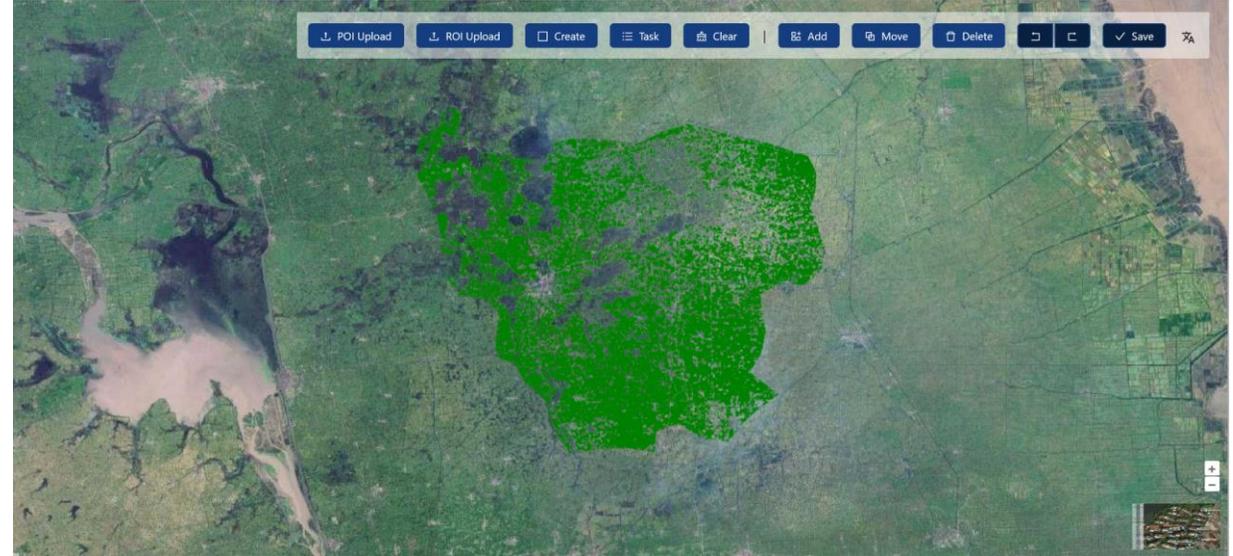
- **Normalized Difference Vegetation Index (NDVI):** An estimate of the density of living green biomass, it is widely used as indicator for crop condition.
- **Maximum Vegetation Condition Index (VCIx):** Vegetation condition of the current season compared with historical data. Values usually are [0, 1], where 0.5 is "NDVI as bad as the average" and 1 is "NDVI as good as the best recent year."
- **Cropped Arable Land Fraction (CALF):** The area of cropped arable land as fraction of total (cropped and uncropped) arable land. Whether a pixel is cropped or not is decided based on NDVI.
- **Cropping Intensity (CI):** CI describes the extent to which arable land is used over a year. It is the ratio of the total crop area of all planting seasons in a year to the total area of arable land.
- **Leaf area index (LAI) :** LAI is a dimensionless quantity that characterizes plant canopies. It is defined as the one-sided green leaf area per unit ground surface area ( $LAI = \text{leaf area} / \text{ground area}$ ,  $m^2 / m^2$ ) in broadleaf canopies.
- **The fraction of absorbed photosynthetically active radiation (FAPAR):** FAPAR is the fraction of the incoming solar radiation in the photosynthetically active radiation spectral region that is absorbed by a photosynthetic organism, typically describing the light absorption across an integrated plant canopy.

# Production Index & Early Warning indicator

- **Cropped area:** It is a surface of land on which a crop is grown
- **Crop yield:** Crop yield is a standard measurement of the amount of agricultural production harvested—yield of a crop—per unit of land area.
- **Crop production:** the result of cropped area multiply crop yield.
- **CPI:** The average crop production situation for the same period in the past five years was used as a benchmark to make an overall estimate of the current season's agricultural production situation. A value of 1.0 represents the basic normal crop production situation in the current period for the spatial unit, and the higher the value, the better the crop production situation in the current period. Conversely, the lower the value, the worse the crop production situation for the spatial unit in the current period.

# Indicators of High-resolution monitoring

- **Crop classification**
- **Cropping intensity**
- **Rice mapping**



# Outline

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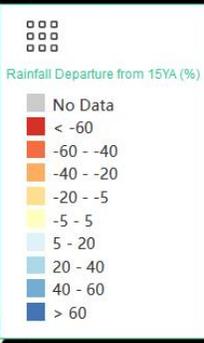
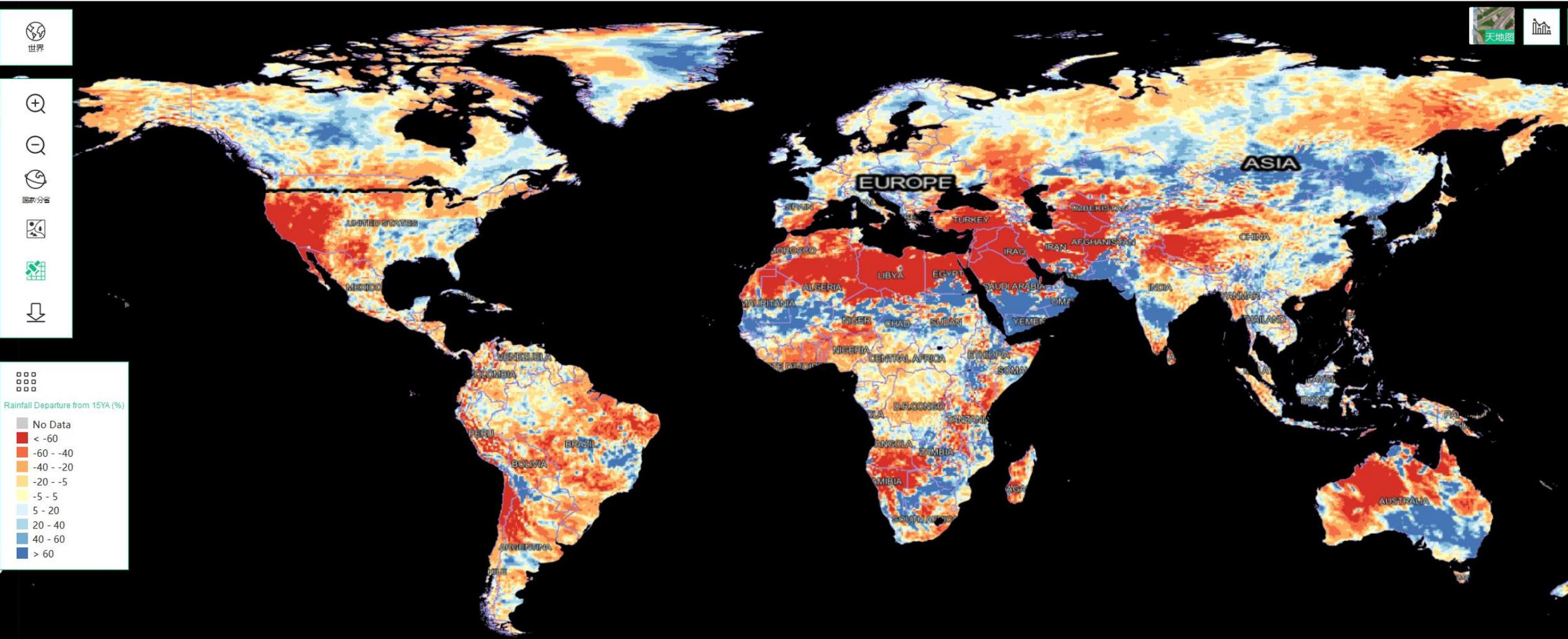
# Products - Precipitation

CropWatch

Agro-climatic Indicators // Agronomic Indicators // Production Index // Early Warning Indicators // High-resolution monitoring // High-Resolution Products // Crop Type // Production Zone // Mangment System

English

zengh.



-15.0591,-49.1545



# Products-TEMP



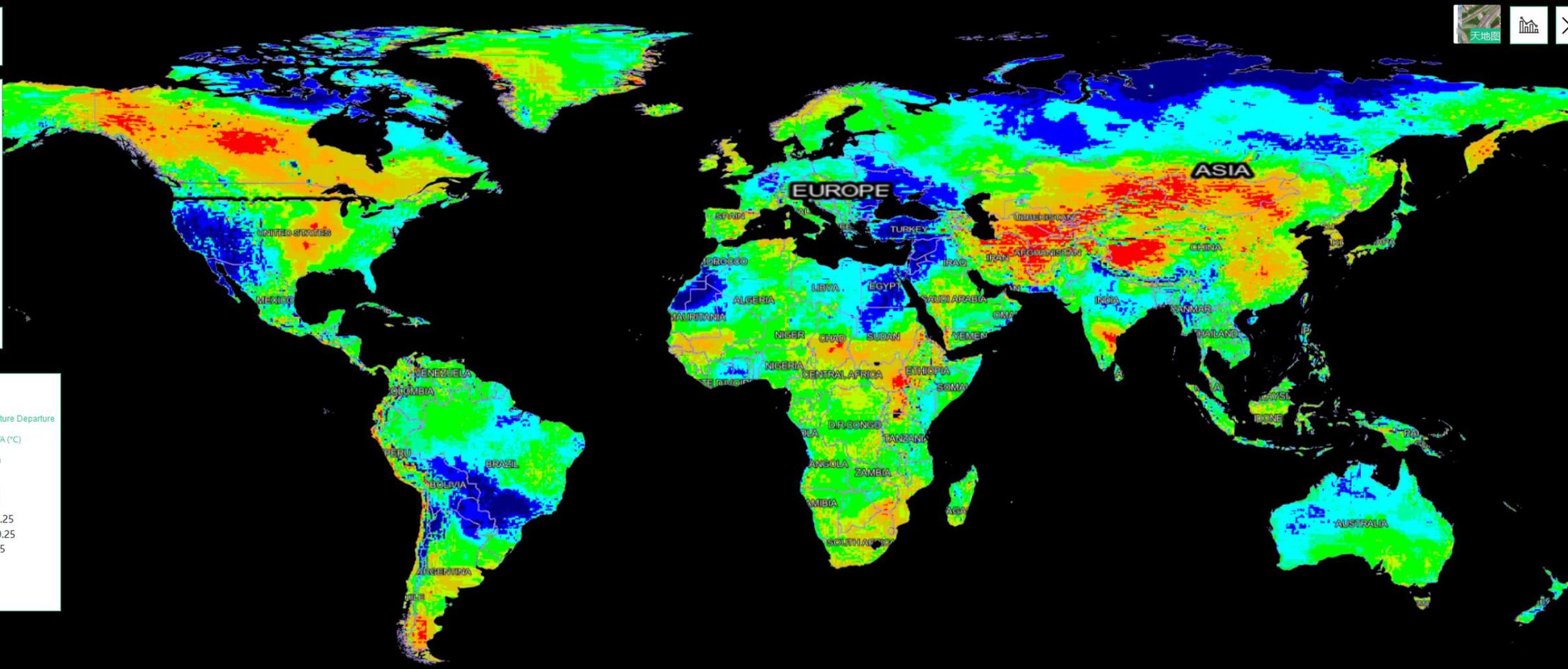
Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.

- World (世界)
- Zoom In (+)
- Zoom Out (-)
- Refresh
- Map Style
- Download

- 天地圖
- Bar chart icon
- Next arrow



Average Temperature Departure from 15YA (°C)

- No Data
- < -1.5
- 1.5 - -1
- 1 - -0.5
- 0.5 - -0.25
- 0.25 - 0.25
- 0.25 - 0.5
- 0.5 - 1
- 1 - 1.5
- > 1.5

-11.0075,-83.0526

Quarter

Timeline: 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023

# Products-PAR



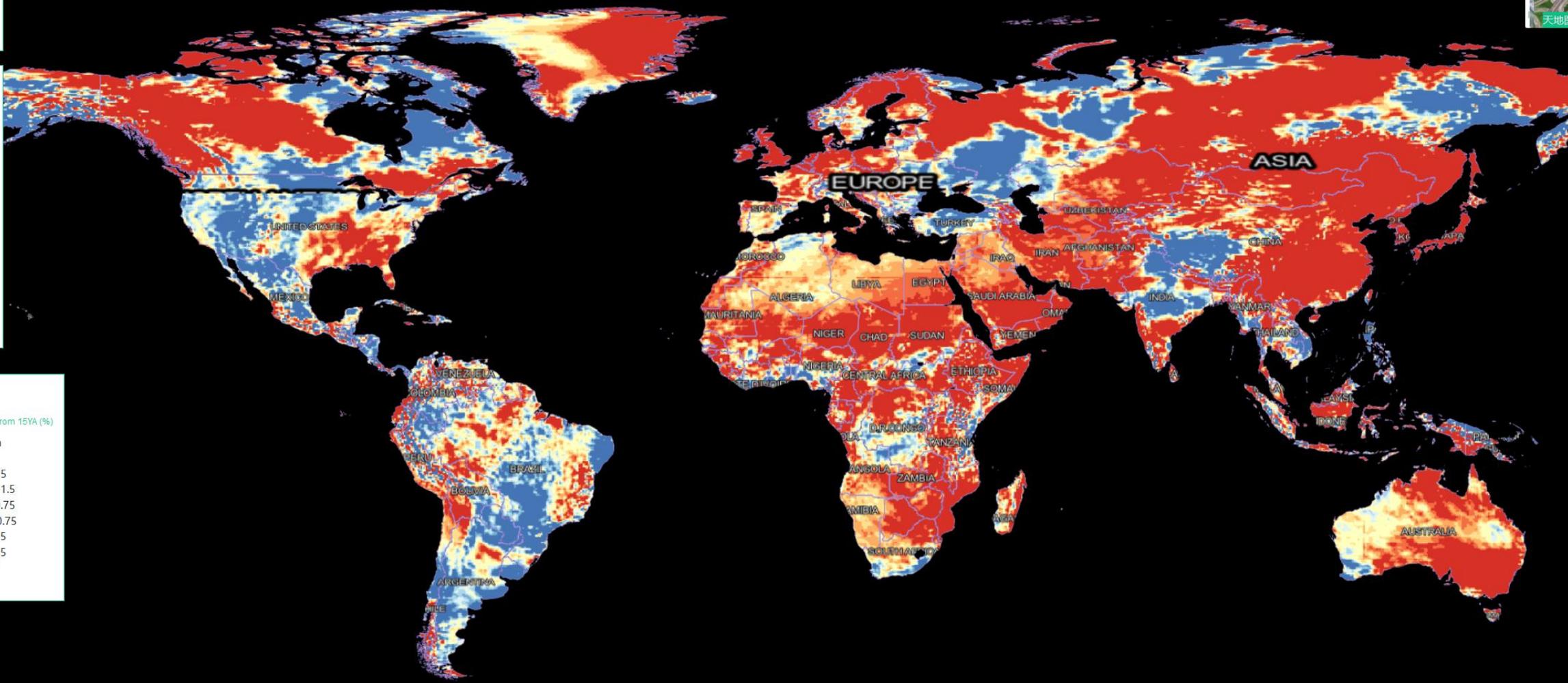
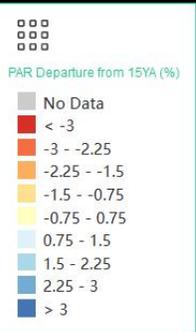
Agro-climatic Indicators / Agronomic Indicators / Production Index / Early Warning Indicators / High-resolution monitoring / High-Resolution Products / Crop Type / Production Zone / Mangment System

English

zengh.



国家分区



-135.3383,24.1353

Quarter



1

2

3

4

2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

# Products-Potential Biomass



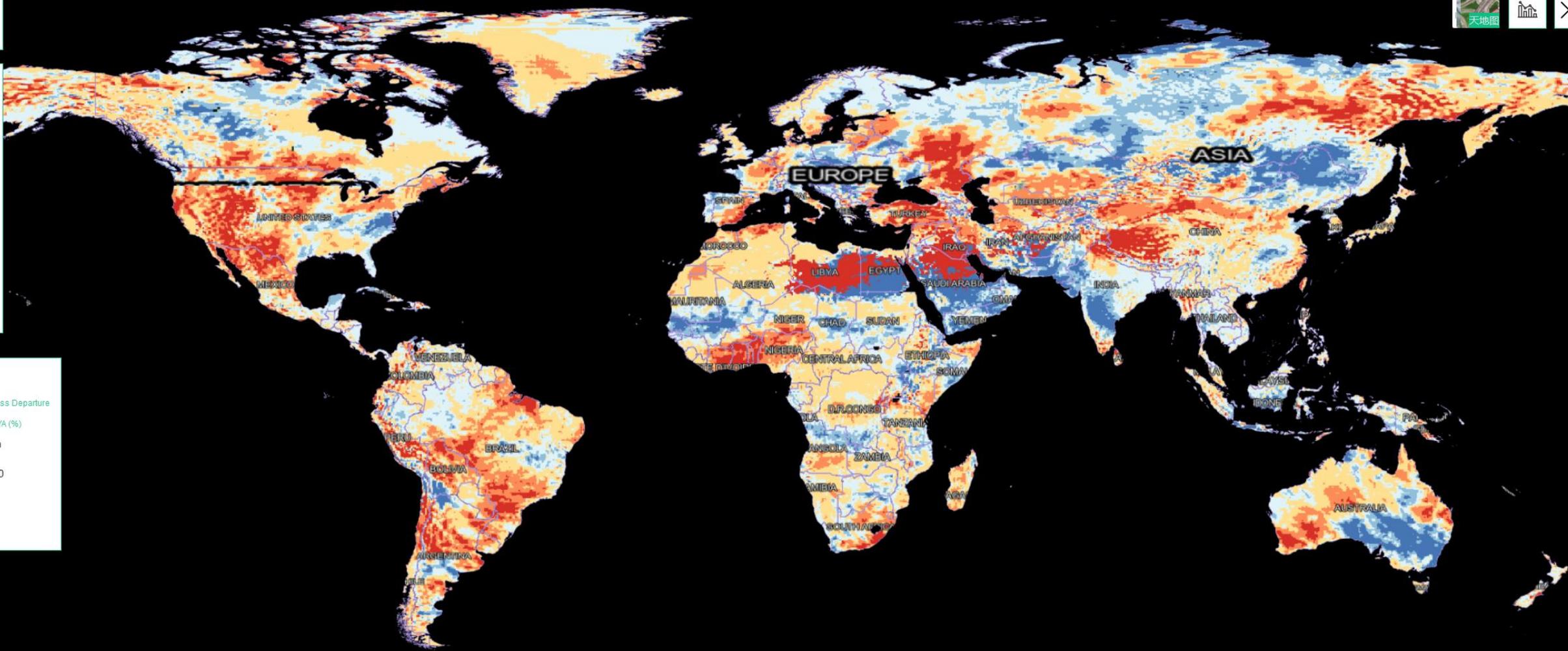
Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English



- World (世界)
- Zoom In (+)
- Zoom Out (-)
- Refresh
- Share
- Fullscreen
- Download

- 天地图
- Bar chart icon
- Next arrow



Potential Biomass Departure from 15YA (%)

- No Data
- < -20
- 20 - -10
- 10 - 0
- 0 - 10
- 10 - 20
- > 20

73.6241,-82.1504

Quarter

Timeline: 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023

Current selection: 4 (2020)

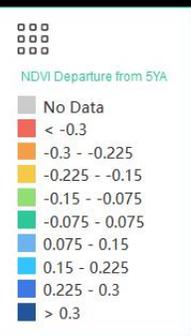
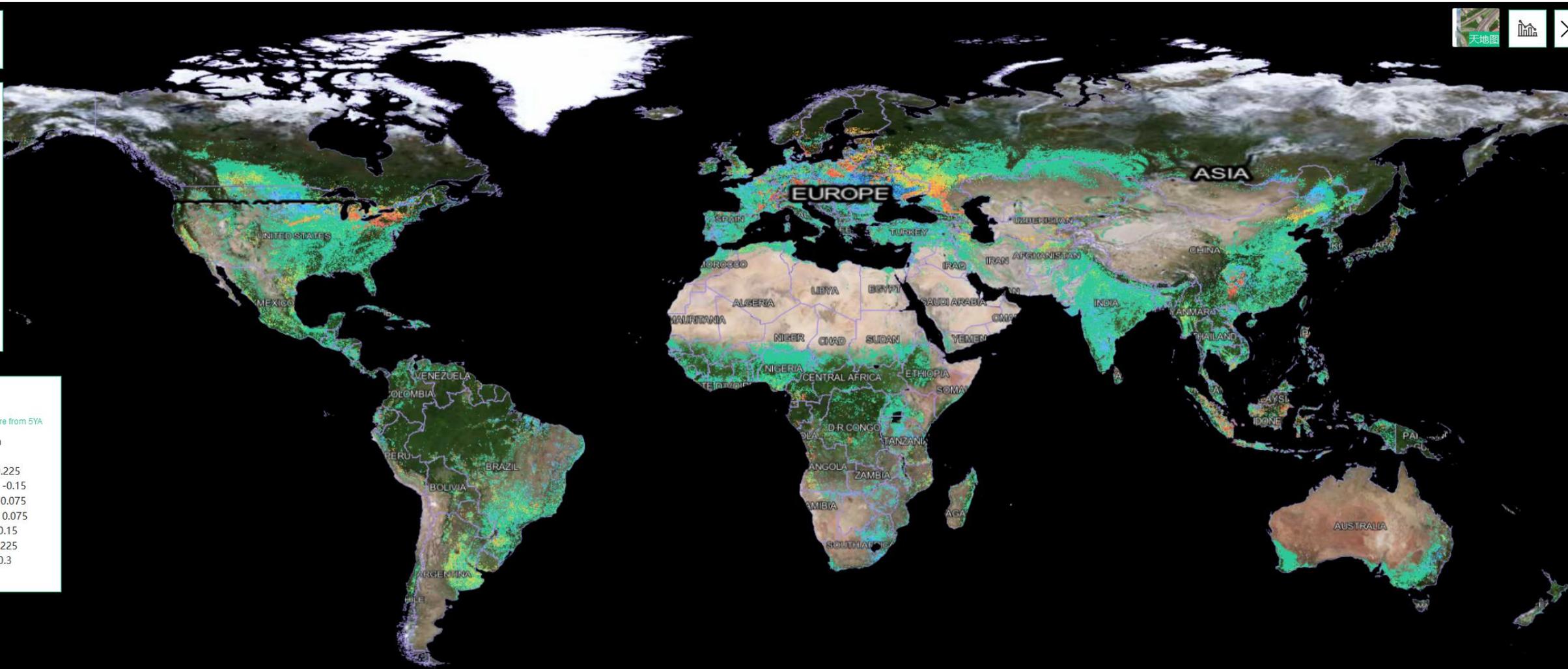
# Products-NDVI



Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.



72.1805,-81.4286



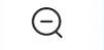
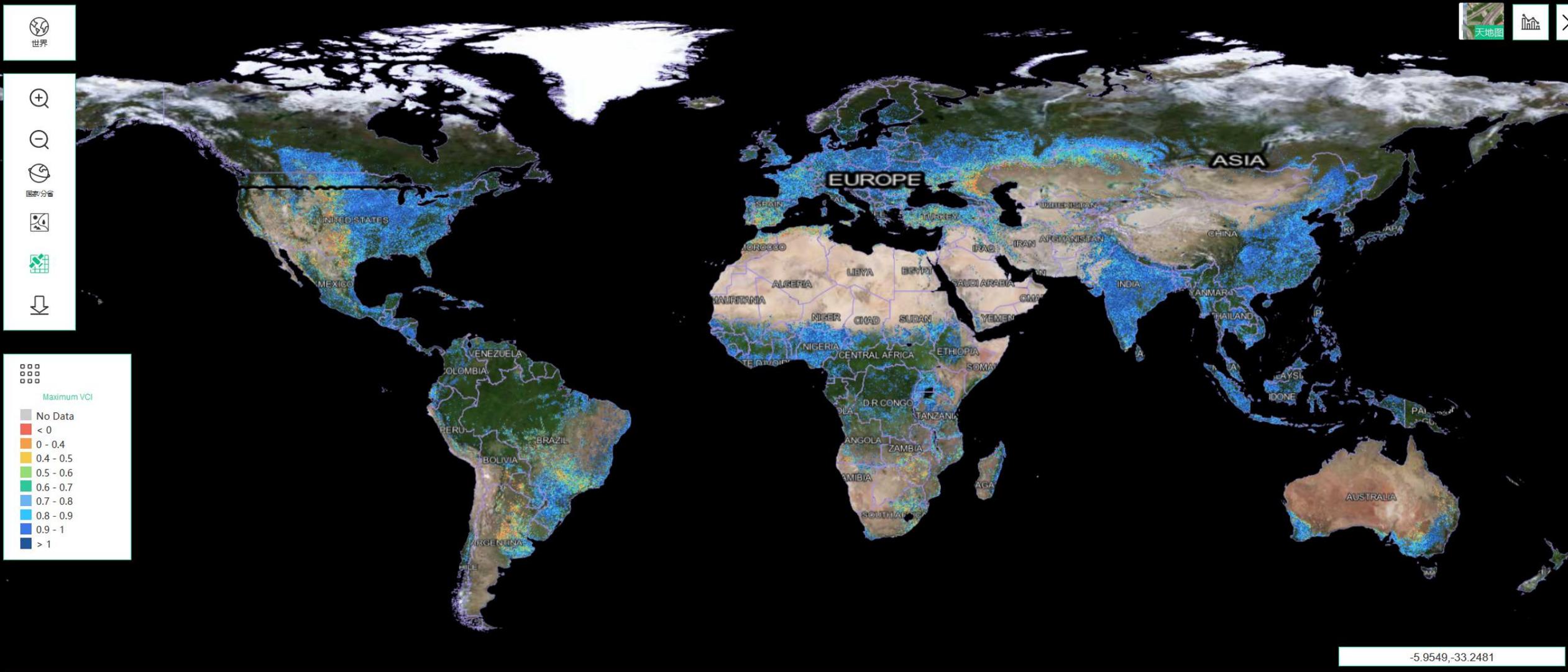
# Products-VCIX



Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.



Maximum VCI

- No Data
- < 0
- 0 - 0.4
- 0.4 - 0.5
- 0.5 - 0.6
- 0.6 - 0.7
- 0.7 - 0.8
- 0.8 - 0.9
- 0.9 - 1
- > 1

-5.9549,-33.2481



# Products-Cropped Arable Land Fraction(CALF)

CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.

世界

+

-

地球分省

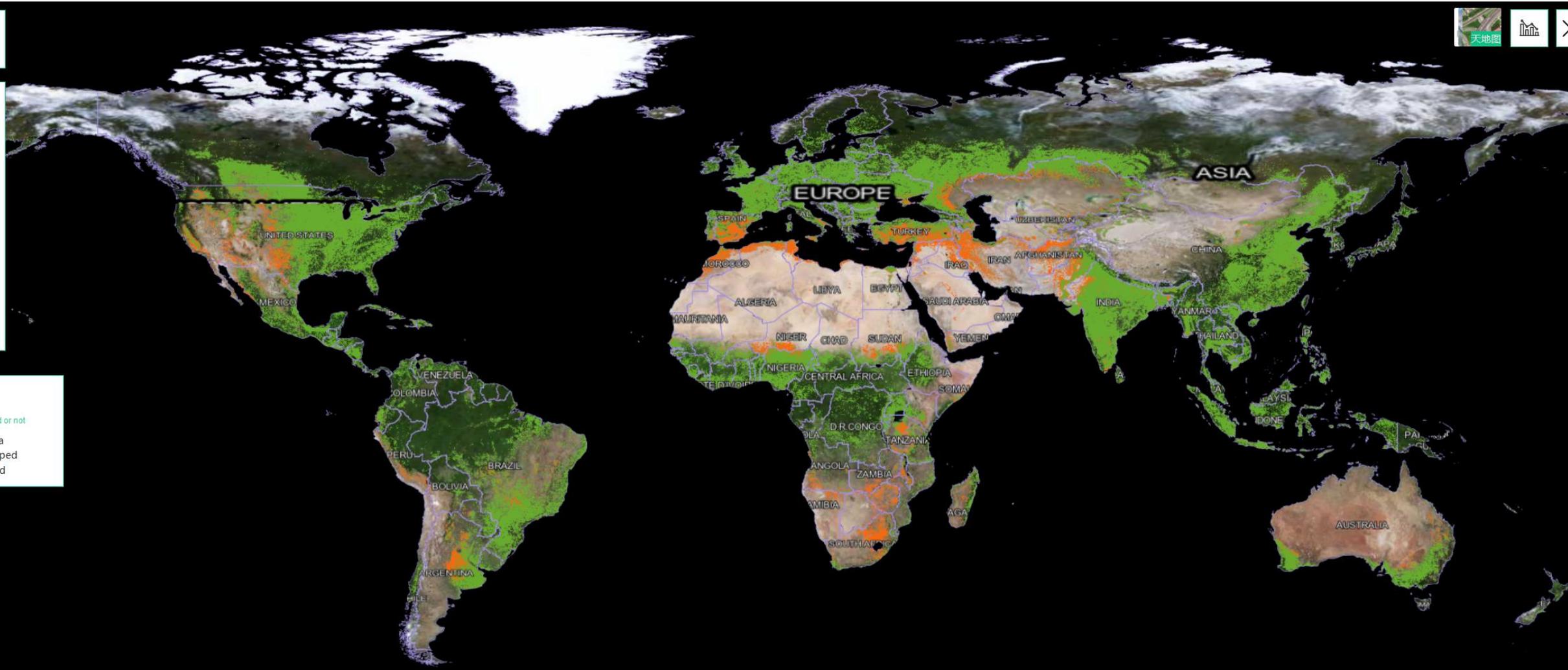
图例

图例

↓

Legend:  
Cropped or not  
No Data  
Uncropped  
Cropped

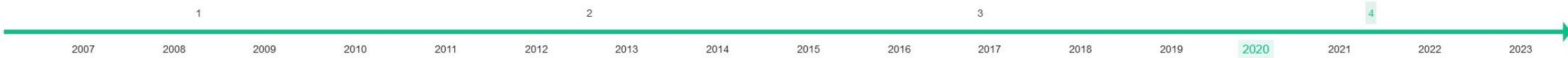
天地图



67.4887,-81.6090

Quarter

▶



# Products-Cropping Intensity



Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English

zenh..

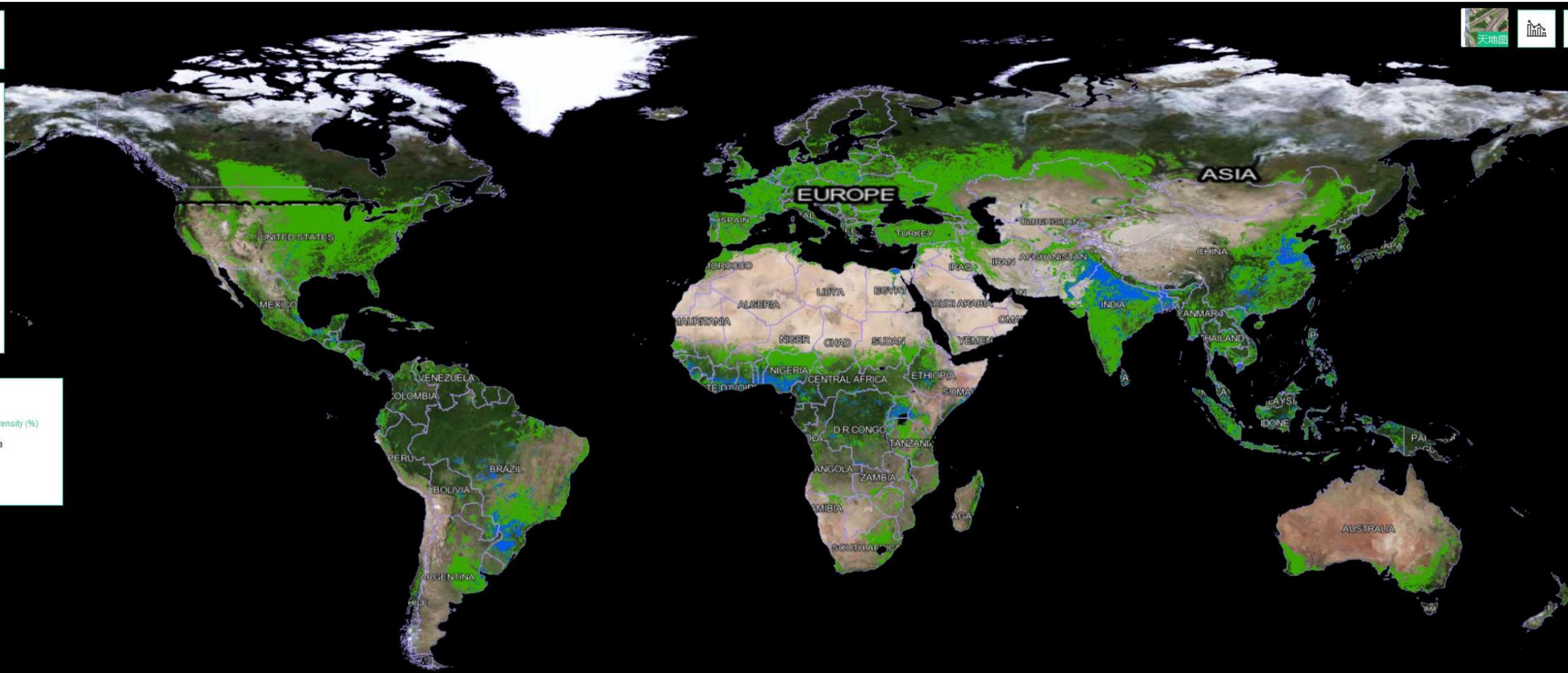


国家分省



Cropping Intensity (%)

- No Data
- ! - 100
- ! - 200
- ! - 300



52.6917,-82.1504

Year



2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023



# Products-Crop types in the Northeast China(2022)



Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

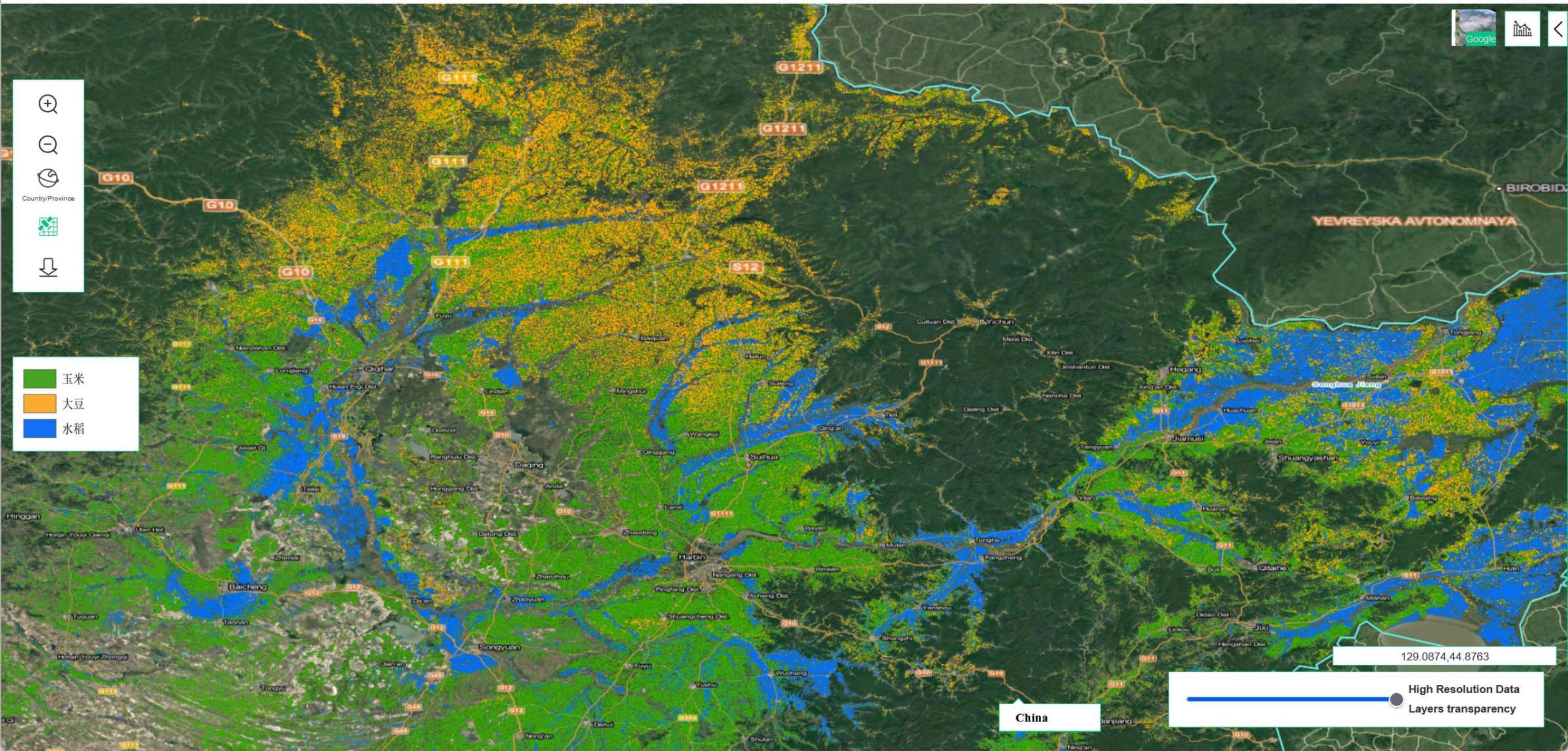
English

zenh.



- 
- 
- 
- Country/Province
- 
- 

- 玉米
- 大豆
- 水稻



China

129.0874,44.8763

High Resolution Data Layers transparency

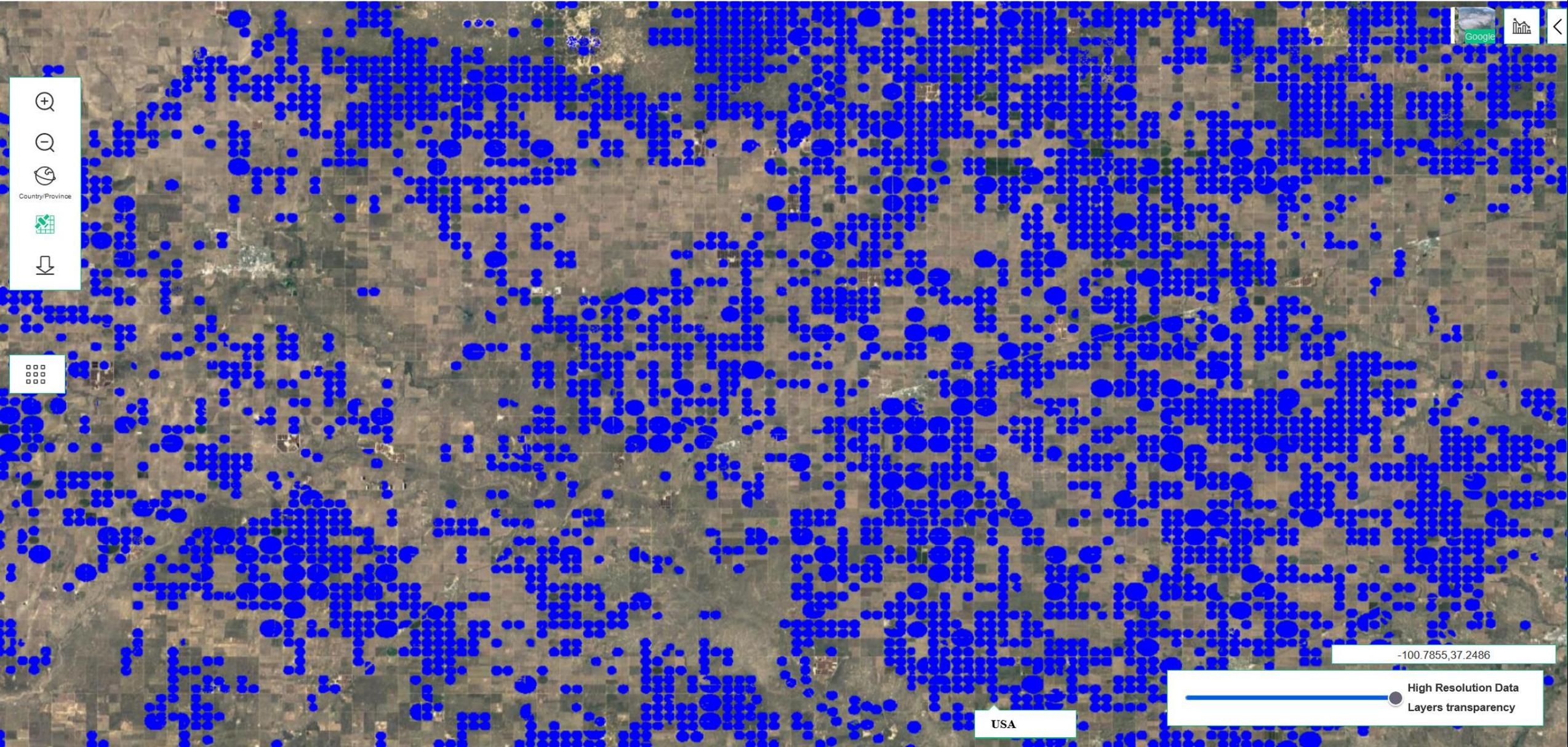
# Products-Center Pivot Irrigation System(CPIS)



Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English

zengh...



Map navigation controls including zoom in (+), zoom out (-), and a search icon.

Country/Province



-100.7855,37.2486

USA

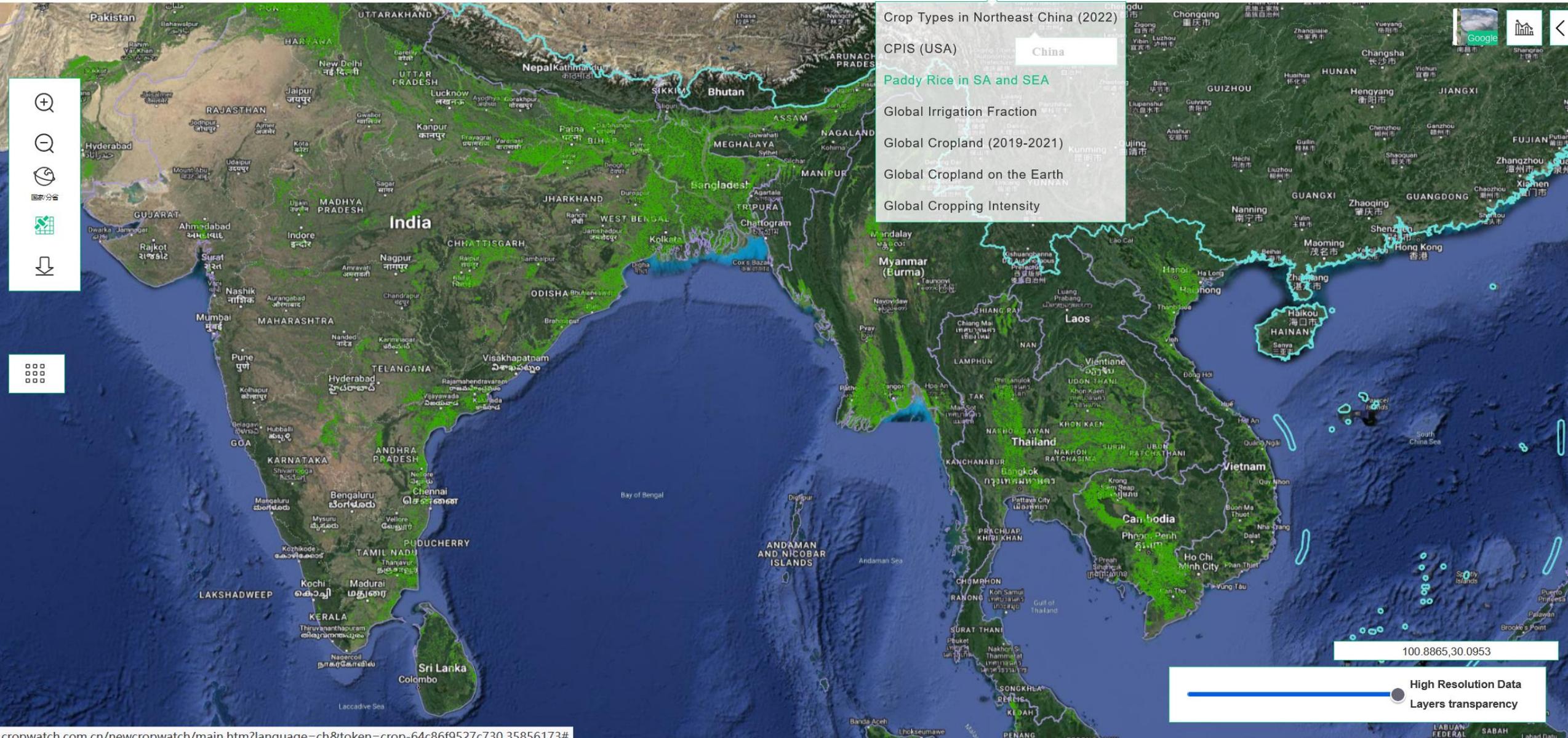
High Resolution Data Layers transparency

# Products-Southeast Asian Paddy Fields



Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

English zengh



- Crop Types in Northeast China (2022)
- CPIS (USA)
- China
- Paddy Rice in SA and SEA
- Global Irrigation Fraction
- Global Cropland (2019-2021)
- Global Cropland on the Earth
- Global Cropping Intensity

- Map navigation icons: zoom in, zoom out, pan, home, layers, download, grid.

100.8865,30.0953

High Resolution Data Layers transparency

# Products-Global Irrigation Fraction



Agro-climatic Indicators // Agronomic Indicators // Production Index // High-resolution monitoring // Early Warning Indicators // High-Resolution Products // Crop Type // Production Zone // Mangment System

English | zengh..

- Crop Types in Northeast China (2022)
- CPIS (USA)
- Paddy Rice in SA and SEA
- Global Irrigation Fraction
- Global Cropland (2019-2021)
- Global Cropland on the Earth
- Global Cropping Intensity



Legend for Irrigation Fraction

- No Data
- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1

45.0549,88.8459

High Resolution Data  
Layers transparency

# Products-Global Cropland (2019-2021)



Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.



- Crop Types in Northeast China (2022)
- CPIS (USA)
- Paddy Rice in SA and SEA
- Global Irrigation Fraction
- Global Cropland (2019-2021)
- Global Cropland on the Earth
- Global Cropping Intensity



56.5955,71.0912

High Resolution Data  
Layers transparency

# CropWatch-Cropland on the Earth

Global 30-m spatial distribution of cropland in 2020

Select

- Global 30-m spatial distribution...

Base Layer

- Tianditu Global Boundary
- Tianditu Imagery Label



Navigation controls:

- North arrow (N)
- Home button (house icon)
- Zoom in (+)
- Zoom out (-)
- Reset button (c)

500 km Longitude: 112.20 Latitude: -26.96

# CropWatch-Cropping Intensity on the Earth

2020 global 30-m cropping intensity (GCI30\_2020)

Select

2020 global 30-m cropping inten...

**Base Layer**

Tianditu Global Boundary

Tianditu Imagery Label



Navigation controls: Home, North arrow, Full screen, Zoom in (+), Zoom out (-), and a layer selection icon.

Abandoned	撂荒
Single Season	单季
Double Season	双季
Three Seasons	三季

Legend

500 km



# Grid Products-Production of Maize

CropWatch

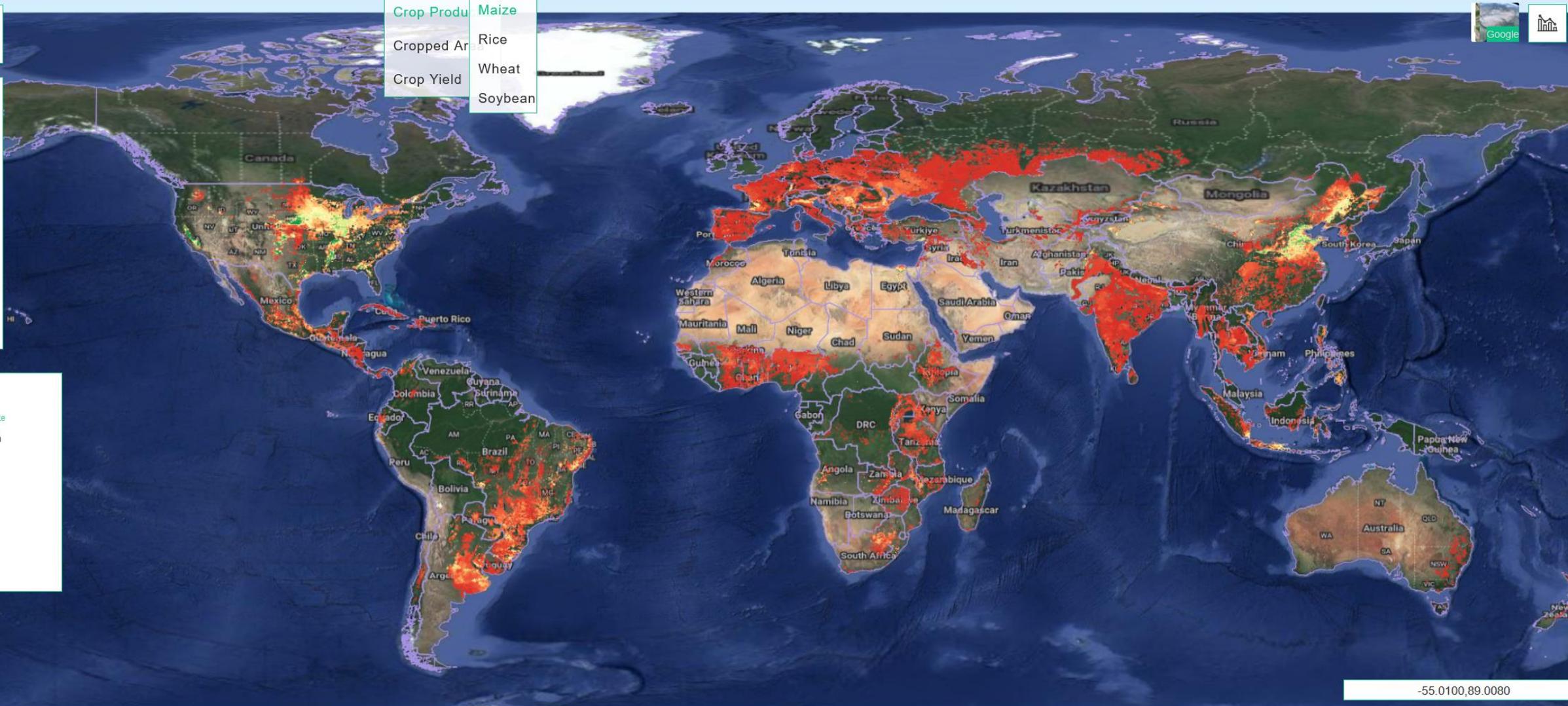
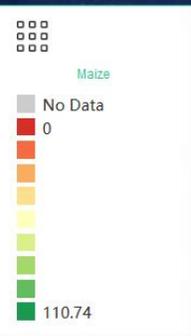
Agro-climatic Indicators // Agronomic Indicators // Production Index // High-resolution monitoring // Early Warning Indicators // High-Resolution Products // Crop Type // Production Zone // Mangment System

English

zengh.



- Crop Production
- Maize
- Cropped Area
- Rice
- Crop Yield
- Wheat
- Soybean



-55.0100,89.0080

Year



# Grid Products-Production of Rice

CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

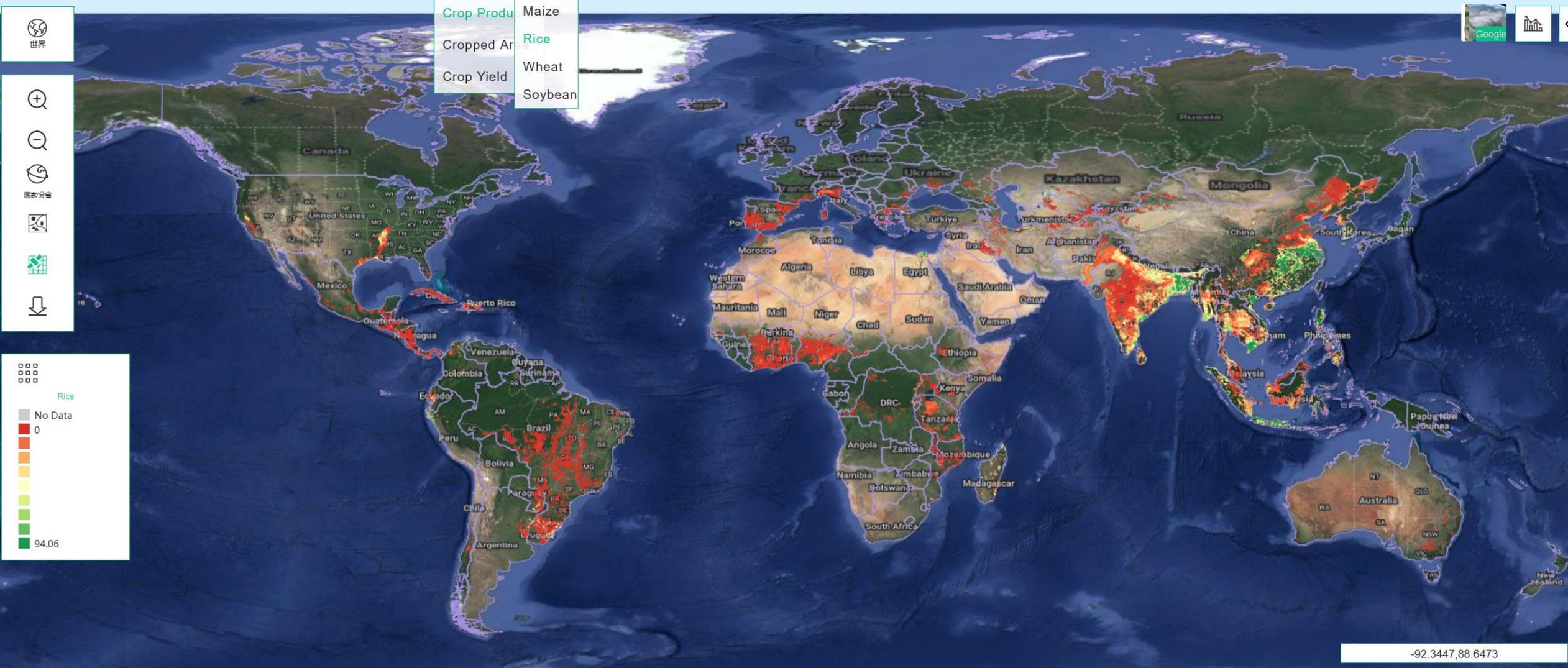
English

zengh.



- Crop Production: Maize
- Cropped Area: Rice
- Crop Yield: Wheat
- Soybean

- World (世界)
- Zoom In (+)
- Zoom Out (-)
- Refresh
- Share
- Download



-92.3447,88.6473

Year



# Grid Products-Production of Wheat

CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

English

zengh.



世界



国家/分区



- Crop Production: Maize
- Cropped Area: Rice
- Crop Yield: **Wheat**
- Soybean



-59.1583,88.4669

Year



2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

# Grid Products-Production of Soybean

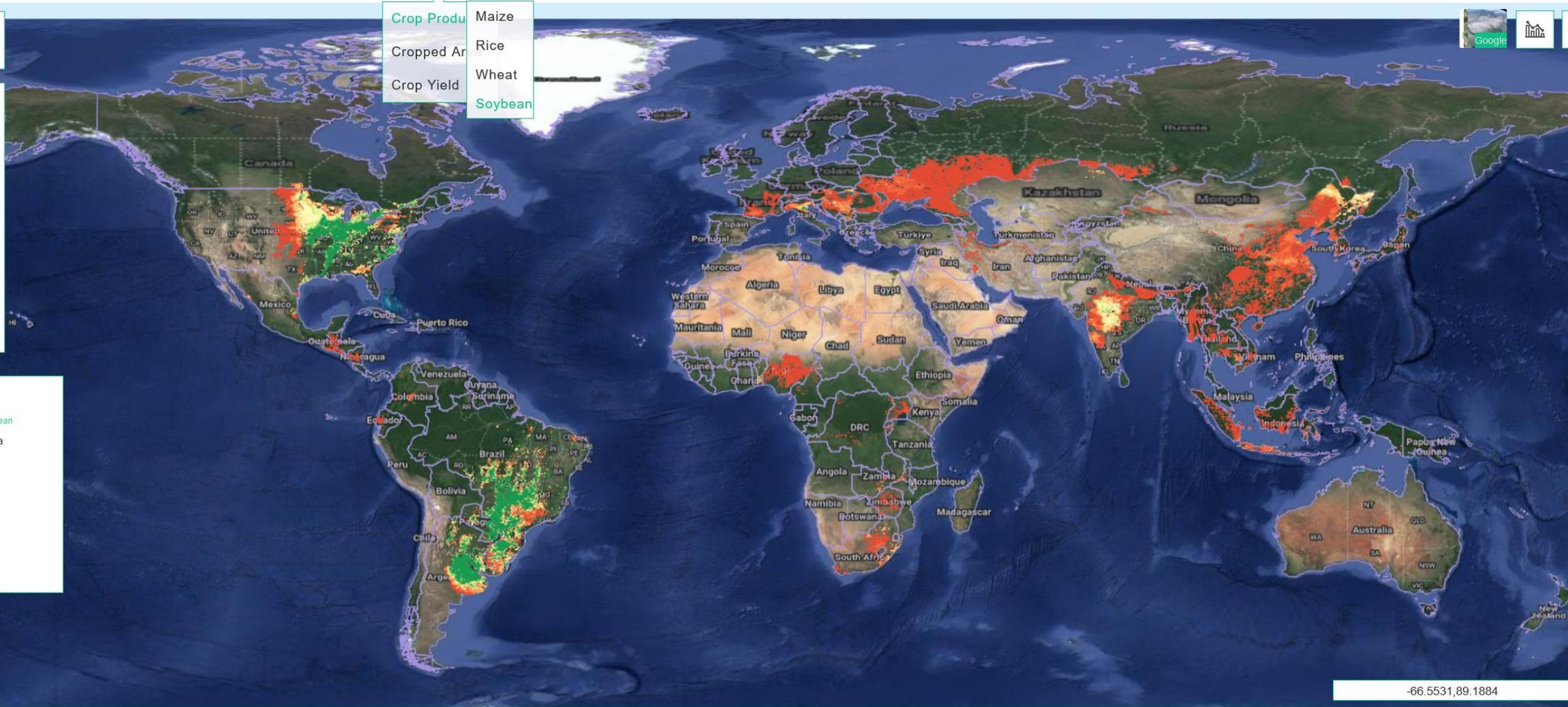
CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index High-resolution monitoring Early Warning Indicators High-Resolution Products Crop Type Production Zone Mangment System

English zengh.

- 世界
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- 🌐
- 📊
- 📍

- Crop Production
- Cropped Area
- Crop Yield
- Maize
- Rice
- Wheat
- Soybean



-66.5531,89.1884



---

# Information at MPZ level

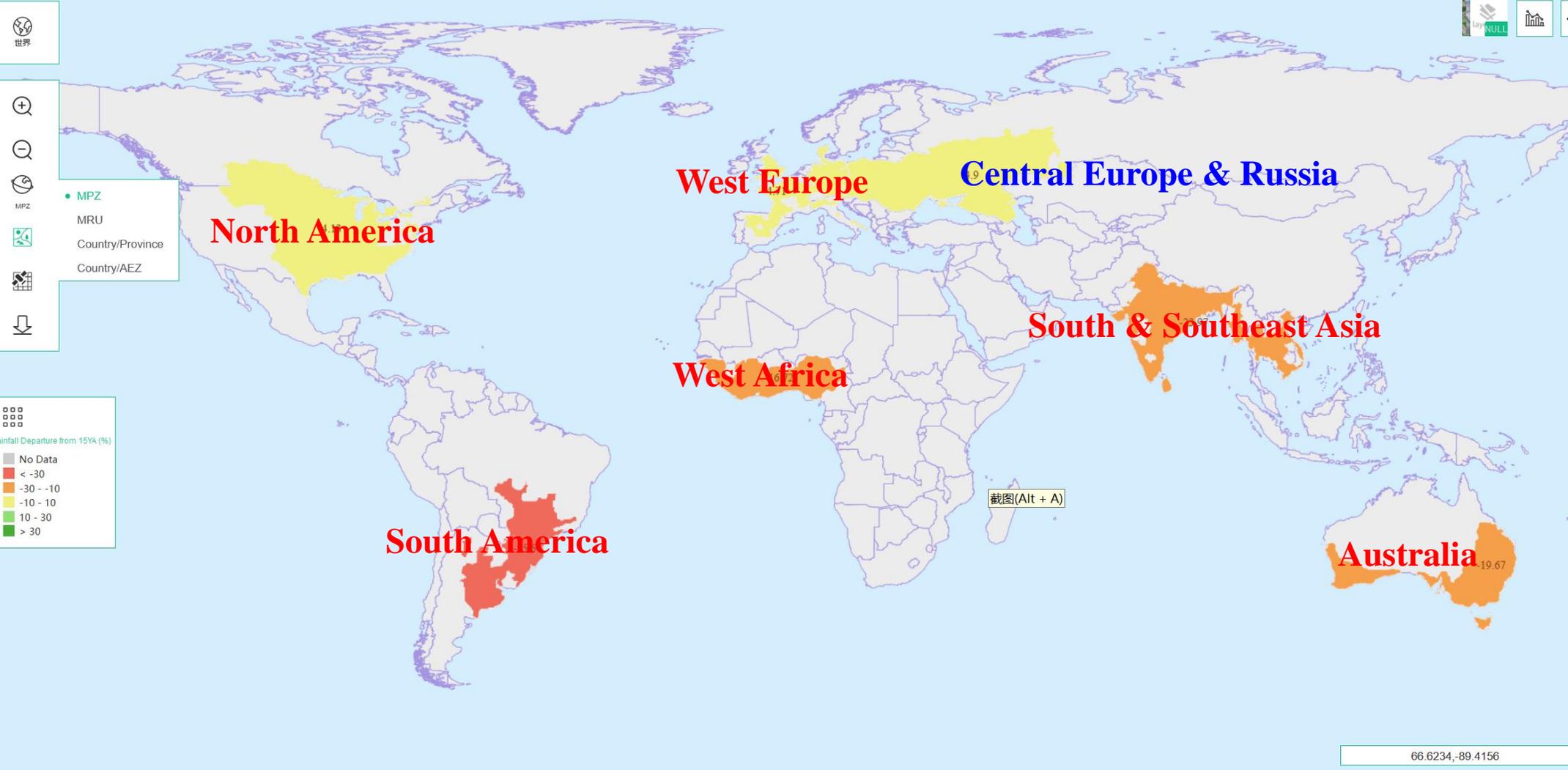


# 7 MPZ: Agro-climatic information

CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English zengh.



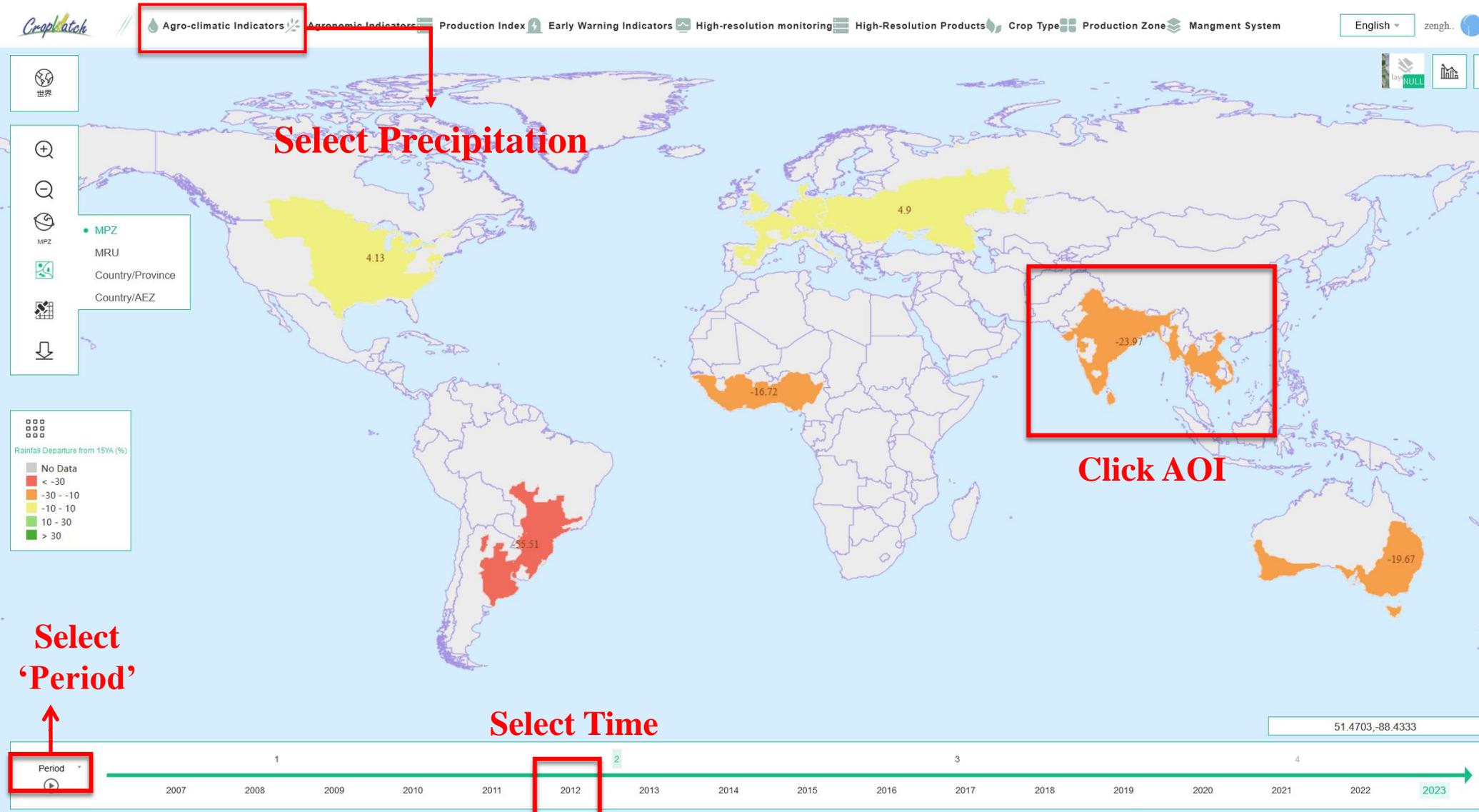
## Agro-climatic

- Rainfall
- Avg. Temp
- PAR
- Potential Biomass

## Agronomic

- NDVI
- VCIx
- CALF
- CI
- LAI
- FPAR

# Rainfall-period



**CropWatch divides each year into 4 periods, including 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> period.**

**1<sup>st</sup> : Oct. – Jan.**

**2<sup>nd</sup>: Jan. – April**

**3<sup>rd</sup>: April – Jul.**

**4<sup>th</sup>: Jul. – Oct.**

**Meaning of result: rainfall departure from 15 YA(%)**

**Departure: Current Value/Ave. Value of last 15 years×100%**

# Rainfall-period

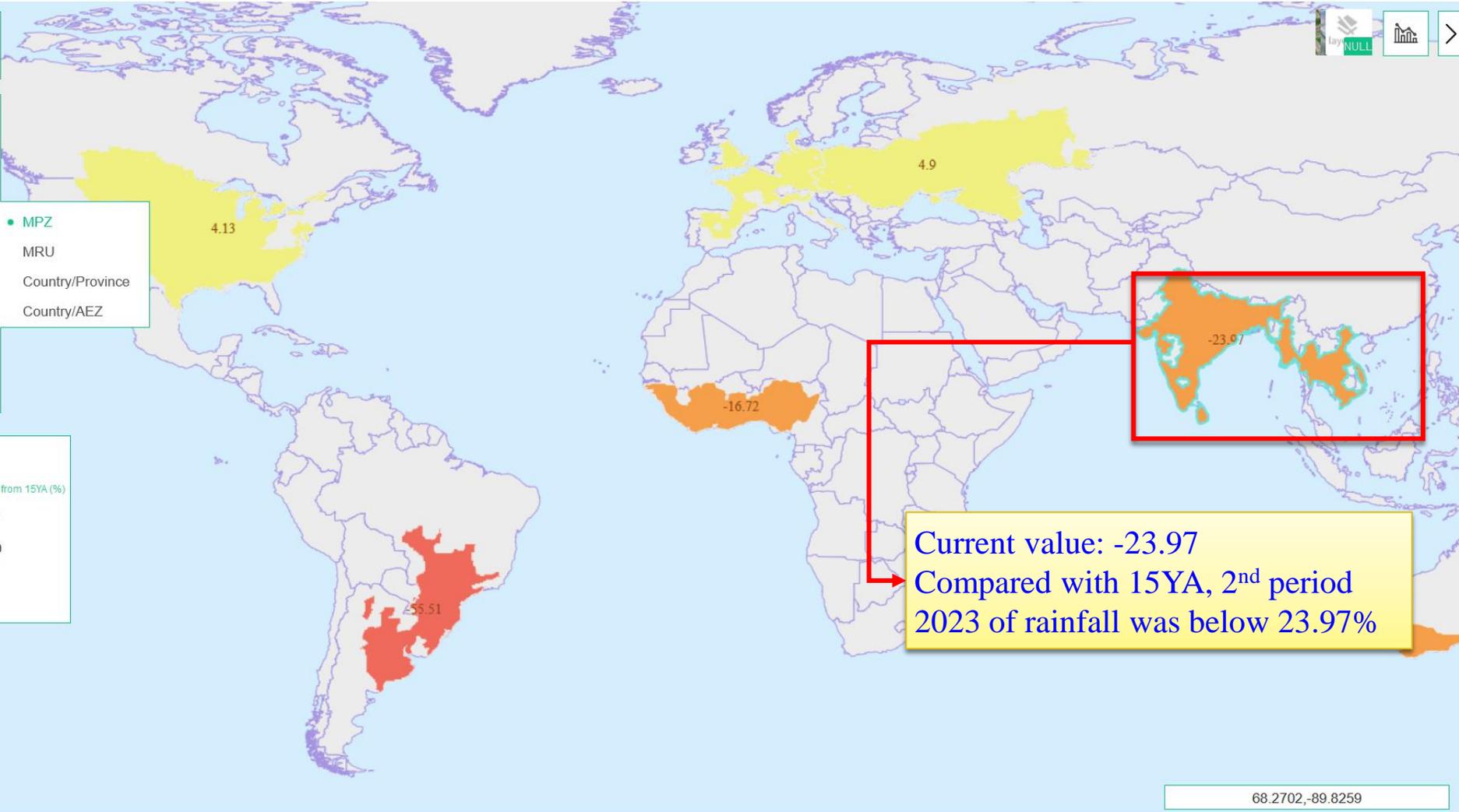
click

English

zengh.

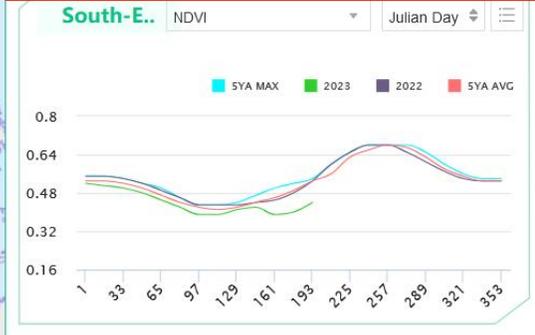
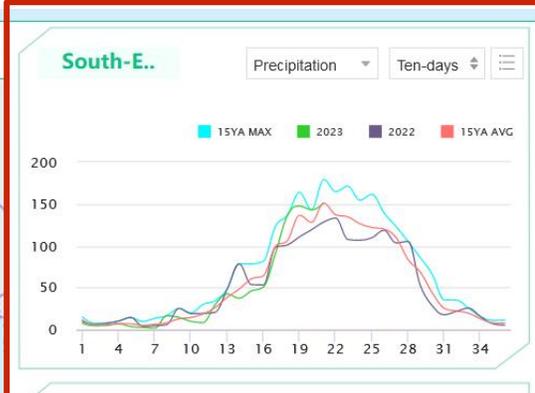
Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

- 世界
- +
- 
- MPZ
- MPZ
- MRU
- Country/Province
- Country/AEZ
- ↓

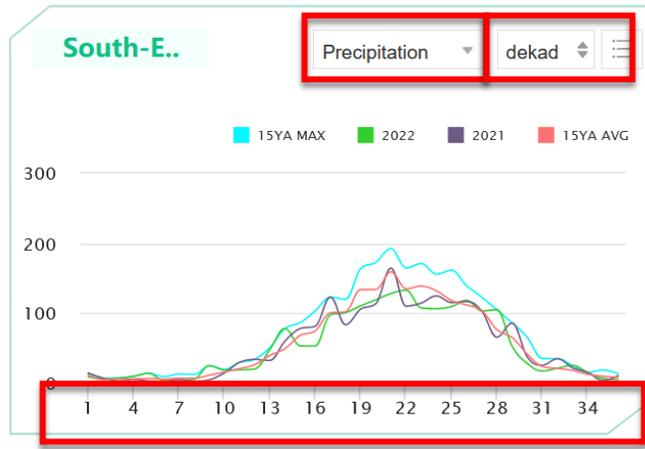


Current value: -23.97  
Compared with 15YA, 2<sup>nd</sup> period  
2023 of rainfall was below 23.97%

68.2702,-89.8259

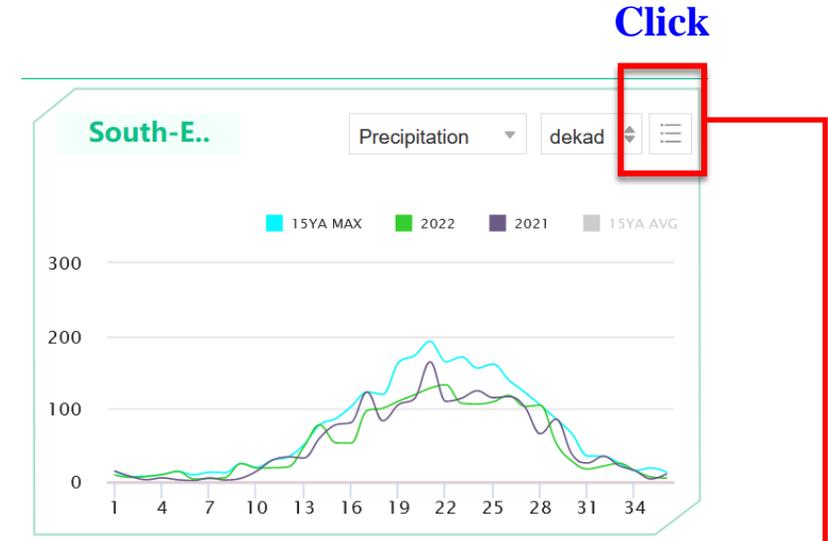


# Rainfall-period



This box shows precipitation information in current year, last year, maximum and average value of last 5 years

Users can close or open the value series of special group through clicking any icon



Close 5 YA average

正在打开 south-east-asia.csv

您选择了打开:

south-east-asia.csv

文件类型: Microsoft Excel 逗号分隔值文件 (120 字节)

来源: data:

您想要 Firefox 如何处理此文件?

打开, 通过(O) Microsoft Excel (默认)

Category	5YA MAX	2020	2019
1	326.87	315.98	252.63
2	187.88	132.72	118.68
3	1091.34		788.95
4	1561.78		1561.78

确定 取消

User can print the chart or download and save the time series to your computer as pictures(PNG, JPEG, PDF, SVG) or table(XLS, CSV) format

# Rainfall-period

CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

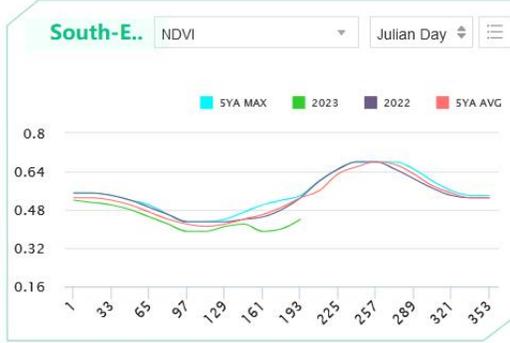
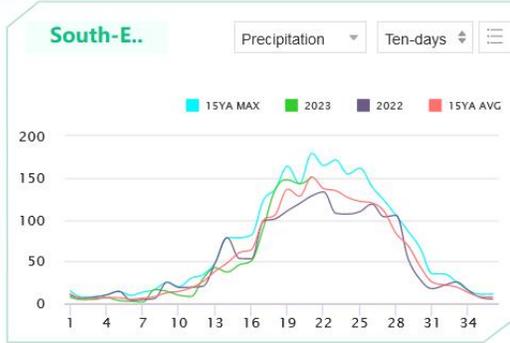
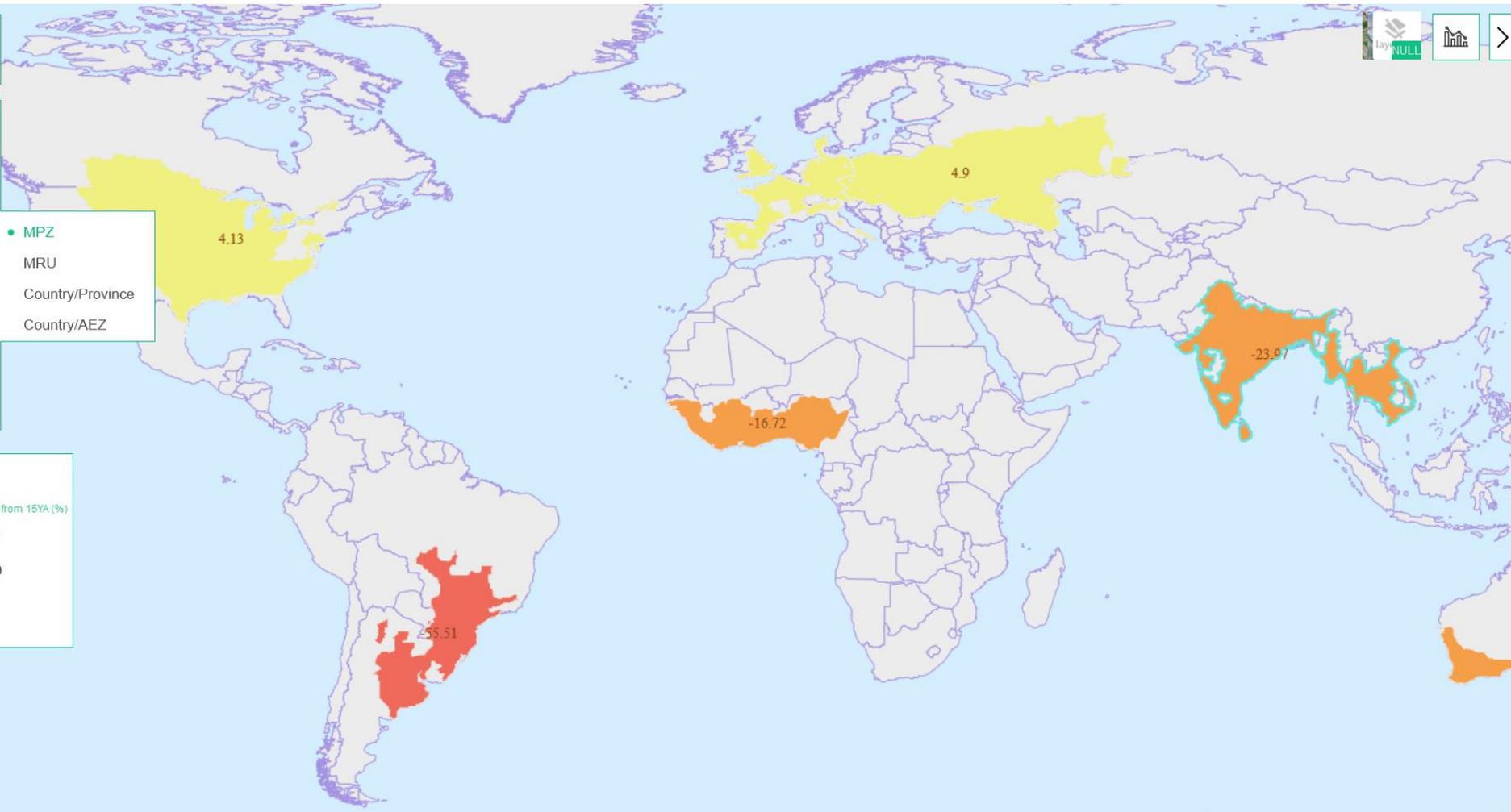
English

zengh.



Rainfall Departure from 15YA (%)

- No Data
- < -30
- 30 - -10
- 10 - 10
- 10 - 30
- > 30



Play mode

This mode will show precinitation departure of the map each by each

68.2702,-89.8259



# Rainfall-10 days

World (世界)

MPZ

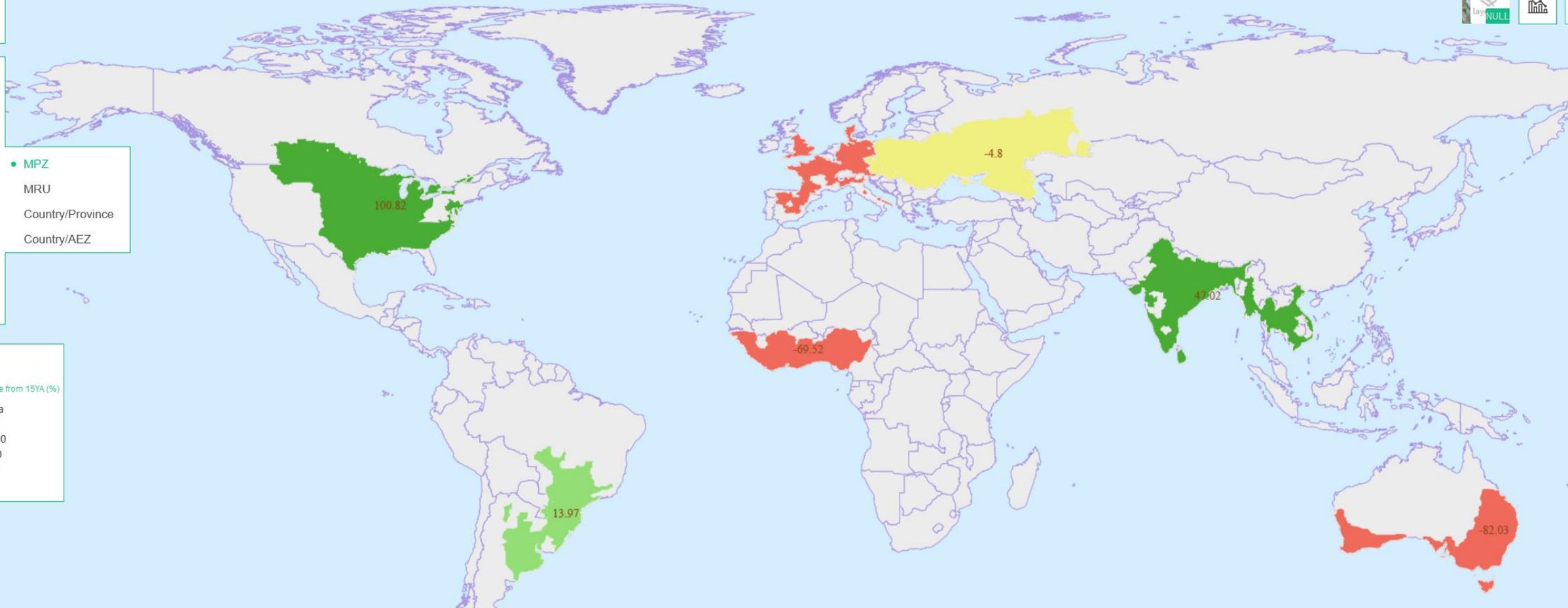
MRU

Country/Province

Country/AEZ

Rainfall Departure from 15YA (%)

- No Data
- < -30
- 30 - -10
- 10 - 10
- 10 - 30
- > 30



Shift from period to dekad(10 days)

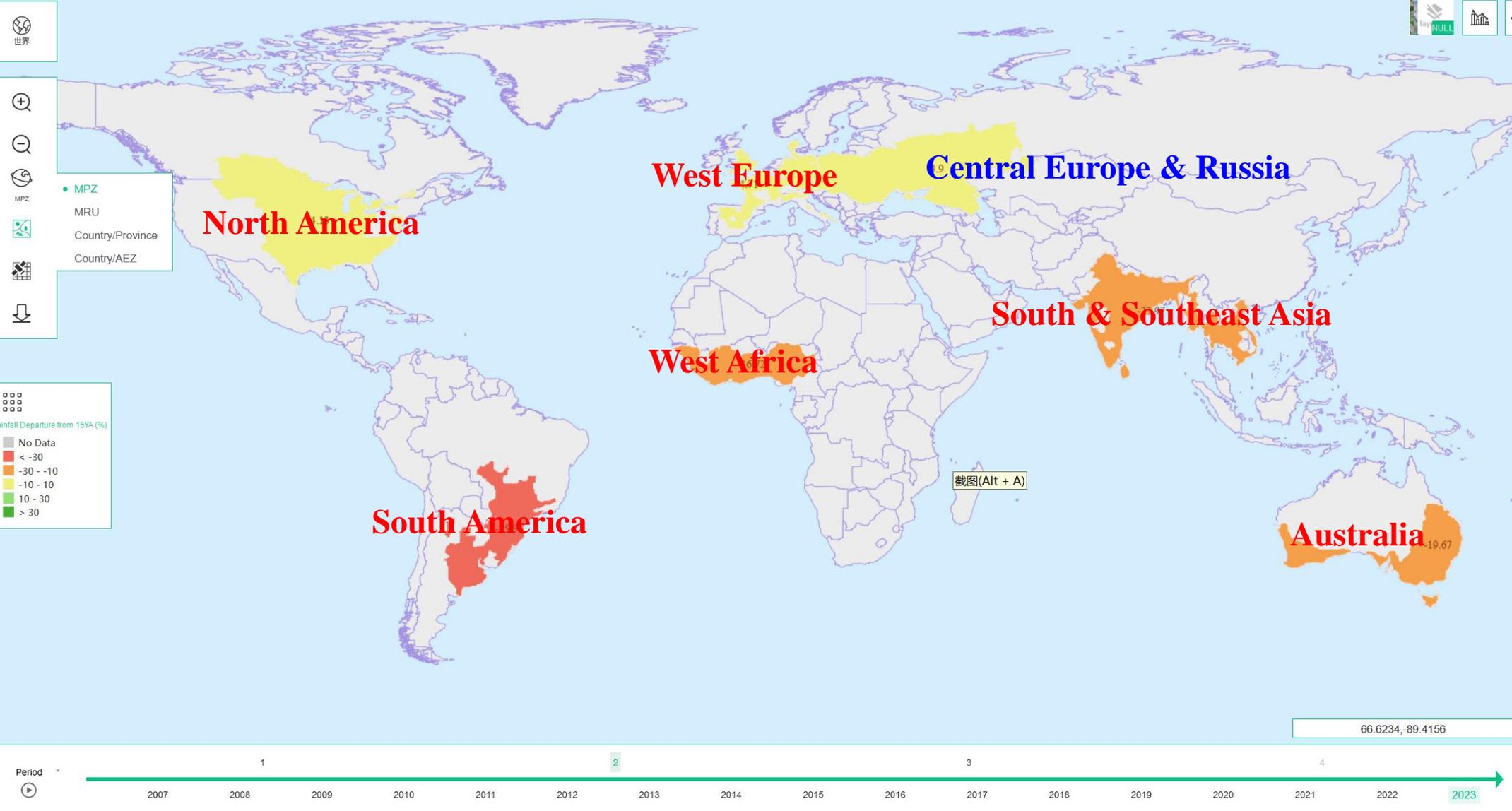


# 7 MPZ: Agronomic information

CropWatch

Agro-climatic Indicators Agronomic Indicators Production Index Early Warning Indicators High-resolution monitoring High-Resolution Products Crop Type Production Zone Mangment System

English zengh.



## Agro-climatic

- Rainfall
- Avg. Temp
- PAR
- Potential Biomass

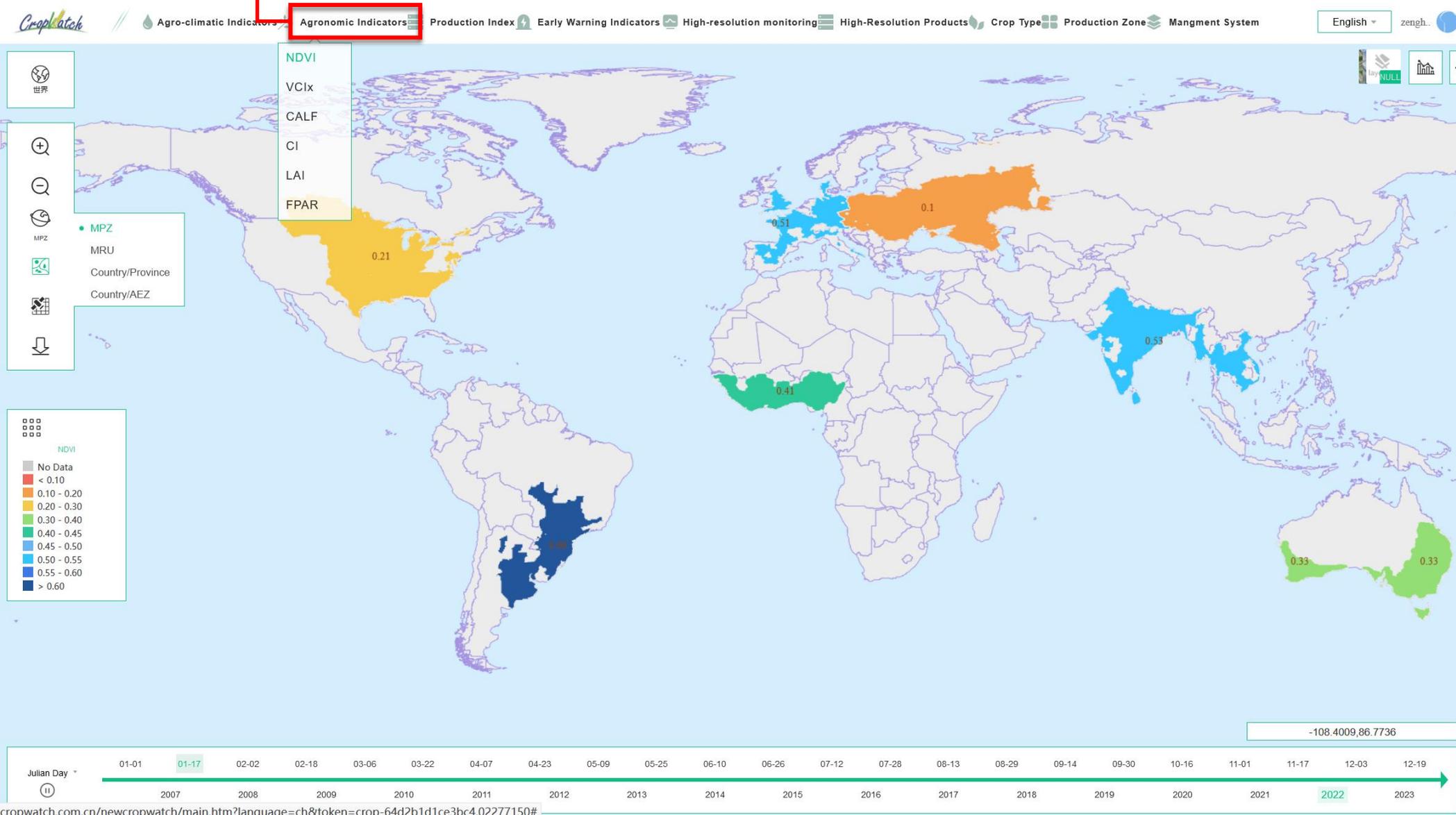
## Agronomic

- NDVI
- VCIx
- CALF
- CI
- LAI
- FPAR

# Agronomic-NDVI

The crop condition can be described by NDVI

Select NDVI



## Agro-climatic

Rainfall

Avg. Temp

PAR

Potential Biomass

## Agronomic

NDVI

VCIx

CALF

CI

LAI

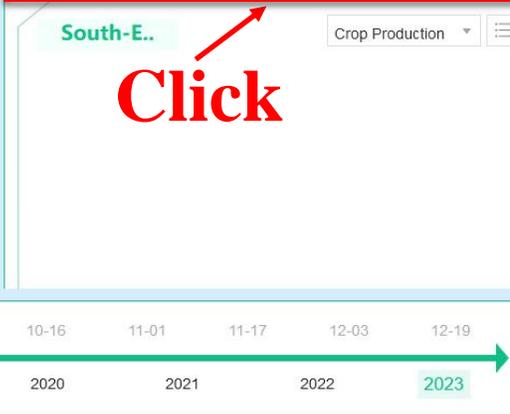
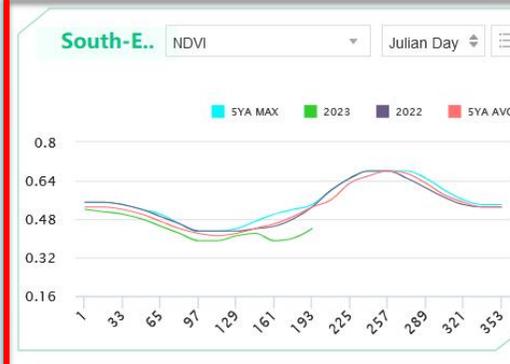
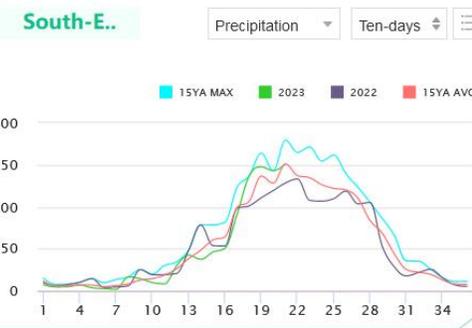
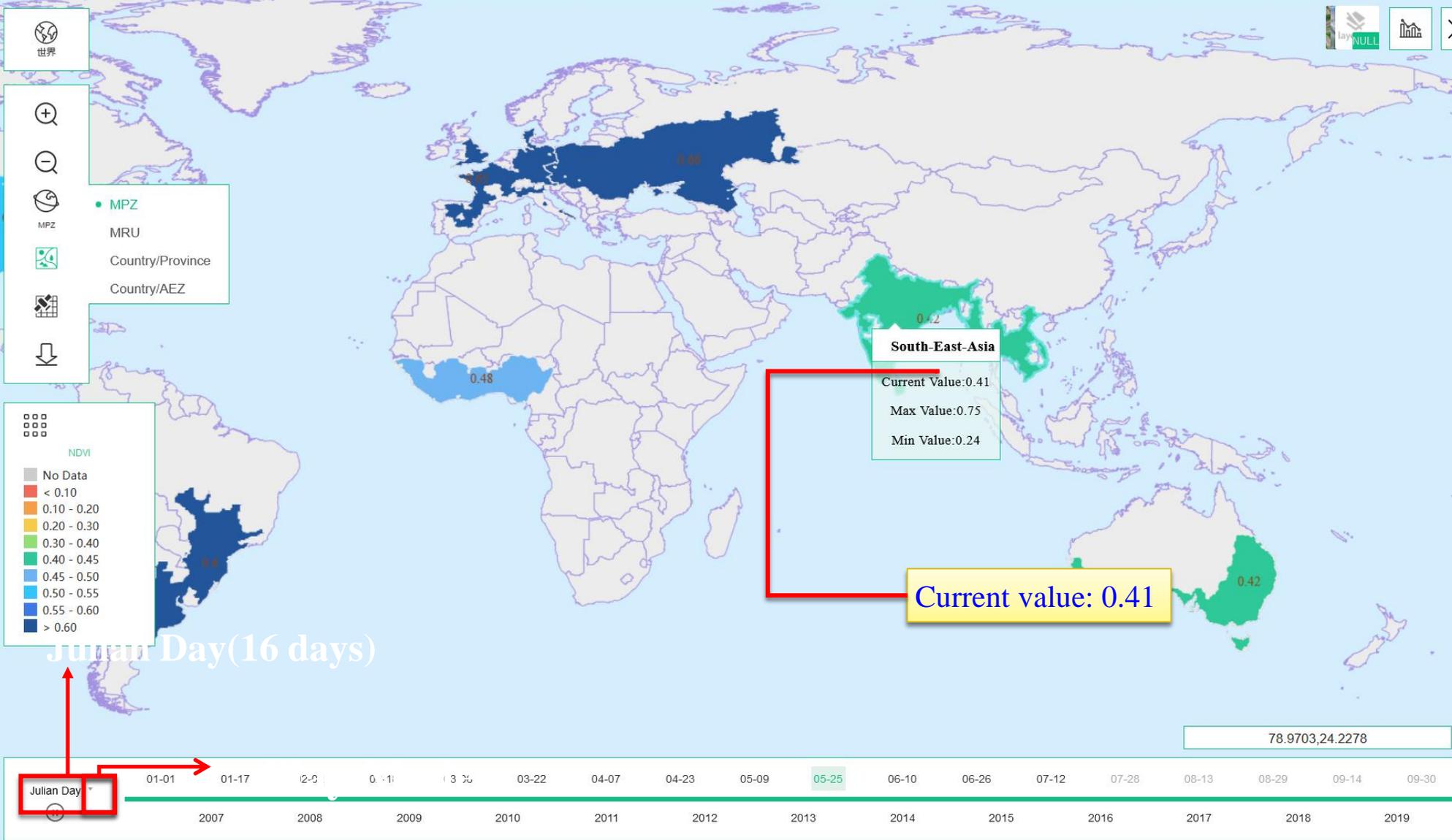
FPAR

# Agronomic-NDVI

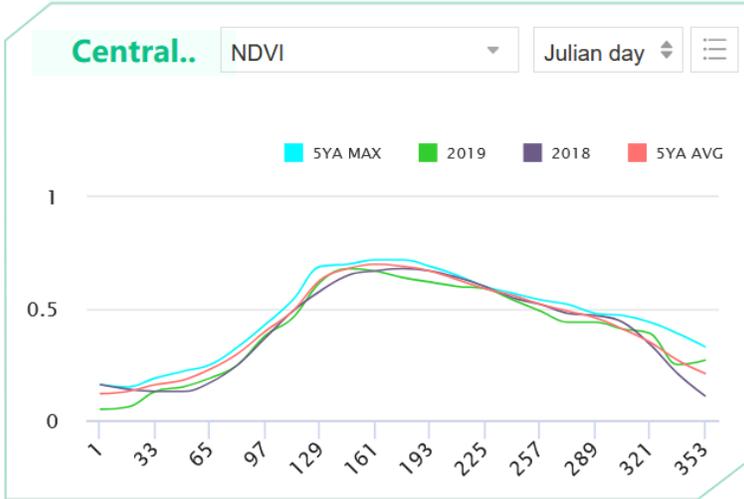
CropWatch

Agro-climatic Indicators | Agronomic Indicators | Production Index | Early Warning Indicators | High-resolution monitoring | High-Resolution Products | Crop Type | Production Zone | Mangment System

English | zengh.

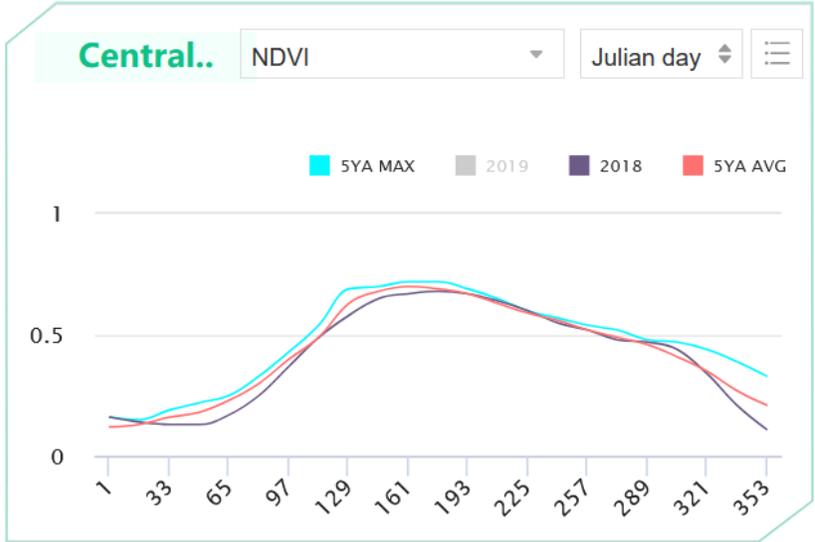


# Agronomic-NDVI



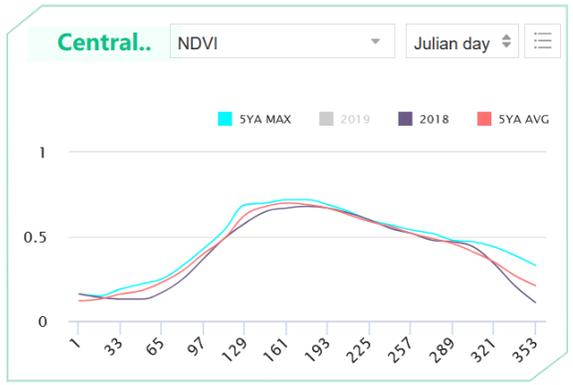
In general, compared the current NDVI value with the same time of last year, last 5 year's average, and last 5 year's maximum value, the users can assess crop condition easily

Users can close or open the value series of special group through clicking any icon

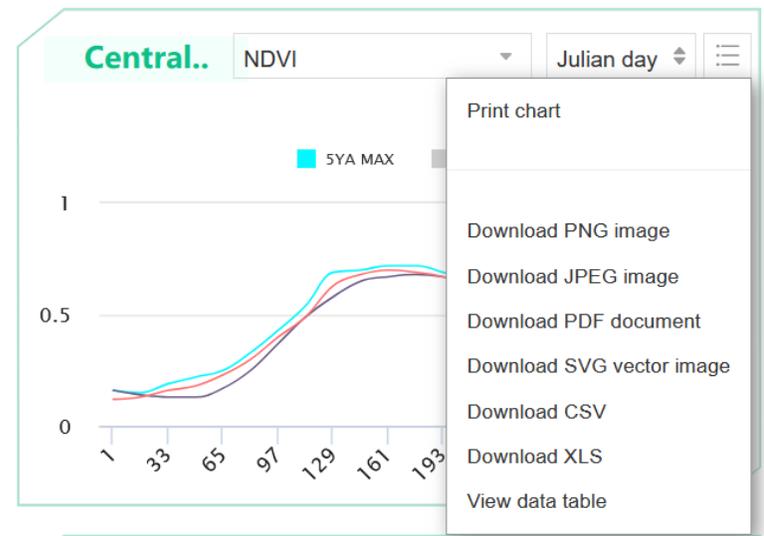


Result after closing 2019

Category	5YA MAX	2020	5YA AVG
1.00	0.54	0.52	0.51
17.00	0.55	0.53	0.51
33.00	0.49	0.51	0.48
49.00	0.48	0.50	0.47
65.00	0.45	0.48	0.44
81.00	0.42	0.43	0.41
97.00	0.40	0.40	0.38
113.00	0.39	0.40	0.37
129.00	0.40	0.40	0.38
145.00	0.41	0.39	0.40
161.00	0.43	0.42	0.42
177.00	0.45	0.44	0.44
193.00	0.50	0.49	0.47
209.00	0.55	0.52	0.52
225.00	0.60	0.58	0.58
241.00	0.66	0.64	0.64
257.00	0.67	0.66	0.66
273.00	0.68	0.65	0.65
289.00	0.65	0.61	0.61
305.00	0.60	0.56	0.56
321.00	0.56	0.53	0.53
337.00	0.54	0.51	0.51
353.00	0.54	0.51	0.51



User can print the chart or download and save the time series to your computer as pictures(PNG, JPEG, PDF, SVG) or table(XLS, CSV) format

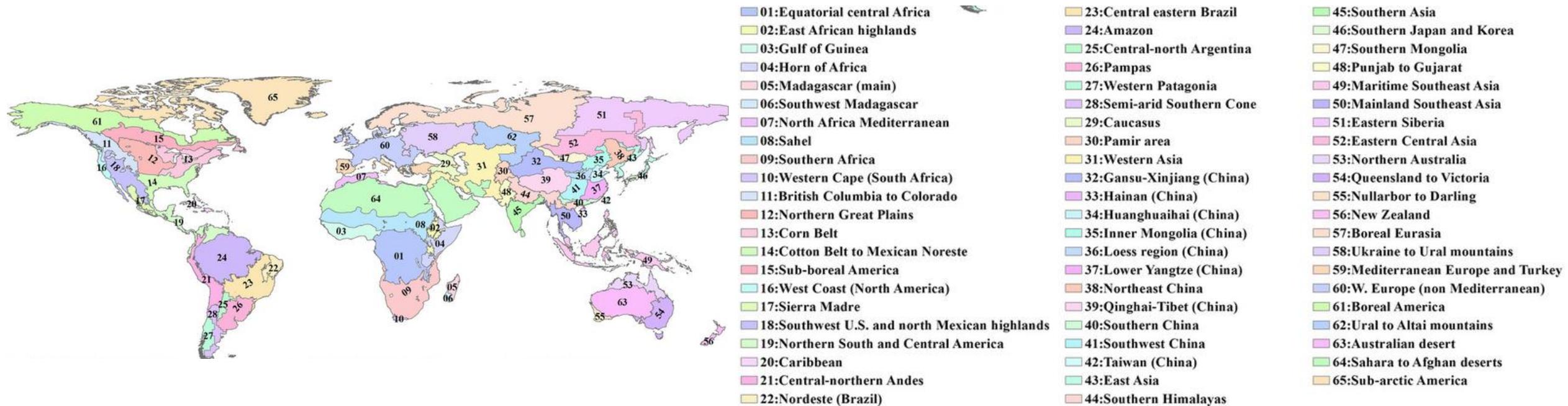




# **Information at MRU Level**

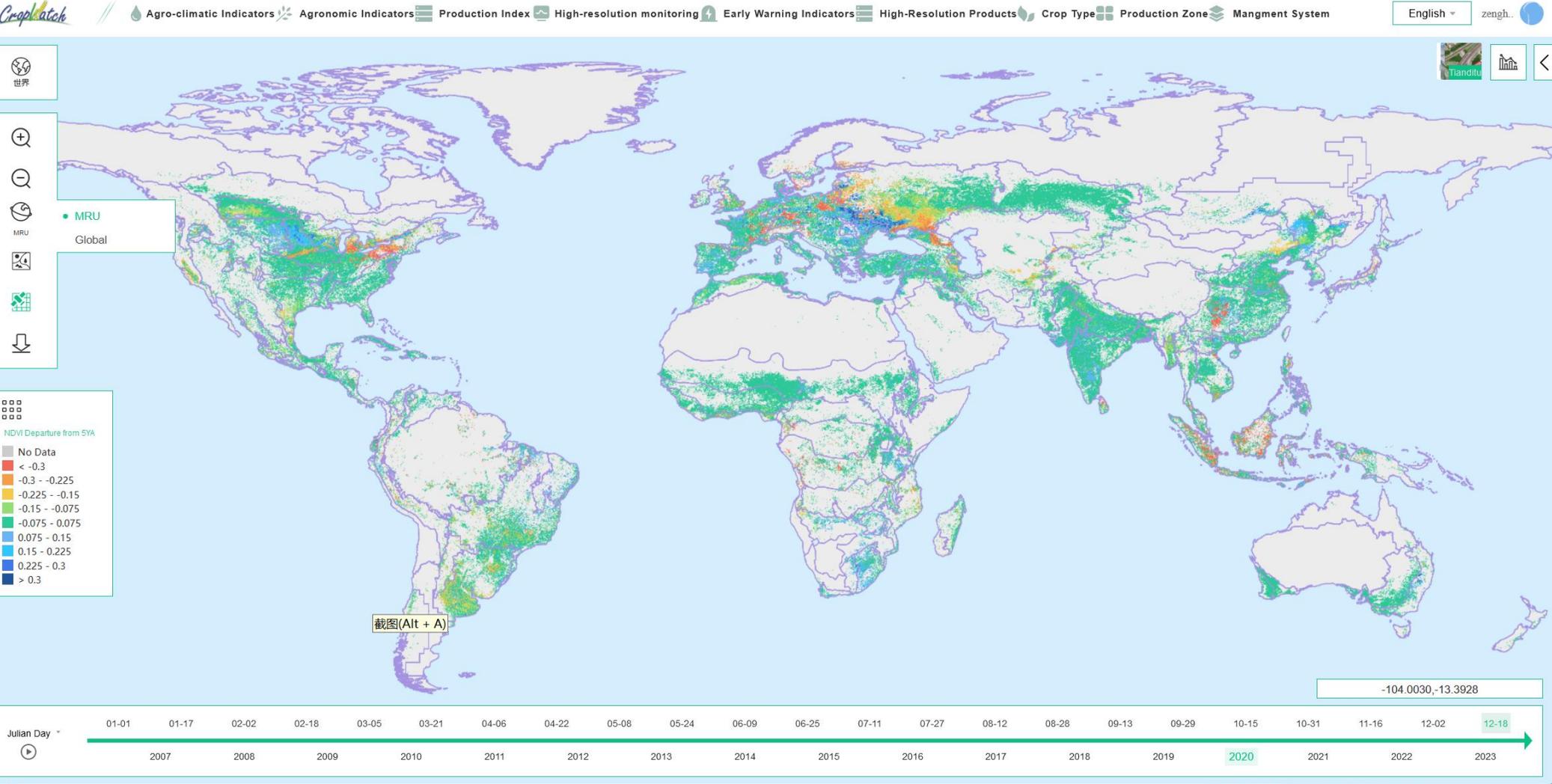
# What's meaning of MRU

- CropWatch divided the global into 65 agri-climatic zones based on climate, terrain, agricultural activities, etc.
- The purpose of designing MRUs is to provide more detail agricultural information to users and help them understanding agricultural information patterns change.



Gommes Rene, Wu Bingfang, Li Zhongyuan, Zeng Hongwei. Design and characterization of spatial units for monitoring global impacts of environmental factors on major crops and food security. Food and Energy Security, 2016, 5(1): 40-55.

# Information can be showed at MRU level



## Agro-climatic

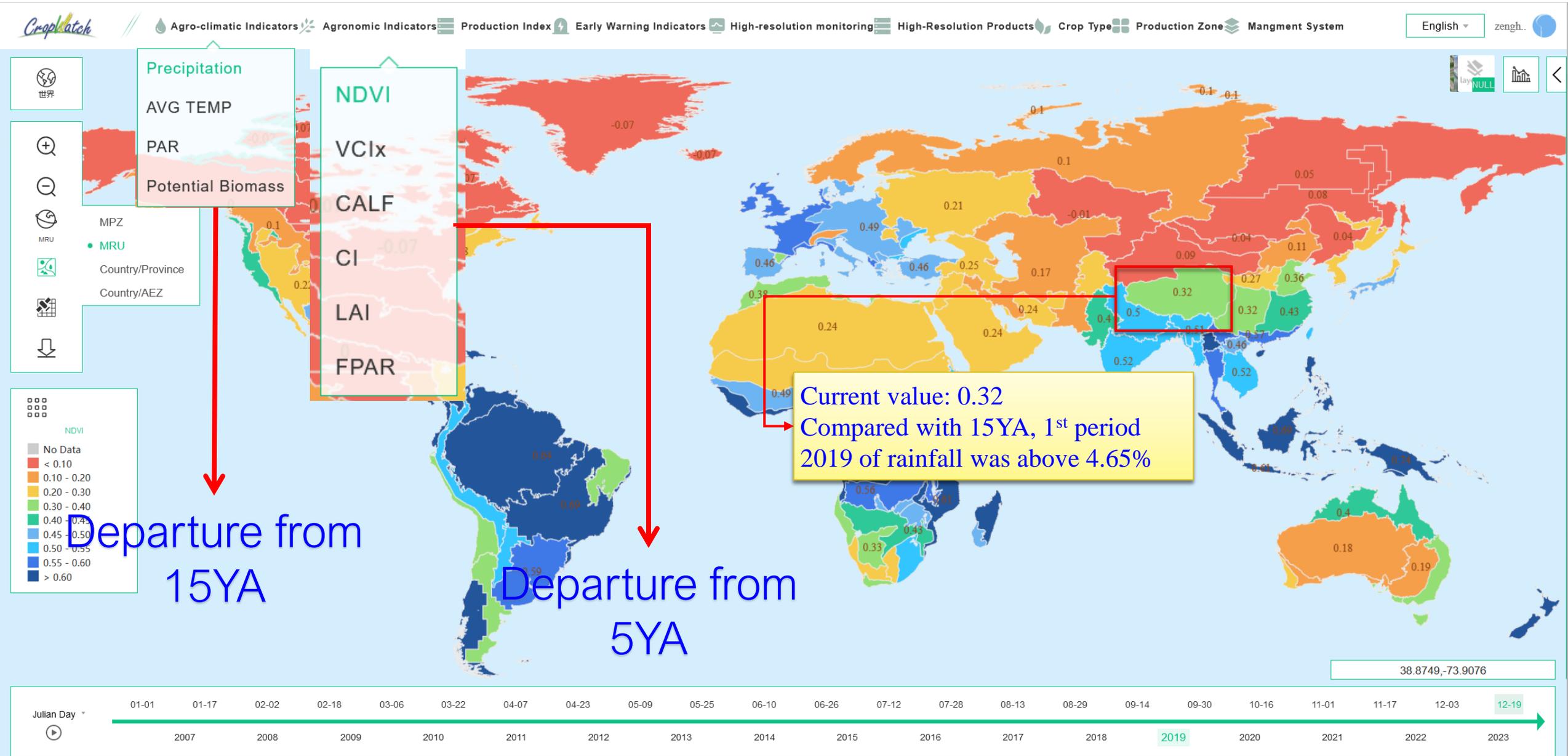
- Rainfall
- Avg. Temp
- PAR
- Potential Biomass

## Agronomic

- NDVI
- VCIx
- CALF
- CI
- LAI
- FPAR

# Information Search at MRUs

Users can select different indices  
User can export time series of different indices



世界  
  
  
  
 MRU

Layers  
 Home



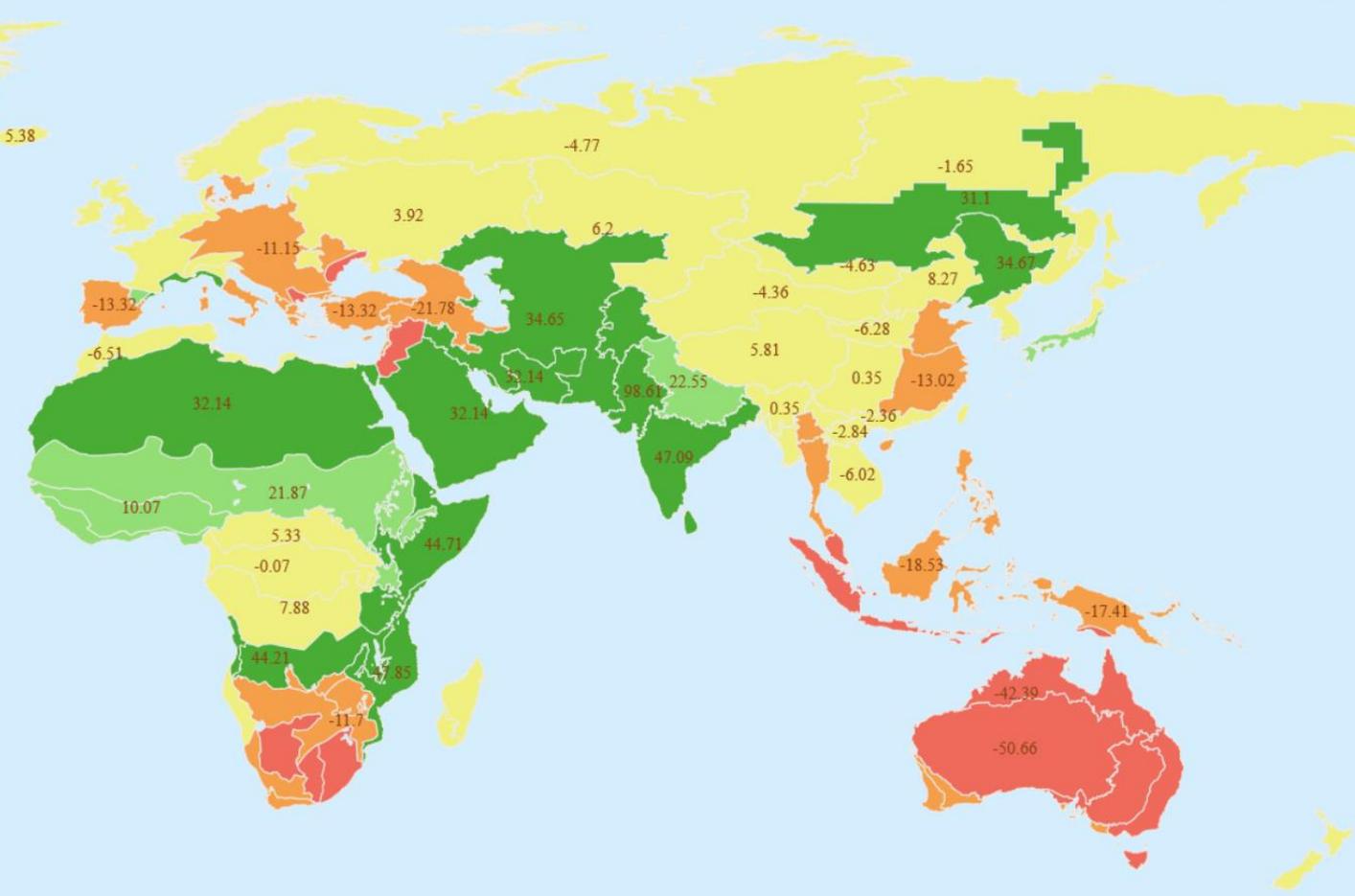
# Rainfall

Time Frequency: period, 10-days

Means of Value: departure from 15 YA(%)

Function: indicate water stress

Rainfall Departure from 15YA (%)  
 No Data  
 < -30  
 -30 - -10  
 -10 - 10  
 10 - 30  
 > 30



61.4766,-94.1587

Period ▾ 1 2 3 4  
 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

World 世界

+

-

MRU

Country/Province

Country/AEZ

↓

lay NULL

zengh..

<

# Average Temperature

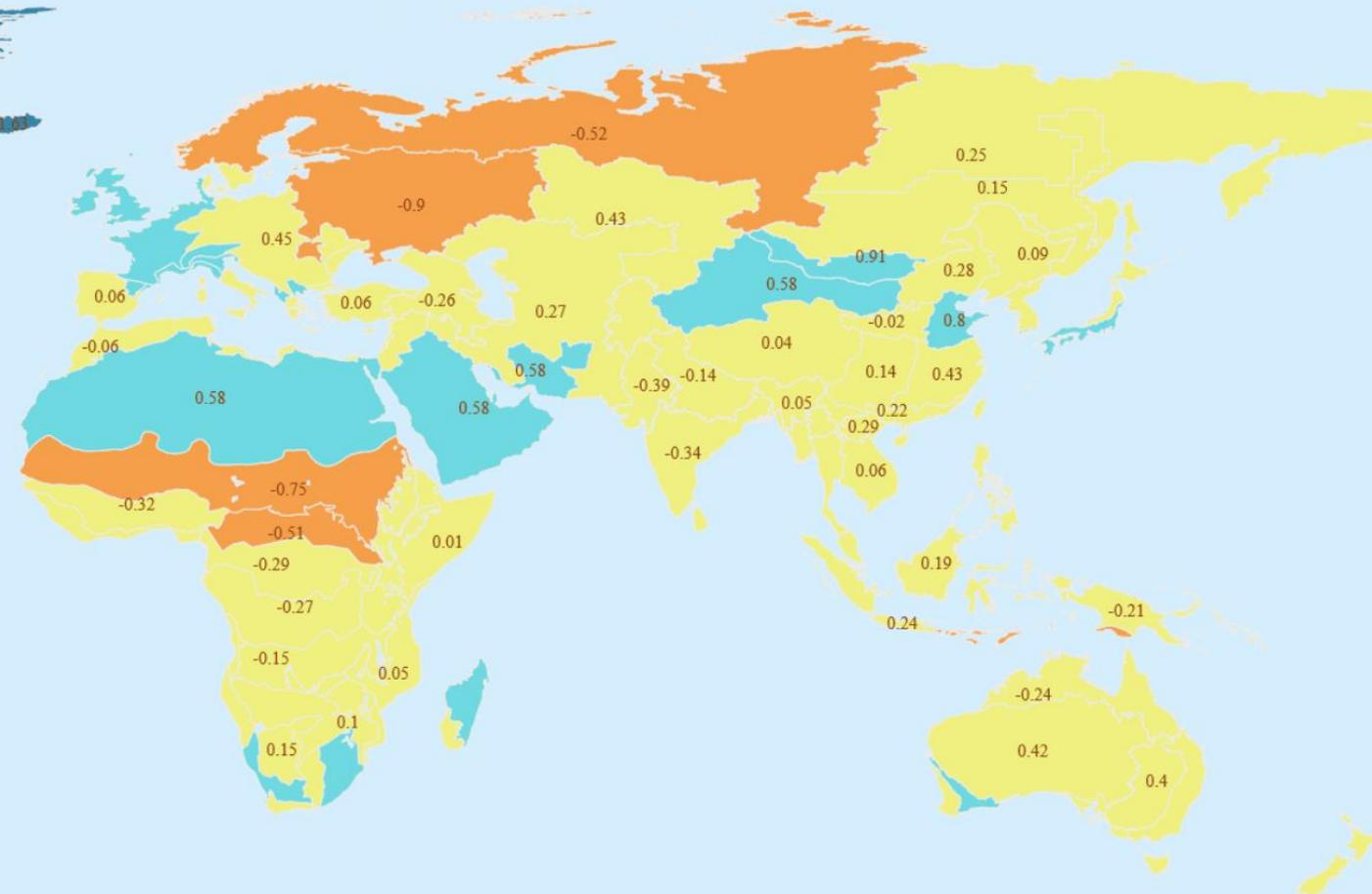
Time Frequency: period, dekad

Means of Value: departure from 15 YA(%)

Funcion: indicate temperature stress

Average Temperature Departure from 15YA (°C)

- No Data
- < -1.5
- 1.5 - -0.5
- 0.5 - 0.5
- 0.5 - 1.5
- > 1.5



世界

+

-

MRU

Country/Province

Country/Area

↓

lay NULL

zengh..

<

# Photosynthetically Active Radiation (PAR)

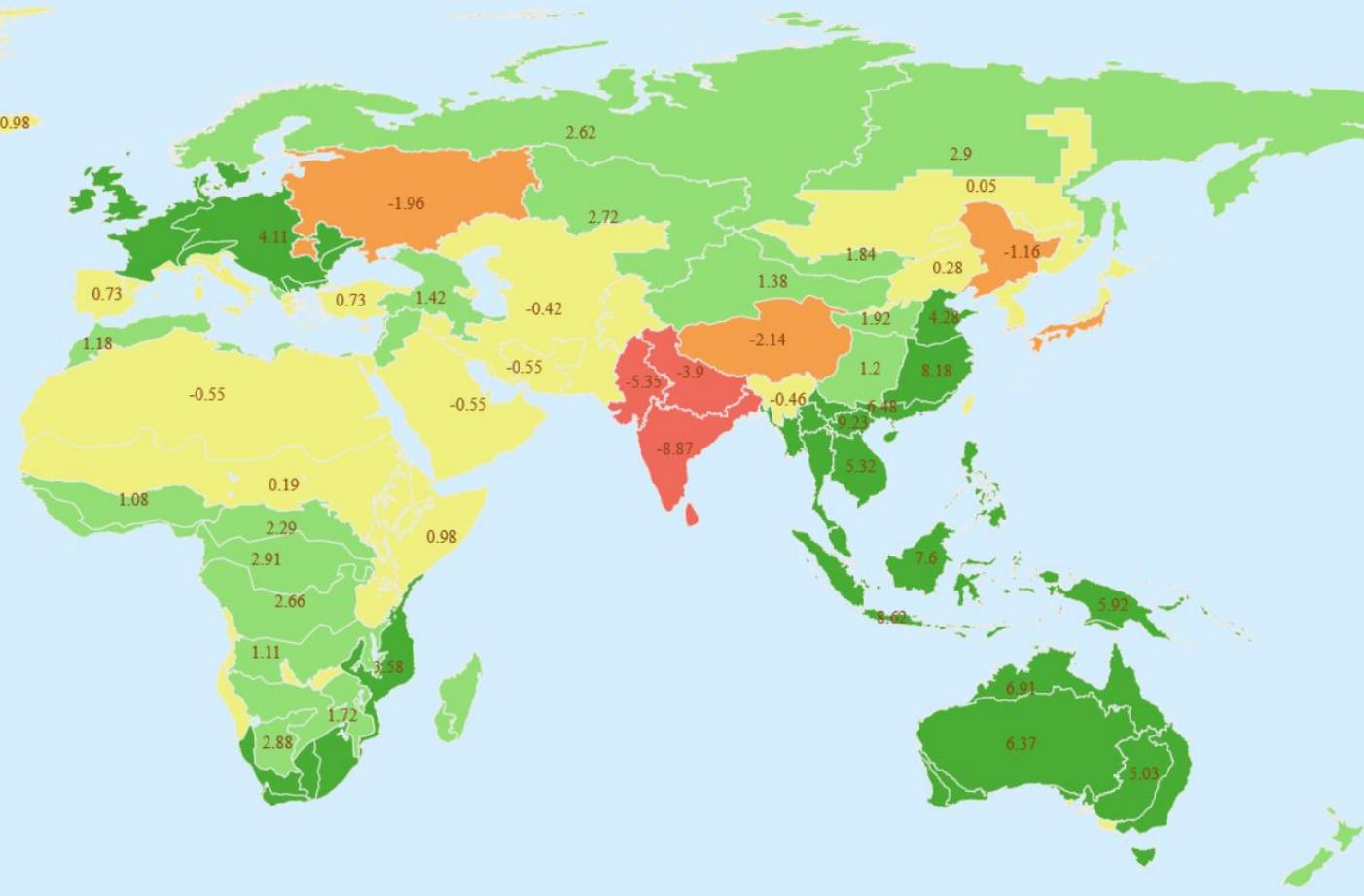
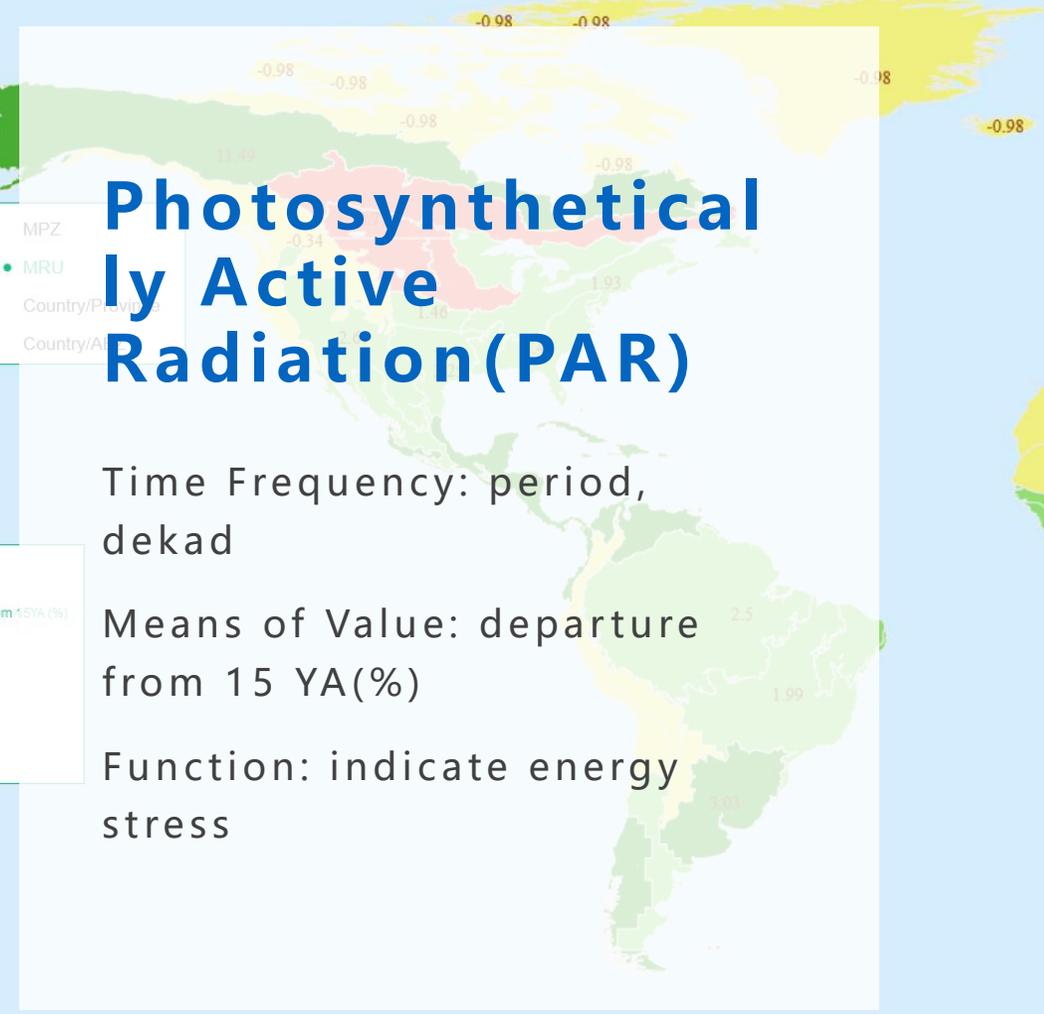
Time Frequency: period, dekad

Means of Value: departure from 15 YA(%)

Function: indicate energy stress

PAR Departure from 15YA (%)

- No Data
- < -3
- 3 - -1
- 1 - 1
- 1 - 3
- > 3

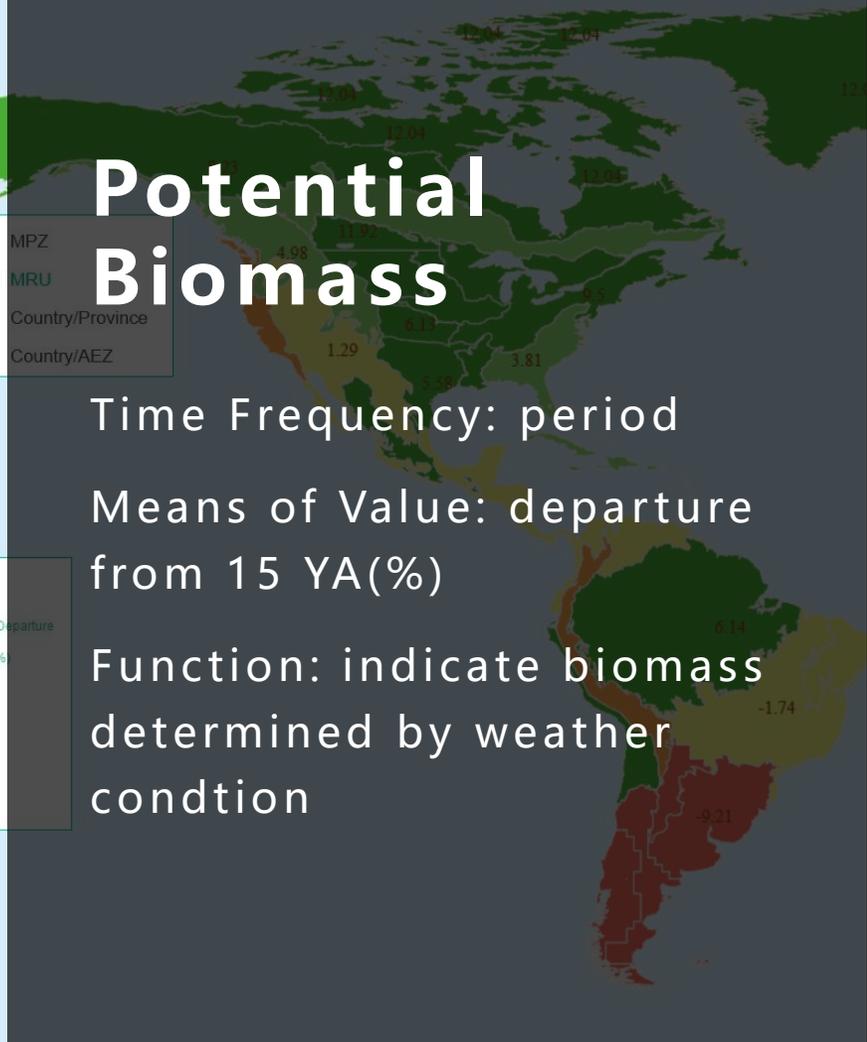


63.6464,-94.7012

Period

1 2 3 4

2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

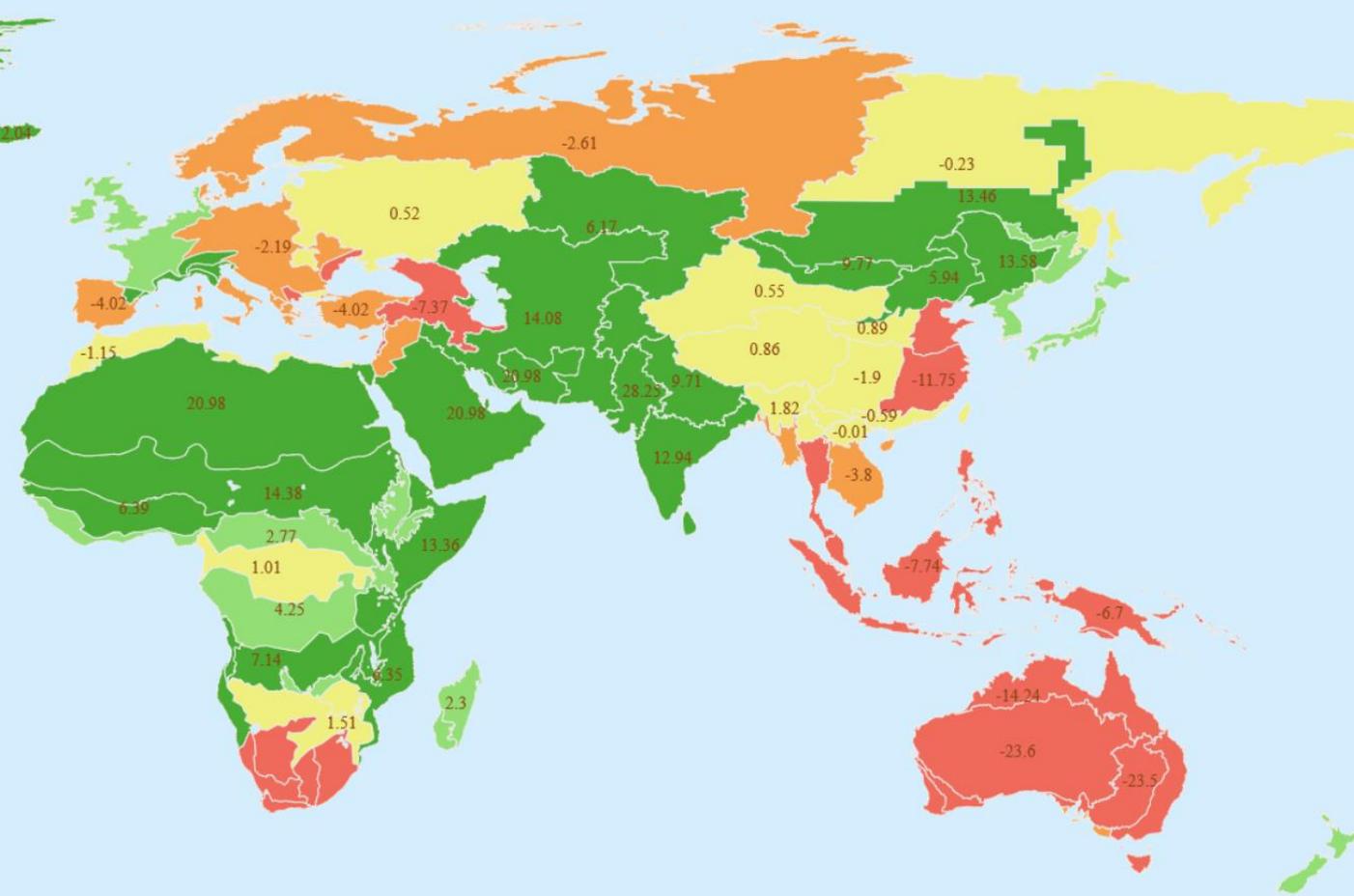
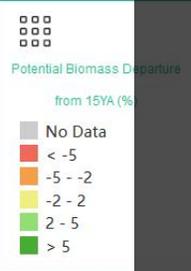


# Potential Biomass

Time Frequency: period

Means of Value: departure from 15 YA(%)

Function: indicate biomass determined by weather condtion



67.0819,-94.3395



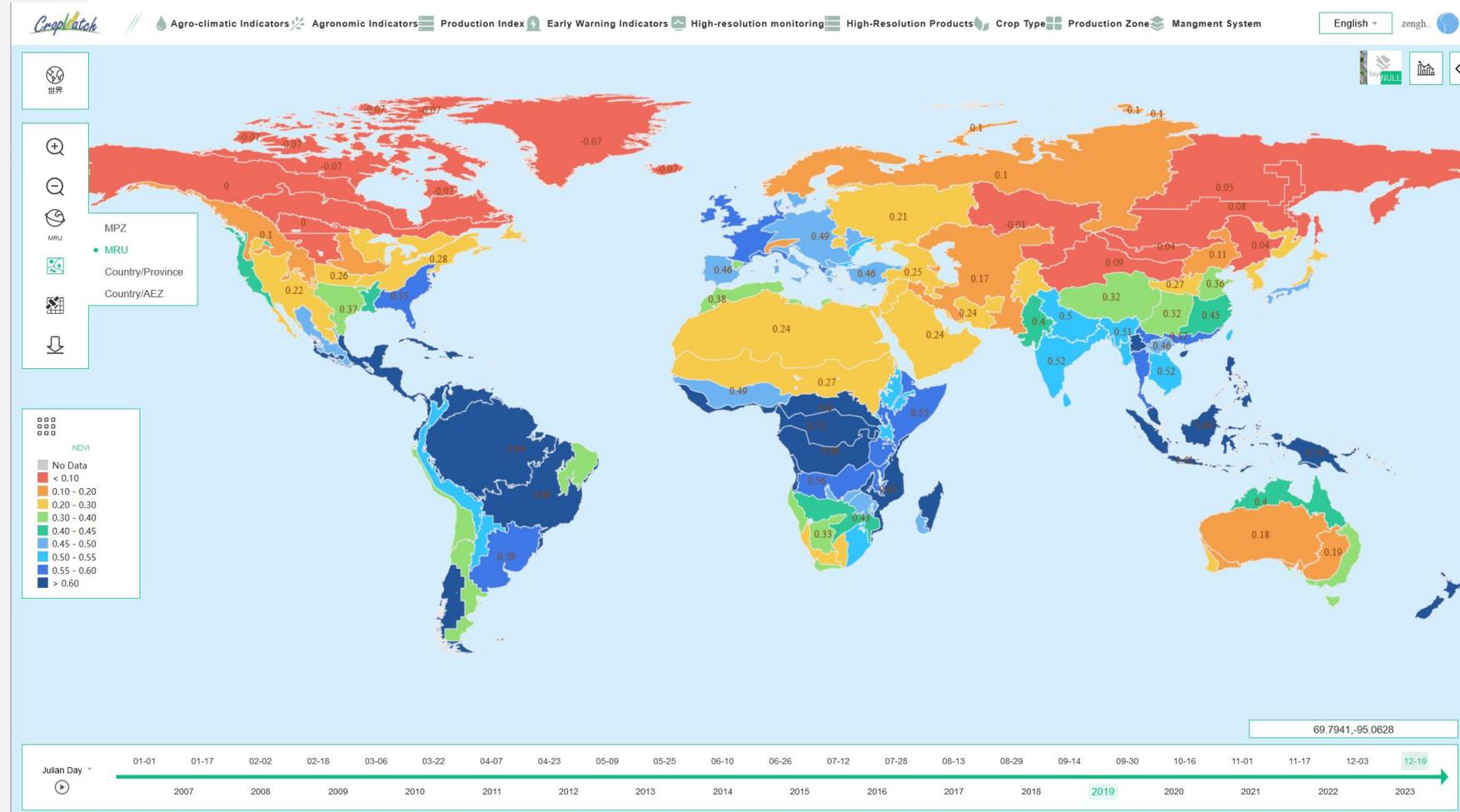
# Normalized Difference Vegetation Index(NDVI)

Time Frequency: Julian day(16)

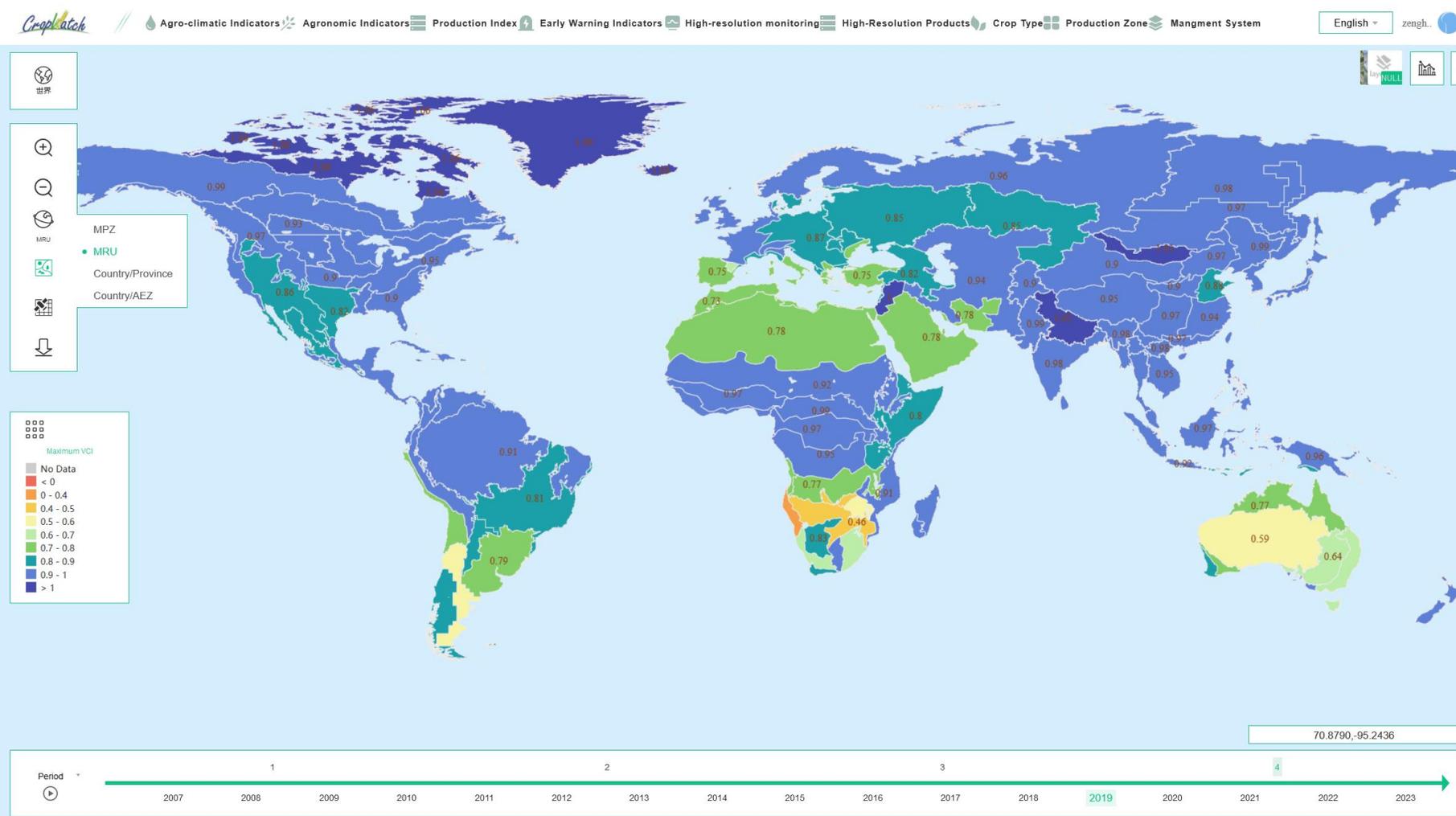
Means of Value: absolute value of NDVI

Function: indicate crop condition at different crop growing stage.

- Same crop in the field, more higher NDVI, means better condition, otherwise, worse condition

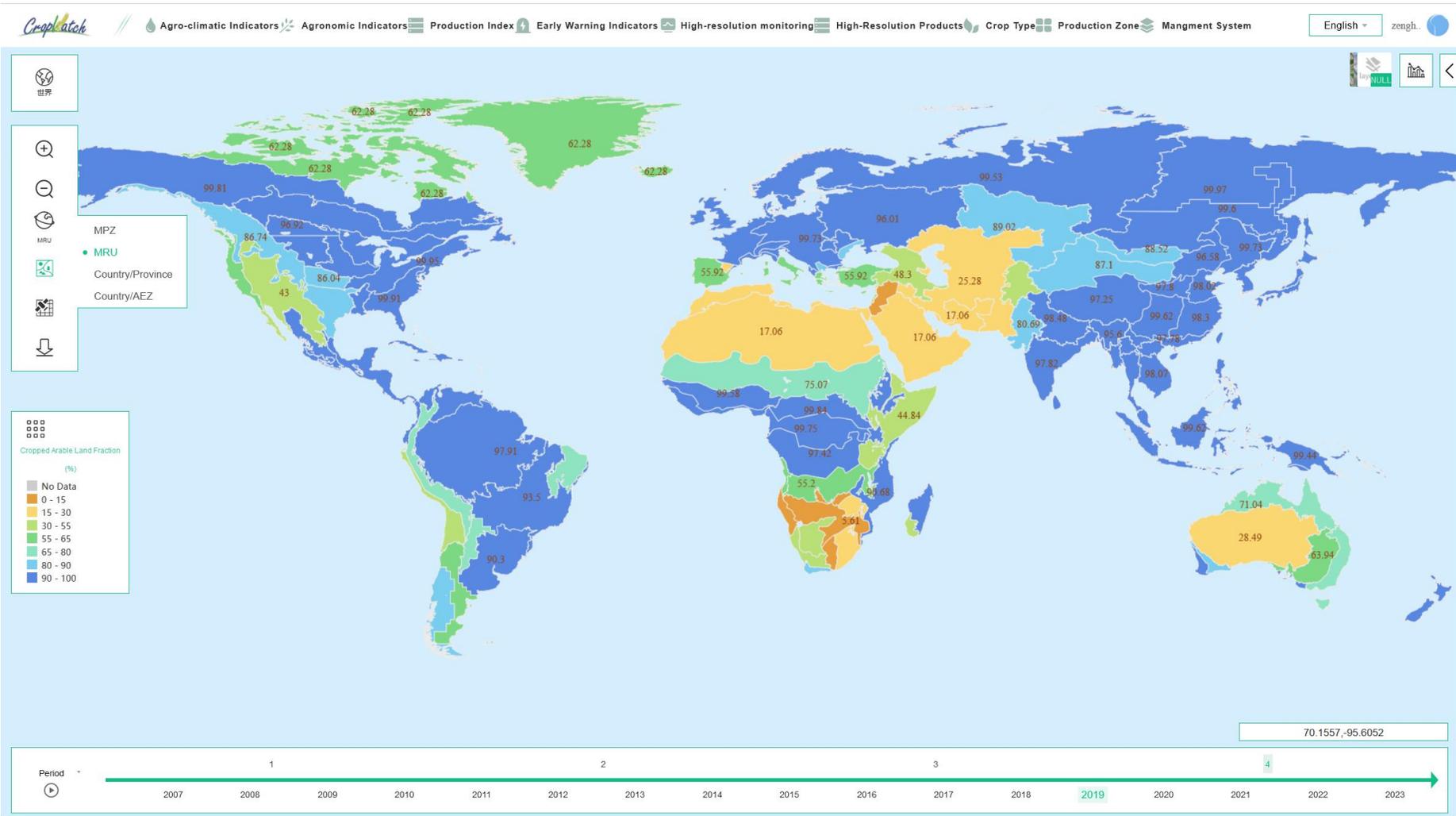


# Maximum Vegetation Index(VCIx)



- Time Frequency: period, dekad
- Means of Value: compare with last 5YA, what's is the NDVI level
- Function: indicating the crop condition at different crop growing stage compared to last 5 year' s average
  - Worse crop condition: < 0.5
  - Favorable crop condition: > 1

# CALF(Cropped Arable Land Fraction)

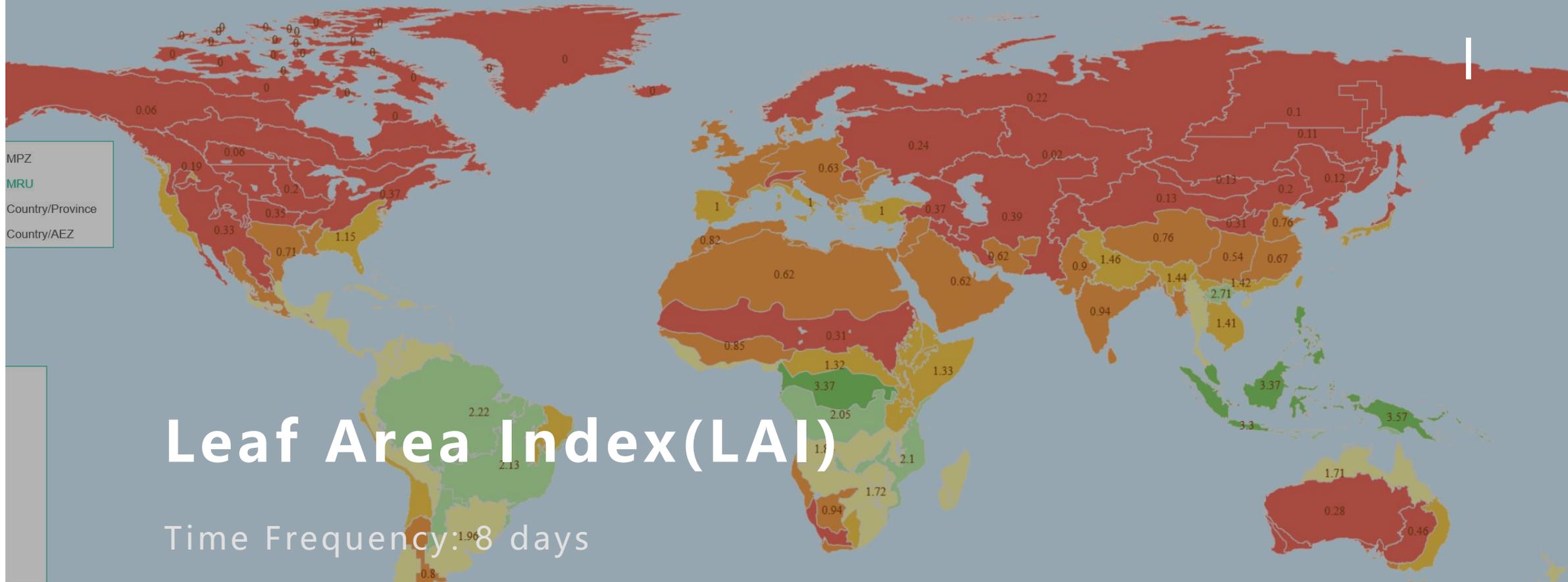


Time Frequency: period

Means of Value: fraction of cropped land accounted for area of interest

Function: indicate the progress of sowing, harvesting, or early warning of crop production





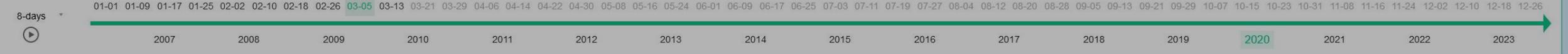
MPZ  
MRU  
Country/Province  
Country/AEZ

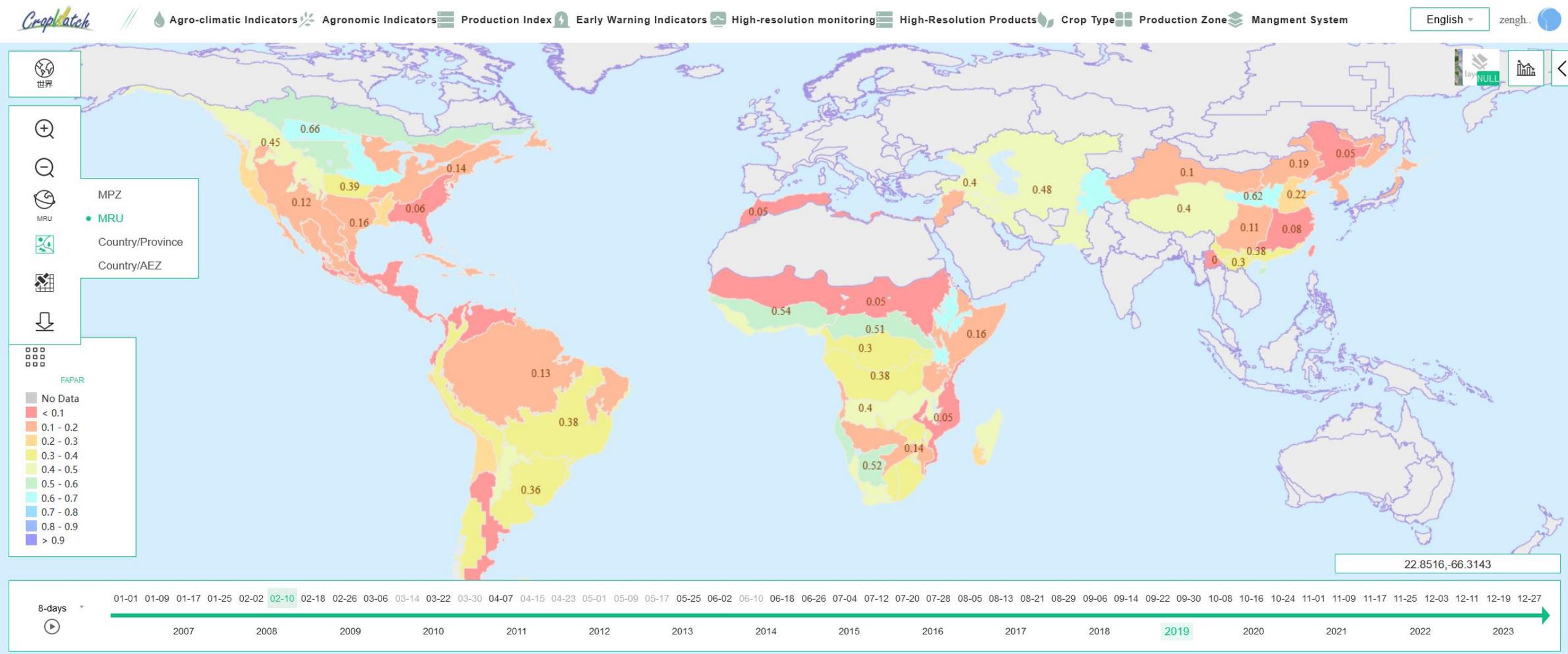
# Leaf Area Index(LAI)

Time Frequency: 8 days

Function: indicate crop yield, the same crop in the field, higher LAI means high yield, otherwise, low yield

63.4656,-94.3395





Time Frequency: 8 days

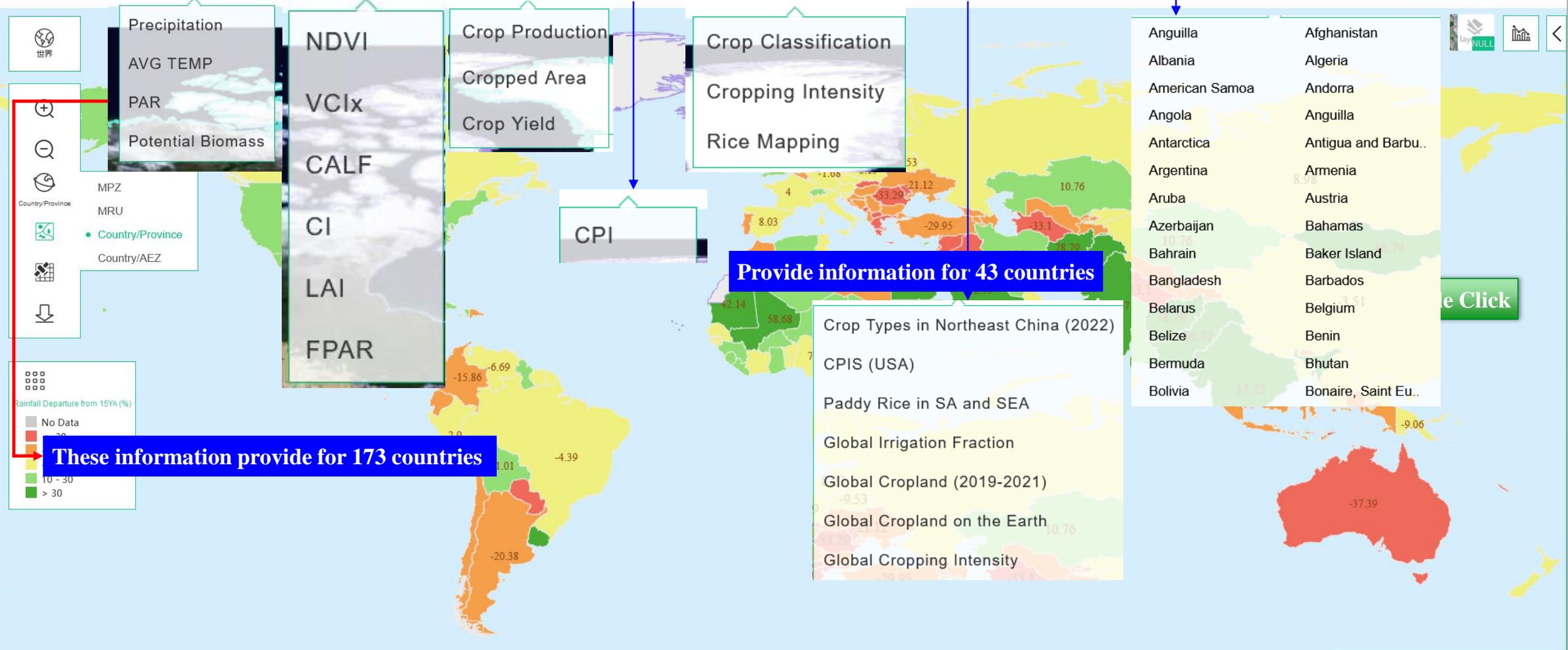
Function: indicates capacity of energy absorption by crop

Fraction of Absorbed Photosynthetically Active Radiation(FPAR)

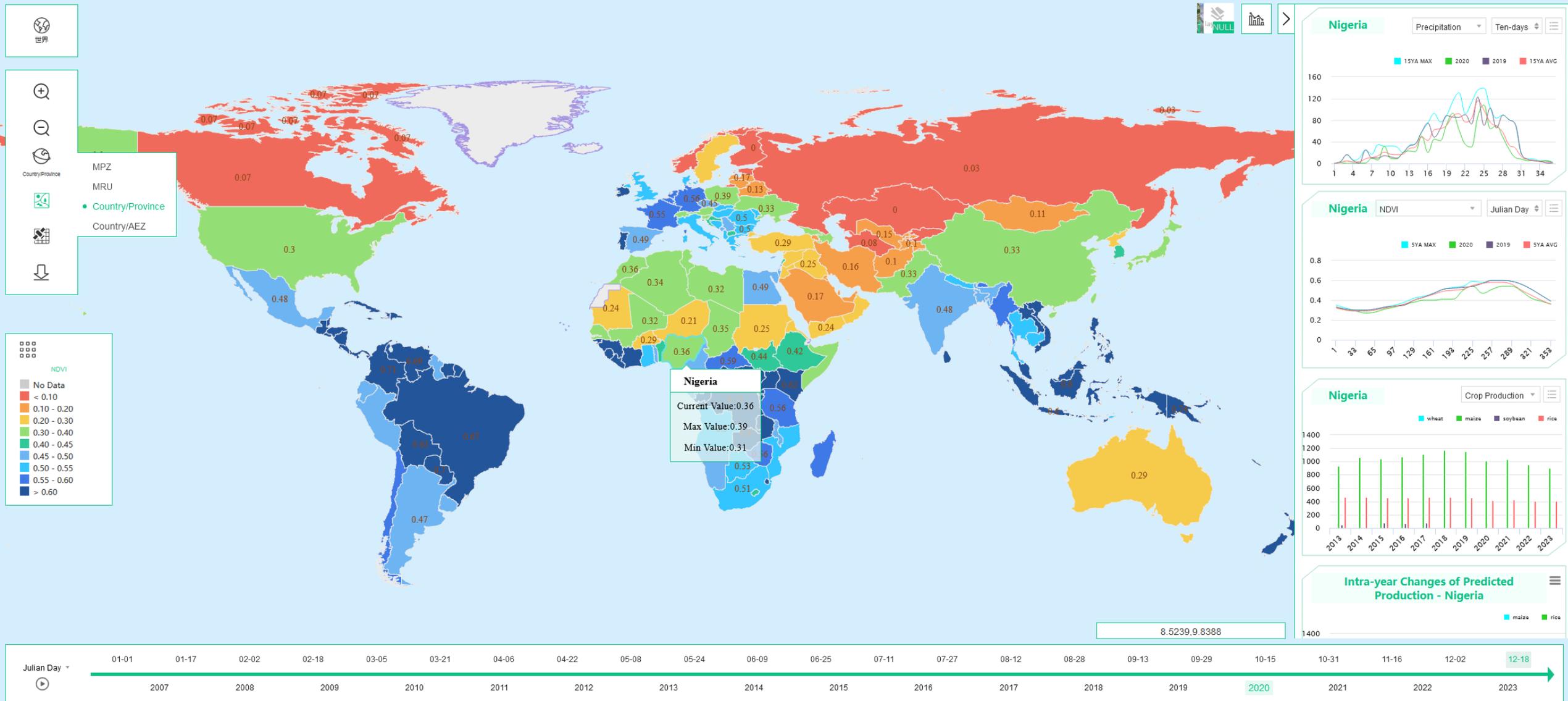
# Information at Country Level(Province)



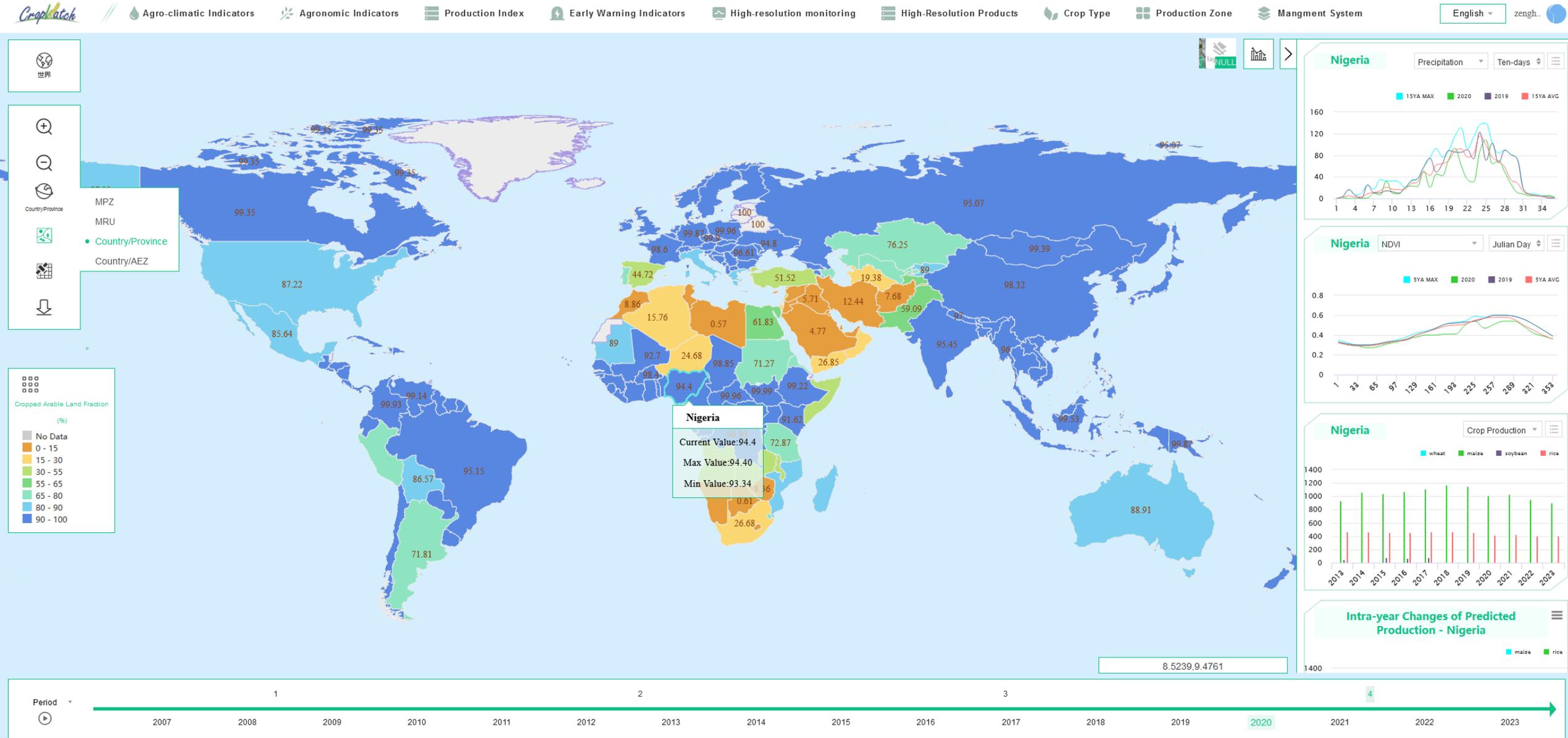
# Information at country



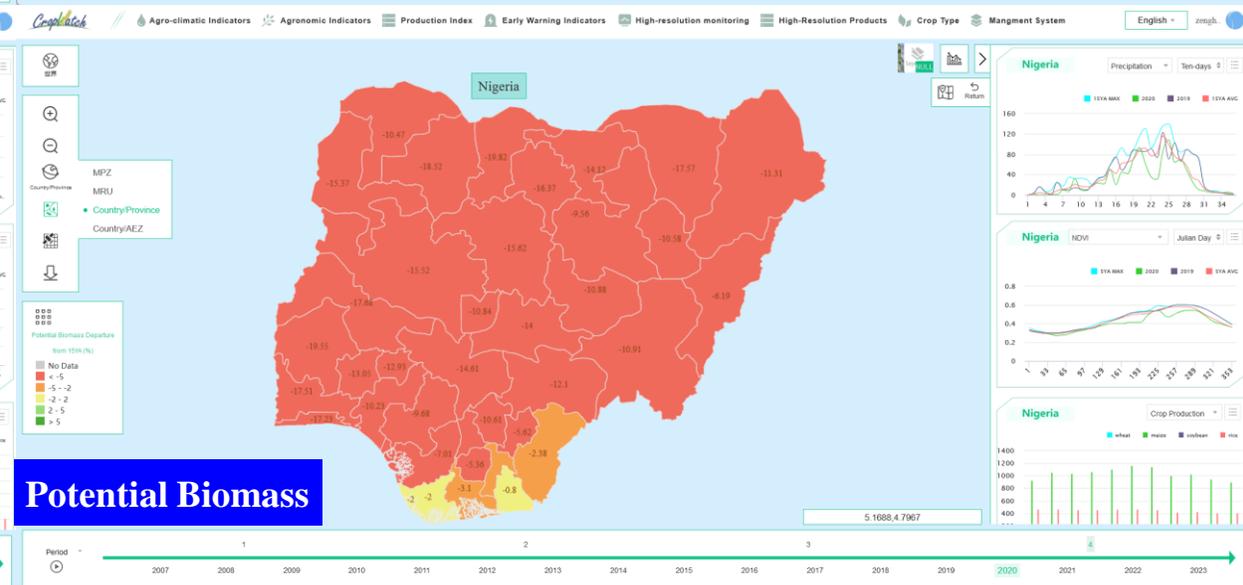
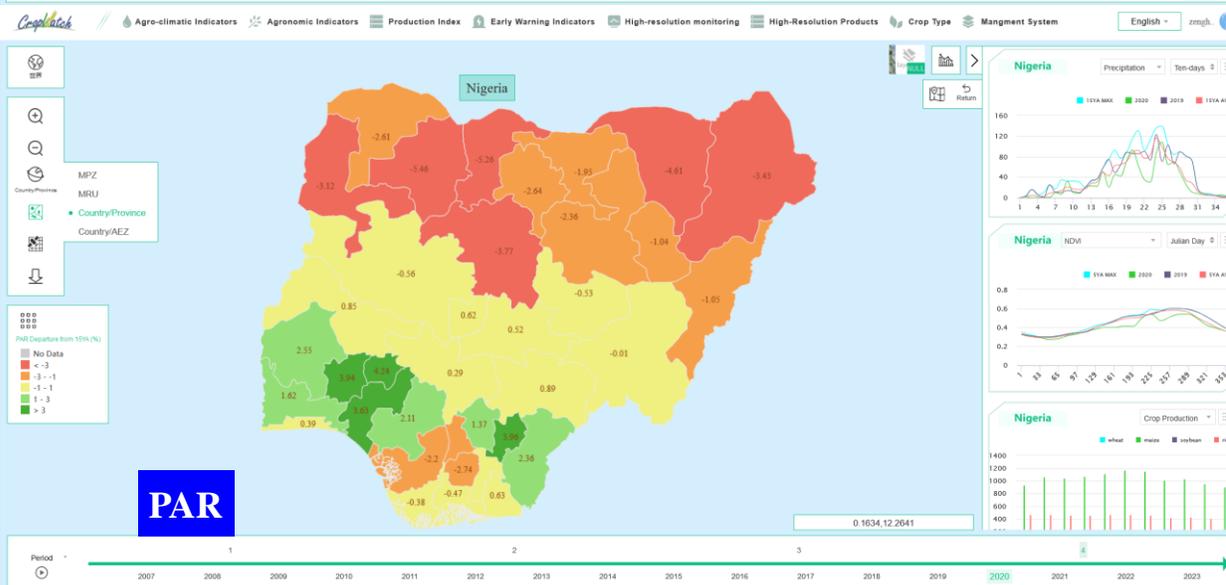
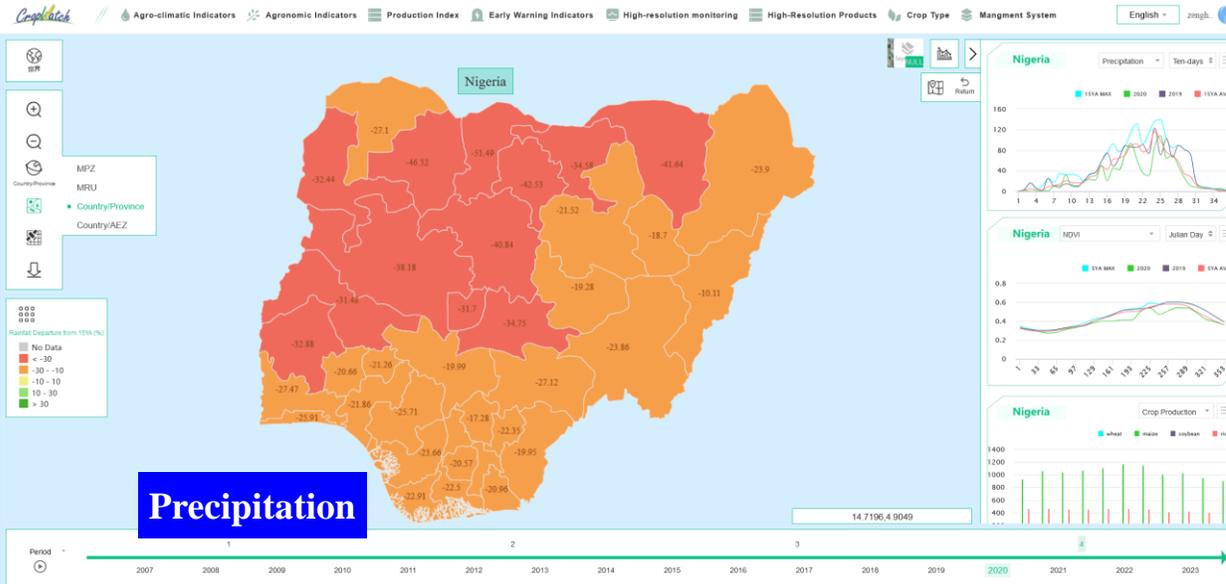
# Information at country- Nigeria



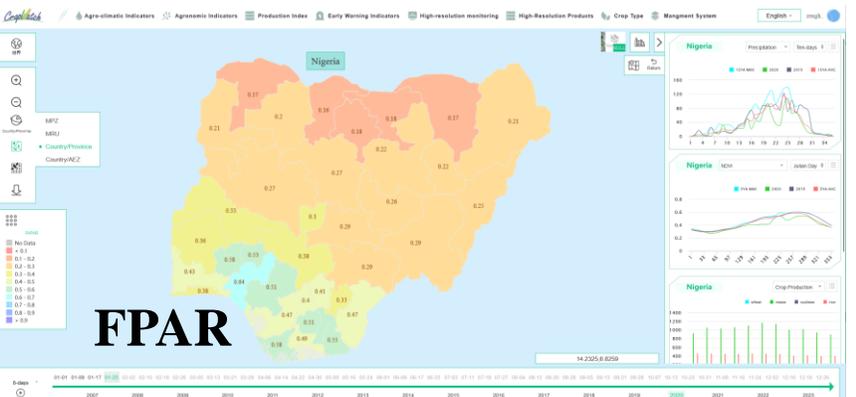
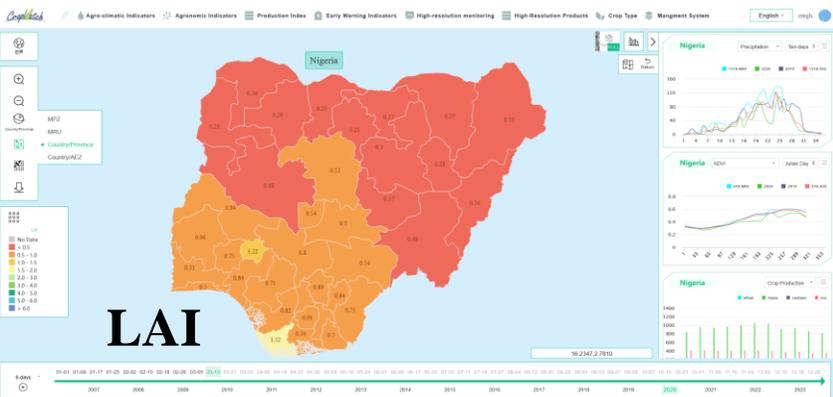
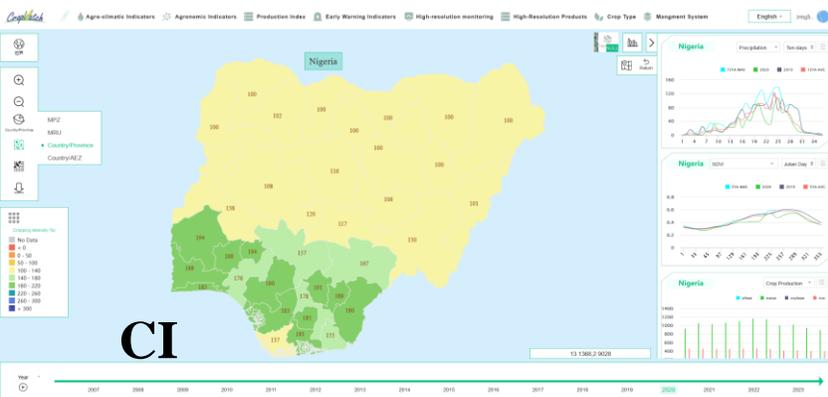
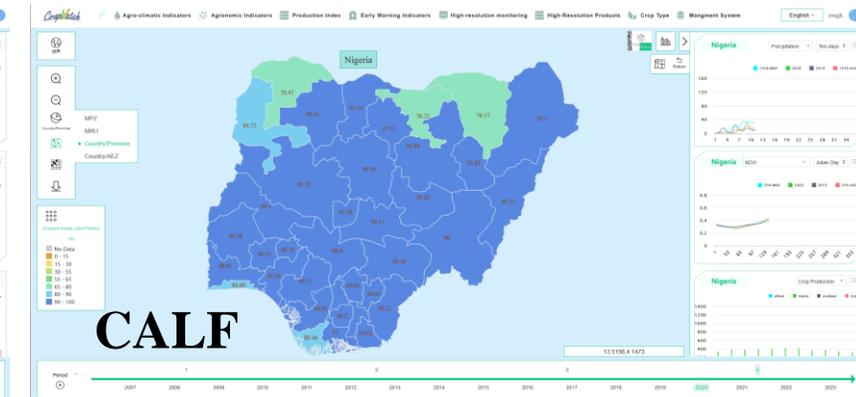
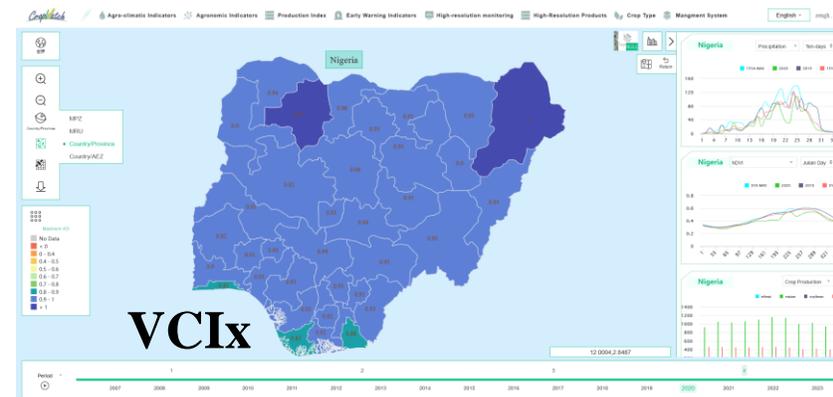
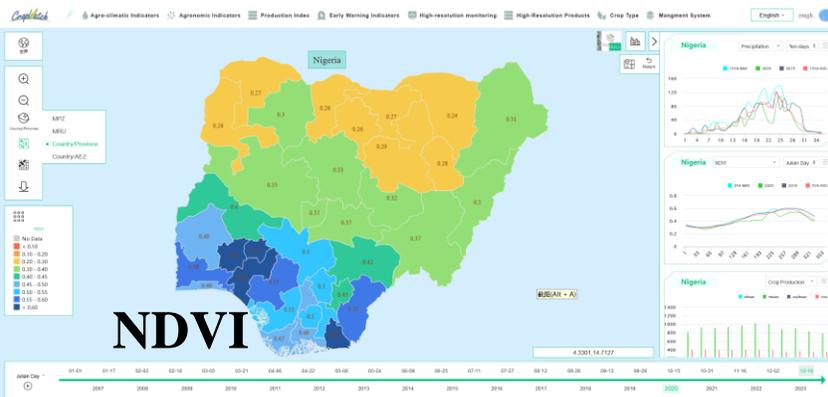
# Provide province's information for 173 countries



# Agro-climatic information at province level of Nigeria

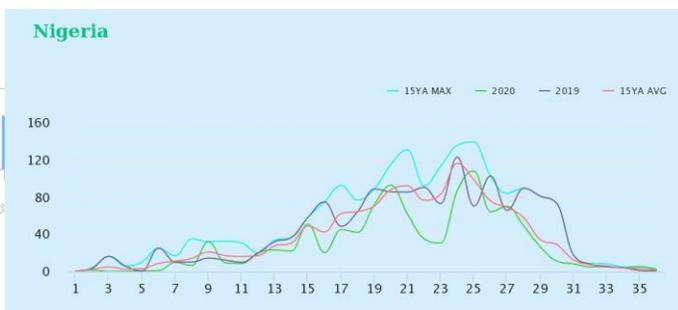
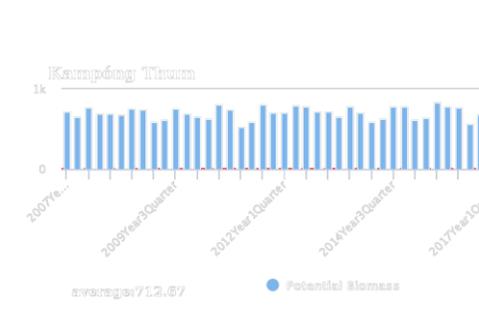
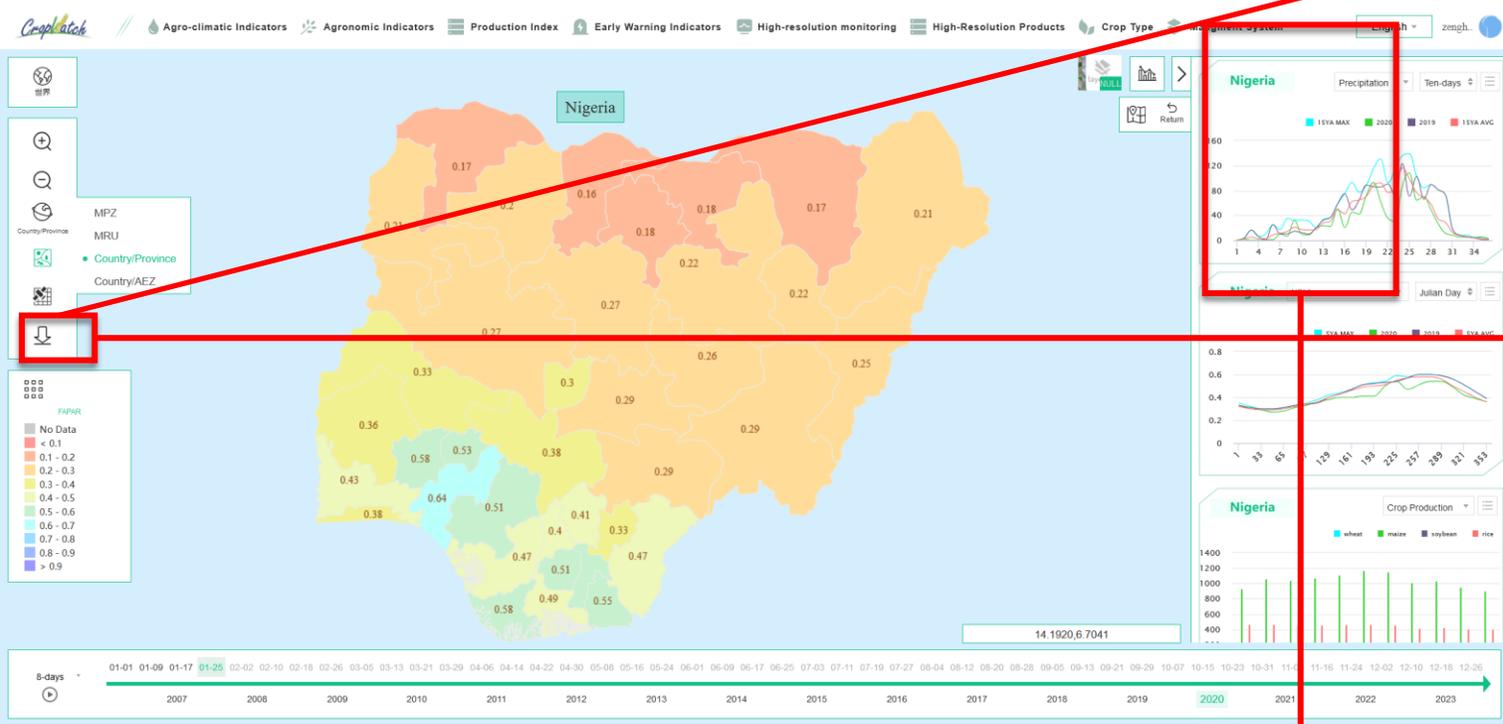


# Agronomic information at province

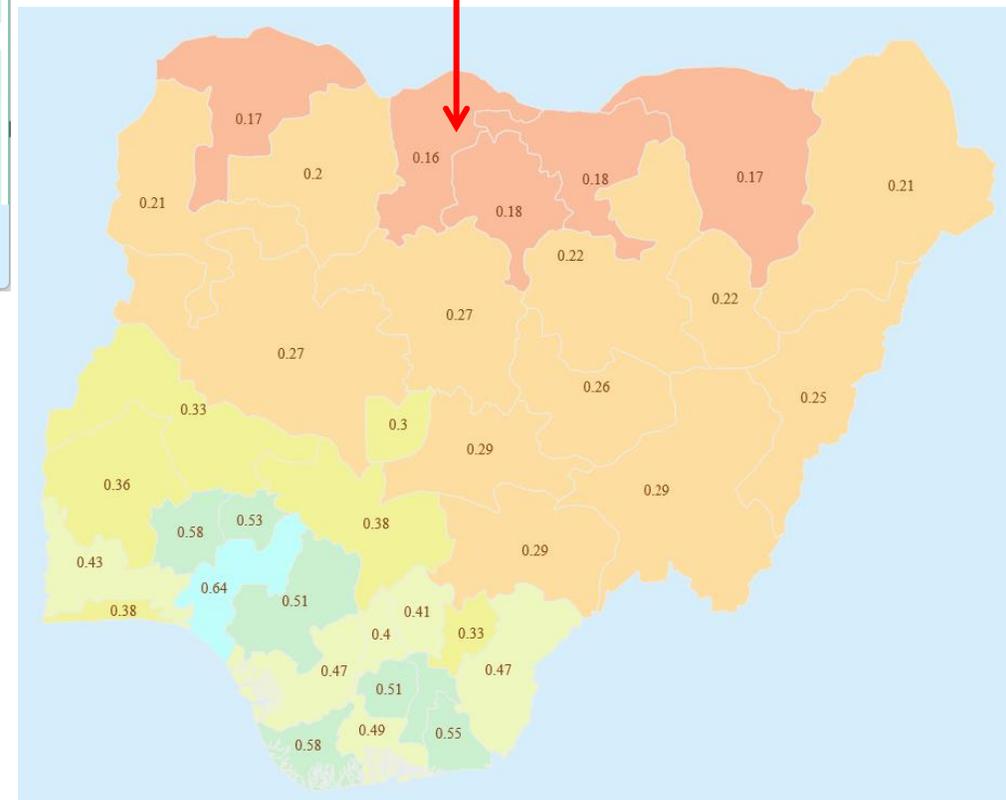


# Information exports

Export Image



Category	5YA MAX	2019	2018	5YA AVG
1	1.53	1.47	1.44	
9	1.59	1.28	1.42	
17	1.56	1.25	1.37	
25	1.36	1.19	1.28	
33	1.48	1.48	1.33	
41	1.53	1.34	1.3	
49	1.41	1.19	1.18	
57	1.35	1.31	1.17	
65	1.35	1.14	1.18	
73	1.14	1.14	1.04	
81	1.1	1.1	1.04	
89	1.1	0.89	0.94	
97	1.3	1.3	1.08	
105	1.4	0.85	0.82	
113	1.29	0.96	0.95	
121	1.24	0.7	1.13	1.08
129	1.29	1.21	1.07	
137	1.54	1.54	1.1	
145	1.43	1.15	1.14	
153	1.49	0.82	1.18	
161	1.35	1.37	1.29	
169	1.77	1.44	1.19	
177	1.84	0.79	1.84	1.37
185	1.43	1.22	1.23	
193	1.61	1.61	0.42	1.09
201	1.69	1.09	0.97	1.21
209	1.57	0.85	1.57	1.24
217	1.48	1.34	1.11	1.28
225	1.69	1.44	0.7	1.34
233	1.54	1.28	0.8	1.23
241	1.68	0.91	1.47	1.35
249	1.46	1.07	0.94	1.22
257	1.61	0.83	0.77	1.19
265	1.88	1.09	1.36	1.43
273	1.76	1.63	1.76	1.32
281	1.89	1.61	1.89	1.4
289	2.08	1.71	1.71	1.68
297	2.09	1.79	1.78	1.89
305	1.8	1.58	1.74	1.63
313	2.02	1.56	1.53	1.65
321	1.79	1.77	1.54	1.63
329	1.74	1.7	1.42	1.54
337	1.67	1.67	1.5	1.54
345	1.57	1.55	1.57	1.41
353	1.66	1.66	1.56	1.51
361	1.55	1.55	1.16	1.39



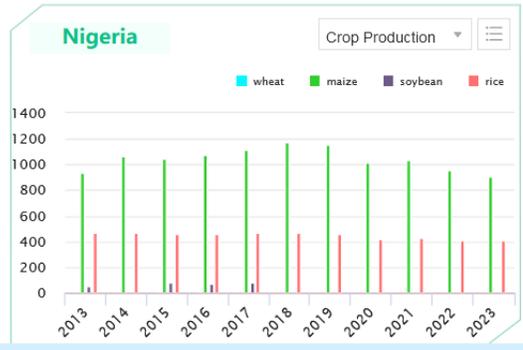
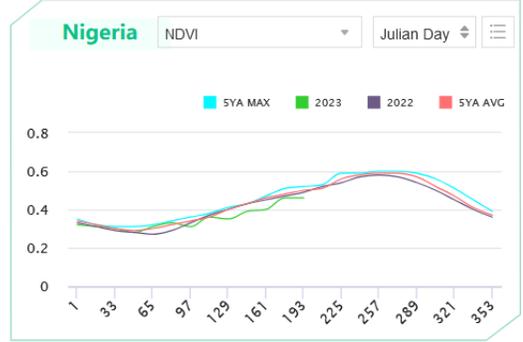
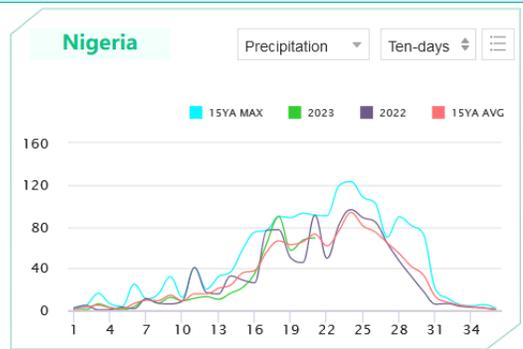
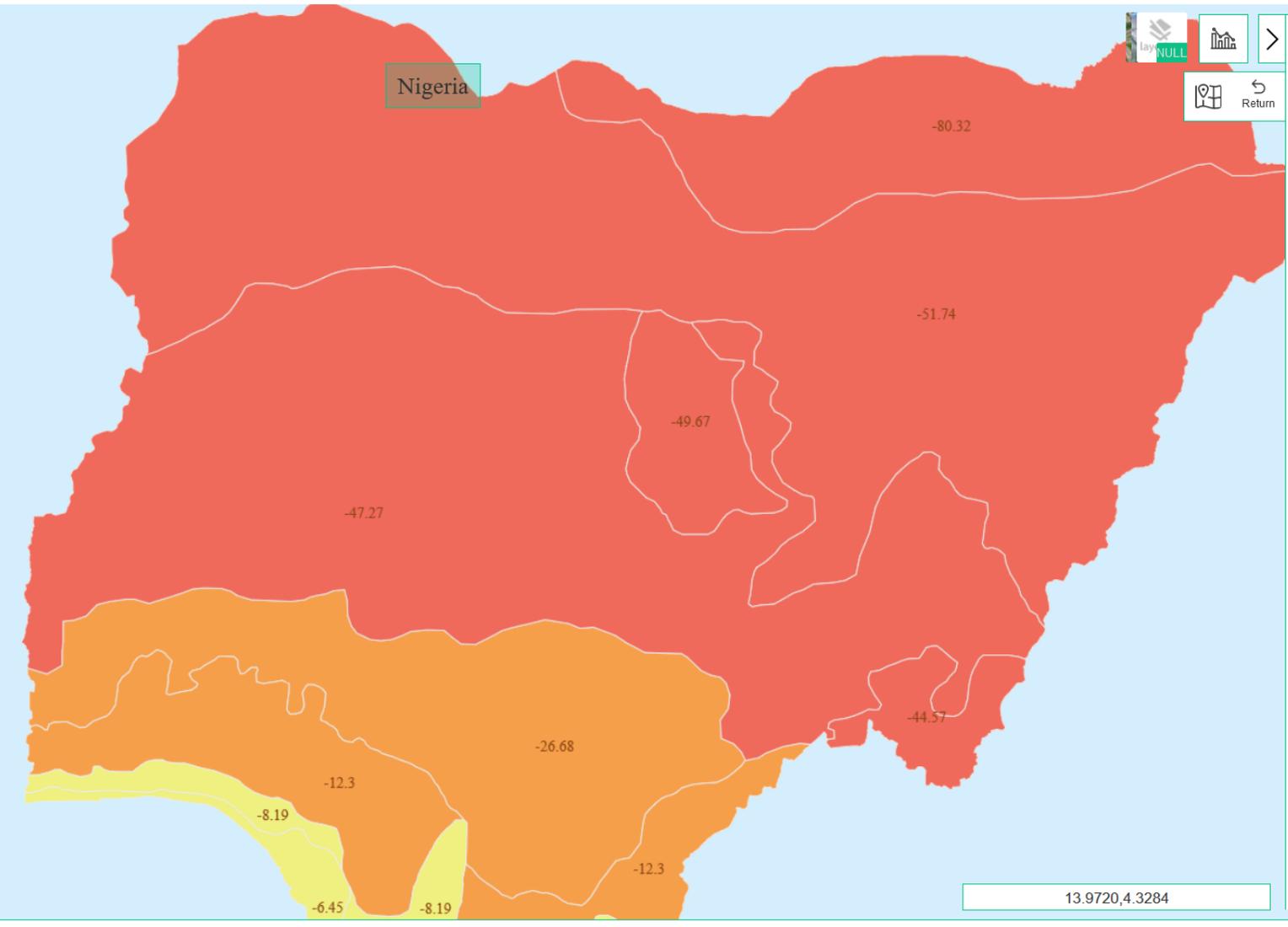


## **Information at country Level(AEZ)**

# Information at the country Level(AEZ)-Agroclimatic Info.

世界  
 MPZ  
 Country/AEZ  
 Country/Province  
 Country/AEZ

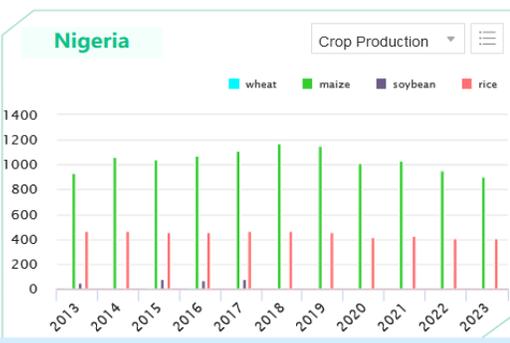
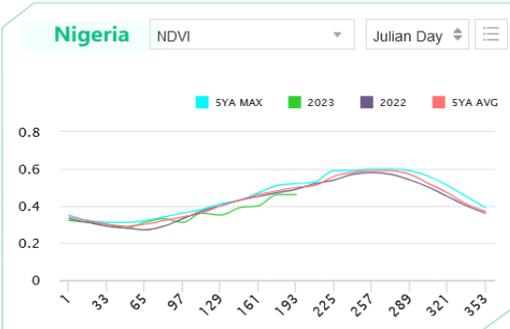
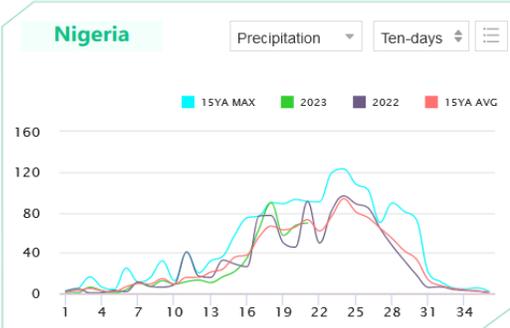
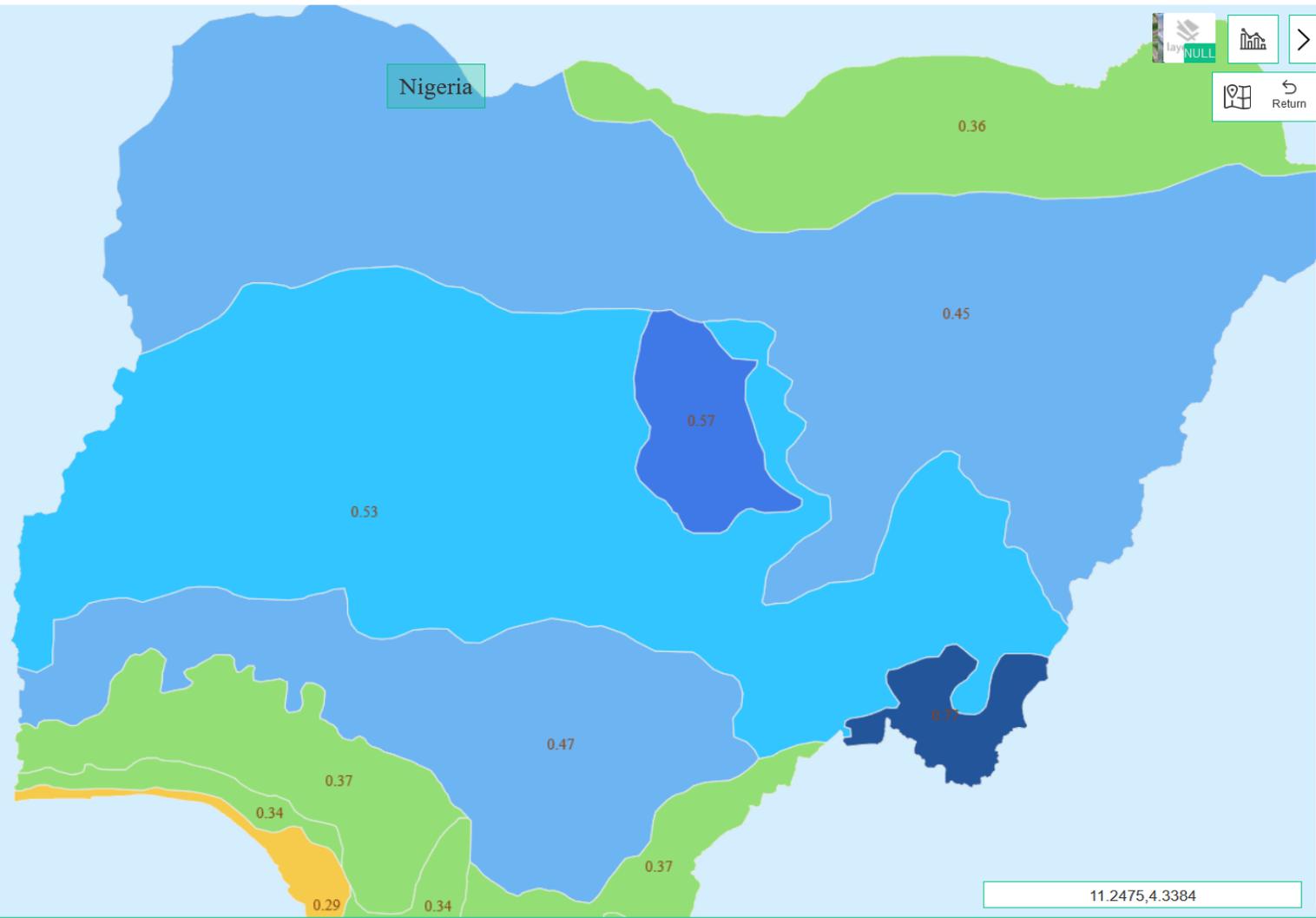
- No Data
- < -30
- 30 - -10
- 10 - 10
- 10 - 30
- > 30



# Information at the country Level(AEZ)- Agronomic Info

世界  
 +  
 -  
 世界  
 Country/AEZ  
 Country/Province  
 Country/AEZ

NDVI  
 No Data  
 < 0.10  
 0.10 - 0.20  
 0.20 - 0.30  
 0.30 - 0.40  
 0.40 - 0.45  
 0.45 - 0.50  
 0.50 - 0.55  
 0.55 - 0.60  
 > 0.60

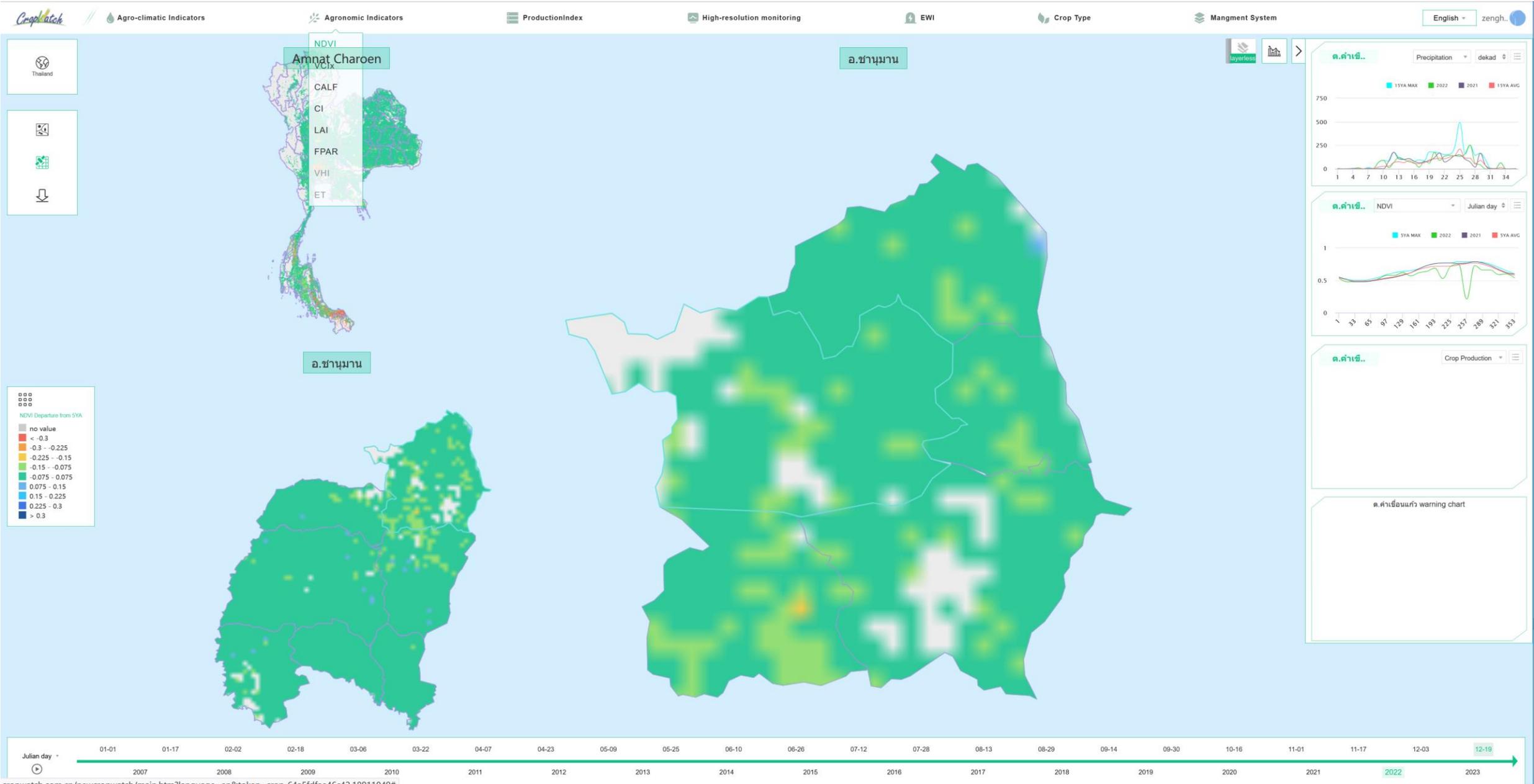


Julian Day 01-01 01-17 02-02 02-18 03-06 03-22 04-07 04-23 05-09 05-25 06-10 06-26 07-12 07-28 08-13 08-29 09-14 09-30 10-16 11-01 11-17 12-03 12-19  
 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

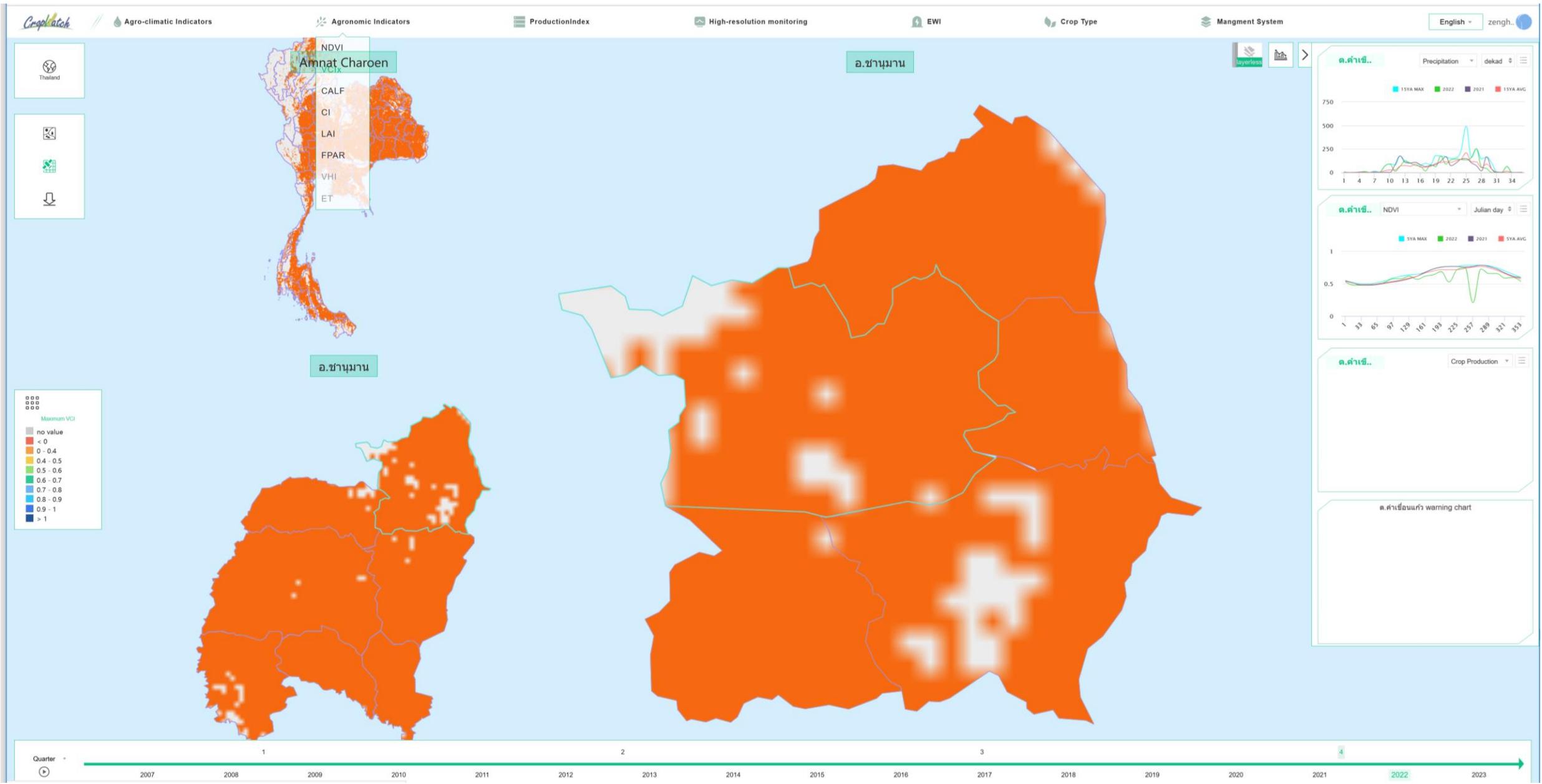
# Information for special country



# Interface of CropWatch for Thailand-NDVI



# Interface of CropWatch for Thailand-VCIX



# Interface of CropWatch for Thailand-CALF

The interface displays the following components:

- Navigation Bar:** Includes 'CropWatch' logo, 'Agro-climatic Indicators', 'Agronomic Indicators', 'Production Index', 'High-resolution monitoring', 'EWI', 'Crop Type', and 'Mangment System'.
- Language and User:** 'English' dropdown and 'zengh..' user profile.
- Map:** Shows a map of Thailand with a detailed view of the Amnat Charoen province. A legend indicates 'Cropped or not' with categories: 'no value' (grey), 'Uncropped' (orange), and 'Cropped' (green). The map is labeled with 'อ.ชานุมาน' (Amnat Charoen) in Thai.
- Indicator List:** A dropdown menu lists indicators: NDVI, VCI, CALF, CI, LAI, FPAR, VHI, and ET.
- Time Series Charts:** Three charts for 'อ.คำเขื่อนแก้ว' (Amnat Charoen) showing data from 2017 to 2022:
  - Precipitation:** Y-axis 0-750, X-axis 'dekad' (1-34). Legend: 15YA MAX (cyan), 2022 (green), 2021 (purple), 15YA AVG (red).
  - NDVI:** Y-axis 0-1, X-axis 'Julian day' (1-357). Legend: 15YA MAX (cyan), 2022 (green), 2021 (purple), 15YA AVG (red).
  - Crop Production:** Y-axis empty, X-axis empty. Legend: 15YA MAX (cyan), 2022 (green), 2021 (purple), 15YA AVG (red).
- Warning Chart:** A section titled 'อ.คำเขื่อนแก้ว warning chart' which is currently empty.
- Timeline:** A 'Quarter' dropdown and a year slider from 2007 to 2023, with 2022 selected.





## How to provide information for specific countries

---

Identify information needs

Provide basic data: borders, crop masks, etc.

Training courses: basic skills





# Conclusion and Outlook

# Conclusion

This presentation introduces the functions of CropWatch Explorer and how to use it to search and download information (images and tables) at MPZ, MRU, national and provincial (AEZ) level, and details of special countries.

We hope that every colleague will understand and master this function.

# Outlook

-  **01** All information generated by CropWatch Pro will be displayed in CropWatch Explorer, including raster information.
-  **02** CropWatch Explorer will provide information personalised to the specific needs of the user (any region, any time, anyone).

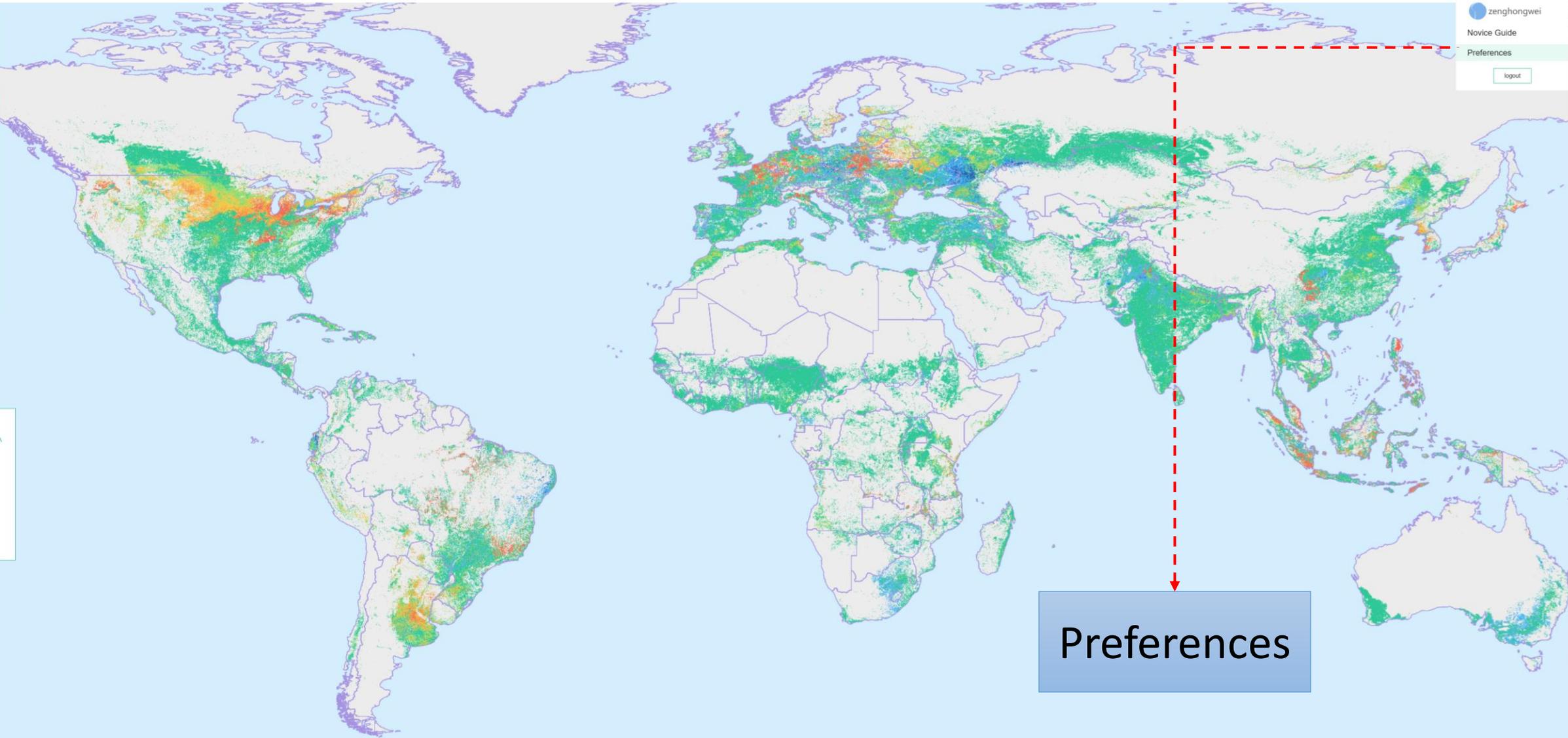
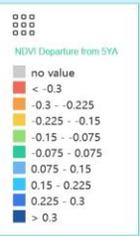


# Practices



**More&Practise**

**Interface  
configuration**



Preferences





世界



国家分区



NDVI

- No Data
- < 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.45
- 0.45 - 0.50
- 0.50 - 0.55
- 0.55 - 0.60
- > 0.60



无底图



无底图



### Preferences



#### Agro-climatic Indicators

- Precipitation
- AVG TEMP
- PAR
- Potential Biomass
- SPI ||

#### Agronomic Indicators

- NDVI
- VCix
- CALF
- CI
- LAI
- FPAR
- VHI ||
- ETI ||

#### Production Index

- Crop Production
- Cropped Area
- Crop Yield
- Maize
- Rice
- Wheat
- Soybean

#### High-resolution monitoring

- Crop Classification
- Cropping Intensity
- Rice Mapping
- Crop Yield Prediction ||

#### Early Warning Indicators

- CPI
- Cropped Area Warning ||
- ASI ||

#### High-Resolution Products

- Crop Types in Northeast China (2022)
- CPIS (USA)
- Paddy Rice in SA and SEA
- Global Irrigation Fraction
- Global Cropland (2019-2021)
- Global Cropland on the Earth
- Global Cropping Intensity

Note: Indicators with '||' is Coming Soon !

Cancel

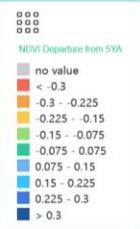
Confirm

6.8709,83.2195

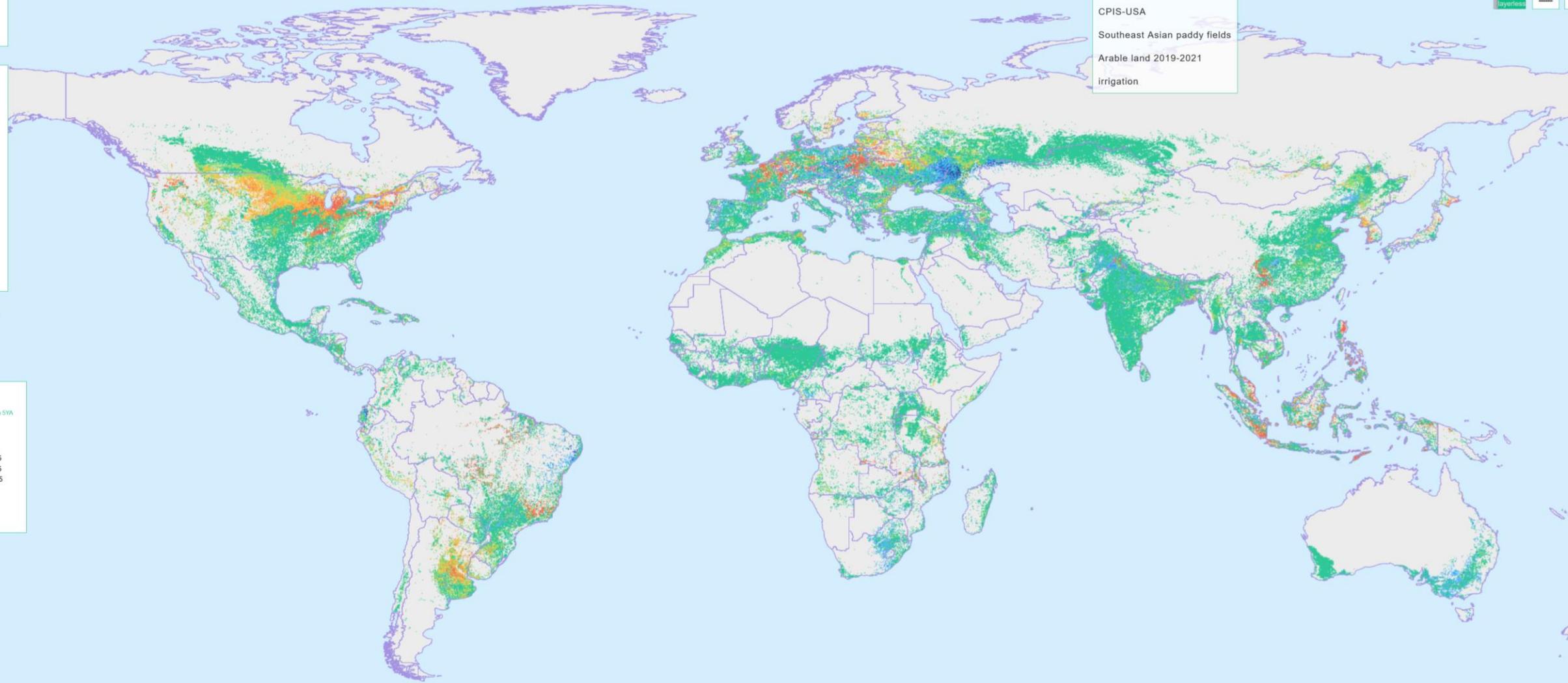
Julian Day

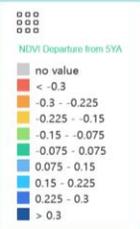
01-01   01-17   02-02   02-18   03-06   03-22   04-07   04-23   05-09   05-25   06-10   06-26   07-12   07-28   08-13   08-29   09-14   09-30   10-16   11-01   11-17   12-03   12-19

2007   2008   2009   2010   2011   2012   2013   2014   2015   2016   2017   2018   2019   2020   2021   2022   2023

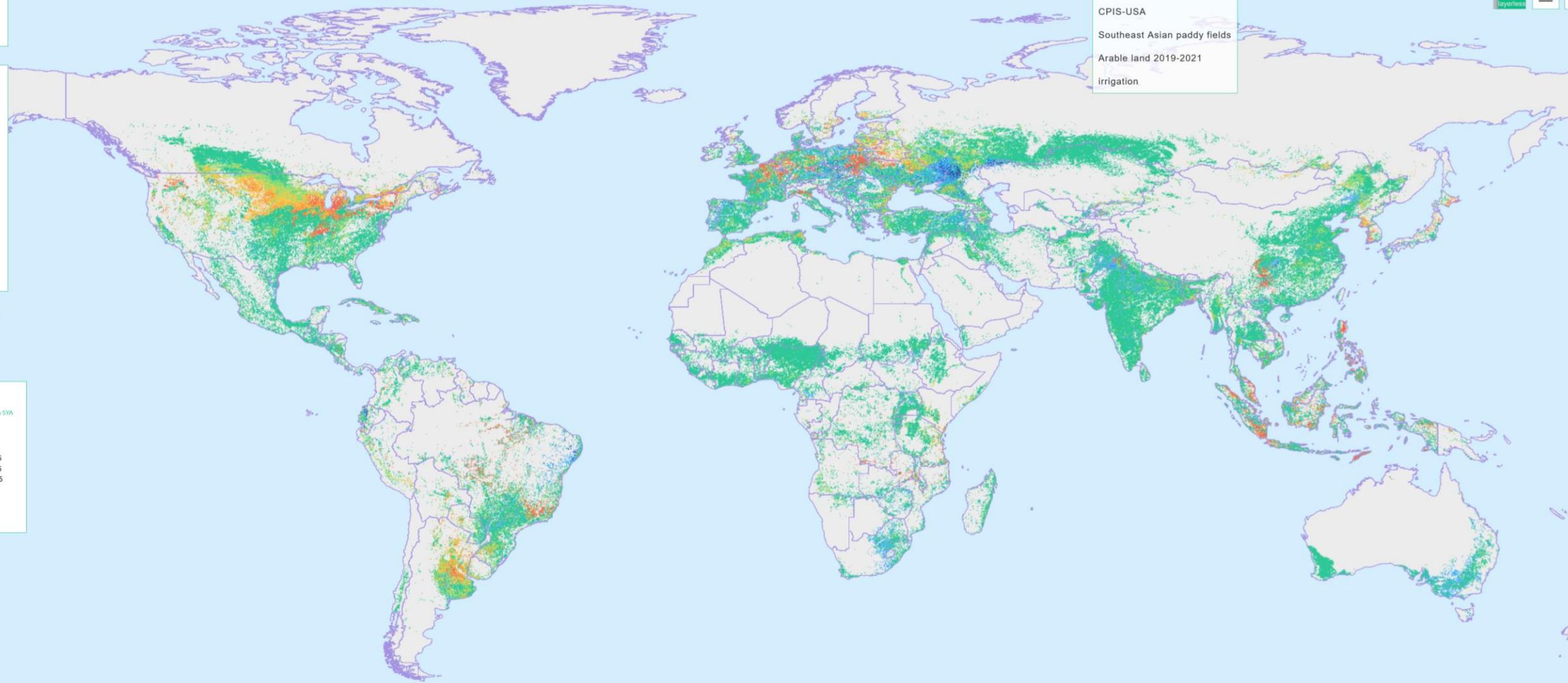


- Crop distribution
- CPIS-USA
- Southeast Asian paddy fields
- Arable land 2019-2021
- Irrigation





- Crop distribution
- CPIS-USA
- Southeast Asian paddy fields
- Arable land 2019-2021
- Irrigation



World

+

-

COUNTRY/Province

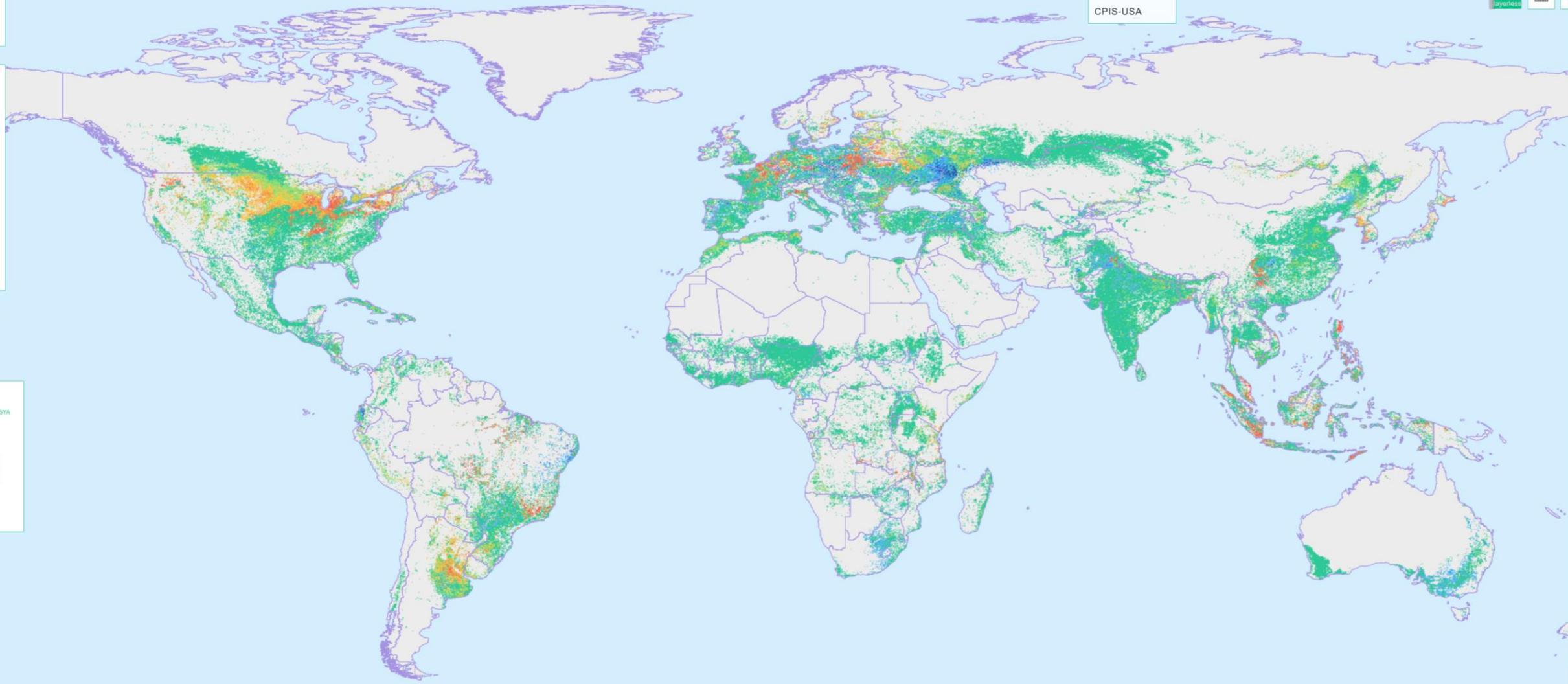
NEVI Departure from SYA

no value
< -0.3
-0.3 - -0.225
-0.225 - -0.15
-0.15 - -0.075
-0.075 - 0.075
0.075 - 0.15
0.15 - 0.225
0.225 - 0.3
> 0.3

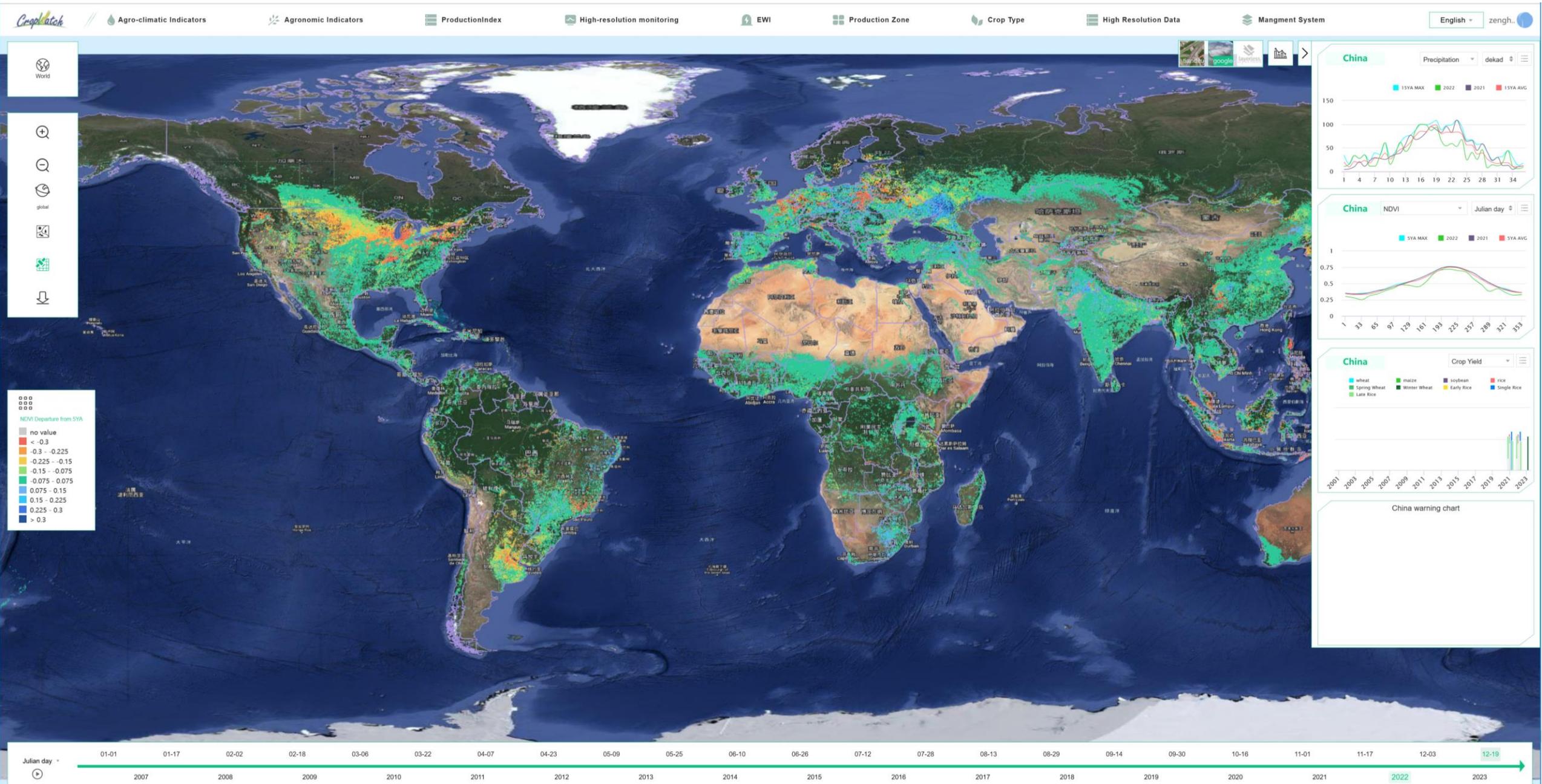
Crop distribution

CPIS-USA

layers



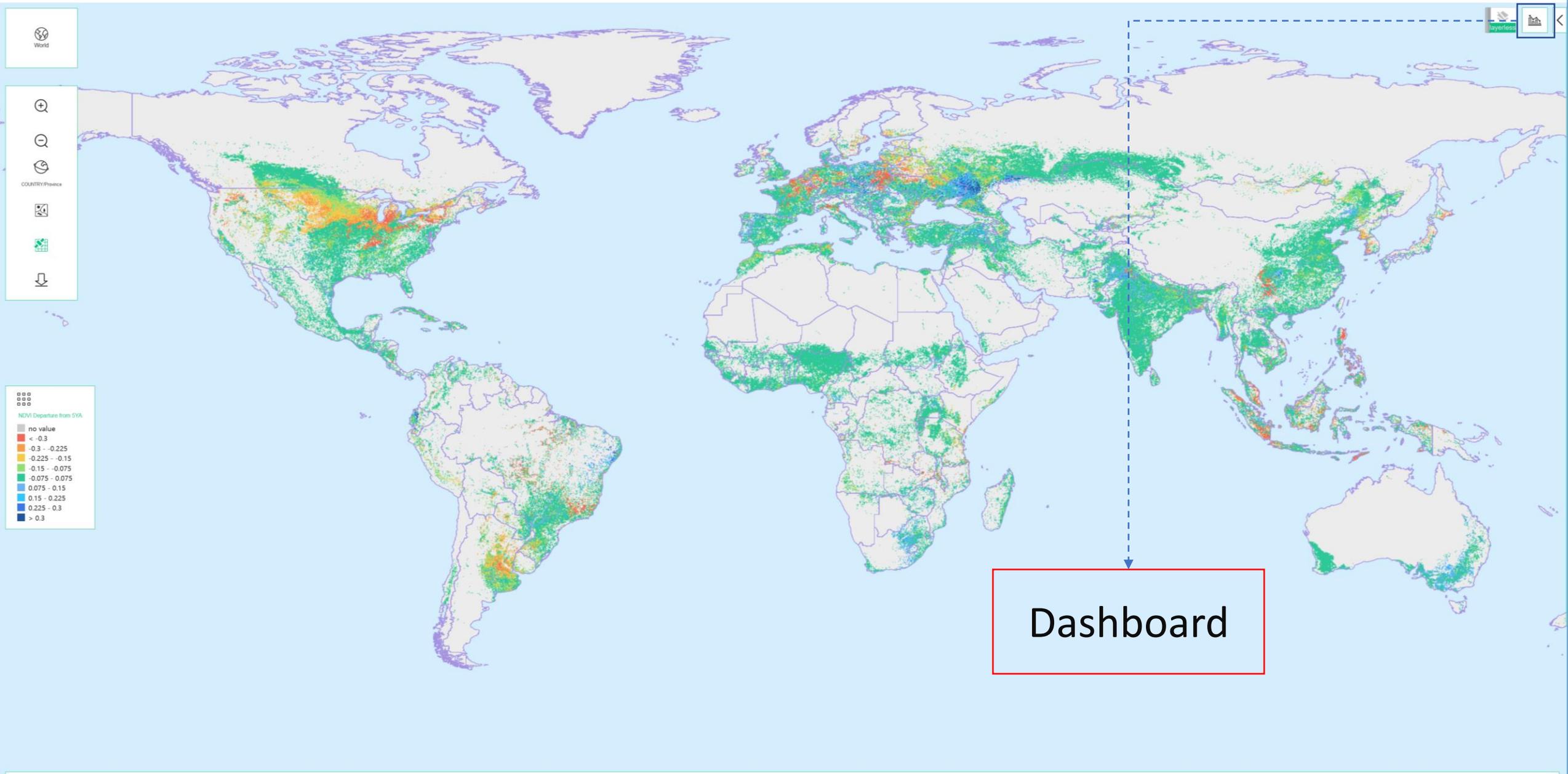
# Change the background map



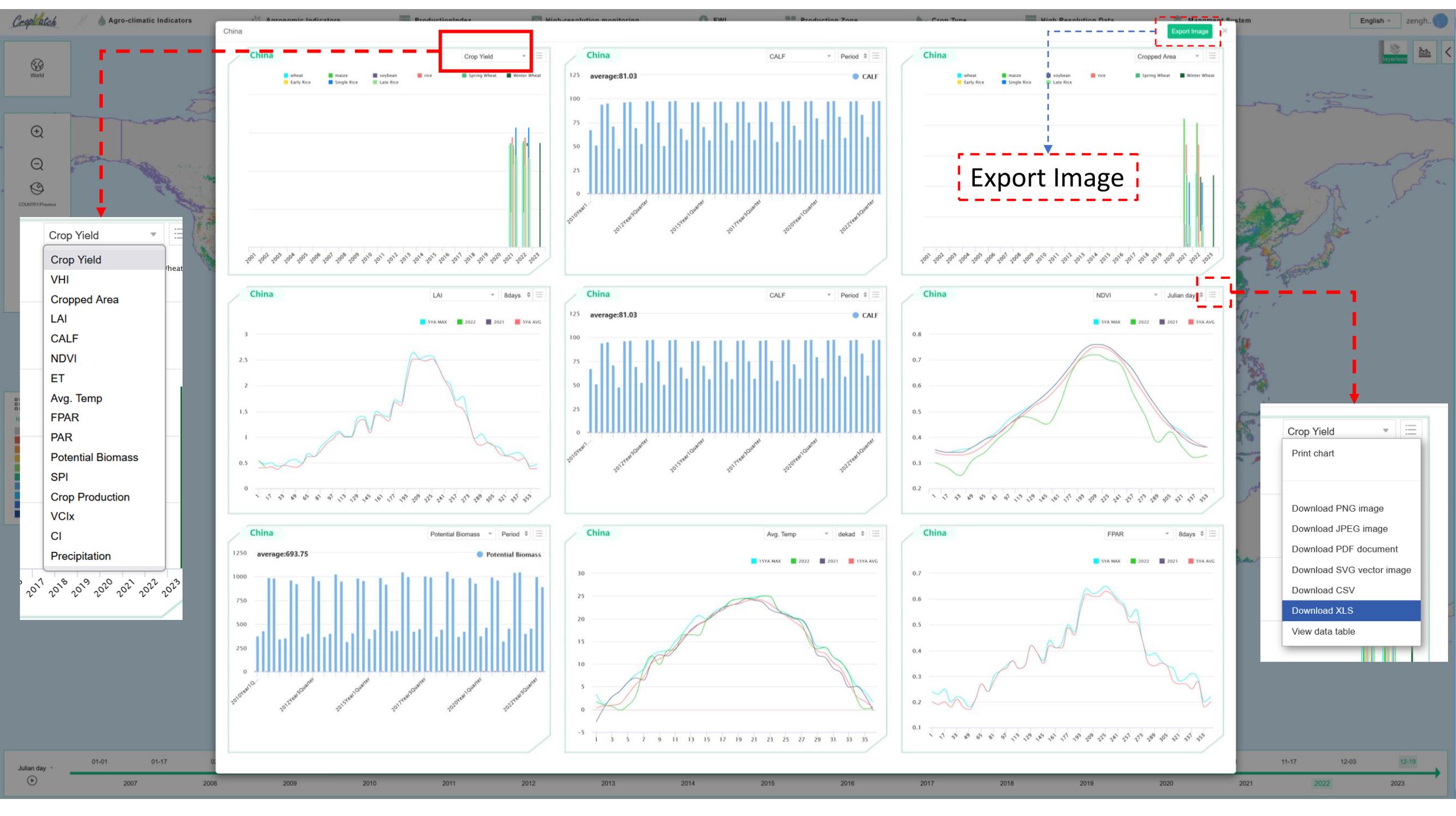


**More&Practise**

**Training on  
Dashboard**



Dashboard



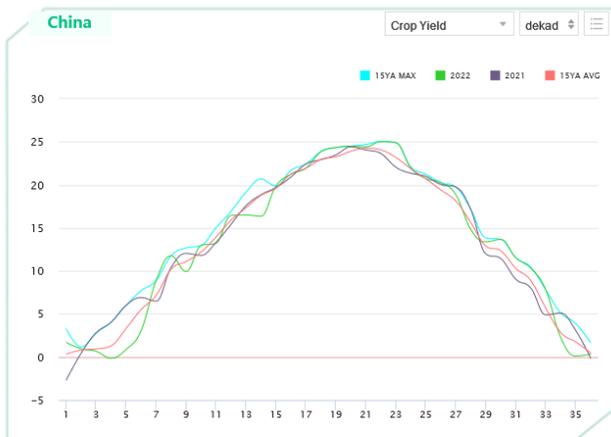
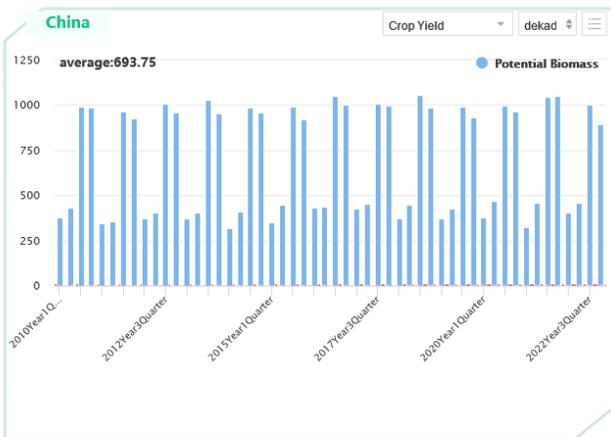
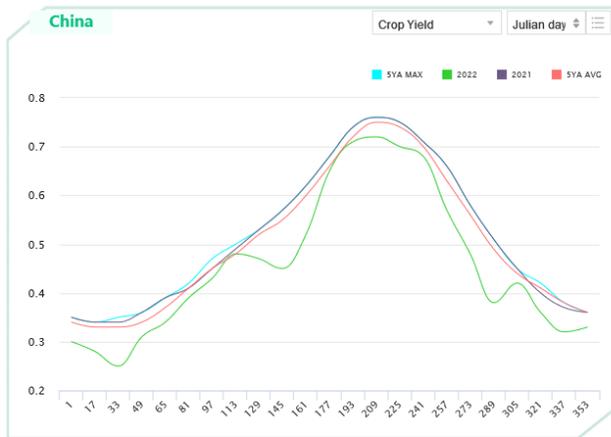
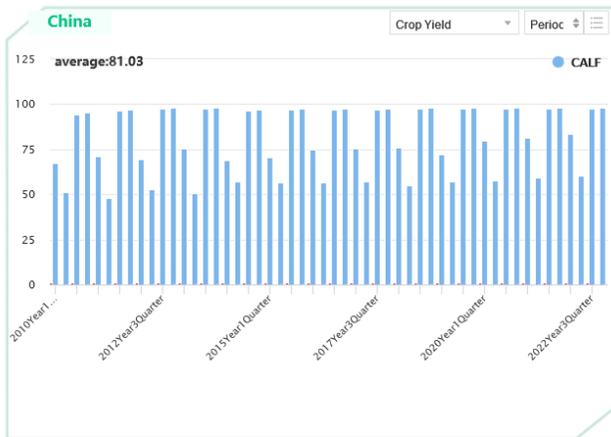
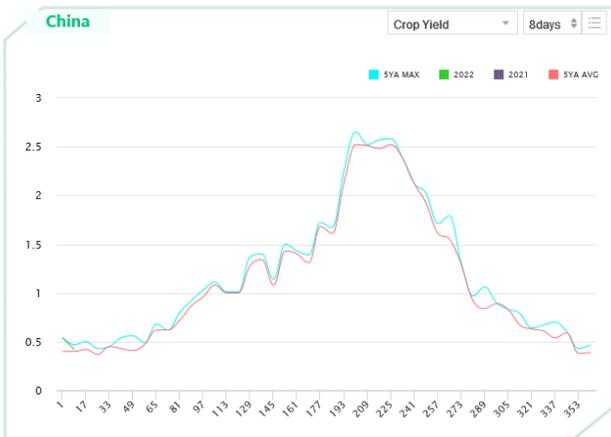
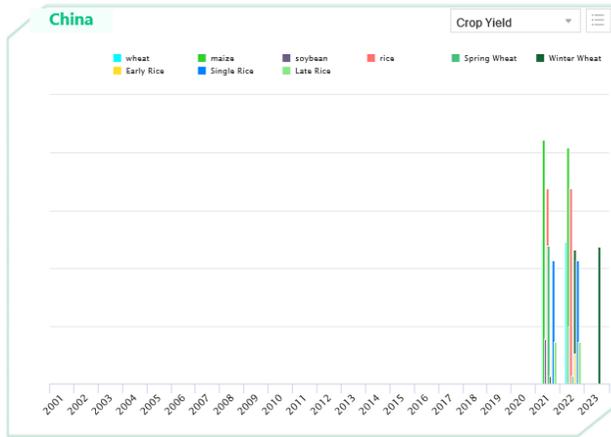
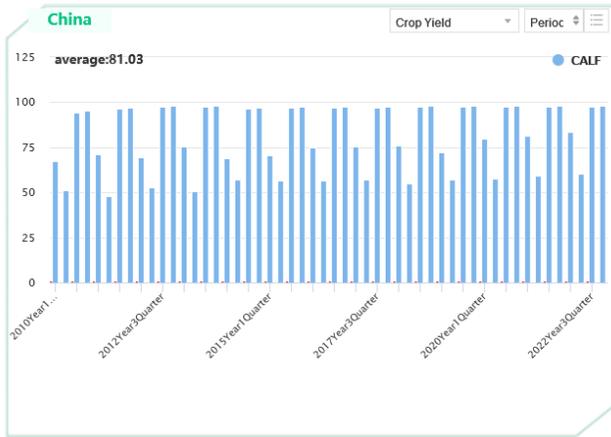
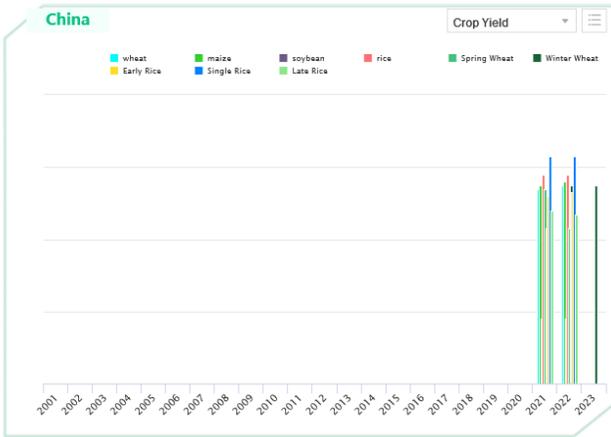
Crop Yield

Export Image

Export Image

- Crop Yield
- VHI
- Cropped Area
- LAI
- CALF
- NDVI
- ET
- Avg. Temp
- FPAR
- PAR
- Potential Biomass
- SPI
- Crop Production
- VCIx
- CI
- Precipitation

- Crop Yield
- Print chart
- Download PNG image
- Download JPEG image
- Download PDF document
- Download SVG vector image
- Download CSV
- Download XLS
- View data table





**More&Practise**

**Exporting  
tables, maps,  
and data**

# Exporting Maps



Agro-climatic Indicators

Agronomic Indicators

Production Index

High-resolution monitoring

EWI

Production Zone

Crop Type

High Resolution Data

Management System

English | zengh...



Export Image



Exporting Maps

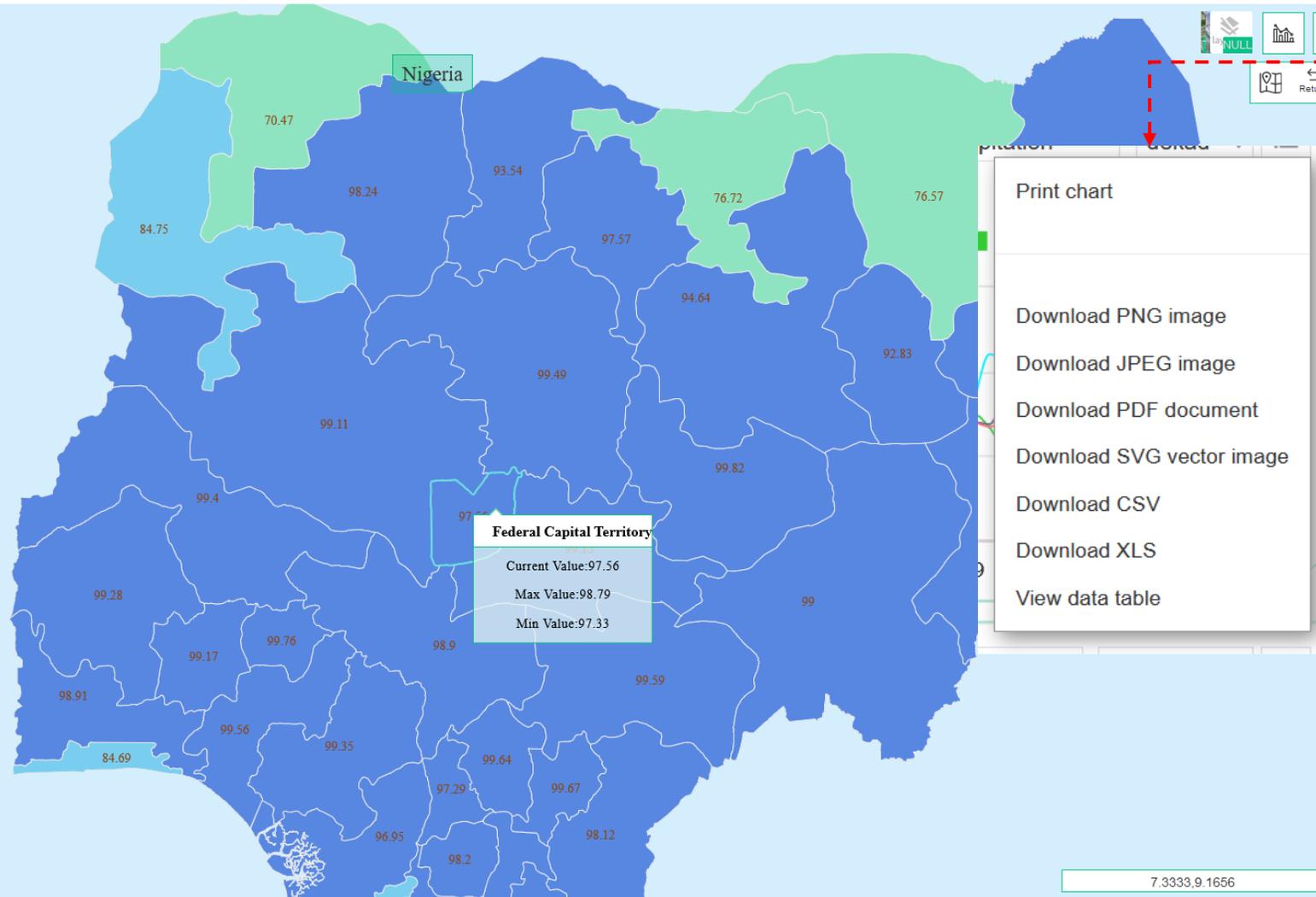
Julian day



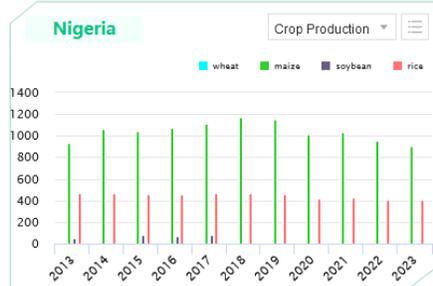
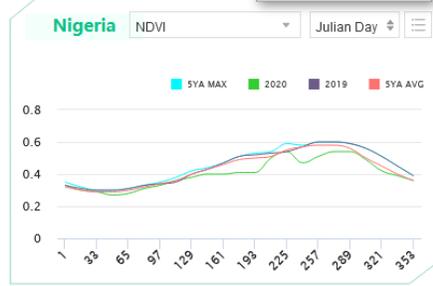
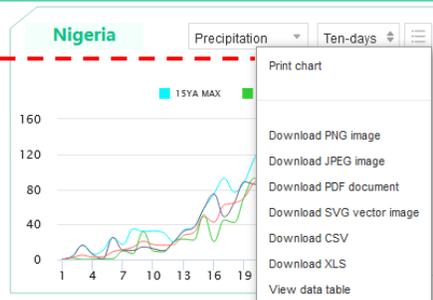
# Exporting Tables

世界  
+  
-  
Country/Province  
 MPZ  
 MRU  
● Country/Province  
 Country/AEZ  
↓

0 0 0 0  
0 0 0 0  
 Cropped Arable Land Fraction  
 (%)  
 No Data  
 0 - 15  
 15 - 30  
 30 - 55  
 55 - 65  
 65 - 80  
 80 - 90  
 90 - 100



Print chart  
 Download PNG image  
 Download JPEG image  
 Download PDF document  
 Download SVG vector image  
 Download CSV  
 Download XLS  
 View data table



Period 1 2 3 4  
 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

7.3333,9.1656

Welcome to join us!!!

Contact us:

Dr. Zeng Hongwei

Email: zenghw@aircas.ac.cn



**THANKS!**

**ANSO project(No. ANSO-SBA-2022-02)  
NSFC-UNEP Project(No. 41861144019)  
CropWatch4GEOGLAM(No.2019YFE0126900)**

