



Institute of Remote Sensing and Digital Earth
Chinese Academy of Sciences

CropWatch and ETWatch for Food Security

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INTRODUCTION

Remote Sensing can be used to improve monitoring and management for food security. This can be done through:



Focus	Applications
Disaster Management	<ul style="list-style-type: none">• Flood mapping and forecasting modeling• Drought monitoring and early warning
Water Management	<ul style="list-style-type: none">• Water balance analysis/Water use efficiency• Ground water to surface water integration• Satellite and in situ precipitation data merging• Evapotranspiration measurement and monitoring• Climate change impact analysis on water
Agriculture Management	<ul style="list-style-type: none">• Crop and irrigation mapping• Agriculture and water productivity• Climate change impact on agriculture production• Crop yield forecasting• Locust monitoring





CropWatch

- Global Crop Monitoring System



DroughtWatch

- Drought monitoring system



ETWatch

- Evapotranspiration monitoring system

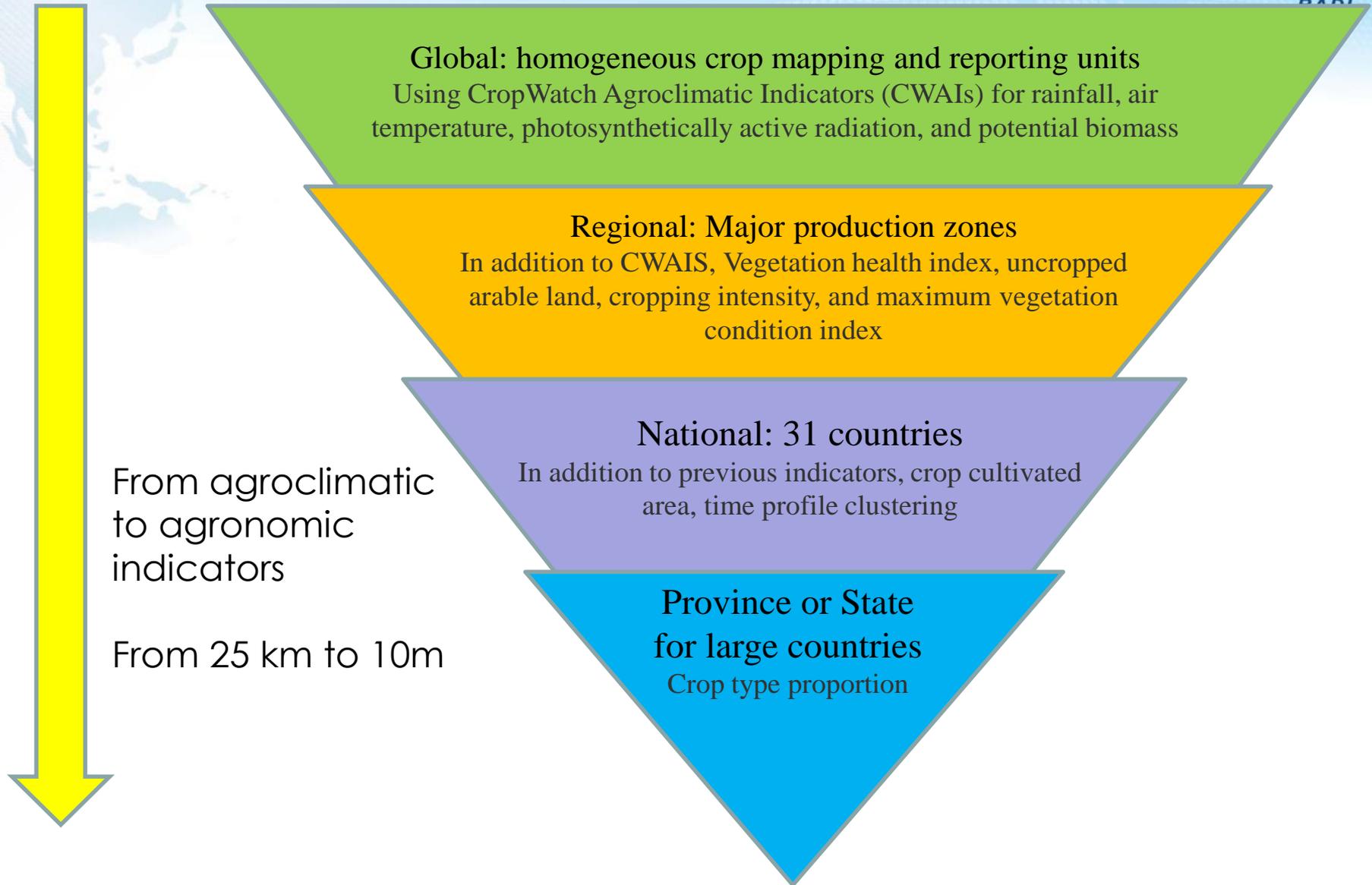
CropWatch Mission

CropWatch aims at improving food information availability, quality and transparency

- To improve access to global information about the worldwide production of major cereals and soybean
- Serve as a science-based Chinese voice on global food security perception
- To provide additional, reliable information for developing countries to fight against hunger
- Offer cloud-based services



CropWatch Hierarchical Approach



CropWatch Hierarchical Approach



➤ 4 scales

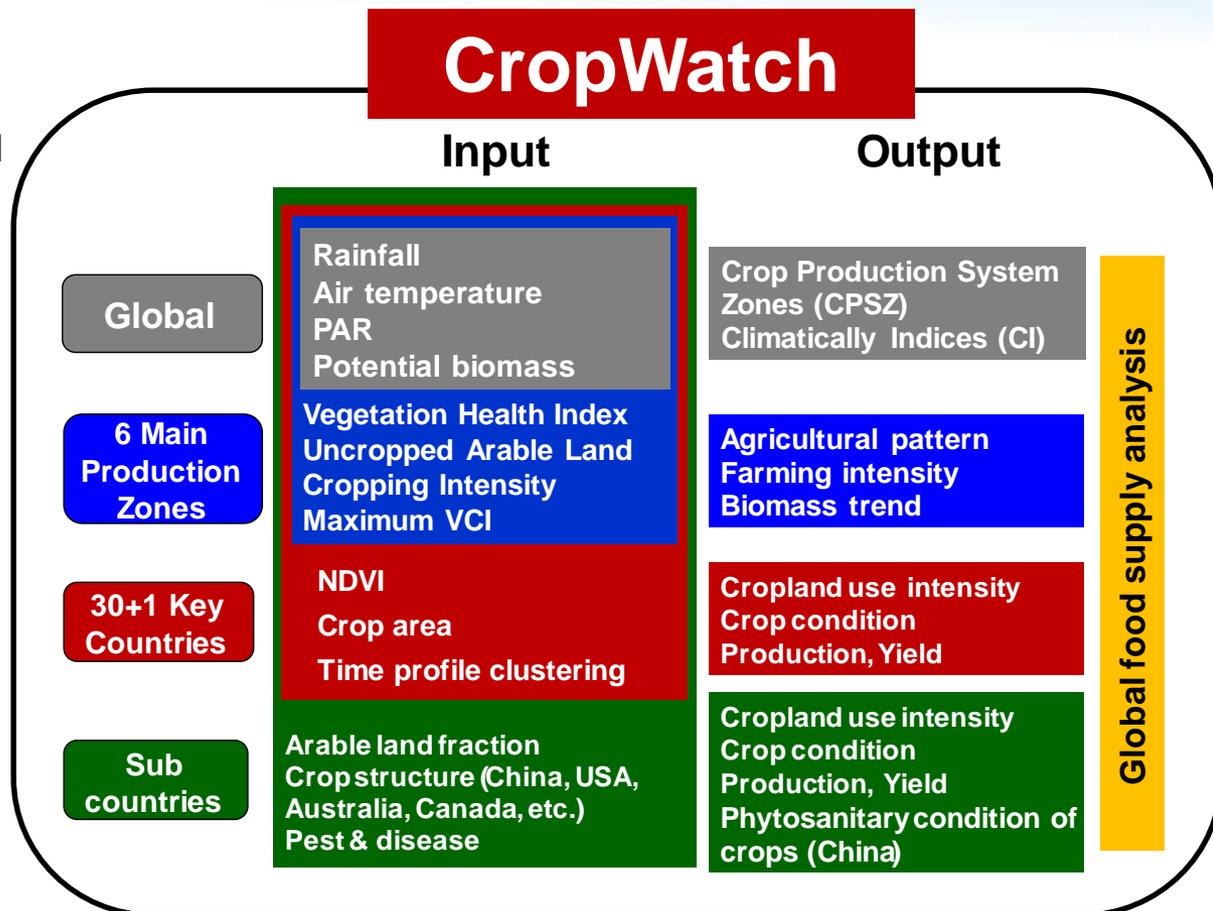
- Covering 31 main crop producing countries
- Taking account of 80% of global production and exports

➤ 4 temporal resolution

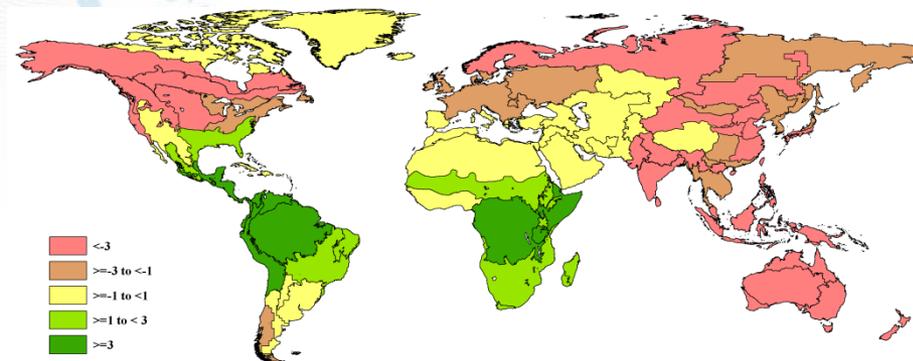
- 16 Days: NDVI, Crop condition
- Seasonal: Agro-climatic indicators, CAL, VHI, VCIx
- Growing season: Area, Yield, Production
- Year: Cropping intensity

➤ 4 spatial resolution

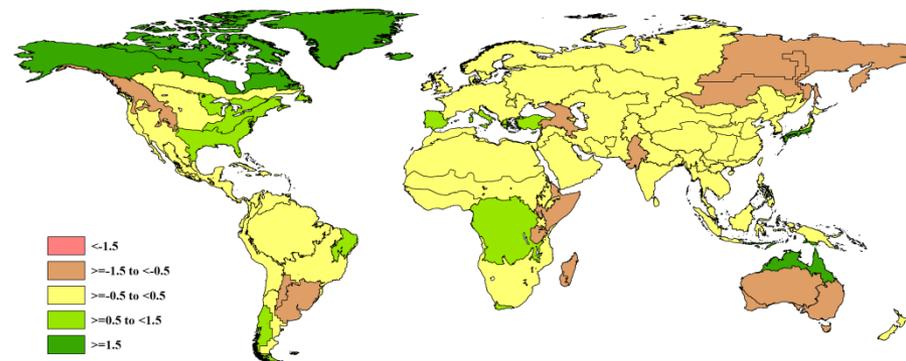
- 0.25° (Global)
- 1km (7 MPZ, 31 countries, Sub countries)
- 250m China
- 30m/16m main production regions in China



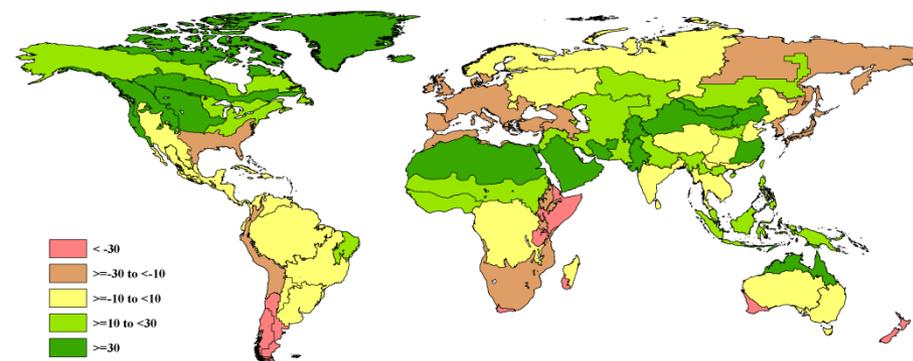
Global: 65 MRUs



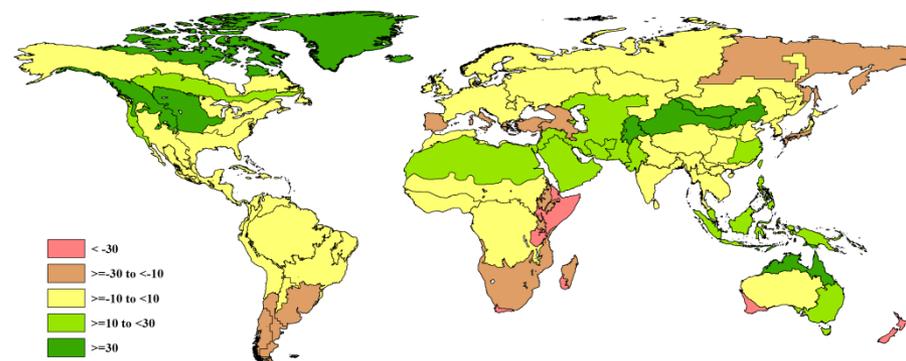
PAR departure



Temperature departure



Precipitation departure



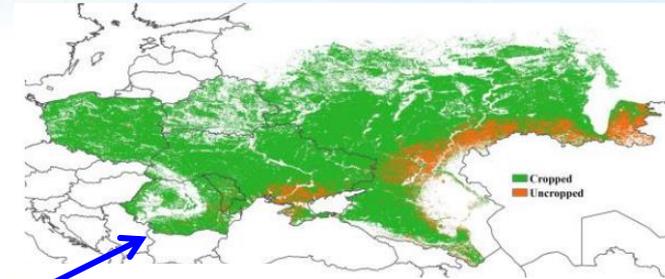
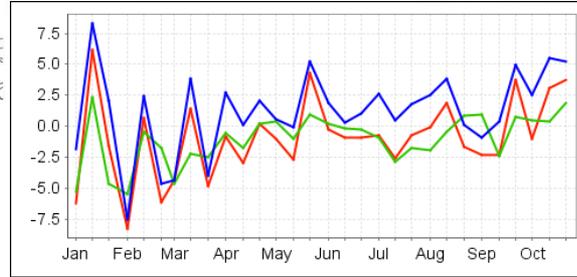
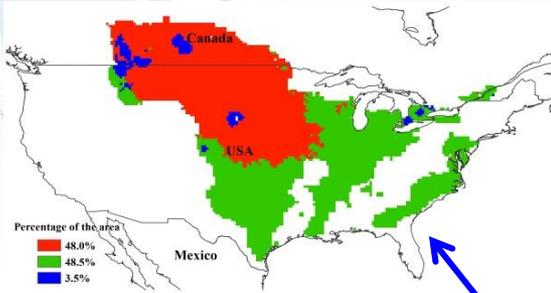
Biomass departure

6 MPZs - Cropping Intensity & Stress



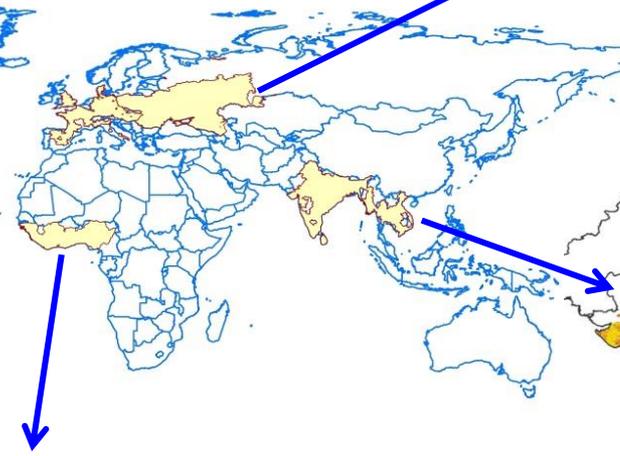
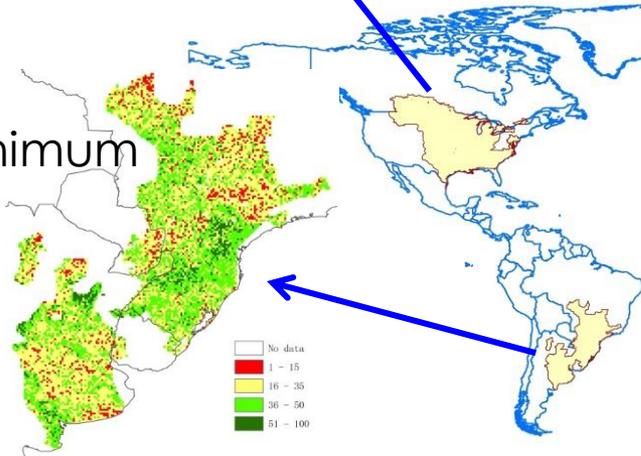
Rainfall cluster and profiles

Cropped and uncropped map

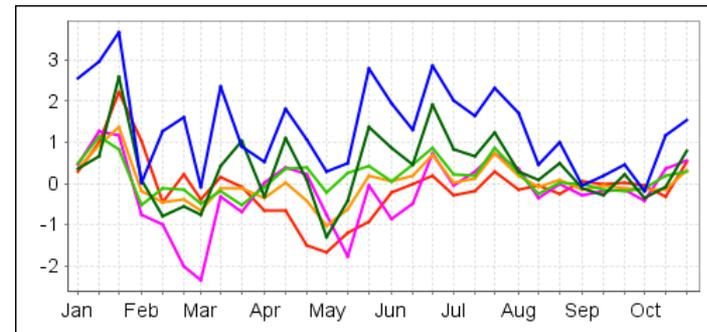
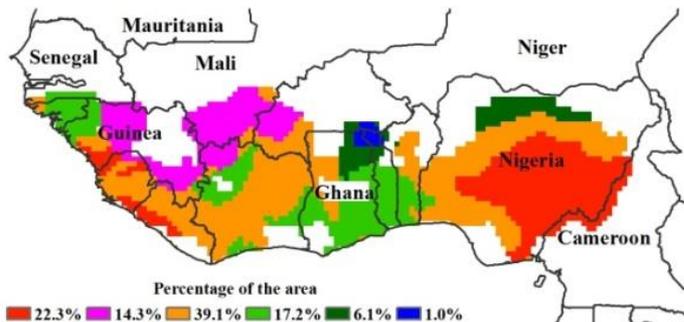


VHI minimum

Maximum VCI



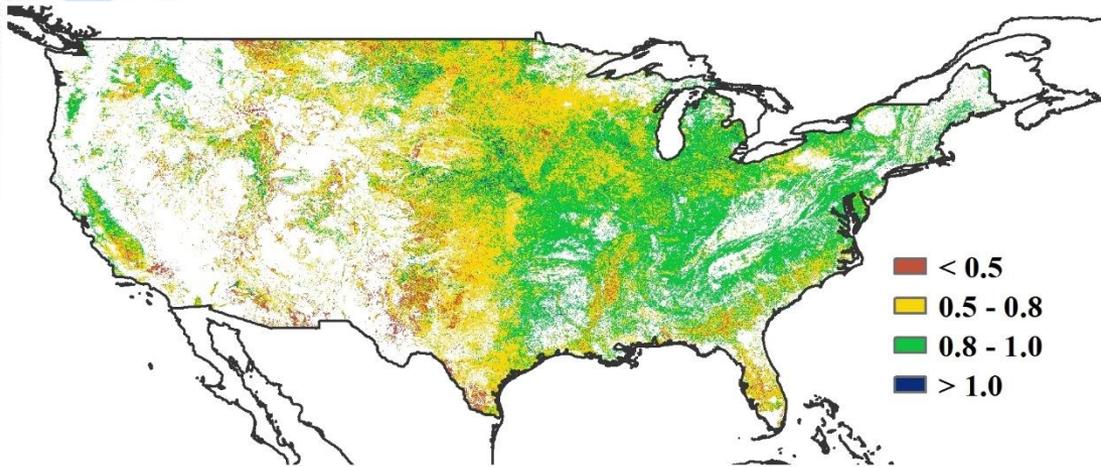
Temperature cluster and profile



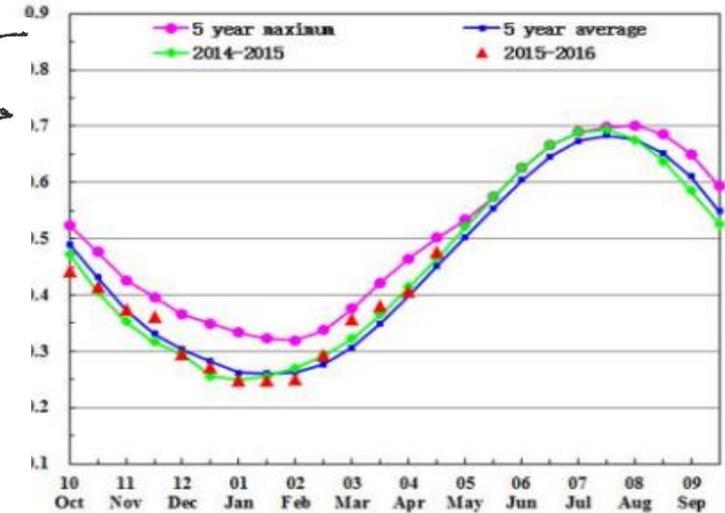
31 Countries - Crop Condition



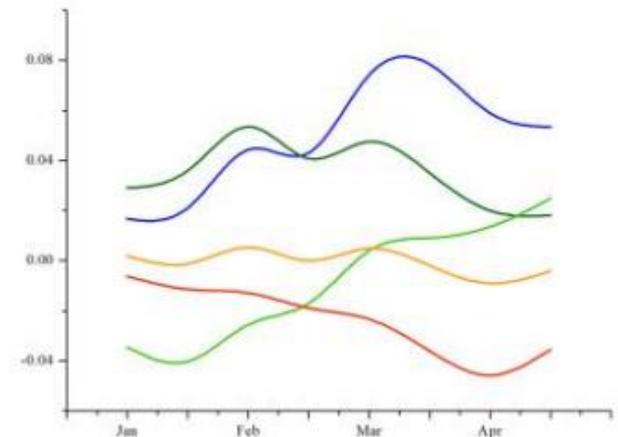
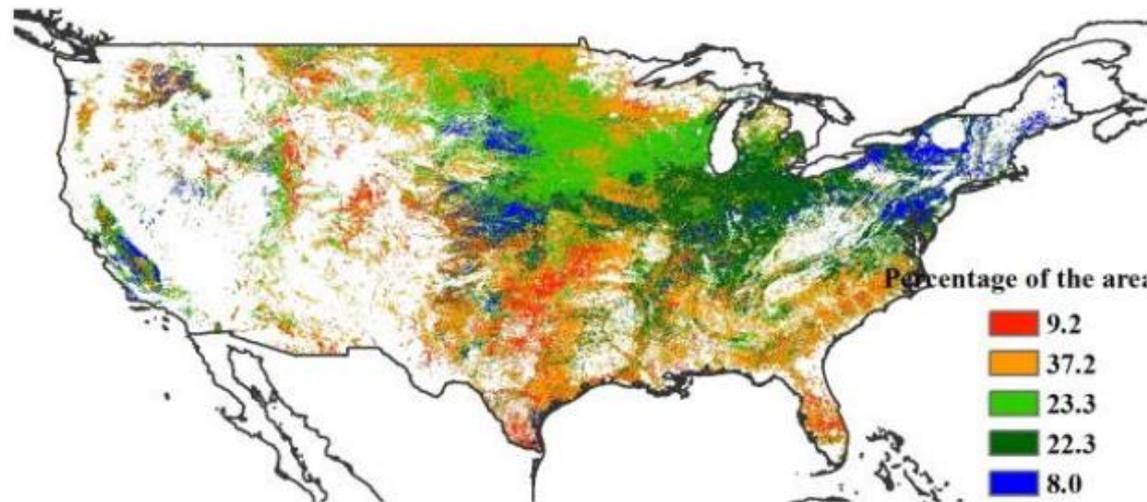
Maximum VCI from Jan. to Apr. 2016



Crop condition development graph based on NDVI



NDVI departure from 5 year average map and cluster (Jan. to Apr. 2016)



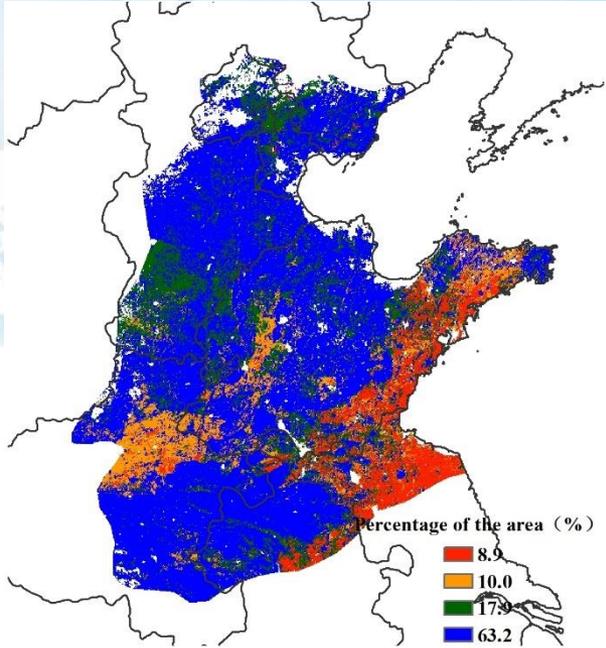
31 Countries - Production for 2016



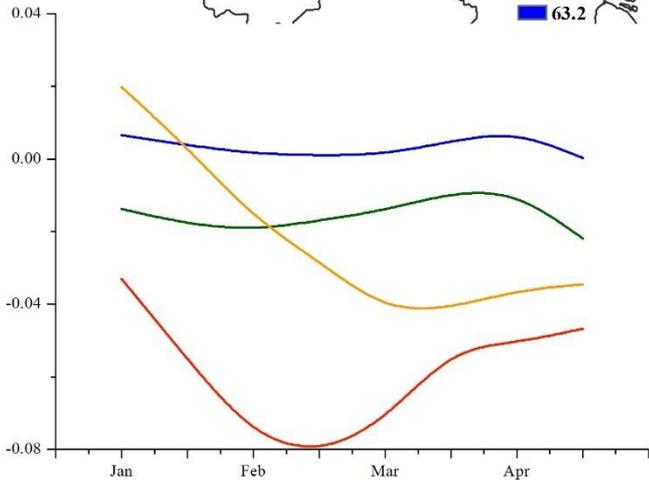
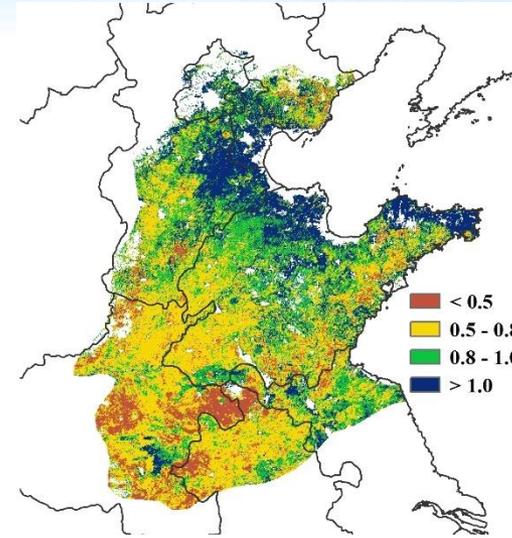
	Maize		Rice		Wheat		Soybean	
	2016	Δ%	2016	Δ%	2016	Δ%	2016	Δ%
Argentina	25710	1	1695	0	11630	-4	51080	-1
Australia	470	3	1507	14	31600	25	99	7
Bangladesh	2375	6	47722	-6	1317	0		
Brazil	70433	-12	11055	-7	7545	8	91774	2
Cambodia	779	-0	8588	-10			166	4
Canada	11701	-1			33290	9	5386	-1
China	200361	0	200532	-1	118591	-1	13287	2
Egypt	5701	-4	6293	-4	10207	3	28	-1
Ethiopia	7157	10	134	5	4743	12	100	14
France	14703	-1	78	-8	37984	-3	208	9
Germany	4602	0			28106	3		
India	18649	-1	156783	1	86099	-6	12176	0
Indonesia	18316	2	69304	3			884	0
Iran	2692	8	2763	9	16073	15	174	-1
Kazakhstan	689	5	411	4	18199	14	271	10
Mexico	23780	0	177	-4	3550	-2	399	10
Myanmar	1746	2	25541	-8	187	1	127	-11
Nigeria	10770	4	4588	1	115	3	662	4
Pakistan	4528	-7	9142	-3	24638	-1		
Philippines	7565	0	20106	3				
Poland	3681	0			10704	3		
Romania	11491	7	47	-4	7675	7	208	8
Russia	12337	3	1017	0	57506	6	2099	3
South Africa	9018	-32	3	1	1704	0	1105	9
Thailand	5080	1	39661	1	1	4	231	3
Turkey	5920	0	937	2	18981	-17	218	12
Ukraine	30774	9	107	-4	24059	3	3799	2
United Kingdom					14337	-3		
United States	367862	5	10528	6	56877	0	110024	3
Uzbekistan	425	7	437	10	6391	-5		
Vietnam	5234	1	42550	-6				
Major producers	884549	1.0	661706	-1.0	632109	1.1	294505	1.8
Minor producers	110391	2.8	74319	1.4	97457	1.6	21158	7.0
All countries	994940	1.2	736025	-0.8	729566	1.2	315663	2.1

Notes: "All countries" combines major and minor producers. Major producers are all the countries listed in the table; minor producers are the remaining countries. Boldfaced numbers in red are model-based estimates by CropWatch calibrated against data up to 2015; normal faced numbers are simple statistical projections based on FAOSTAT data up to 2014.

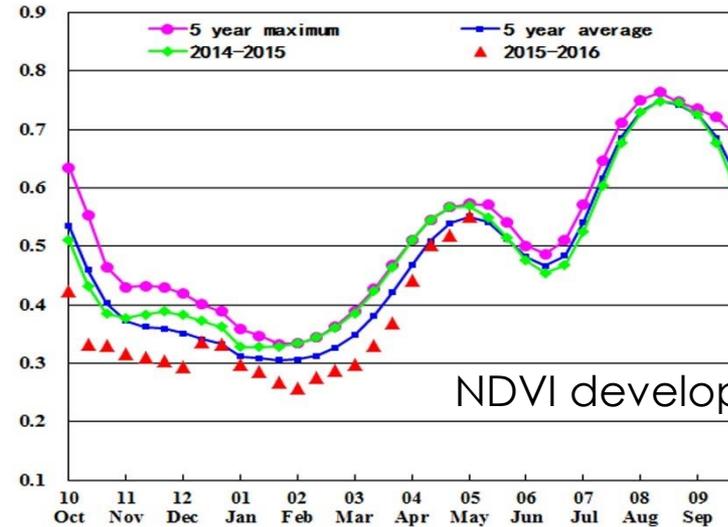
Sub-national - Crop Condition in North China Plain



Maximum VCI from Jan to Apr

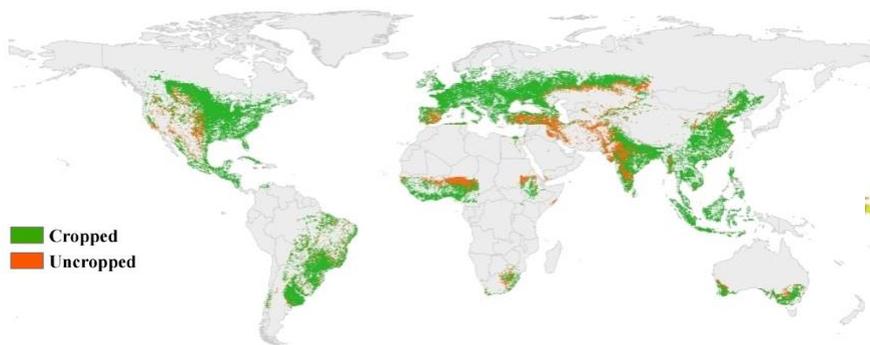


NDVI departure from 5 year average map and cluster (March to October)



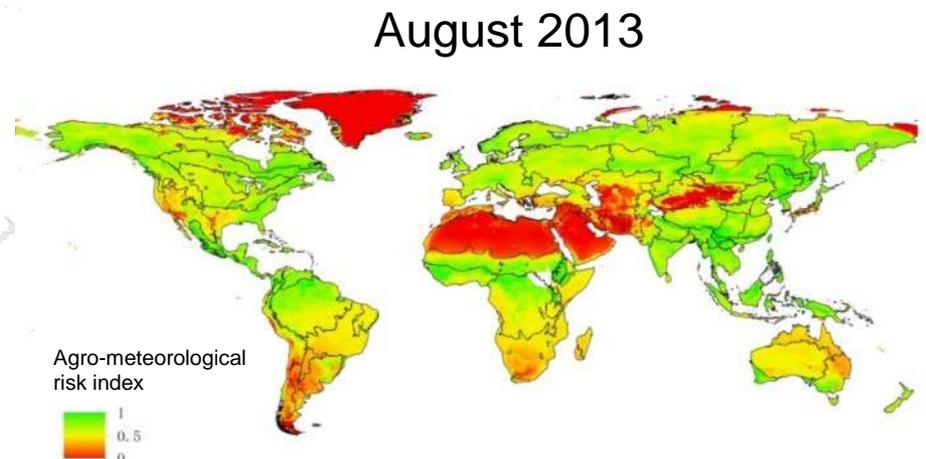
Food security early warning

- Cropped arable land fraction (CALF) represents the total cropping proportion at early growing stage
- Agro-meteorological risk index (AMRI) considering meteorological suitability for crops at different growing stage is used for yield alarming



■ Cropped
■ Uncropped

July to October 2015



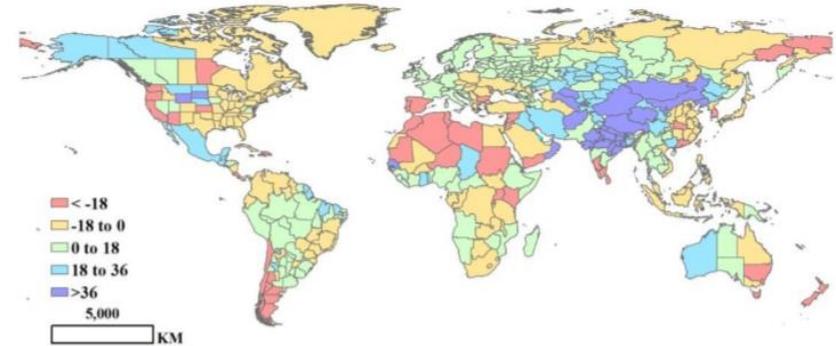
August 2013

Agro-meteorological
risk index
1
0.5
0

Early outlook based on CropWatch

	Environmental indices departure from 12YA (2001-2013)				Crop indicators departure from 5YA (2008-2013)		
	Rainfall total (%)	Temperature average (°C)	PAR accumulation (%)	Biomass accumulation (%)	Uncropped arable land in % of pixels (Absolute difference in % points)	Maximum VCI (absolute difference)	
Argentina	5	1.0	0.1	-1	0.7	-0.05	
Australia	-27	0.3	3	3	9.2	0.01	
Bangladesh	11	-0.5	-0.5	33	-0.2	0.06	
Brazil	-1	0.2	-0.4	2	-0.4	0.01	
Cambodia	5	-0.8	5	8	0.5	-0.01	
Canada	8	-1.3	6	-2	10.7	0.01	
China	19	0.5	8	21	-3.3	0.03	
Egypt	-24	0.2	3	26	-1.0	0.05	
Ethiopia	28	0.3	0.2	16	-4.3	0.01	
France	-3	0.8	0.1	4	-2.0	0.07	
Germany	5	1.2	0.4	9	-10.7	0.11	

Figure 3.1. Global map of biomass accumulation by country and sub-national areas, departure from twelve-year average (2001-13) average (percentage)



Overall, CropWatch tentatively summarizes the ongoing season as follows:

Mostly unfavorable: Armenia, Azerbaijan, Canada, Georgia, Philippines, Poland, Spain, Turkey, Ukraine, Moldova, Morocco, United States, and Vietnam.

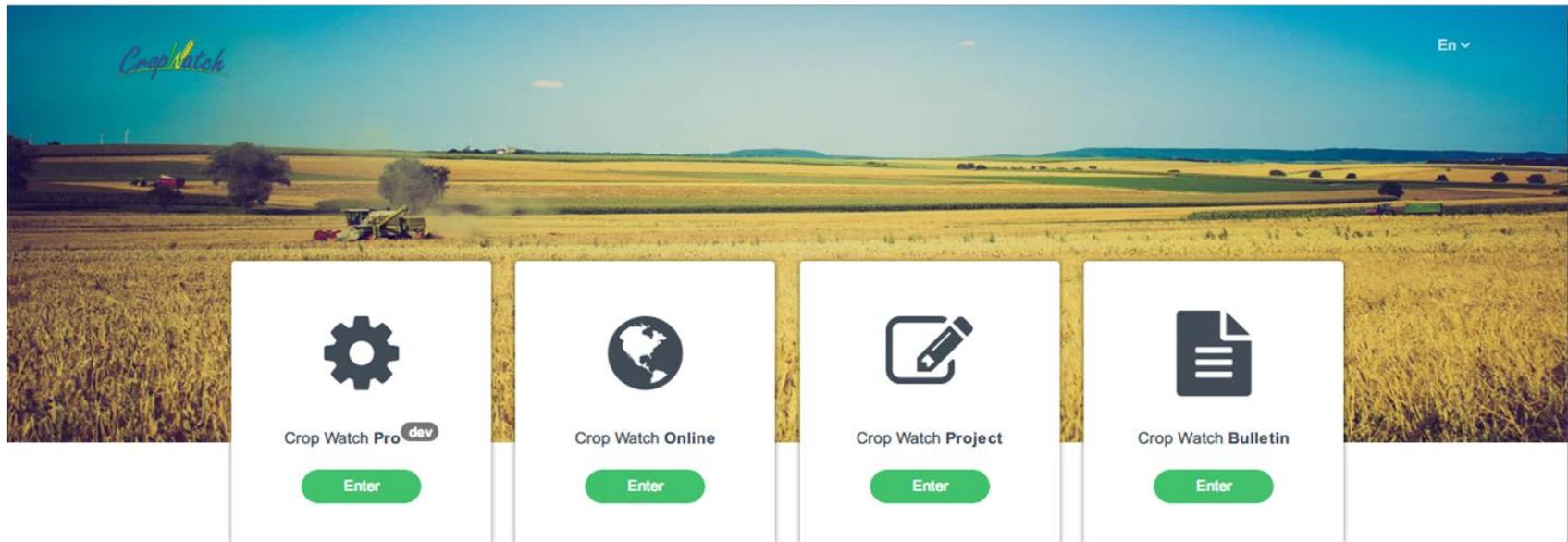
Mixed: Argentina, Brazil, China, Denmark, Egypt, France, Hungary, Indonesia, Iran, Italy, Nigeria, Romania, Russia, South Africa, United Kingdom, and Uzbekistan.

Mostly favorable: Bangladesh, Czechia, Germany, India, Kazakhstan, Mexico, Myanmar, Pakistan, and Thailand.

CropWatch Cloud System



CropWatch cloud system is composed of cropwatch processing, cropwatch explore, cropwatch analysis and cropwatch bulletin, it is a system of agricultural monitoring system.



The System is based on Alibaba E-MapReduce.

Contact

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Institute of Remote Sensing and Digital Earth (RADI)
Chinese Academy of Sciences (CAS)



CropWatch-Processing



CropWatch Pro

中文

alice



- 预处理
- 农情指标
- 作物长势
- 作物单产
- 作物面积
- 产量估算
- 指数统计
- 专题图
- 农气指数
- 任务中心
- 系统管理

服务器状态

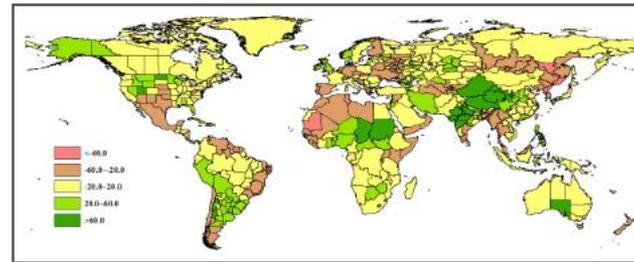
CPU使用率 15%

内存使用率 75%

专题图生产

专题图参数设置

专题图类型:	矢量
类型名称:	降水
区域类型:	全球
区域名称:	无
年:	2011
期:	5



生产

重置

专题图介绍

指用模拟方法将复杂的水文现象和过程经概化所给出的近似的科学模型。按模拟方式分为水文物理模型(实体模型、比尺模型)和人文数学模型两种基本类型。





CropWatch-Explore-vector



CropWatch Beta

English

Query

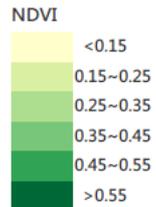
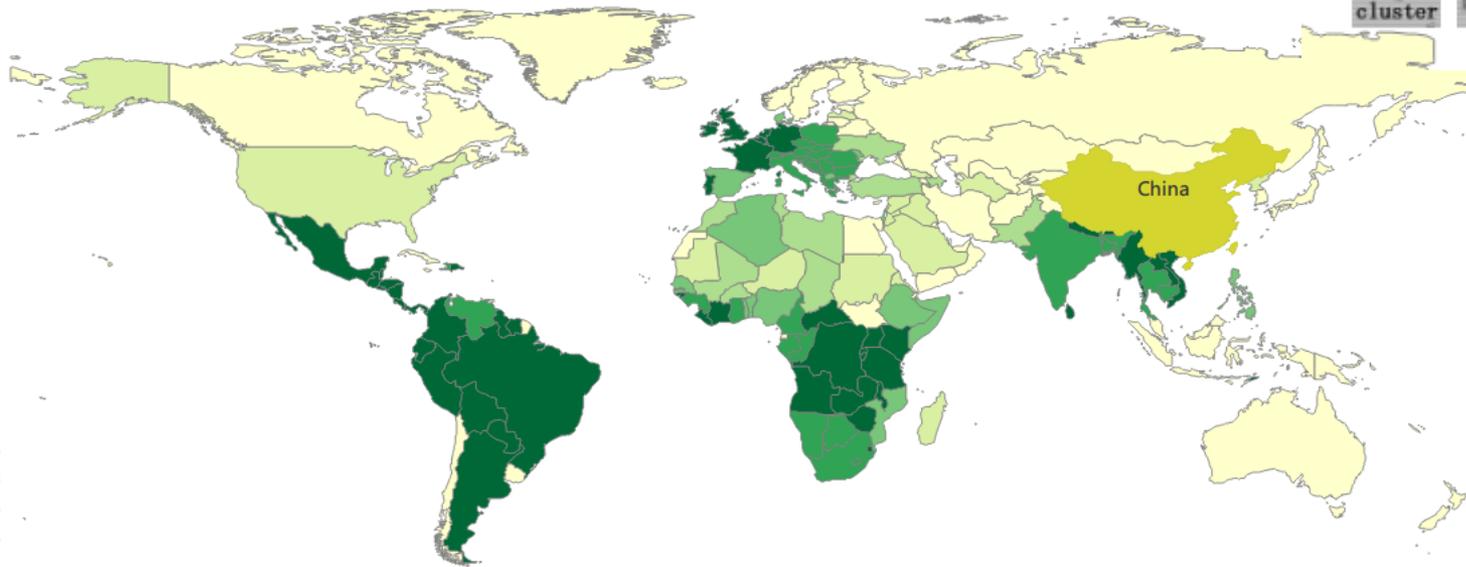
Zone

Color

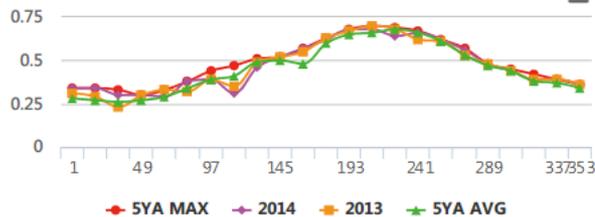
Crop



2014-1-16
location : China
NDVI: 0.34
5YA MAX: 0.47
5YA MIN: 0.09



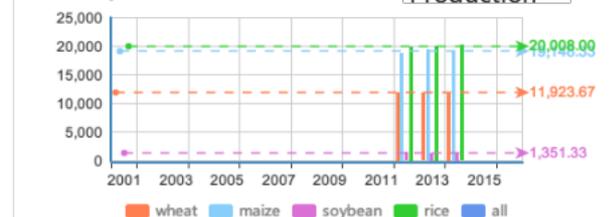
China NDVI Development



China Temperature Development



China Crop Production





CropWatch-Analysis



CropWatch Analysis is cloud collaboration documentation tool for the CropWatch teams or individual people from over the world analyzing their CropWatch indicators anywhere. It provides create document, allocate and manage tasks, monitor schedule and publish the document online functions.



CropWatch Team

In November 2016 CropWatch bulletin (Vol. 16, No. 4), 37 colleagues from 9 countries and 4 teams (Digital Agricultural Lab., Pets and disease team of RADI, 3DS company(price prediction), Agricultural Information Institute of CAAS(Grain and soybeans imports and exports in China)) have joined the Cropwatch analysis platform.



CropWatch-Analysis

Write and revise the analysis

The screenshot displays the CropWatch web interface. On the left is a dark sidebar with navigation options: Reports, Report, Work, Settings, Auth, and Tag. The main content area shows a report titled "#2 Argentina" in English. A notification bar indicates that "rene, Anna has accepted this section." Below this is a rich text editor with various formatting tools. The report text discusses wheat and maize harvesting and planting in Argentina, and mentions a decrease in rainfall (RAIN) compared to the 15-year average (15YA). To the right of the text is a map of Argentina showing the Maximum Vegetation Condition Index (VCI). The map is color-coded according to a legend: red for VCI < 0.5, yellow for 0.5 - 0.8, green for 0.8 - 1.0, and blue for > 1.0. Below the map is a line graph showing the VCI over time for the years 2015 and 2016, along with 5-year maximum and 5-year average values. The graph shows a general downward trend in VCI for both years, with 2016 showing a slight recovery towards the end of the period.

Home > Sections > CropWatch November Bulletin 2016 > Argentina > Write

#2 Argentina English

rene, Anna has accepted this section.

T B I U S A [List] [List] [Quote] [Code] [Table] [Link]

At the end of current reporting period (July-October), wheat is beginning to be harvested in the north of the country; the planting of early maize is almost completed and soybean planting is beginning. Predictions of harvested areas show an increment for wheat and maize and a slight reduction in soybean associated with reductions in both export taxes and regulations for maize and wheat.

For RAIN, a moderate decrease (-7% compared to the 15YA) was observed, while in general TEMP and RADPAR were close to average. Reductions in the RAIN indicator could be due to neutral or La Niña conditions, in a change from the strong El Niño that affected the southern hemisphere summer; this can also explain the 14% reduction in potential biomass (BIOMSS), a reduction that was stronger in the Pampas than in north Argentina. The top three agricultural producing provinces—Buenos Aires, Cordoba, and Santa Fe—experienced rainfall shortages that reached 29%, 27%, and 9%, respectively. NDVI profiles for the reporting period are higher than average, and for the last month (the maize planting period) they are also higher than last year's in spite of the poorer RAIN conditions. Abundant soil water retention from the last season could explain this behavior. In addition, changes in crop

Maximum VCI

Legend: < 0.5, 0.5 - 0.8, 0.8 - 1.0, > 1.0

Graph: 5 year maximum, 5 year average, 2015, 2016

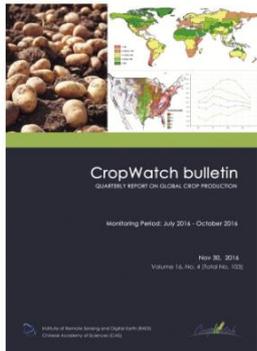


CropWatch-Bulletin

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The CropWatch bulletin is published four times a year in English and Chinese. The bulletin presents the latest CropWatch forecast of global and national crop production and condition.



November 2016 CropWatch bulletin (Vol. 16, No. 4)

November 2016 CropWatch bulletin released. The November 2016 CropWatch bulletin presents the latest CropWatch production estimates for 2016, in addition to the usual updates on prevailing weather conditions, resulting crop condition, and size of cultivated areas, among others, focusing on crop growth from July until the end of October. The bulletin naturally includes detailed analyses for China as well as thirty major agricultural countries; for China, regional conditions and an update on pests and diseases, prices, and prospects for import and export are presented. The geographic focus in this bulletin on the Middle East.

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Linkage of CropWatch and food security



- CropWatch can provide latest, near real time, transparency agro-climatic and agronomic information.
- CropWatch is able to provide early warning.
- CropWatch provides a easy way to be customized into local environment for interesting countries.



CropWatch

- Global Crop Monitoring System



DroughtWatch

- Drought monitoring system



ETWatch

- Evapotranspiration monitoring system

DroughtWatch



DroughtWatch 4.1 - Application Analysis - [D:\DroughtWatch_Run\plugins\dwgis.pg]

System Modules Edit View Insert Image Vector Tool Window Help

Layer Manager: Layer, World

DroughtWatch 4.1 - Preprocessing

Sensor: MODIS/TERRA
Resolution: 1km
Start Time: 2016 1 25
End Time: 2017 1 24

Input Folder: D:\DroughtWatch_Run\KGM\Originaldata\MODIS1b\

Output Folder: D:\DroughtWatch_Run\KGM\Prepout\

Processing Procedure

Time (GMT)	GEO	MOS	RAD	CLD	ATC	NDVI	EVI	LST

Run Cancel Help

DroughtWatch 4.1 - Indices

VCI TCI VHI NDDI NDWI VSWI SFI AI

Sensor: MODIS/TERRA
Resolution: 1km
Frequency: Day
Date: 2017 1 24

Input Data

NDVI: Load Preview
Max_NDVI: Load Preview
Min_NDVI: Load Preview

Output Folder: D:\DroughtWatch_Run\KGM\Index\

Run Cancel Help

DroughtWatch 4.1 - Drought

Single Combination Dashboard

Sensor: MODIS/TERRA
Resolution: 1km
Frequency: Day
Date: 2017 1 24
IndexType: WACI

Input File: Load Preview

Image Information:

Max: Min: Mean: Stdev: Accumulative Frequency (95%):

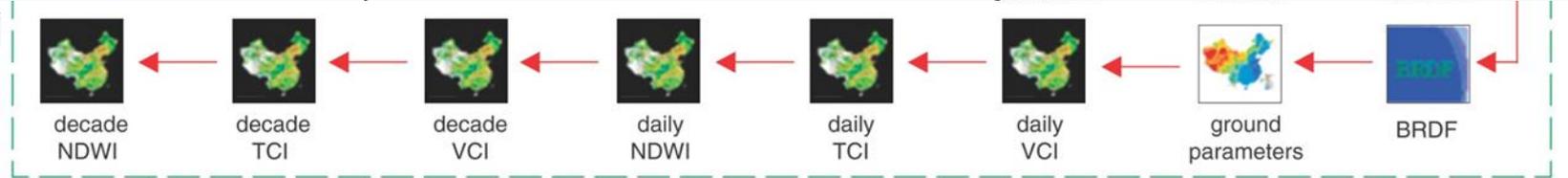
Drought Classification:

Extreme: 0.8	~ 1	
Serious: 0.5	~ 0.8	
Moderate: 0.3	~ 0.5	
Slight: 0	~ 0.3	
Normal: 0	~ 0	

Output Folder: D:\DroughtWatch_Run\KGM\Droughtout\single\

Run Cancel Help

62.387575, 105.477481



UN ESCAP Regional Drought Monitoring Mechanism



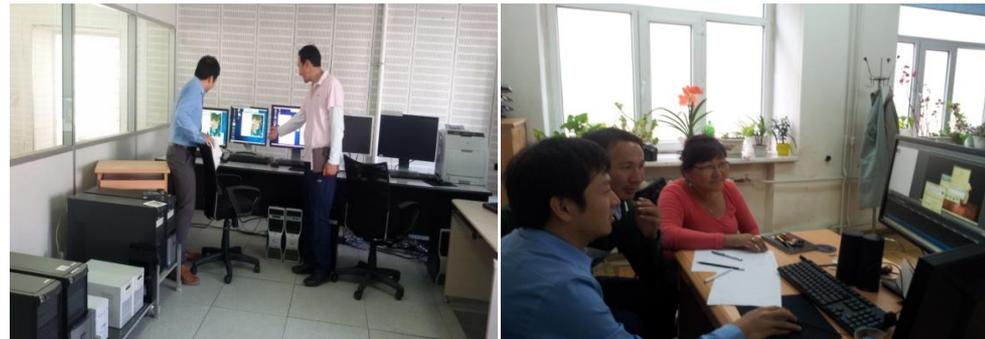
Services provided by RADI:

- ❑ **Technical Assistance Service:** to assist the pilot country to customize well demonstrated agricultural drought monitoring methodology and models, development of products and services that adapted to local conditions, including different areas of a requested country.
- ❑ **Satellite Data Service:** to provide low- and medium-resolution satellite data based products at near-real-time by responsible Service Nodes to requested local service providers.
- ❑ **Satellite Data Based Monitoring Service:** to provide relevant interim products and analytical services by responsible service nodes to requested local service providers (LSPs) of less capable countries.

Customized for Mongolia



- **Data management**
(in-situ, statistics, Geotiff etc.)
- **Data preprocessing**
(RS data processing, composition)
- **Indices calculation**
- **Drought monitoring**
(by single index and combination indices, dashboard)
- **Statistics and analysis**
(over the spatial, over time interval)
- **Batch for the whole procedure**
- ***DroughtWatch3.1(English+Chinese)***



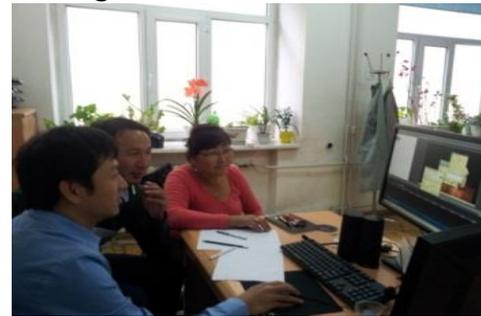
Training and workshop for Mongolia



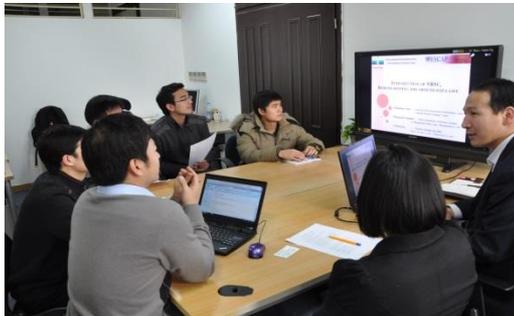
Cooperative field campaign from 27 July to 5 August of 2015 had been carried out in the large region covering main steppe type of north Mongolia.



The latest version of drought monitoring system (DroughtWatch3.1) had been **installed and deployed** in Mongolia.



January of 2015, hand-on **training** meeting for two Mongolians about two weeks, later hand-on training meeting for two Mongolians about one month, the Chinese experts offered methodology and experiences about drought model validation.



February of 2014, **Workshop** on the Technology Service for Mongolia under the Cooperation Mechanism of Drought Monitoring for the Asia-Pacific regions

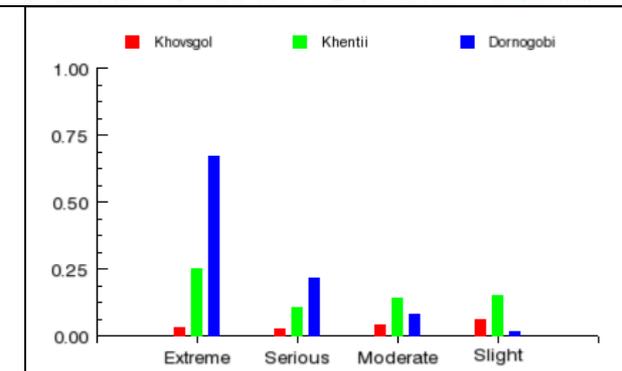
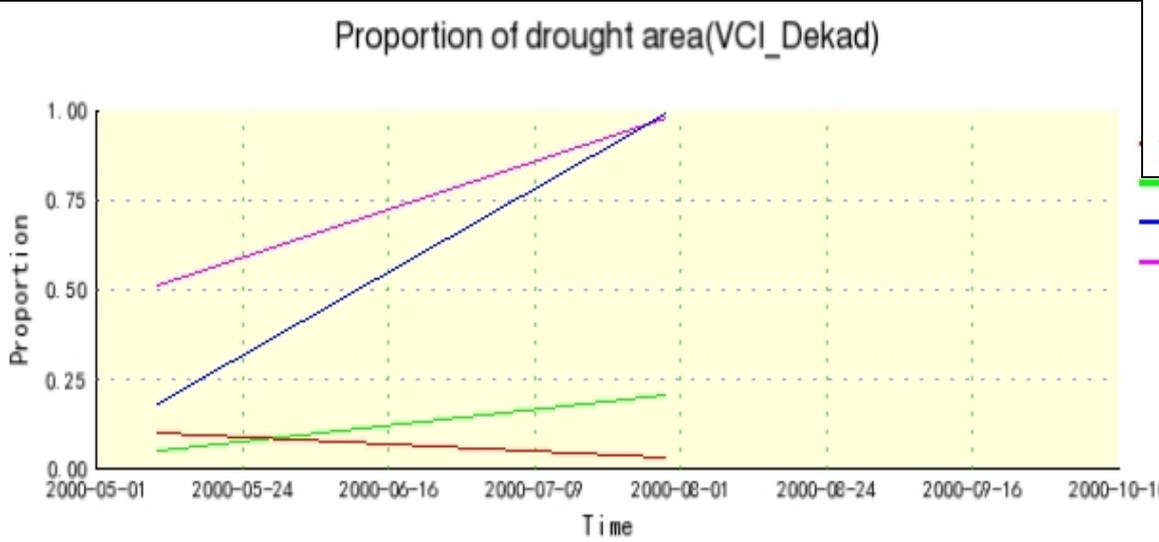
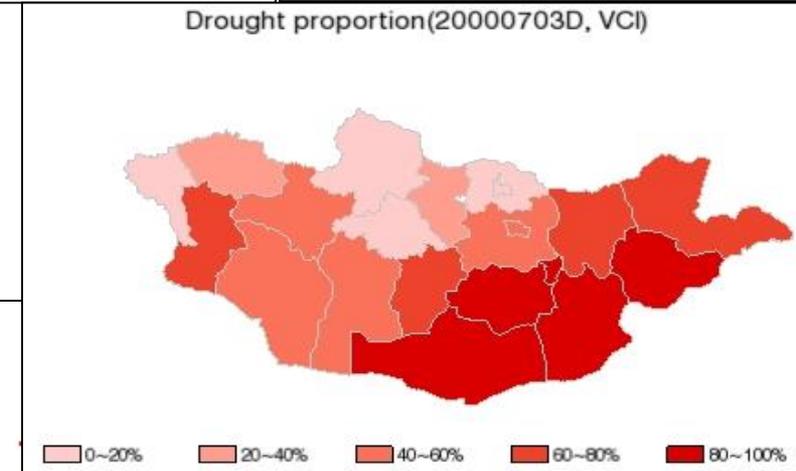
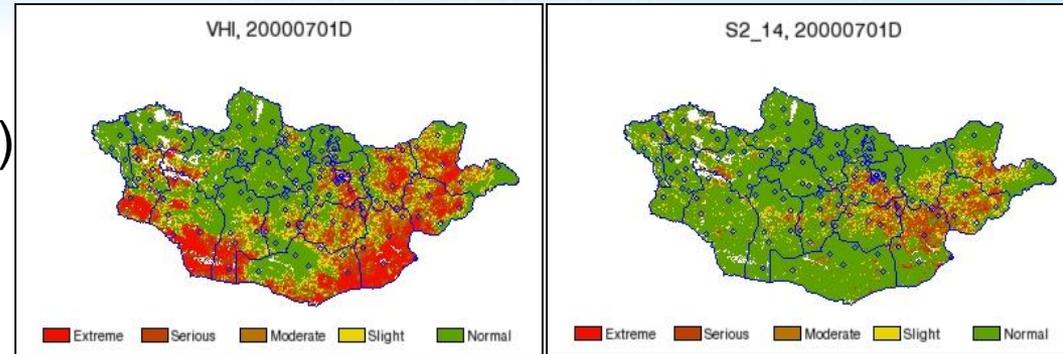


Output products



Products Forms(database, tables, files, maps, charts, graphs)

- Drought map and comparison results
- Spatial distribution maps
- Time change charts
- Drought classification graphs



Drought system transfer to Sri Lanka



Multi-res sensing

全球空间对地观测卫星

Meteorol

නවීන තාක්ෂණ පිලිබඳ ආර්ථික ක්ෂේත්‍ර ආයතනය
 நவீன தொழினுட்பவியல் களஞ்சிய ஆர்தி தரீ கிளார்க் நிறுவனம்

Arthur C Clarke Institute for Modern Technologies
 (A corporate body established by Act No. 11 of 1994)

කළමනාකරු මොරටුව ල ලංකාව
 கட்டுத்தல், மொரட்டுவ, ஸ்ரீ லங்கா
 Katubedda, Moratuwa, Sri Lanka

දුරකථන } +94(0)11 2650838 தொலைபேசி } +94(0)11 2650569 Telephone }	අයුරු } பெயர் } Fax } +94(0)11 2650462	මගේ අංකය } எனது இல } My No. }
	ඉකුත් දිනය } உறுதி செய்த இல } Your No. }	දිනය } திகதி } Date }

DECLARATION

I, the undersigned, Eng. Sanath Panawennage, the Director General & Chief Executive Officer of the Arthur C. Clarke Institute for Modern Technologies of Sri Lanka (hereinafter referred to as ACCIMT), declare the following:

- ACCIMT has received and installed a test version of DroughtWatch software, developed and owned by CropWatch Unit, Institute of Remote Sensing and Digital Earth (RADI), Chinese Academy of Sciences (hereafter referred to as CropWatch);
- ACCIMT will use the software for a period of time not exceeding 6 months on an experimental basis, and will report back to CropWatch about any requirements, bugs or deficiencies for improvement;
- ACCIMT will sign the license agreement with CropWatch once the final version of DroughtWatch has been received and installed in ACCIMT, with a Representative of UNESCAP as witness.

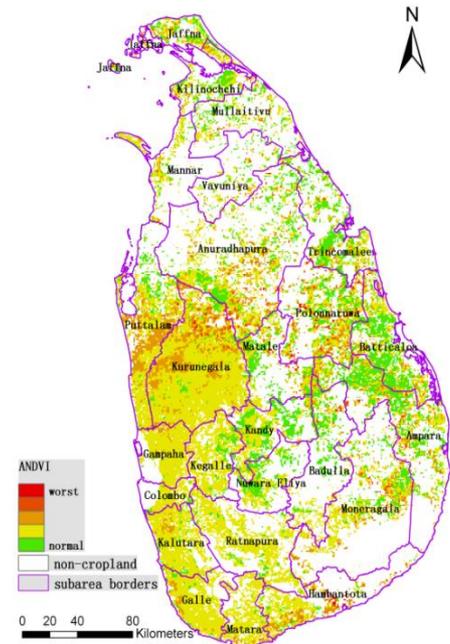
Eng. Sanath Panawennage
 Director General & CEO
 Date: 20 February, 2015.

Director General
 Arthur C. Clarke Institute for
 Modern Technologies
 Katubedda, Moratuwa,
 Sri Lanka.

processing calculating

ht monitoring

Drought in Sri Lanka Mid-March 2014





CropWatch

- Global Crop Monitoring System



DroughtWatch

- Drought monitoring system



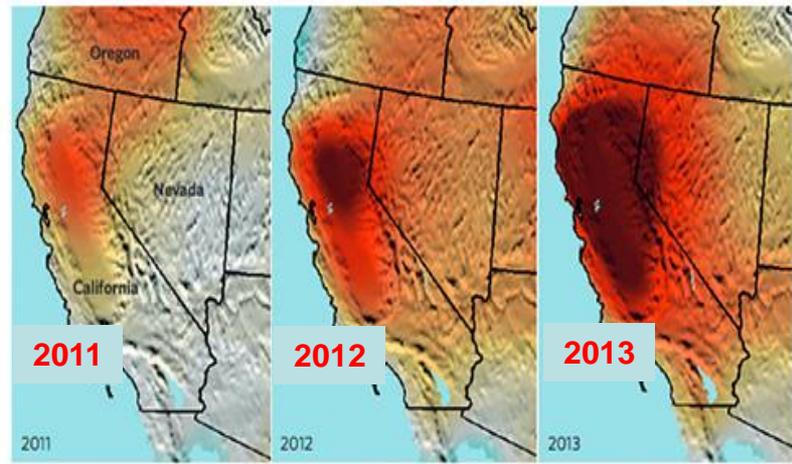
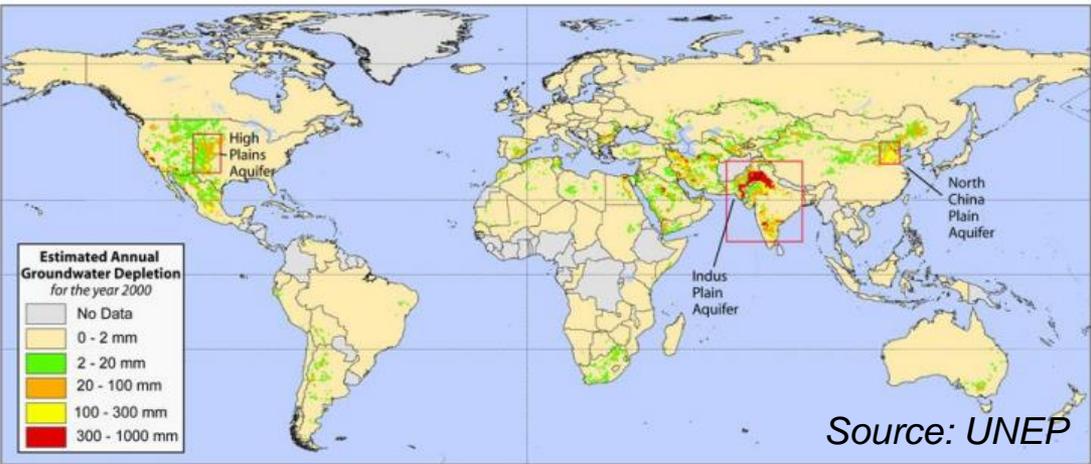
ETWatch

- Evapotranspiration monitoring system

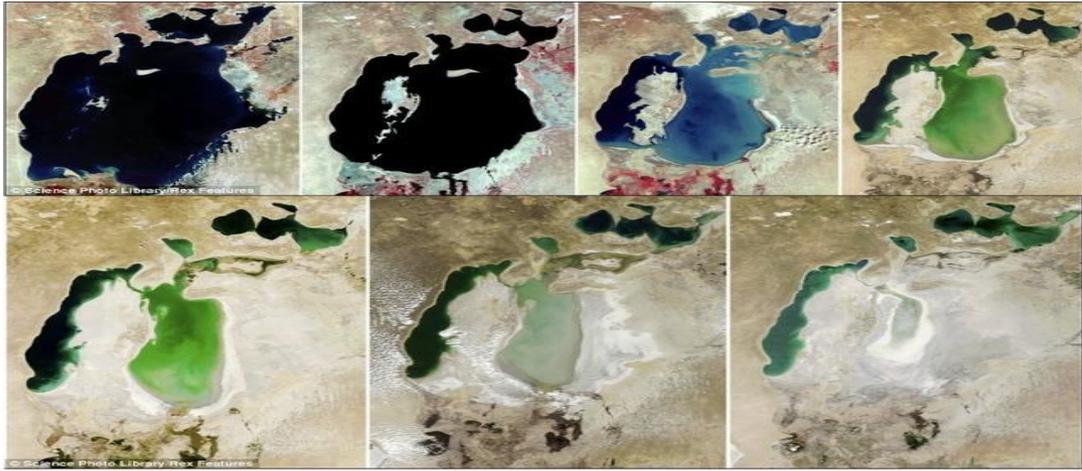
Groundwater depletion in the world



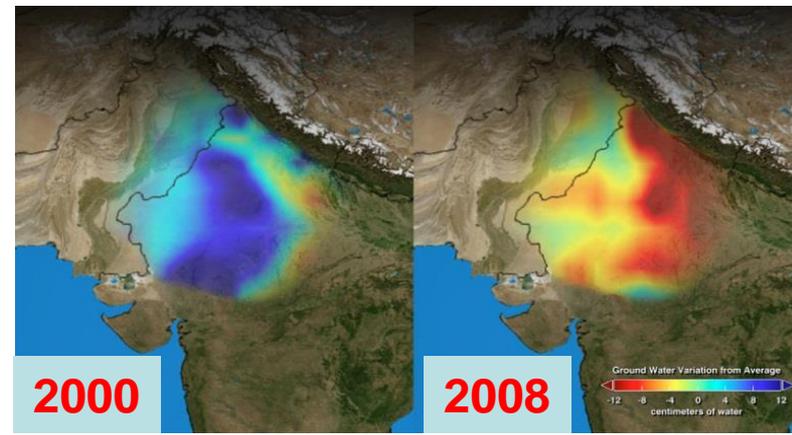
In most arid and semi-arid sub-basin in the world are suffering serious groundwater depletion. Where water gone?



Source: NASA



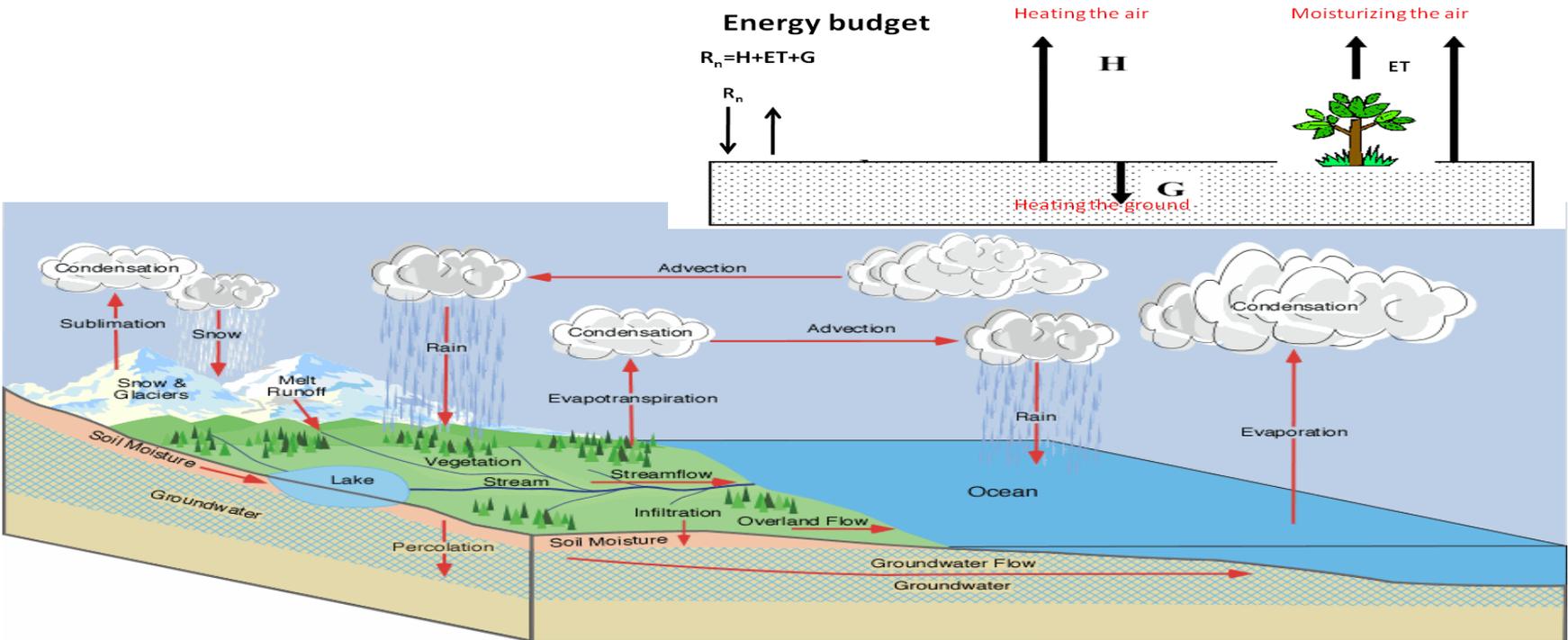
Water surface shrinkage of Aral Sea



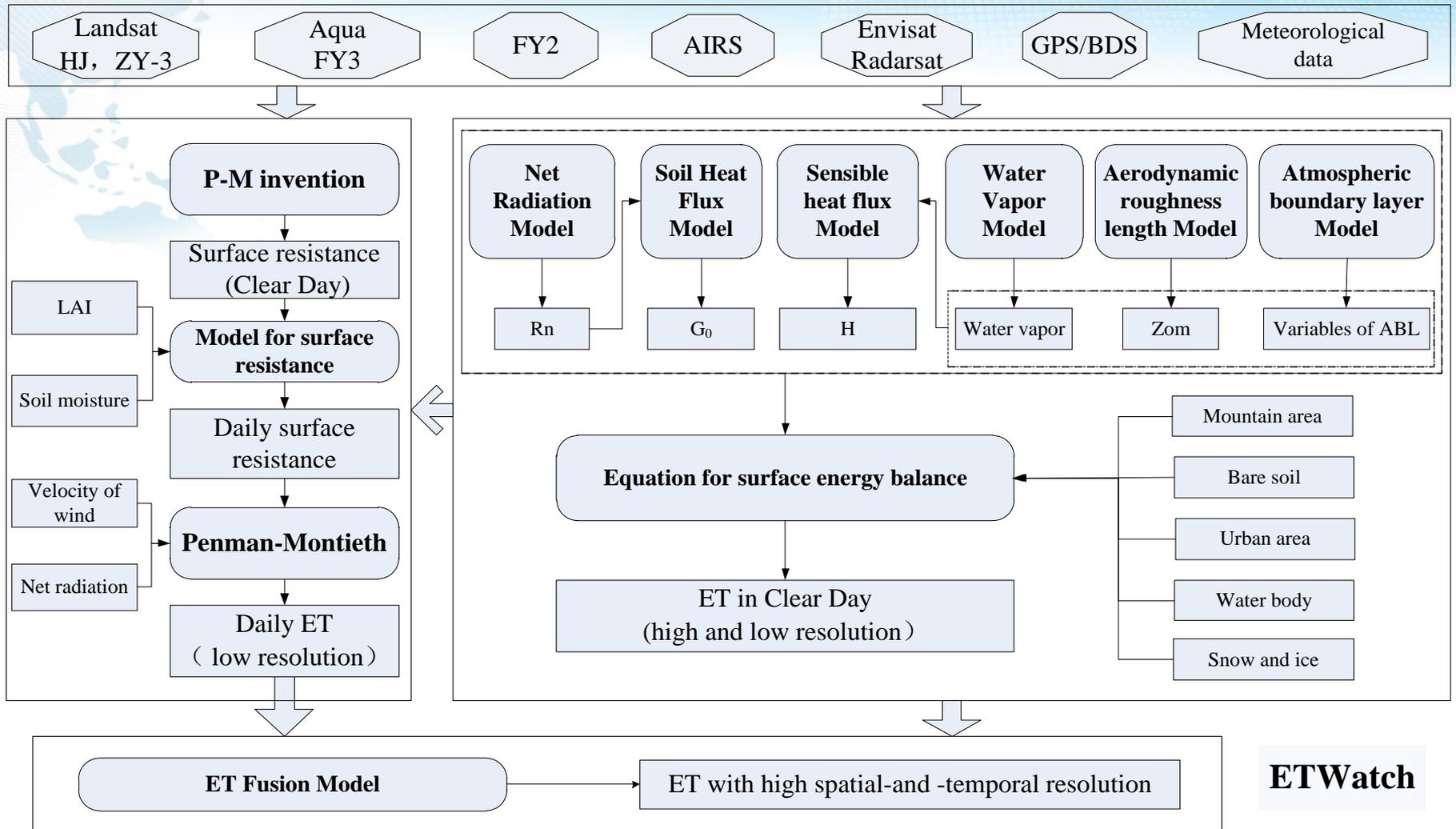
ET

Evapotranspiration: the canopy transpiration and soil evaporation

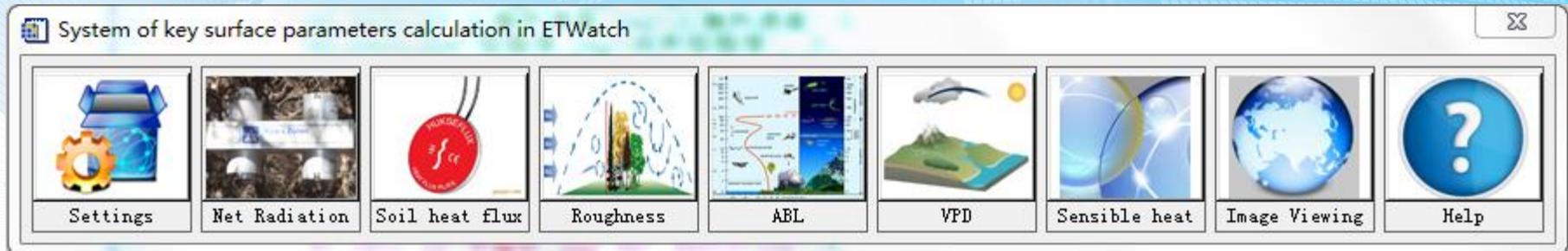
- ET is the actual water consumption.
- ET is the important segment of water circulation.
- ET is equally important to precipitation, hydrological observation.



ETWatch – operational remote sensing model



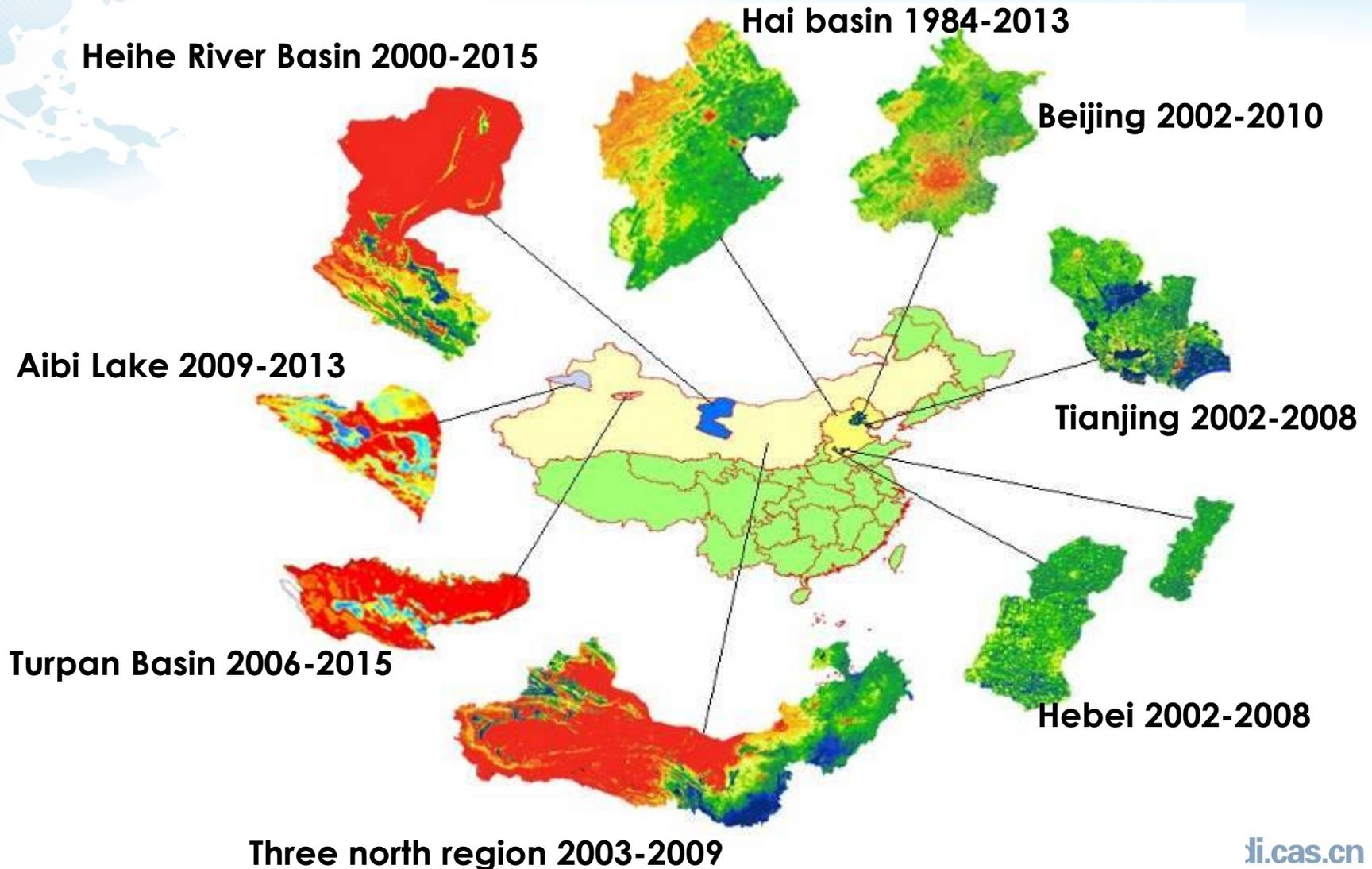
Models in ETWatch



- Net-radiance model
- Soil heat flux model
- Aerodynamic roughness length model
- Atmospheric Boundary Layer model
- Vapor pressure deficit model
- Sensible heat flux model
- Surface resistance model: Daily Surface resistance (R_s)
- ET model on bare land
- ET model on water surface, snow and ice
- ET data fusion algorithm: data-fusion algorithm between high and low resolution data



Application: ETWatch in China



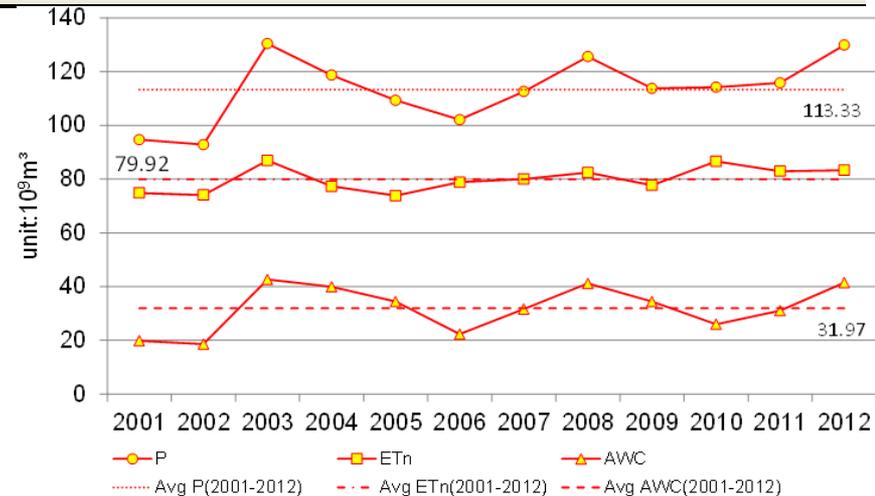


Hai Basin: Allowable Water for Human Consumption

Year	P	Natural ET						Total	Total/P (%)	Flow _{unc}	ACW	ACW/P (%)
		ET _{for}	ET _{gra}	ET _{wet}	ET _{fal}	ET _{urb}	ET _{bar}					
2001	94.69	25.35	14.54	2.35	31.51	0.91	0.2	74.86	79.06	0	19.83	20.94
2002	92.84	22.95	13.01	2.18	34.68	1.03	0.23	74.08	79.79	0.15	18.61	20.04
2003	130.4	30.68	17.68	2.58	34.67	1.07	0.29	86.97	66.68	0.83	42.64	32.69
2004	118.7	27.01	13.41	2.36	33.1	1.24	0.23	77.35	65.16	1.4	39.95	33.66
2005	109.3	24.42	12.16	2.3	33.53	1.24	0.19	73.84	67.54	1.04	34.44	31.5
2006	102.1	27.24	13.77	2.37	34.03	1.22	0.23	78.87	77.24	0.93	22.31	21.85
2007	112.6	27.13	14.43	2.26	34.71	1.27	0.24	80.04	71.08	0.92	31.65	28.1
2008	125.6	31.09	14.1	2.34	33.15	1.52	0.26	82.46	65.65	1.94	41.2	32.8
2009	113.8	28.91	13.07	2.39	31.62	1.45	0.27	77.71	68.31	1.59	34.46	30.29
2010	114.2	31.95	14.47	2.37	36.12	1.52	0.24	86.67	75.89	1.52	26.01	22.78
2011	115.8	29.62	14.22	2.33	34.98	1.52	0.27	82.94	71.61	1.84	31.05	26.8
2012	129.9	30.74	13.84	2.4	34.48	1.6	0.27	83.33	64.15	5.08	41.49	31.94
Average	113.3	28.09	14.06	2.35	33.88	1.3	0.24	79.92	70.52	1.44	31.97	28.21

unit: 10⁹m³

The average ACW from 2001 to 2012 for the entire Hai Basin is 31.97×10⁹m³yr⁻¹, signifying the average amount of water available for human consumption in the basin.



Hai Basin: Water Balance Analysis



Year	ACW	Actual water consumed					Sum	Water Depelction
		Crops	Urban	Biological	Industrial			
2001	19.8	31.93	2.09	0.06	2.04	36.1	-16.29	
2002	18.6	29.11	2.04	0.06	2.04	33.3	-14.64	
2003	42.6	38.68	2.95	0.06	2.04	43.7	-1.09	
2004	40	34.87	2.75	0.06	2.04	39.7	0.23	
2005	34.4	28.38	2.42	0.06	2.04	32.9	1.55	
2006	22.3	32.09	2.48	0.06	2.04	36.7	-14.35	
2007	31.7	30.89	2.34	0.06	2.04	35.3	-3.69	
2008	41.2	39.38	3.23	0.06	2.04	44.7	-3.51	
2009	34.5	32.99	3.28	0.06	2.04	38.4	-3.91	
2010	26	28.35	3.17	0.06	2.04	33.6	-7.61	
2011	31.1	28.75	3.29	0.06	2.04	34.1	-3.09	
2012	41.5	32.2	3.53	0.06	2.04	37.8	3.66	
Average	32	32.3	2.8	0.06	2.04	37.2	-5.23	

unit: 10^9m^3

- For the period 2001-2012 this leads to average aquifer depletion in Hai Basin of $5.23 \times 10^9\text{m}^3\text{yr}^{-1}$ based on actual outflow.
- Agriculture is largest water consumption sector.

Hai Basin: water saving potential

	Coverage of anniversary stalks (wheat-corn)	The row spacing adjustment (wheat-corn)	Optimization of irrigation system(wheat)	Water saving and high yielding(wheat)	planting structure adjustment	Integrated water saving of wheat and corn
Area /10 ⁴ km ²	4.3	4.3	4.3	4.3	4.3	4.3
Water saving amount /mm	37.9	20-30	40-50	25-40	82	30-45
Water saving total amount /10 ⁸ m ³	16.3	8.6-13	17.2-21.5	10.8-17.2	35.3	13-19.4
Scene 1			Scene 2			
Wheat growing season controllable ET/mm	187.9	Farmland controllable ET/mm			331.2	
Wheat fallow area /km ²	26,000	Farmland fallow area /km ²			15,000	
Proportion /%	24.8%	Proportion/%			14.1%	

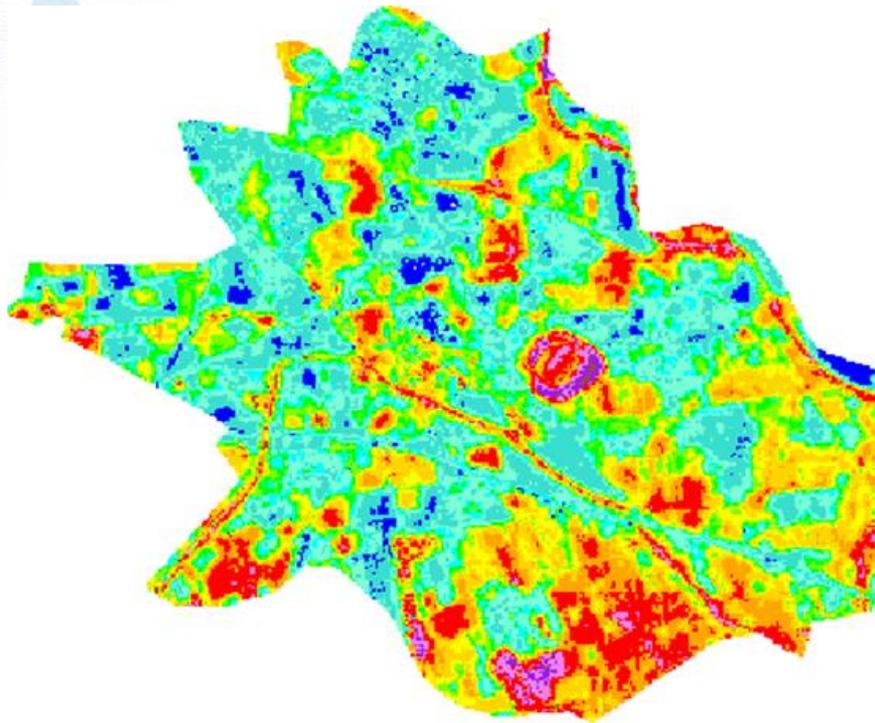
- ❑ The water deficit was $5.23 * 10^9 m^3$ from 2001 to 2012 in Hai basin;
- ❑ The total water saving of integrated water saving measures was up to $1.94 * 10^9 m^3$;
- ❑ 14.8% (24.8%) of cultivated land (wheat) need to be fallow.



Water saving supervision: cropping pattern

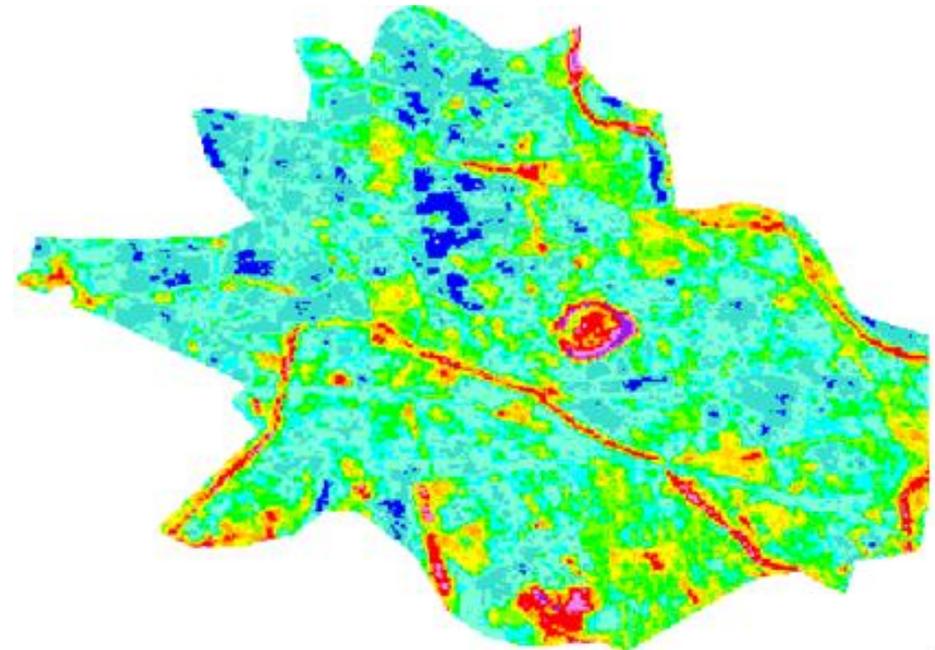
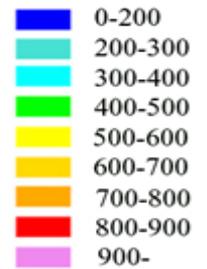


- Evaluation of water consumption for water saving measures.



Before Project

Legend(unit:mm)

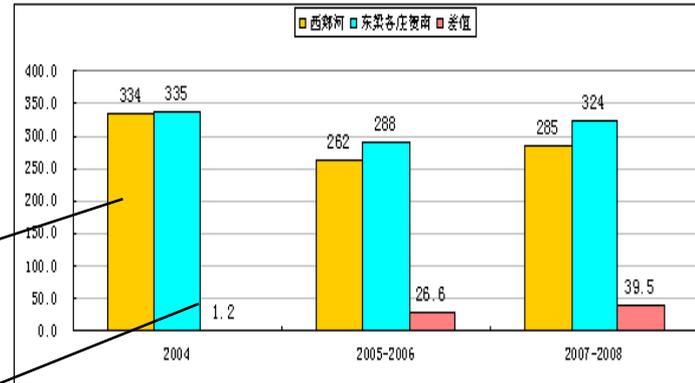
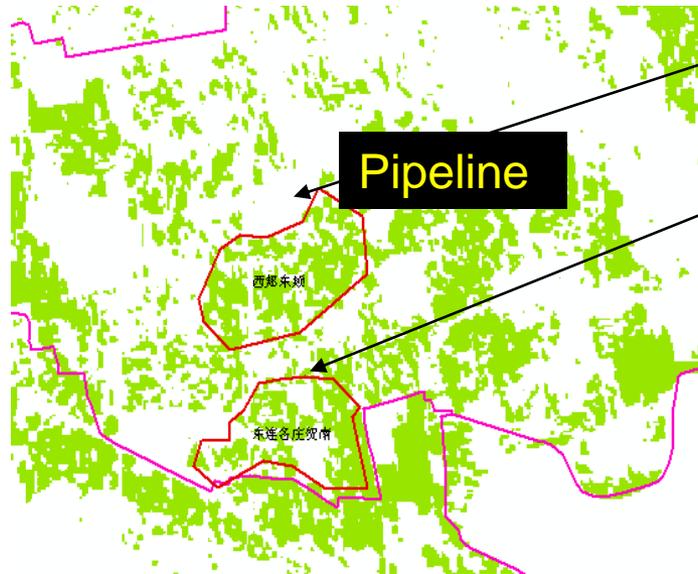


After Project

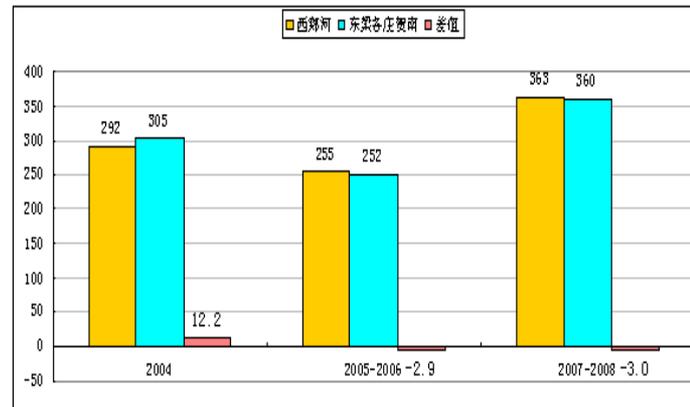
Water saving supervision: irrigation

- Evaluation of water consumption for water saving measures.

Water Saving



Wheat



Maize

- Water saving measure: Xijiahe, pipeline irrigation since 2005
- Since 2005, ET in Xijiahe is lower than Donliangezhuang in wheat growth season; But there is little difference in maize

Well Water Retrieval Supervision



Irrigation Scheme for grape

Water supervision for an electric-mechanism well

– Total/monthly allowable water use

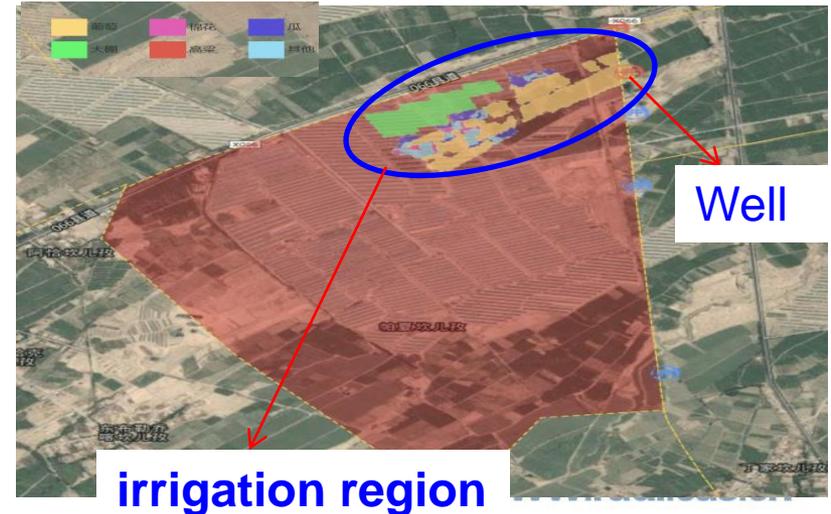
$$WU_a = \sum_{i=c_1}^{cn} IQ_i \times A_i$$

WU_a is the total or monthly retrieval water amount for a well, IQ_i is the irrigation quota for crop I for different period; A_i is the area for crop i . Irrigation quota is calculated from the recommended irrigation scheme.

– Water use control

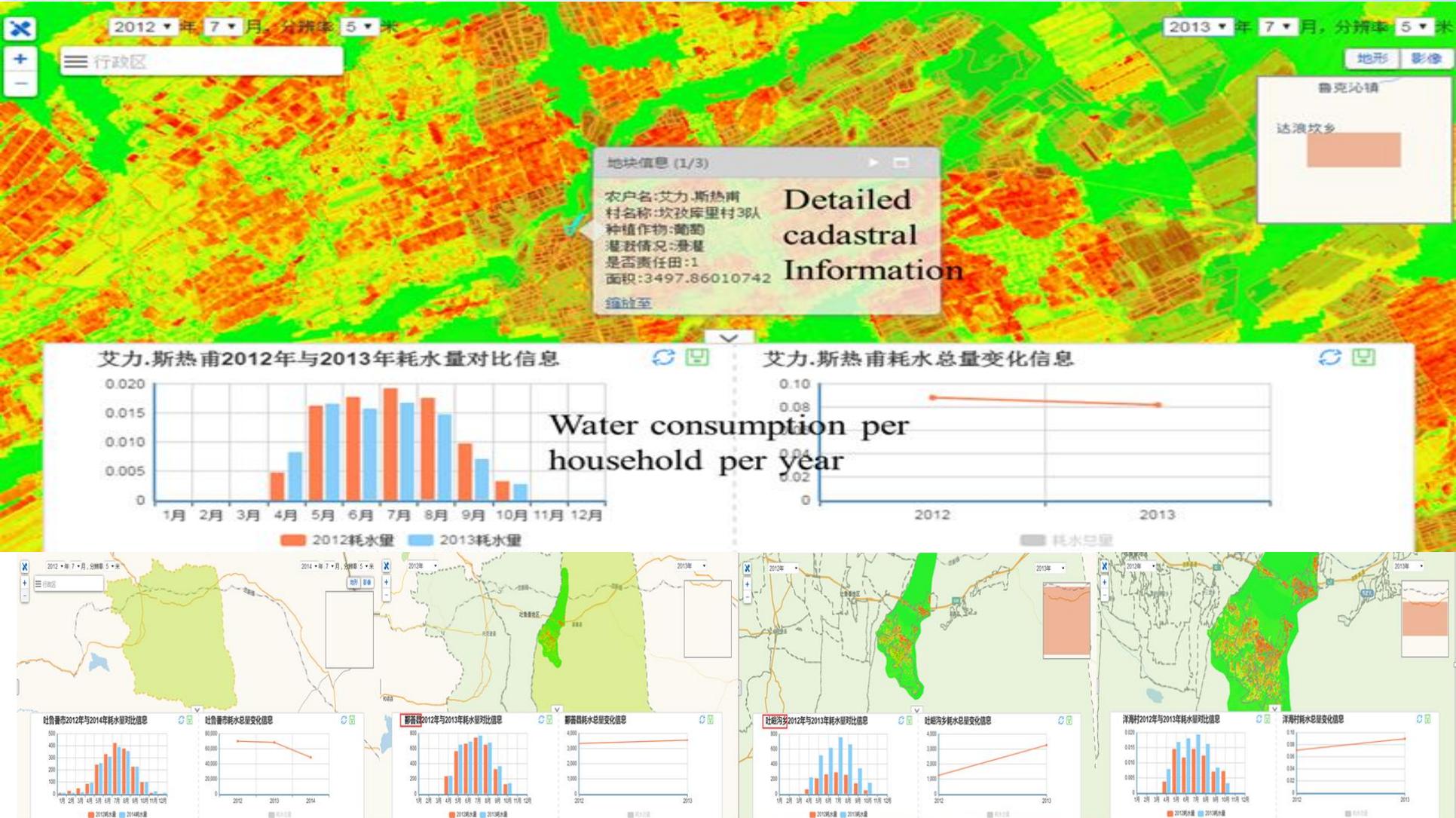
The actual water retrieval could be monitored by comparing with WU_a , and provide the alert information to control draft water for a certain well.

灌水次数	灌水定额 (m3/亩)	灌水时间			灌水延续时间
		始	终	中间日	
1	75	3/26	4/10	4/2	16
2	90	4/26	5/5	4/30	10
3	100	5/16	5/25	5/20	10
4	60	6/1	6/10	6/5	10
5	60	6/21	6/30	6/25	10
6	70	7/5	7/15	7/10	11
7	70	7/21	7/30	7/25	10
8	60	8/10	8/20	8/15	11
9	50	8/26	9/4	8/30	10
10	30	9/21	9/30	9/25	10
11	70	10/10	10/20	10/15	11
小计	735				



irrigation region

Water saving supervision: farmer



■ Including field location, area, crop types, farm name, water consumption, water source. www.radi.cas.cn

ETWatch for Egypt



埃及ET处理与分析系统, 当前用户: admin

System navigation menu with icons and labels:

- 系统设定 (System Settings)
- 遥感数据处理 (Remote Sensing Data Processing)
- 气象数据处理 (Meteorological Data Processing)
- 地表参量计算 (Surface Parameter Calculation)
- ET 计算 (ET Calculation)
- 统计分析 (Statistical Analysis)
- 数据库管理 (Database Management)
- 业务集成 (Business Integration)
- 关于系统 (About System)

行政单元ET统计条件选择 (Administrative Unit ET Statistics Condition Selection)

单元类型: 市 县 镇

选择: 叶县, 郟县, 鲁山县, 许昌县

地块类型: 土地利用 作物 生长期表格

数据类型: ET 降水量

传感器: aqua_AIRS 分辨率: 1000

时间选择: 年 季 月 日 自定义

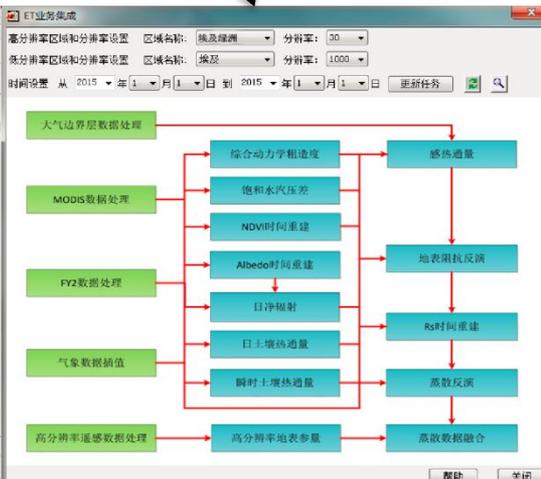
开始年: 2015 月: 1 日: 1

结束年: 2015 月: 1 日: 1

确定 关闭

数据库管理 - 数据管理

站号	站名	经纬度	最高温	最低温	平均温	总雨量
51526	2015/01/01	0	-90	-95	-78	8899
51528	2015/01/01	0	-49	-189	-119	8219
51571	2015/01/01	0	-41	-134	-94	10273
51573	2015/01/01	0	-29	-115	-80	10026
51576	2015/01/01	0	-51	-185	-130	10590
51581	2015/01/01	0	-30	-151	-92	9862
51608	2015/01/01	0	9	-107	-74	9019
51751	2015/01/01	0	-19	-142	-88	9706
51752	2015/01/01	0	-41	-136	-89	10414
51754	2015/01/01	0	-45	-113	-78	9077
51755	2015/01/01	0	-27	-127	-85	9991
51756	2015/01/01	0	-48	-126	-87	9217
51757	2015/01/01	0	-30	-114	-84	9204
51758	2015/01/01	0	-52	-135	-99	0
51759	2015/01/01	0	-70	-111	-87	9153
51760	2015/01/01	0	-29	-133	-86	0
51761	2015/01/01	0	-55	-109	-83	0
51762	2015/01/01	0	-37	-125	-86	0
51763	2015/01/01	0	-38	-115	-85	0
51764	2015/01/01	0	-71	-120	-91	8912
51765	2015/01/01	0	-54	-117	-77	0
51767	2015/01/01	0	-47	-127	-87	0
51768	2015/01/01	0	-45	-121	-86	0
51769	2015/01/01	0	-42	-111	-78	0



Data statistics

Database management

System integration



人民网 >> 环保

水利部、发展改革委联合召开视频会议

全面实施水资源消耗总量和强度双控行动

2016年11月11日09:15 来源：人民网-环保频道

分享到: 

人民网北京11月11日电 昨日，水利部、发展改革委在北京联合召开全面实施水资源消耗总量和强度双控行动视频会议。会议指出，实施水资源消耗总量和强度双控行动，是破解我国水资源短缺瓶颈、确保水资源可持续利用的战略举措，是贯彻落实绿色发展理念、加快推进生态文明建设的内在要求。

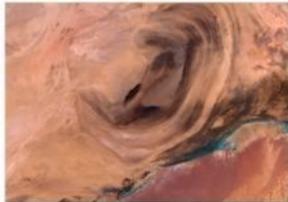
水利部部长陈雷指出，党的十八大以来，以习近平同志为核心的党中央高度重视水资源问题，明确提出“节水优先、空间均衡、系统治理、两手发力”新时期水利工作方针。党的十八届五中全会明确要求实施水资源消耗总量和强度双控行动。近日，经国务院同意，水利部和发展改革委联合印发了《“十三五”水资源消耗总量和强度双控行动方案》。实施水资源消耗双控行动，全面节约和高效利用水资源，是破解我国水资源短缺瓶颈、确保水资源可持续利用的战略举措，是助推供给侧结构性改革、加快转变经济发展方式的有力抓手，是贯彻落实绿色发展理念、加快推进生态文明建设的内在要求，是创新水资源管理体制机制、提升水治理能力的重要途径，事关“五位一体”总体布局和“四个全面”战略布局，事关中华民族永续发展和国家长治久安。要充分认识实施双控行动的重大意义，切实把思想、认识和行动统一到中央的决策部署上来。

陈雷强调，《“十三五”水资源消耗总量和强度双控行动方案》是做好“十三五”期间双控工作的指导性文件。要深刻理解、准确把握实施双控行动的指导思想

Nov.11, 2016, water consumption and intensity control action plan was released by Chinese government.

Water resource management enters ET management period.

Thanks!



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Chinese Academy of Sciences**

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