



Institute of Remote Sensing and Digital Earth  
Chinese Academy of Sciences

# Progress on the drought monitoring mechanism

**Nana Yan**

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



# Services provided



- ❑ **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.

# Technical assistance for Mongolia

- Fact finding and requirement analysis
- Work plan for 2014-2017
- Field data collection and assessment
- Satellite resources analysis and model development
- Field work plan and model validation
- Database and system customization
- Capacity building: data processing, field work, model and system training  
(2014.2.17-4.15, 2014.11-12 , 2015.7-8, 2015.10-11, 2016.7-8, 2016.7-8, )

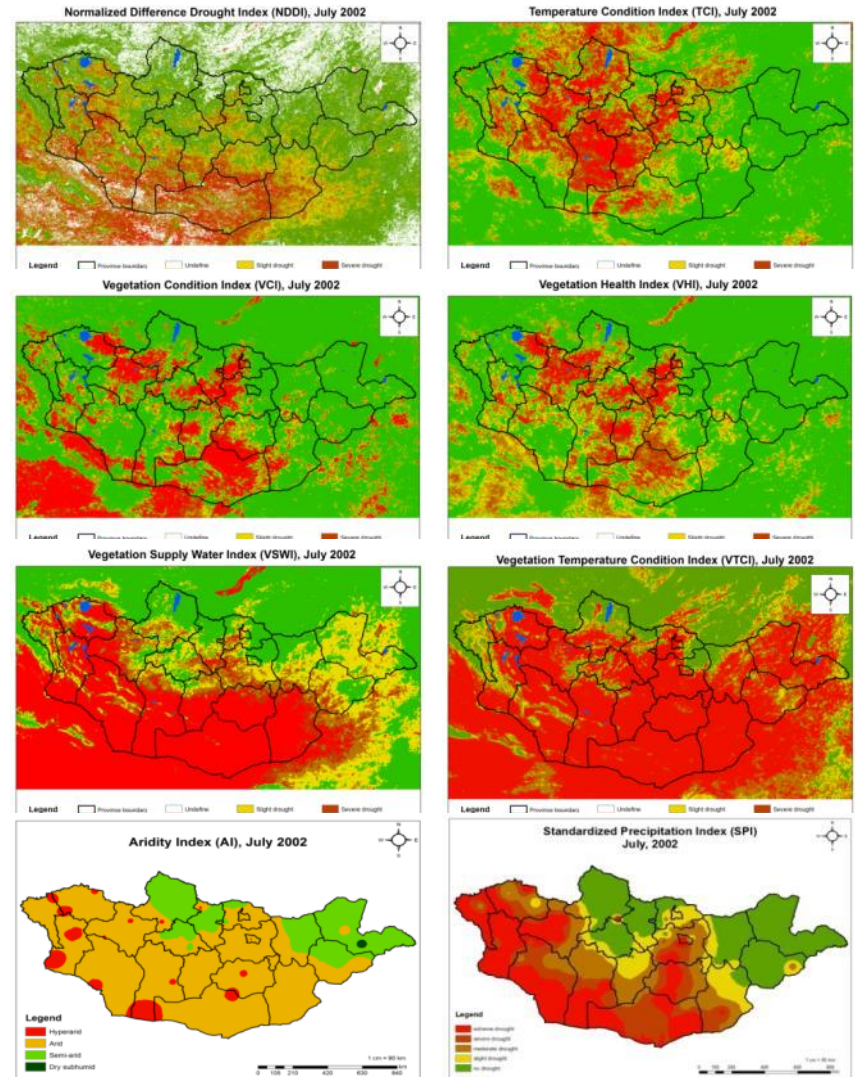
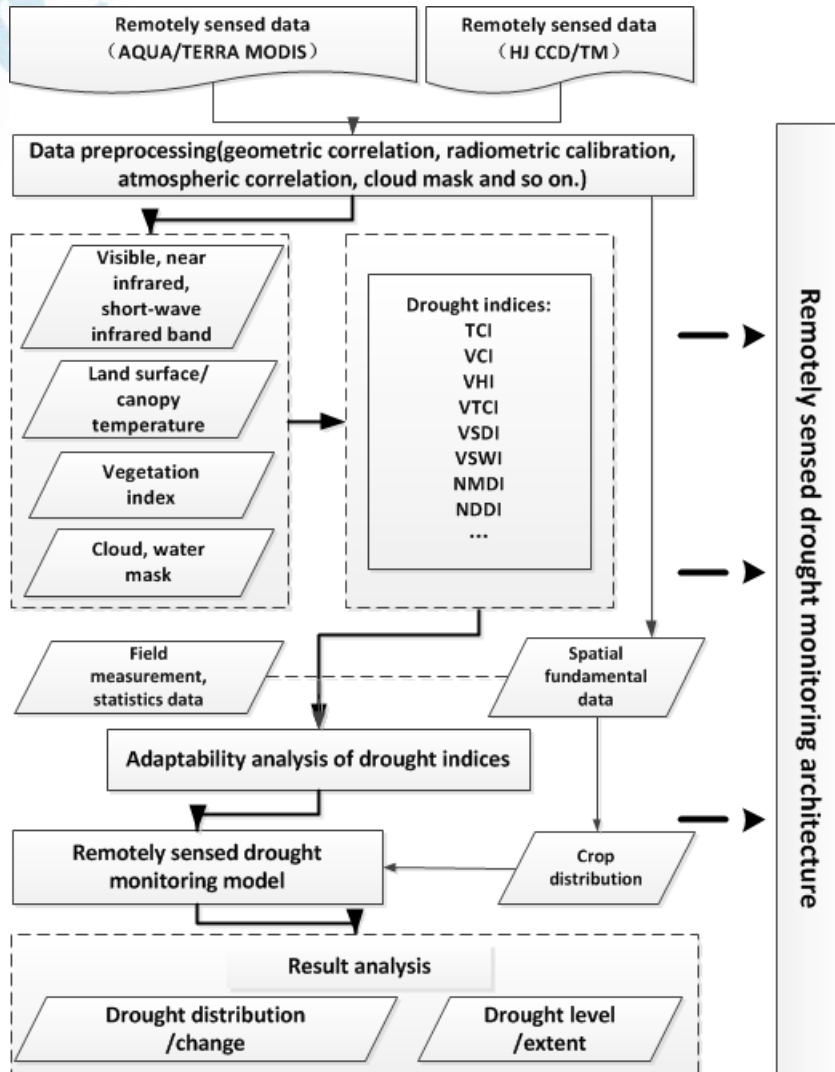




# Model for Mongolia



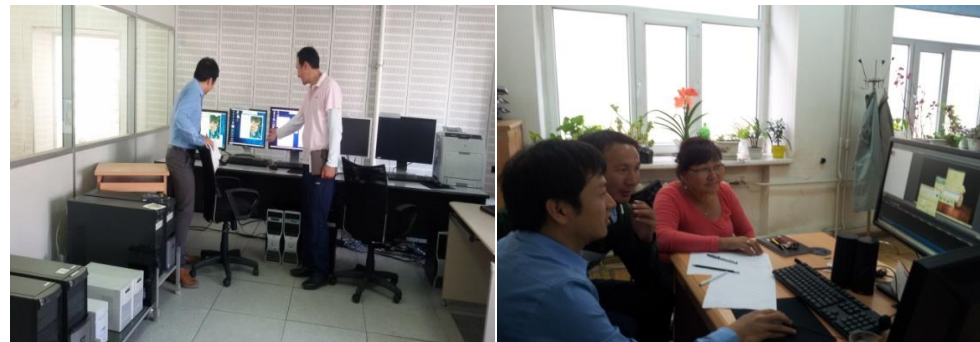
## Flowchart of Drought monitoring in Mongolia and drought products



# System 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)***





# Main interface for Mongolia



**DroughtWatch 3.1**

Modules Help

*DroughtWatch* © Mongolia

User Login

User Name:

Password:

Login Setting Help

Modules

Database Preprocessing Indices Drought Analysis Batch

VCI TCI VHI NDI VSWI SPI AI

Resolution: 130N

Frequency: Dekad

Date: 2000 7 1

< Input Data ->

NDVI: E:\DrounS\UdrounS\DataDir\Parameter\dekad\2\ Load Preview

Max\_NDVI: E:\DrounS\UdrounS\DataDir\Reference\0701D\_n\_ Load Preview

Min\_NDVI: E:\DrounS\UdrounS\DataDir\Reference\0701D\_n\_ Load Preview

Output Folder: E:\DrounS\UdrounS\DataDir\Index\ Browse Preview

Ok Cancel Help

Sensor/Satellite: MODIS/TERRA Resolution: 130N

ST: 2000 YY 1 MM 1 DD ET: 2000 YY 1 MM 1 DD

Frequency:  Month  Dekad  Week  Pentad

<Parameters Configuration->

Atmos. Correction:  No  Yes

Aggregation:  Maximum  Average

Single Index:  VCI  TCI  VHI  NDI  VSWI

Combination Index: S2\_12345 (VCI@TCI@VHI@NDI@VSWI)

Combination Method:  Max  Min  Mean  Median  Majority

OK Cancel Help

PROGRESS

Preprocessing Indices Drought Statistics

DroughtWatch 3.1 - Database

Station Observation Data

Station ID	Year	Month	Dekad	Air Temperature
497010	2000	5	1	11.100000
497010	2000	5	2	9.700000
497010	2000	5	3	11.800000
497010	2000	5	4	17.300000
497010	2000	5	5	18.300000
497010	2000	5	6	14.700000
497010	2000	5	7	16.100000
497010	2000	5	8	19.300000
497010	2000	5	9	15.300000
497010	2000	5	10	15.300000
497010	2000	5	11	16.000000
497010	2000	5	12	11.000000
497010	2000	6	1	12.400000
497010	2000	6	2	11.200000
497010	2000	6	3	17.600000
497010	2000	6	4	24.700000
497010	2000	6	5	18.000000
497010	2000	6	6	20.200000
497010	2000	6	7	14.400000
497010	2000	6	8	17.500000
497010	2000	6	9	18.300000
497010	2000	6	10	19.300000
497010	2000	6	11	19.300000
497010	2000	6	12	14.300000

Query

Start Time: 2000 - 1 - 1

End Time: 2014 - 1 - 1

Category: Station Grids

Prequery: Month

Group: Initial Indices

View: ALL

DroughtWatch 3.1 - Preprocessing

Preprocessing Composition

Resolution: 130N

Start Time: 2013 10 13

End Time: 2014 10 13

Modis1b Folder: E:\DrounS\UdrounS\DataDir\Modis1b\ Browse Search

Output Folder: E:\DrounS\UdrounS\DataDir\Prepout\ Browse Preview

< Processing Procedure ->

Time (GMT)	GBO	MOS	RAD	CLD	ATC	NDVI	LST

Run Cancel Help

DroughtWatch 3.1 - Drought

Single Combination Dashboard

Resolution: 130N

Frequency: Month

Date: 2014 10

IndexType: TCI

Input File: Load Preview

Image Information:

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

Drought Classification: Edit Save

Extremes: 0	~ 0.095	Red
Serious: 0.095	~ 0.167	Orange
Moderate: 0.167	~ 0.255	Yellow
Slight: 0.255	~ 0.343	Light Green
Normal: 0.343	~ 1	Dark Green

Output Folder: E:\DrounS\UdrounS\DataDir\Droughtout\single\ Browse Preview

Run Cancel Help

DroughtWatch 3.1 - Analysis

Over Spatial Unit Over Time Interval

Frequency: Month

Date: 2014 10

Admin. Unit: Country

Drought: VCI

Drought Data: Load

Administrative File: E:\DrounS\UdrounS\data\country\_code\_almbers2.tif Select

Output Folder: E:\DrounS\UdrounS\DataDir\Droughtstat\ Browse

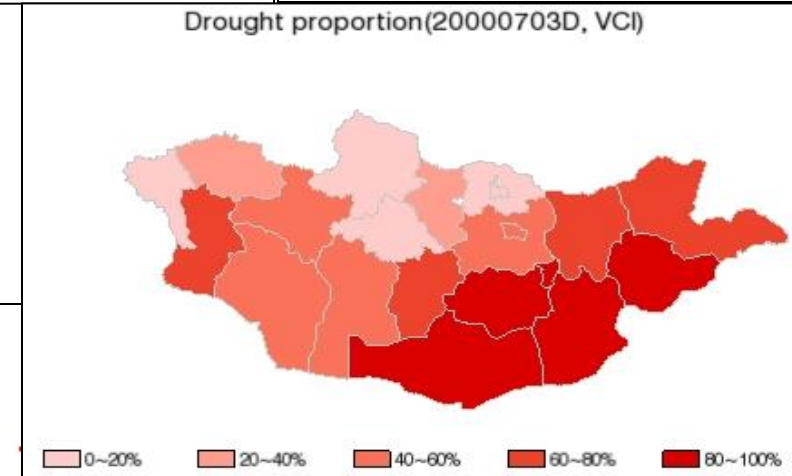
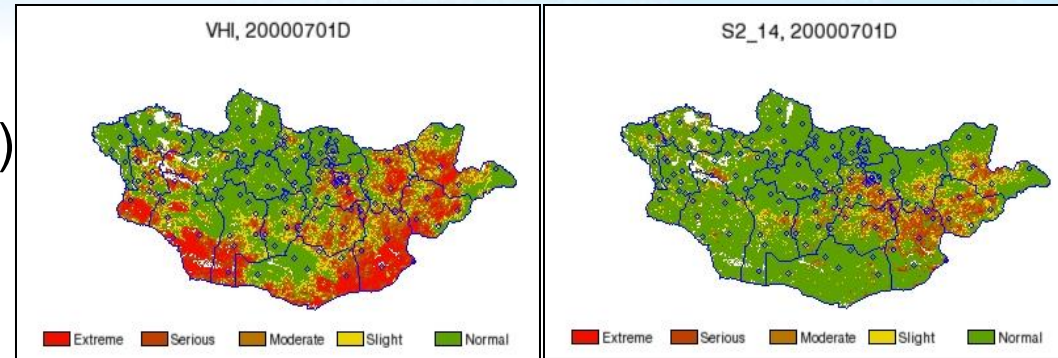
Stat Map Cancel Help

# Output products

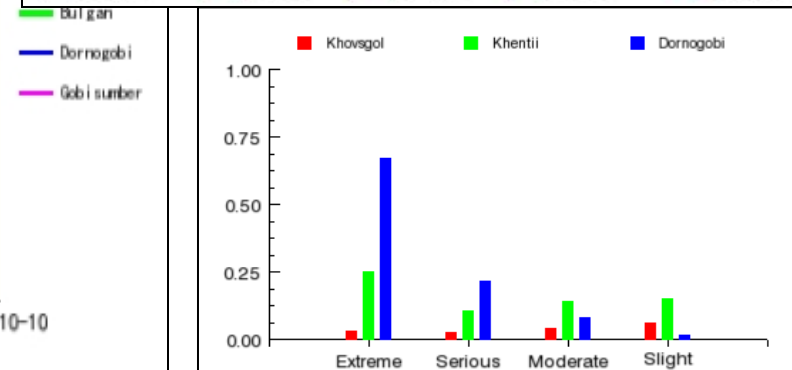
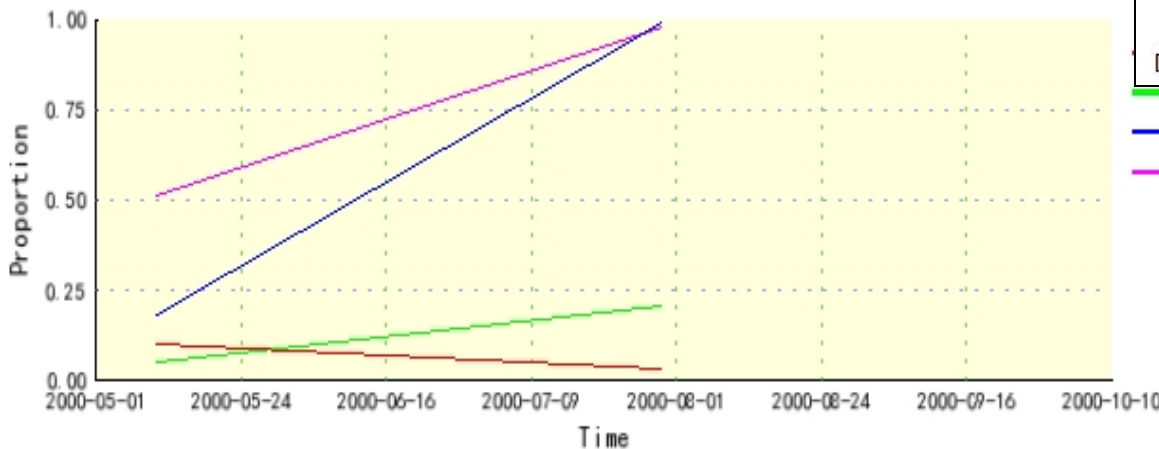


**Products Forms**(database, tables, files, maps, charts, graphs)

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



Proportion of drought area(VCI\_Dekad)





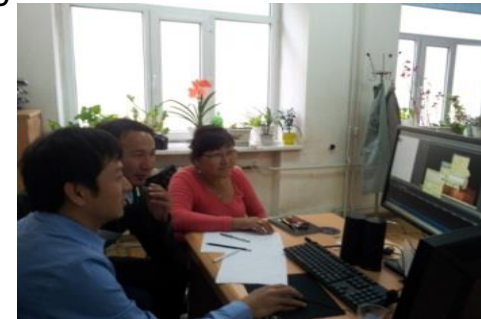
# Training and workshop for Mongolia



**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.

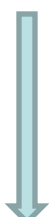


February of 2014, **Workshop** on the Technology Service for Mongolia under the Cooperation Mechanism of Drought Monitoring for the Asia-Pacific regions





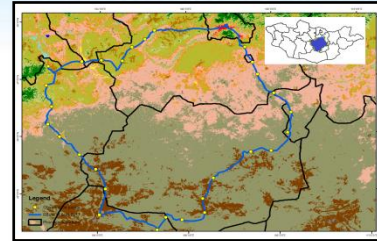
Field campaign: 23 July to 09 August, 2016  
Participants: 3 Chinese specialists and 6  
Mongolian specialists



Validation training: 25 November - 24 December,  
2016  
Participants: 2 specialist from Mongolia  
Time: 1 month



Field campaign: 24 July to 11 August  
Participants: 3 Chinese specialists and 5  
Mongolian specialists



Revalidation training: 20 March to 16 April,  
2017  
Participants: 3 specialist from Mongolia  
Time: 1 month

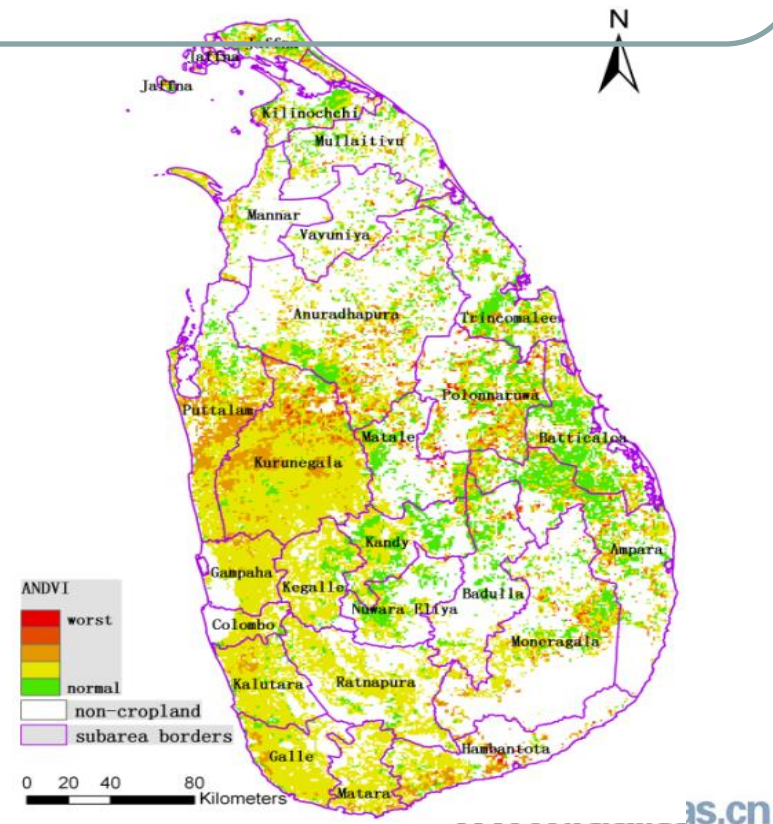


# Technical assistance for Sri Lanka

- ESCAP Regional Cooperative Mechanism for Drought Monitoring and Early Warning in Asia and the Pacific. Feb 17-22, 2014
- Drought monitoring results for March-April, 2014
- Technology transfer-DroughtWatch system customization and technical training. Feb 2015, April; 27-30, 2016



Arthur C Clarke Institute for Modern Technologies





# Main interface for Sri Lanka



**DroughtWatch 3.1**

Modules Help

*DroughtWatch* DEMO

User Login

User Name:

Password:

**Modules**

Sensor: MODIS/TERRA Resolution: 1km Frequency: Month Date: 2015 2

< Input Data ->

Vir\_Band(Band2):  Load Preview

Svir\_Band(Band7):  Load Preview

Output Folder: D:\DroughtWatch\_LKA\bin\Datadir\Index\

Sensor/Satellite: MODIS/TERRA Resolution: 1KM

ST: 2000 YY 1 MM 1 DD ET: 2000 YY 1 MM 1 DD

Frequency:  Month  Dekad  Week  Pentad

< Parameters Configuration ->

Atmos. Correction:  No  Yes

Aggregation:  Maximum  Average

Single Index:  VCI  TCI  VHI  NDDI  VSWI

Combination Index: S2\_12345 (VCI@TCI@VHI@NDDI@VSWI)

Combination Method:  Max  Min  Mean  Median  Majority

PROGRESS

**DroughtWatch 3.1 - Database**

Input: Edit Table Window

SQL: select \* from atmosphere where country=1

Station ID	Year	Month	Wind	Air Temperature
476102	2000	5	0	16.70000
476102	2000	5	0	16.80000
476102	2000	5	0	17.30000
476102	2000	5	0	18.30000
476102	2000	5	0	14.70000
476102	2000	5	0	16.10000
476102	2000	5	0	17.30000
476102	2000	5	0	18.30000
476102	2000	5	0	15.00000
476102	2000	5	0	14.70000
476102	2000	5	0	17.30000
476102	2000	5	0	18.30000
476102	2000	5	0	11.00000
476102	2000	5	0	6.00000
489590	2000	5	1	12.40000
489590	2000	5	2	12.00000
489590	2000	5	3	17.00000
489590	2000	5	3	17.00000
489590	2000	5	1	22.80000
489590	2000	5	2	24.70000
489590	2000	5	3	18.00000
489590	2000	5	1	20.20000
489590	2000	5	2	18.40000
489590	2000	5	3	17.50000
489590	2000	5	1	20.30000

Query

Start Time: 2000 1 1 End Time: 2014 12 31

Bad Time: 2014 1 1 2014 12 31

Category: Sentinel Grids

Prequery: Batch

Group: Initial Indices

View: ALL

**DroughtWatch 3.1 - Preprocessing**

Preprocessing Composition

Sensor: CCB/AT Resolution: 30m Start Time: 2000 2 26 End Time: 2015 2 26

Input Folder: D:\DroughtWatch\_LKA\bin\Datadir\Originaldata\VICCB\

Output Folder: D:\DroughtWatch\_LKA\bin\Datadir\Preproc\

Atmospheric Correction  Delete Temporary Files

NHIA-CCB1-97-108-20120712-120000805442.tar.gz

**DroughtWatch 3.1 - Drought**

Single Combination Dashboard

Resolution: 1KM Frequency: Month Date: 2014 10 IndexType: TCI

Input File:

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

Drought Classification:

Extreme: 0	~ 0.095	<span style="color: red;">■</span>
Serious: 0.095	~ 0.167	<span style="color: orange;">■</span>
Moderate: 0.167	~ 0.255	<span style="color: yellow;">■</span>
Slight: 0.255	~ 0.343	<span style="color: lightgreen;">■</span>
Normal: 0.343	~ 1	<span style="color: green;">■</span>

Output Folder: E:\DroukS\DroukS\Datadir\droughtout\single\

**DroughtWatch 3.1 - Analysis**

Over Spatial Unit Over Time Interval

Frequency: Month Date: 2014 10 Admin. Unit: Country Drought: VCI

Drought Data:

Administrative File: E:\DroukS\DroukS\data\country\_code\_albers2.tif

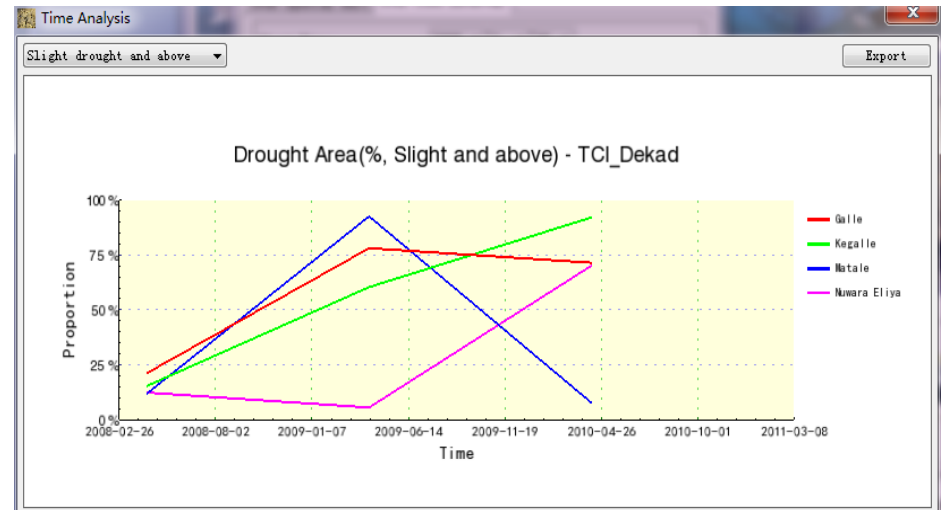
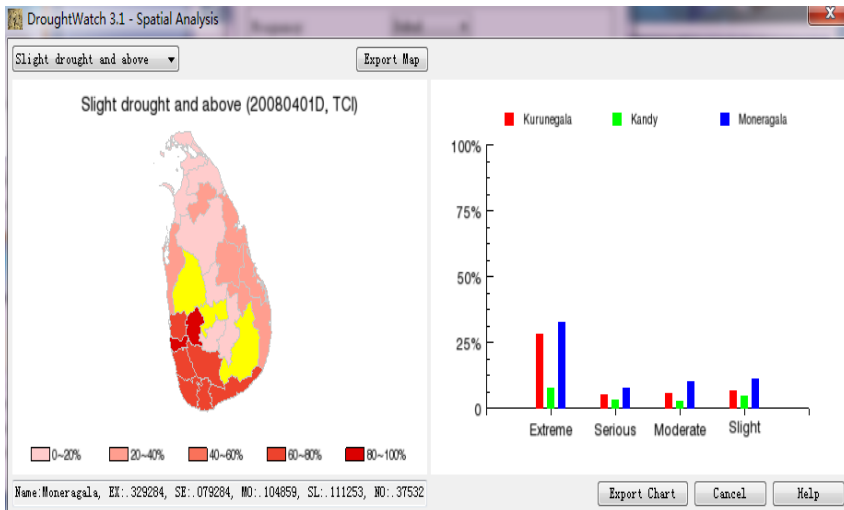
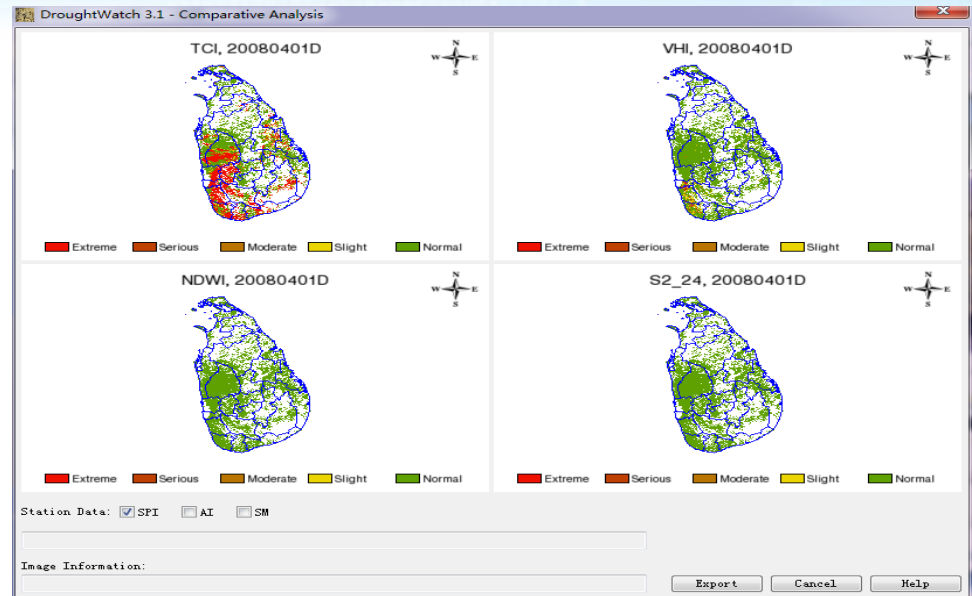
Output Folder: E:\DroukS\DroukS\Datadir\droughtstat\

# Output products



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

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

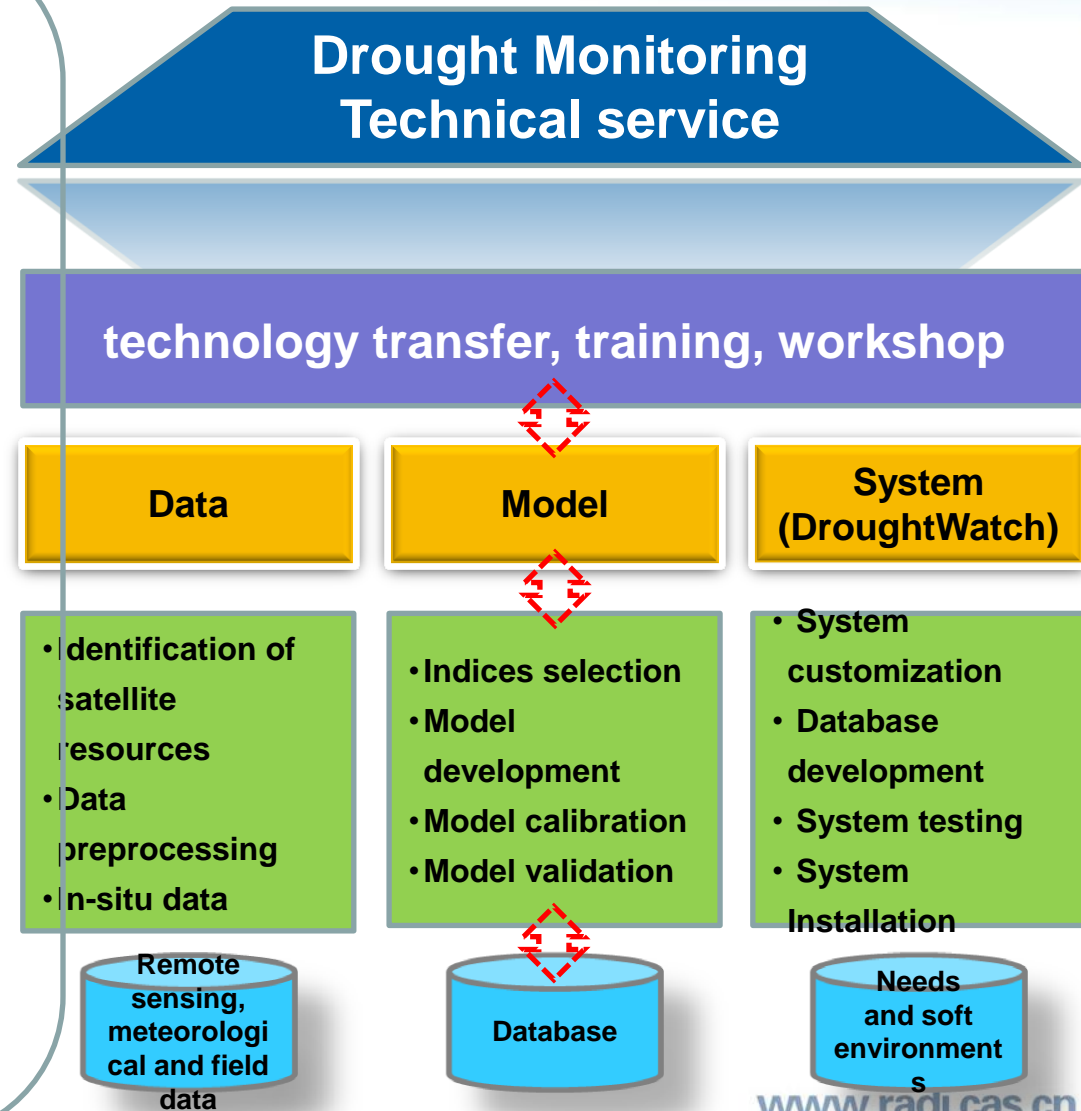




# Technical assistance for Cambodia



- Fact finding and requirement analysis ( 2015 )
- Work plan for 2016
- Field data collection and assessment
- Satellite resources analysis and model development
- Field work plan and model validation
- Database and system customization
- Capacity building: data processing, field work, model and system training



# Training



- Data requirement analysis (Feb, 2016)
- Training Workshop for Regional Drought Mechanism in Cambodia. (July 26-28, 2016 )
- Hand-on training of data processing, indices calculation, indices suitable analysis, database development and final indices decision for Cambodia persons in RADI, China( Nov-Dec, 2017).

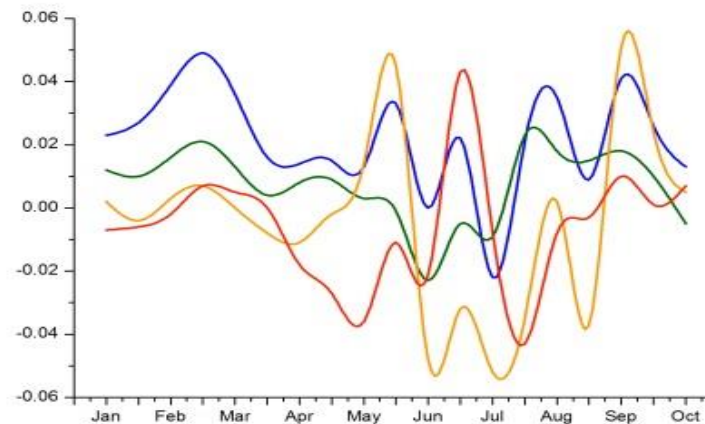
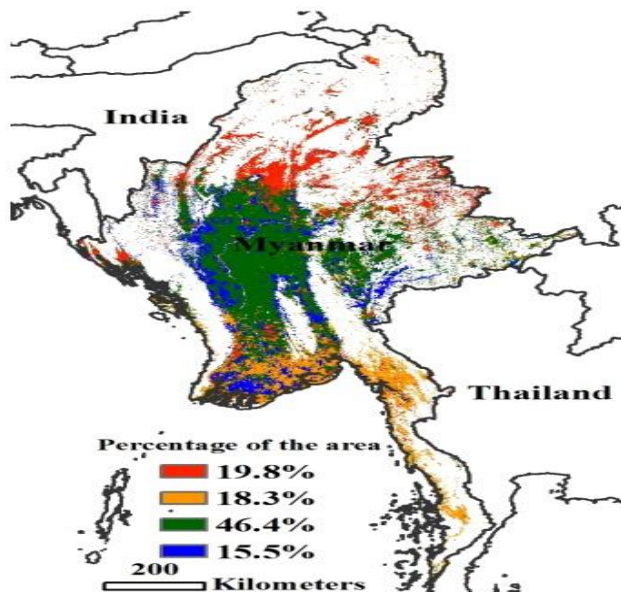




# Technical assistance for Myanmar



- Fact finding and requirement analysis
- Work plan for 2016, April 2016
- Training on drought monitoring, April 2016



# Services provided

- **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.



# FY-3 data for Mongolia and Sri Lanka (NSMC)



- Data delivery via Baidu Cloud
- Help Mongolian Partner to process the FY-3  
MERSI data
- Process FY3A/C MERSI data for Sri Lanka

# FENGYUN Satellite Data Center

NATIONAL SATELLITE METEOROLOGICAL CENTER

- Home
- SATELLITES
- DATA
- IMAGES
- PRODUCTS
- DOCUMENTS
- TOOLS

## Archive

Satellites	File count	Volume(TB)
FY-3C	7783270	387.7
FY-3B	23047540	1419.0
FY-3A	27388994	1504.9
FY-2G	685778	7.7
FY-2F	2124719	24.7
FY-2E	3953988	38.6
FY-2D	4728093	58.1
FY-2C	2878665	39.8
FY-1D	270292	6.5

[Data Overview>>](#)

## Statistics

DOWNLOAD SINCE 2005 ( MB )

**2,204,124,446 MB**

Satellites

**FY-LEO**

**L1 DATA**

Image

Atmosphere

Land

Ocean

Radiation

**FY-GEO**

FY-3C  FY-3B  FY-3A  FY-1D More...

Data Name

Start Date  Start Time

End Date  End Time

Time Range  Each Day

Spatial Sel

Coverage  Intersect  Entirely Within

[Availability](#) [Search](#)

## Sign In

User ID:

Password:

Verify:

Stay Signed In

[Forget Password?](#) [SIGN UP](#)

[Sign In](#)

## SATELLITE TRACK ALL FY-3C FY-3B FY-3A FY-2G FY-2F FY-2E FY-2D



## Orbit Parameters

<b>TBUS</b>	FY-3C	FY-3B	FY-3A
<b>Two Line</b>	FY-3C	FY-3B	FY-3A
<b>One Line</b>	FY-3C	FY-3B	FY-3A
<b>Time Table</b>	FY-3C	FY-3B	FY-3A



http://pan.baidu.com/disk/home#list/path=%2FSriLanka%2Ffy3a%2FUNESCA 百度云 网盘-全部文件

文件(F) 编辑(E) 查看(V) 收藏夹(A) 工具(T) 帮助(H)

百度云 主页 网盘 分享 应用 牛奶咖啡 <从你的全世界路过> 搜索你的文

全部文件 上传 新建文件夹 离线下载 我的设备

返回上一级 | 全部文件 > SriLanka > fy3a > UNESCAP\_...

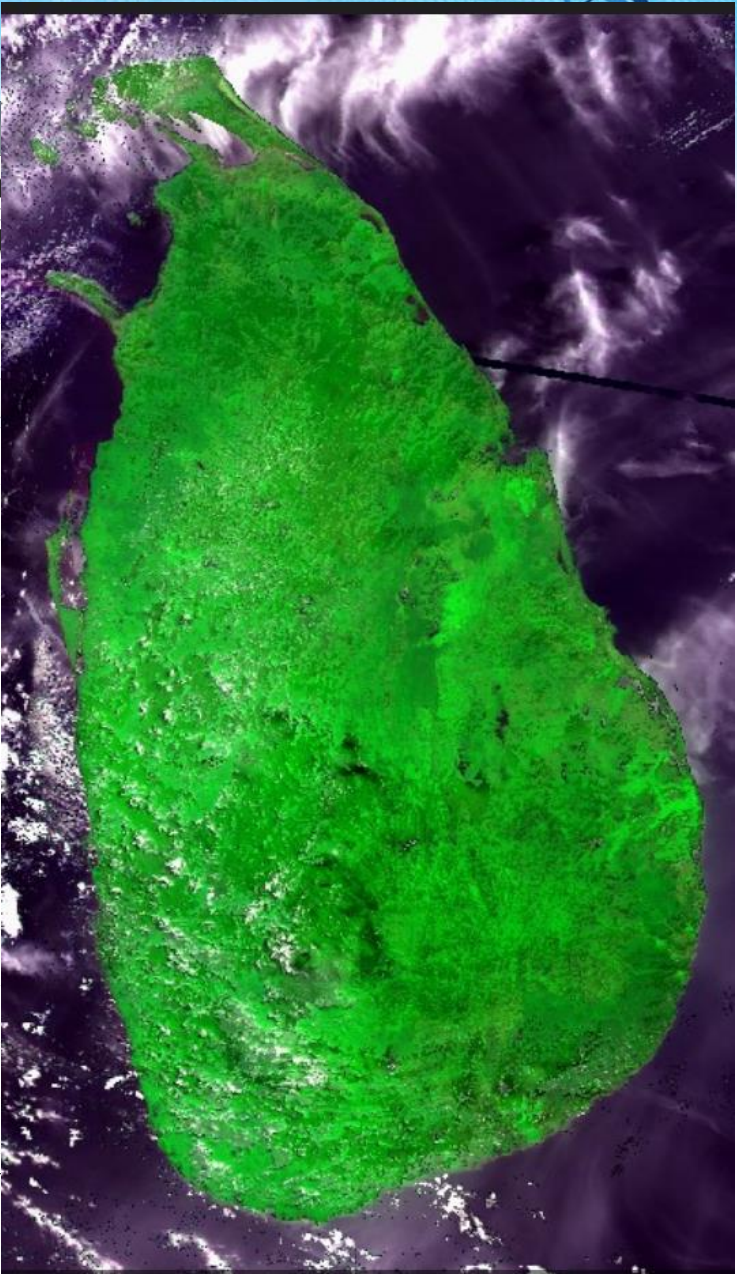
已选中1个文件/文件夹 分享 下载 删除 推送到云设备

- FY3A\_MERSI\_20140626\_5Day\_0250M.UNESCAP\_SriLanka.img
- FY3A\_MERSI\_20140626\_5Day\_0250M.UNESCAP\_SriLanka\_FalseTrueColor.jpg
- FY3A\_MERSI\_20140621\_5Day\_0250M.UNESCAP\_SriLanka.img
- FY3A\_MERSI\_20140621\_10Day\_0250M.UNESCAP\_SriLanka.img
- FY3A\_MERSI\_20140621\_5Day\_0250M.UNESCAP\_SriLanka\_FalseTrueColor.jpg
- FY3A\_MERSI\_20140626\_5Day\_0250M.UNESCAP\_SriLanka.hdr
- FY3A\_MERSI\_20140616\_5Day\_0250M.UNESCAP\_SriLanka.img
- FY3A\_MERSI\_20140621\_10Day\_0250M.UNESCAP\_SriLanka\_FalseTrueColor.jpg
- FY3A\_MERSI\_20140621\_5Day\_0250M.UNESCAP\_SriLanka.hdr
- FY3A\_MERSI\_20140611\_5Day\_0250M.UNESCAP\_SriLanka.img
- FY3A\_MERSI\_20140611\_5Day\_0250M.UNESCAP\_SriLanka\_FalseTrueColor.jpg
- FY3A\_MERSI\_20140616\_5Day\_0250M.UNESCAP\_SriLanka.hdr
- FY3A\_MERSI\_20140606\_5Day\_0250M.UNESCAP\_SriLanka.img

回收站

云管家 Android iPhone 更多

4.64G/2053G 扩容



# Services provided

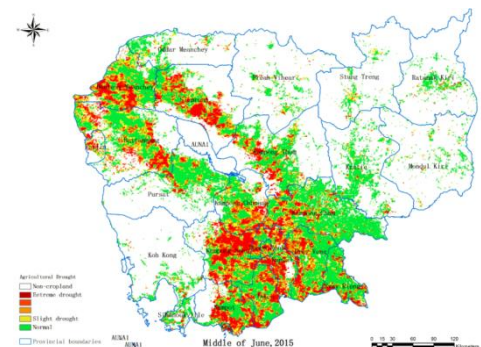
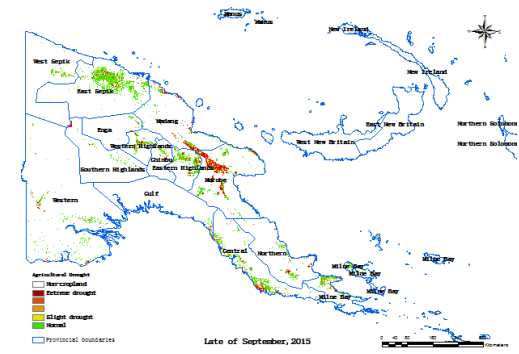
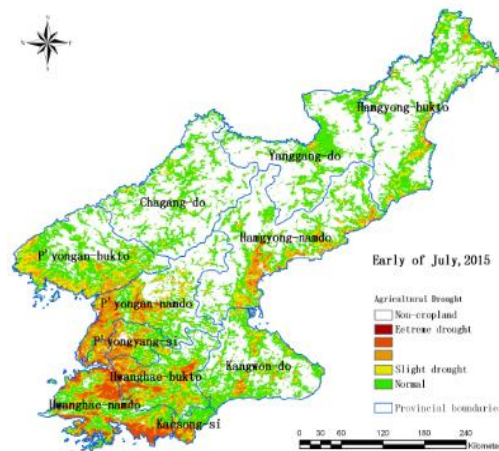
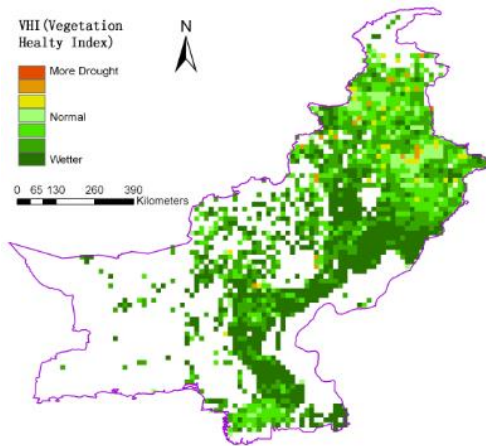


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- ❑ **Satellite Data Based Monitoring Service:** to provide relevant interim products and analytical services by responsible service nodes to requested local service providers (LSPs) of less capable countries.



# Products

- **Paksitan: Oct 2014-Mar 2015.**
- **Democratic People’s Republic of Korea(DPRK): April to early of July, 2015**
- **Papua New Guinea (PNG): Sept-Oct.**
- **Cambodia: June to August 2015; April 2016.**

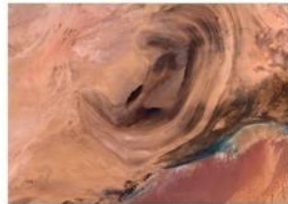


# Capacity Building

- CAS-TWAS Center of Excellence Spatial technology for Disaster Mitigation for developing countries
  - Ph.D student (3 yr fellowship)-Two Mongolia person
  - Post Doctor Fellowship (2 yr)
  - Senior visiting scientists (0.5 yr – 1yr)
- Project cooperation



# Thanks!



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Chinese Academy of Sciences**

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Web: [www.radi.cas.cn](http://www.radi.cas.cn)