GEOGLAM
Global Agricultural Monitoring

The GEO Global Agricultural Monitoring initiative
Advances and Action Plan

The Group on Earth Observations
João Vianei Soares (GEO), Pascal Kosuth (Irstea)

Background : the G20 Agriculture priority (2011)

G20 Final Declaration – Cannes, November 2011

44. We commit to improve market information and transparency in order to make international markets for agricultural commodities more effective. To that end, we launched:

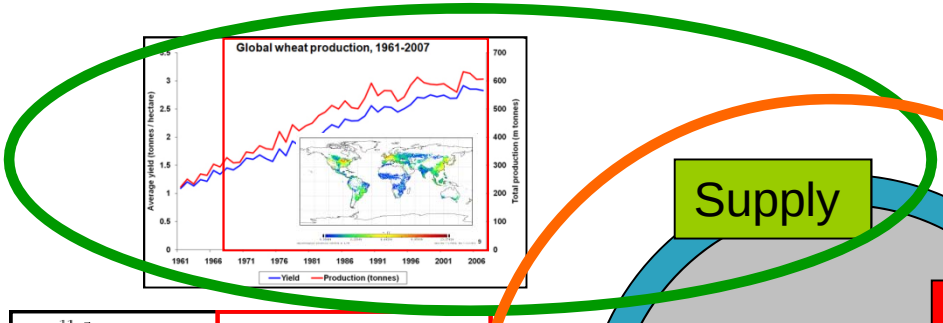
- *The **"Agricultural Market Information System" (AMIS)** in Rome on September 15, 2011, to improve information on markets ...;*

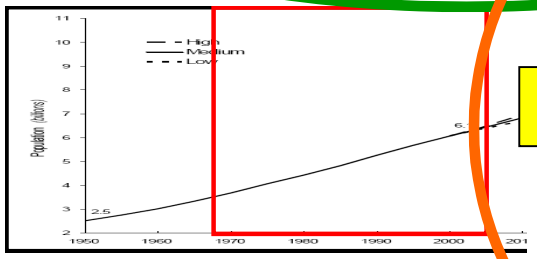
- *The **"Global Agricultural Geo-monitoring Initiative" (GEOGLAM)** in Geneva on September 22-23, 2011. This initiative will coordinate satellite monitoring observation systems in different regions of the world in order to enhance crop production projections and weather forecasting data.*

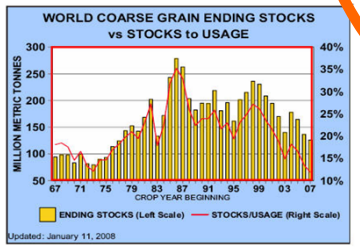
Background : the G20 Agriculture priority (2011)

2 initiatives to increase information availability, quality and transparency

GEOGLAM







Supply

Price

Demand

Policies

Finance

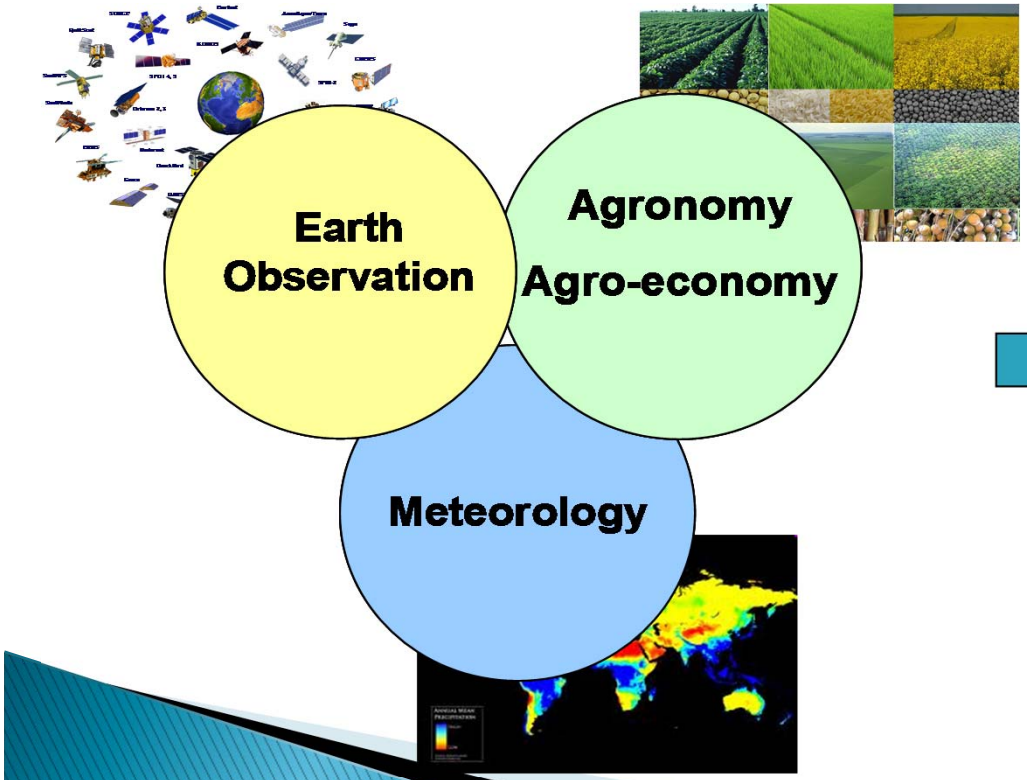
Trade

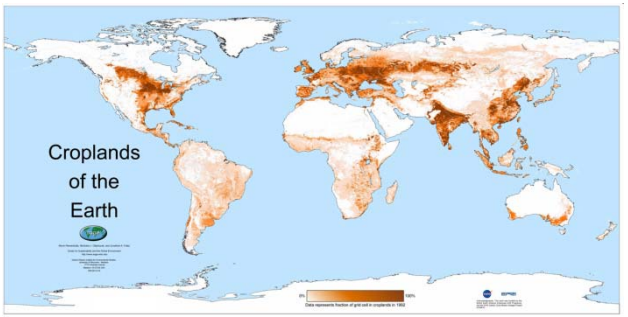
Stocks

AMIS

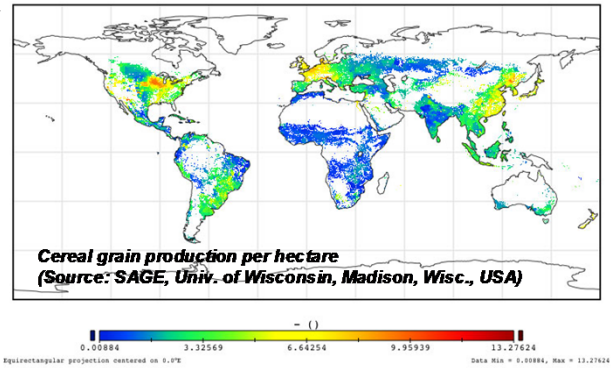
1. The GEOGLAM Initiative : Objectives

To strengthen the international community's capacity to produce and disseminate relevant, timely and accurate forecasts of agricultural production at national, regional and global scales, through reinforced use of Earth Observations.



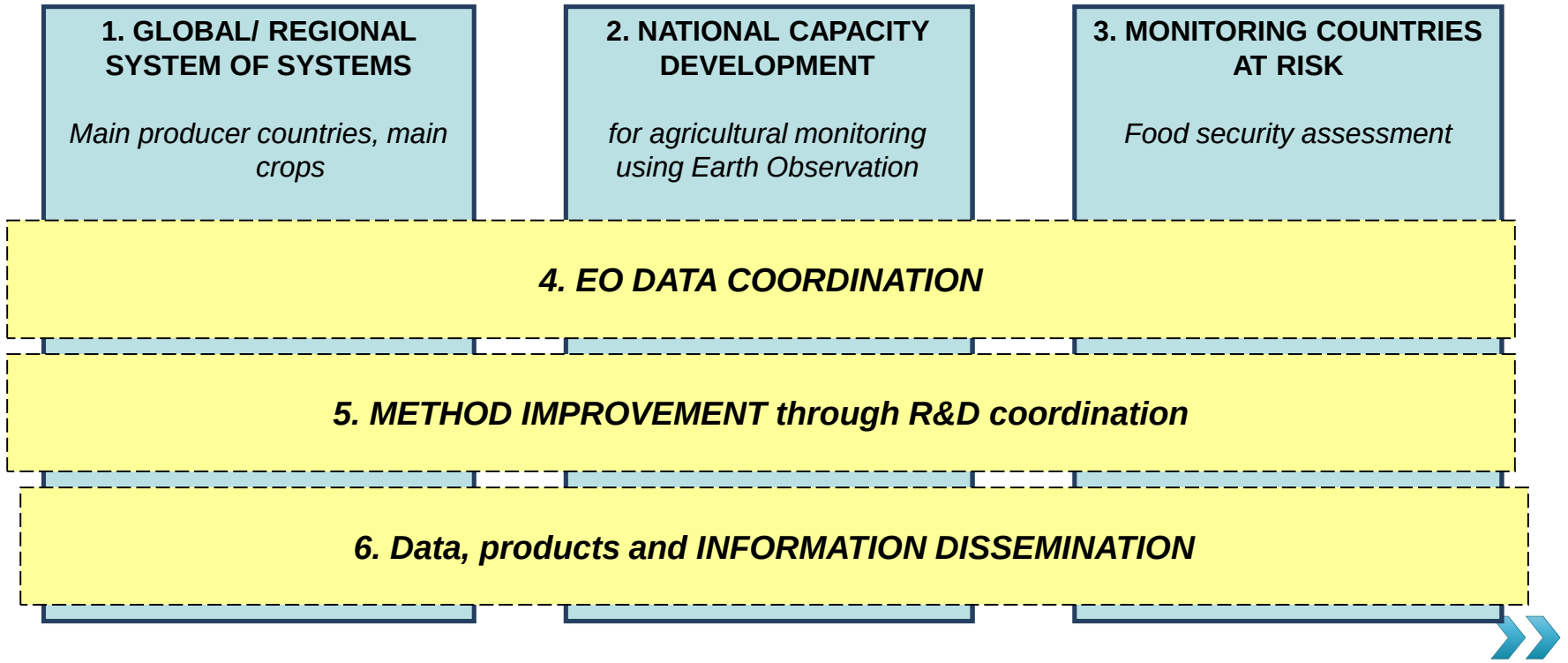


Cultivated area / crop type area



Crop yield forecast

2. The GEOGLAM Initiative : 2011-2012 advances



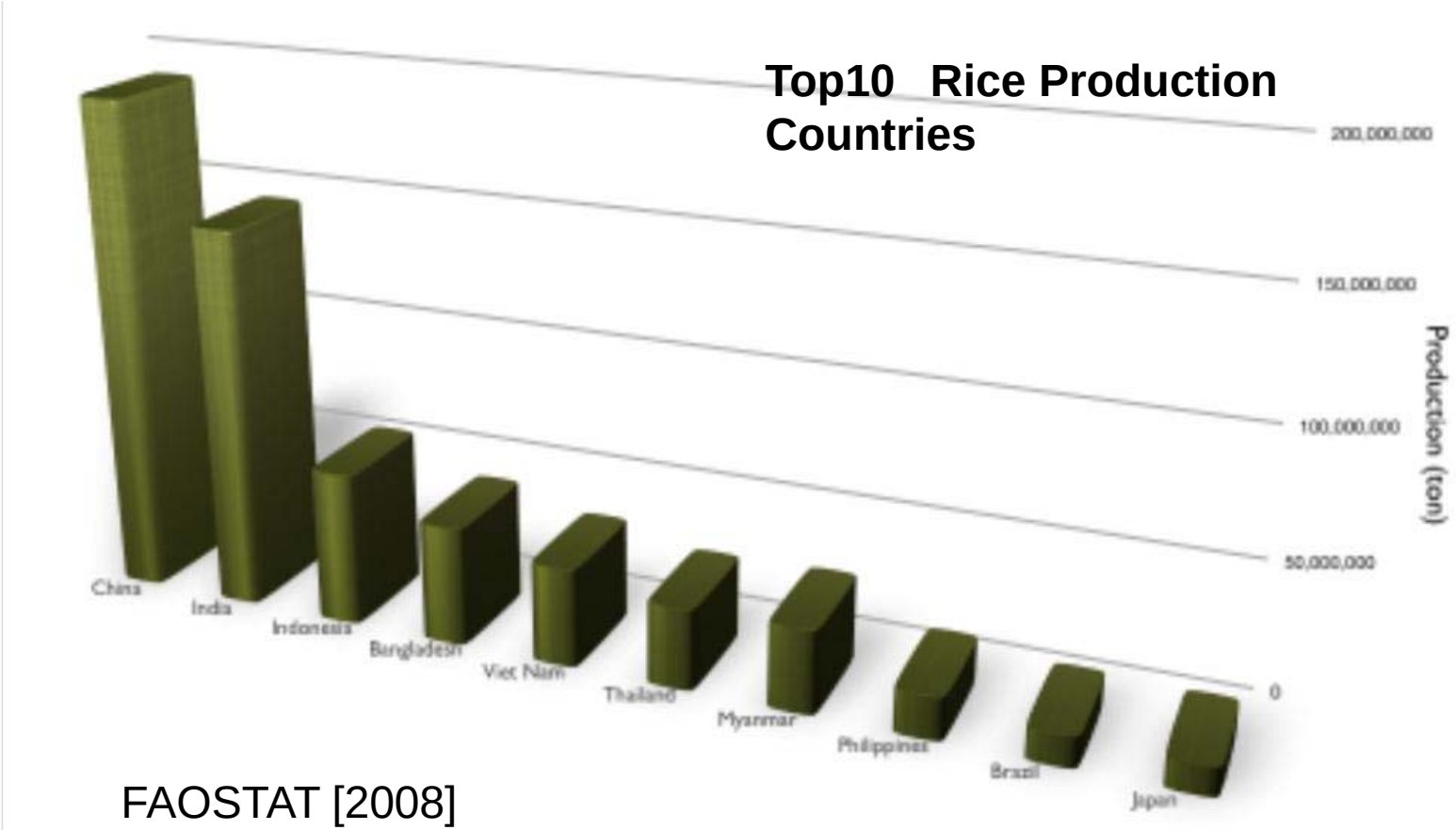
GEOGLAM is a coordination initiative, aiming at providing key information on Agricultural production using Earth Observations through:
- supporting, strengthening and articulating existing efforts and
- developing capacities and awareness at national, regional and global level

Asia- Rice Crop Estimation Monitoring (Asia-RiCE): A component of GEOGLAM

Shin-ichi Sobue
Sobue.shinichi@jaxa.jp
on behalf of Asia rice crop estimation and monitoring team

Rice Production in Asia

- Asian countries are responsible for approximately 90% of the world rice production and consumptions.



FAOSTAT [2008]

Asia rice crop monitoring Team in GEO GLAM

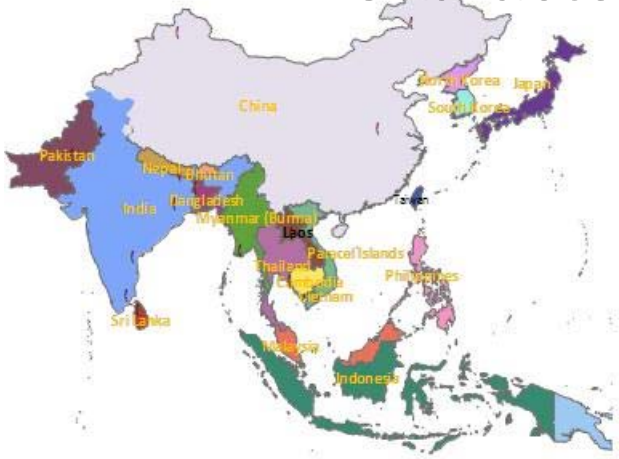
Purpose : Compile Asia rice crop monitoring requirement and develop a work plan of Asia rice crop monitoring as a part of GEO GLAM work plan.

Team members:

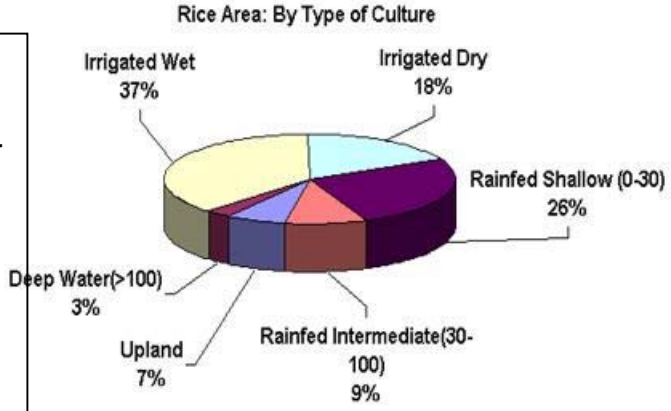
- Shin-ichi Sobue (lead- JAXA) , Kei Oyoshi (JAXA), Jai Singh Parihar, Sushma Panigrahy, K.R. Manjunath (ISRO, India), Preesan Rakwatin (GISTDA, Thailand), Lam Dao Nguyen, Thuy Le Toan (VAST/STI, Vietnam), Agus Hidayat, Dr Mahkmoud, Ratih Dewanti (LAPAN, Indonesia), Muhrizal Sarwani, Rizatus Shofiyati (ICALRD/MOA, Indonesia), Heng Suthy (MRC), Wu Bingfang (IRSA, China)

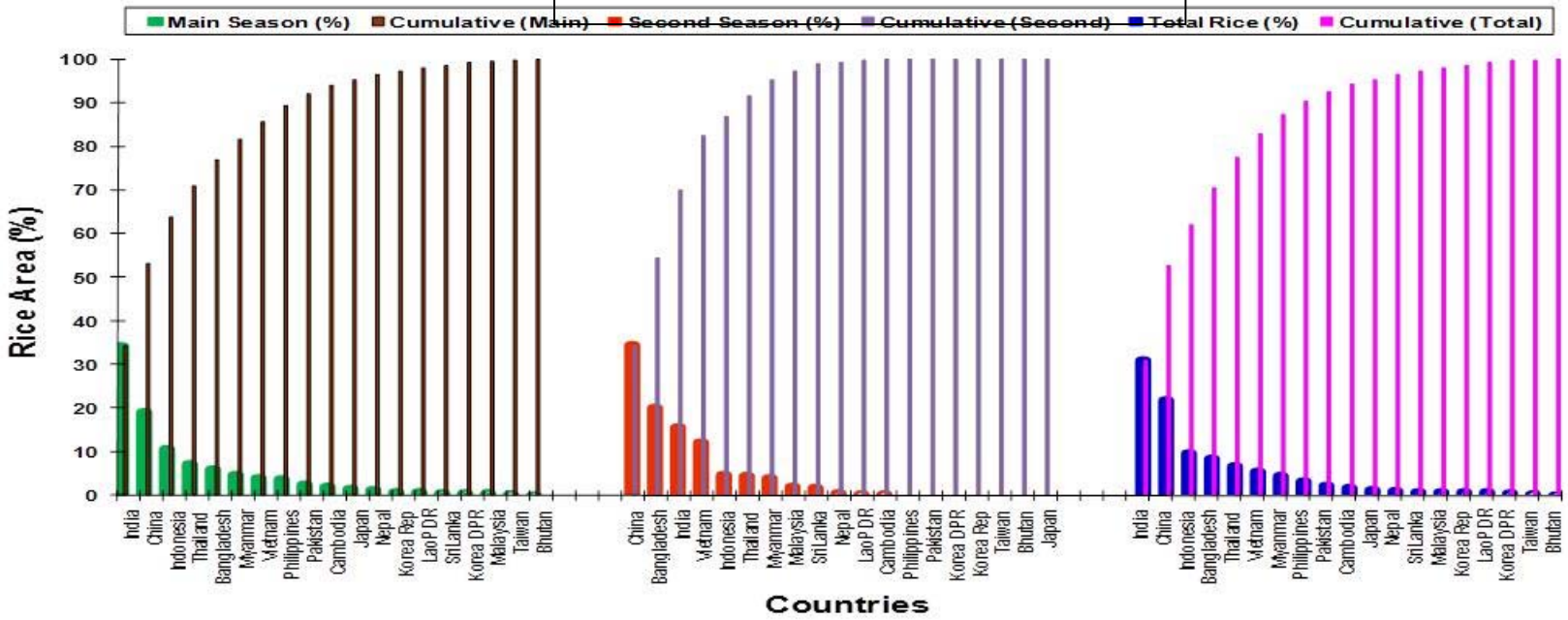
- Supported by Stephen Ward, George Dyke, Matthew Steventon (SIMBIOSS) and Toshio Okumura, Akira Mukaida, Nobuhito Tomiyama (RESTEC)

Characteristic of Asian rice growing region



- **Multi season crop**
- **Variable crop calendar within a season**
- **Diverse growing practice**
- **Water resource dependency (Water stress – irrigate, rain-fed)**
- **Rainy season growth (cloud)**





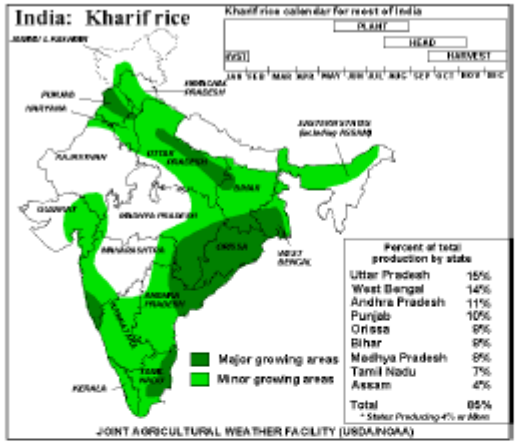
Data provided by ISRO

Main rice crop area by USDA/MAFF

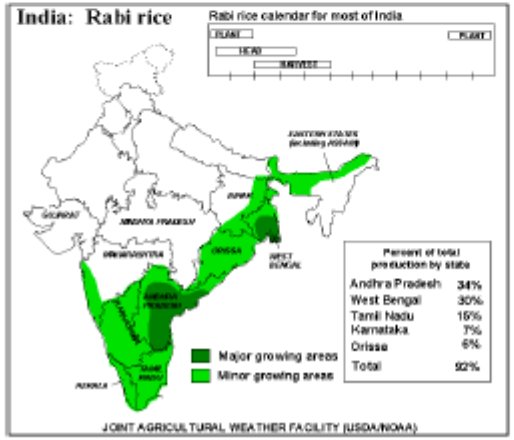
India

主要国の米の作付け地域

インド（カリフ　雨期米　緑色が主産地）
（インドほぼ全域）



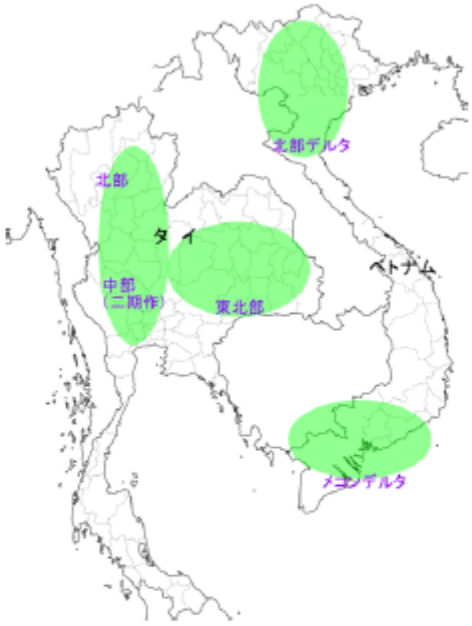
インド（ラビ　乾期米）
（インド半島部、東部）



資料：米国農務省

SE Asia

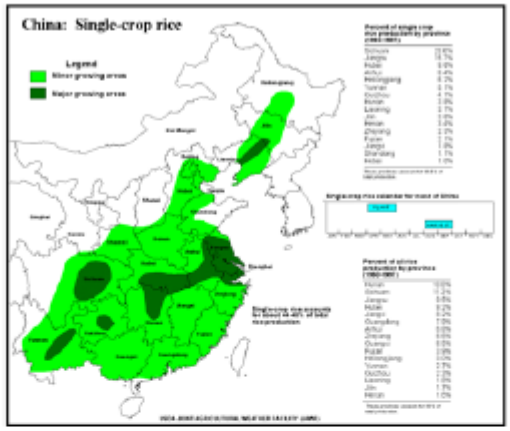
東南アジア（タイ、ベトナム　緑色が主産地）



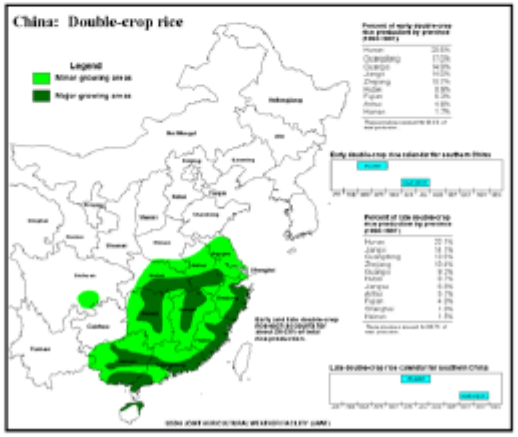
資料：タイ政府資料ほか

China

中国（一期作　緑色が主産地）
（東北地区、華中、華南等）



中国　（二期作）
（主に華南地区）



資料：米国農務省

Characteristics of Asia Rice crop

Climatic and socio-economic aspects and imperative technologies in Asian region

- Rice is cultivated in rainy season, cloudy condition -> SAR Observation
- Frequent severe damage induced by drought and flood (rain-fed type rice) -> Early Warning
- Field size variation - each parcel is small and the landscape is complicated in Asia. damage assessment for insurance, compensation for individual paddy field (each parcel). -> Detailed Mapping
- Some region cultivated two/three times in a year and Rice is the dominant crop in Asian countries with a large diversity of crop varieties (short, medium and long duration crops). -> Detailed Crop Calendar (mean crop calender and abnormal year crop calender)
- Crop growth model input information -> Agro-weather information (rain, radiation, temperature, etc.)

- Sampling Design for Asia rice crop monitoring

Work plan for Asia rice crop monitoring

2012/7: Report about Asia rice crop monitoring requirement to CEOS UR meeting at Montreal (by Shinichi)

2012/9: Develop draft Asia rice crop monitoring work plan

2012/11: Review the work plan at ACRS2012 hosted by GISTDA, Thailand with AARS

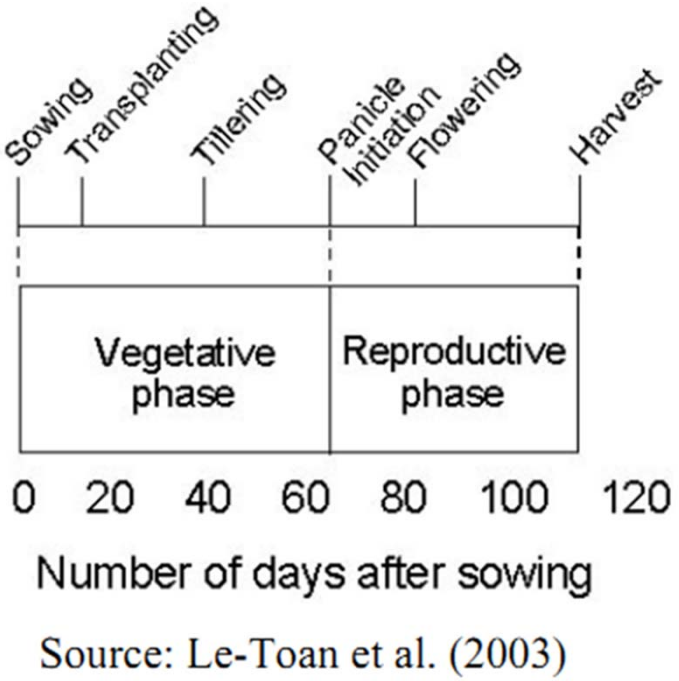
2012/12: Approve the work plan at APRSAF-19 hosted by ANGASA and Japan and submit it to Joao

With monthly Asia rice crop monitoring telecon

Example of Multiple season crop
Rice cropping systems in Suphan Buri, Thailand

GEOGLAM
Global Agricultural Monitoring

Rice growing stage (crop cycle length of 120 days)



Source: Le-Toan et al. (2003)

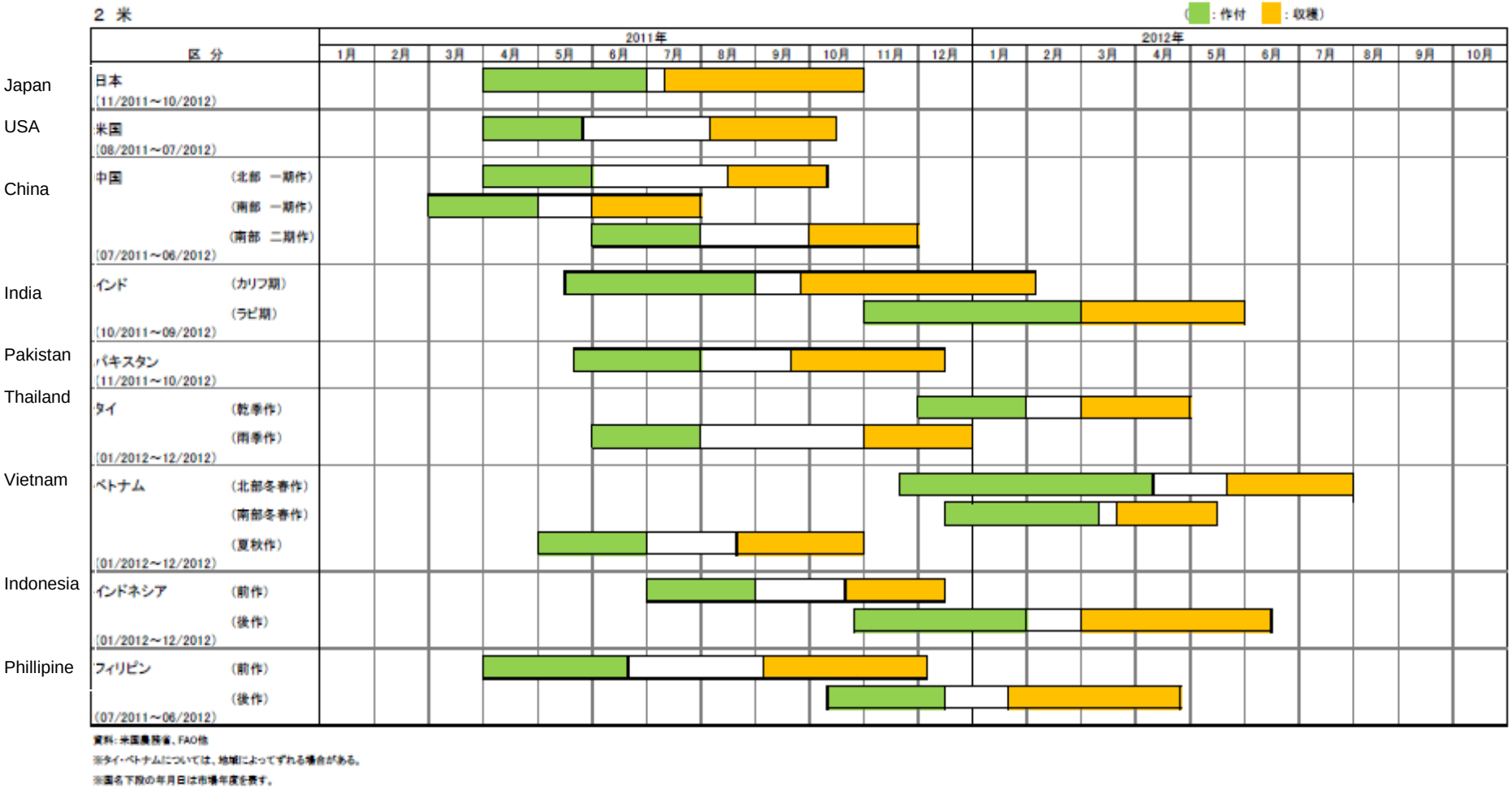
Rice crop system	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 st crop	→				←							→
2 nd crop						→			←			

→ Seeding dates

← Harvesting dates

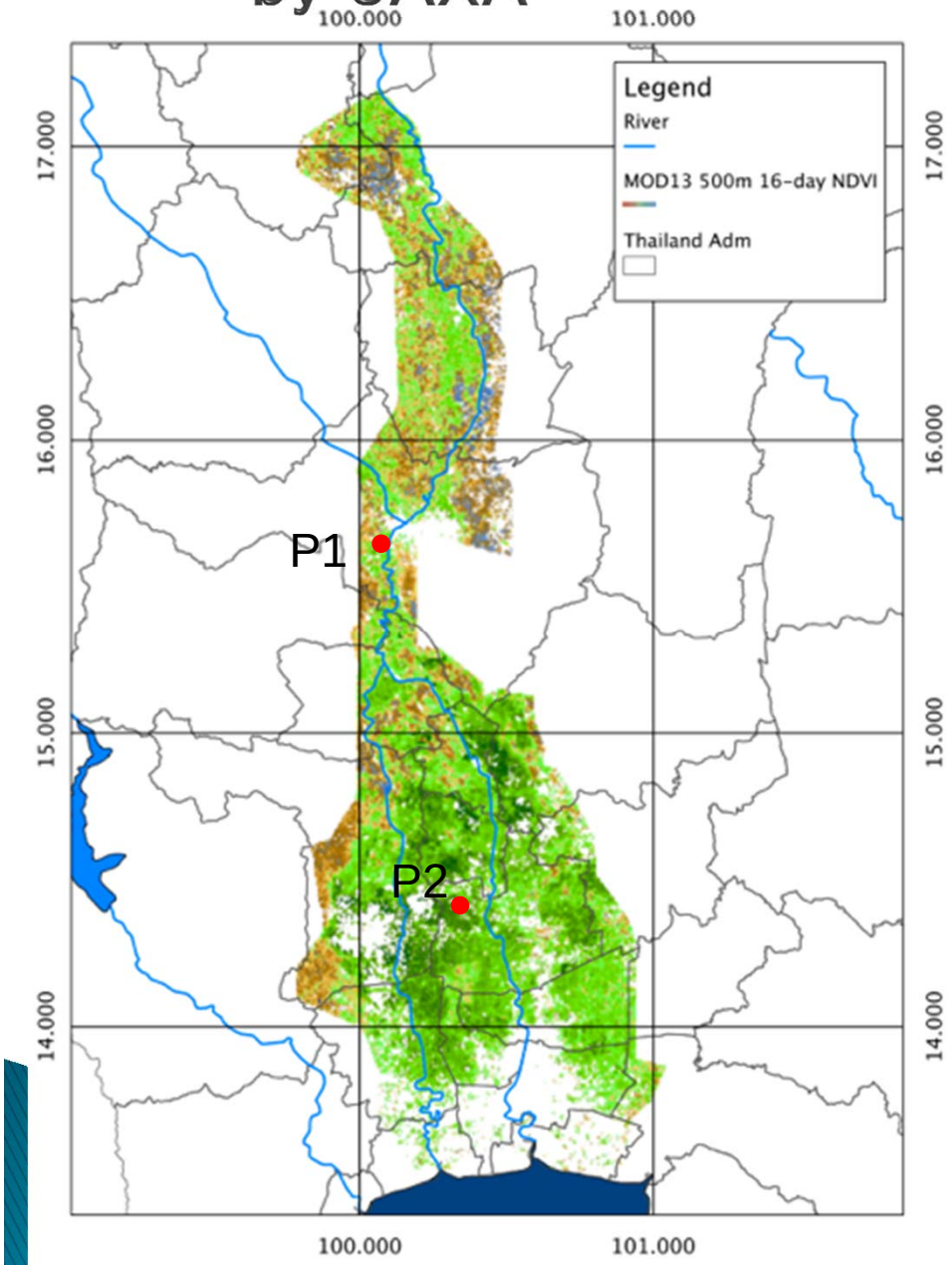
JAXA 宇宙航空研究開発機構 Japan Aerospace Exploration Agency

Asia Rice Crop Calendar



資料: 米国農務省、FAO他
※タイ・ベトナムについては、地域によってずれる場合がある。
※国名下段の年月日は市場年度を表す。

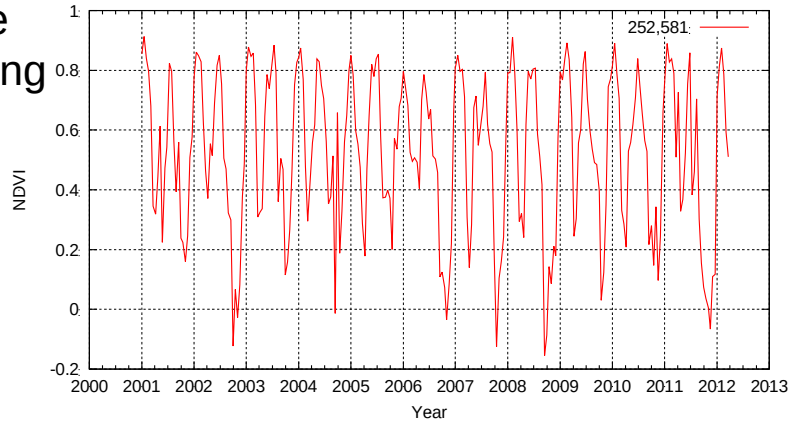
Thai Crop Calendar of Chaophraya Basin by JAXA



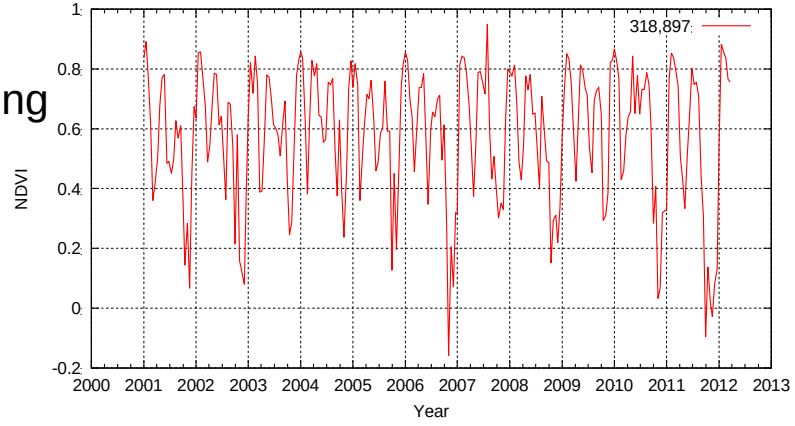
Definition of Croplands (MCD12 IGBP)

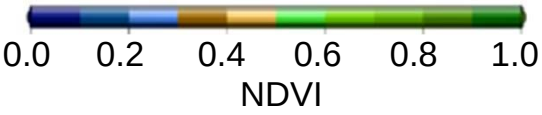
- Croplands + Cropland/Natural Vegetation

Double Cropping（P1）



Triple Cropping（P2）



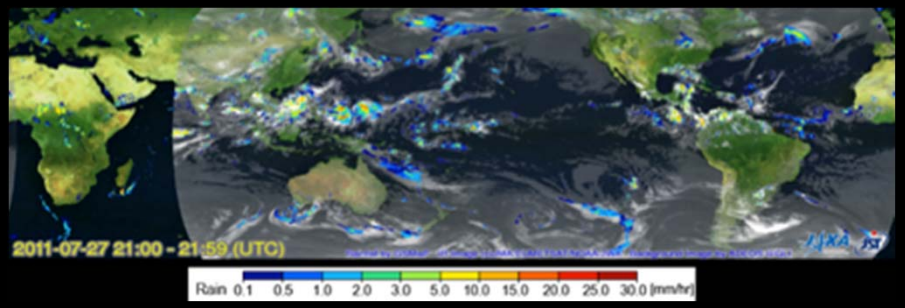


JAXA Satellites (Sensors) for Agricultural Applications

TRMM/GPM

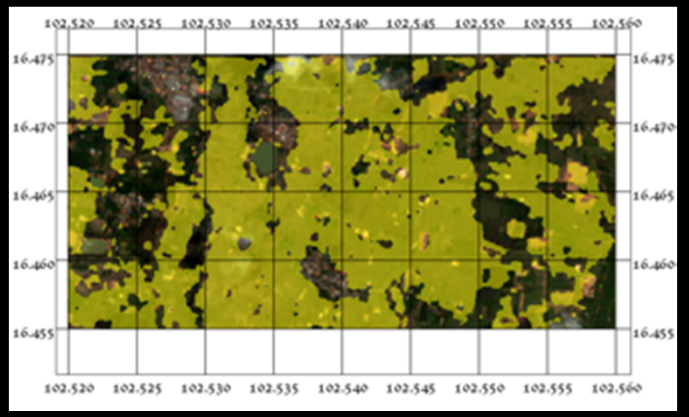
RADAR

Precipitation (yield forecast, drought)

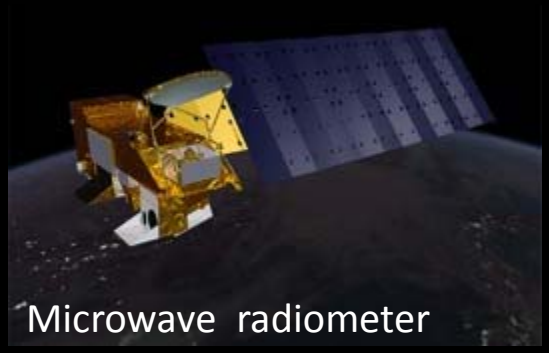


ALOS/ALOS-2,3 /GCOM-C SGLI

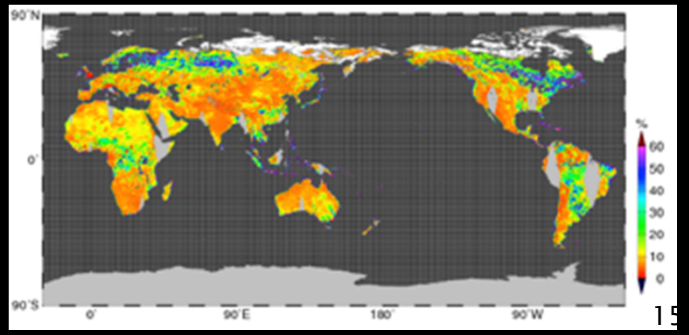
Crop Area Mapping (base map)



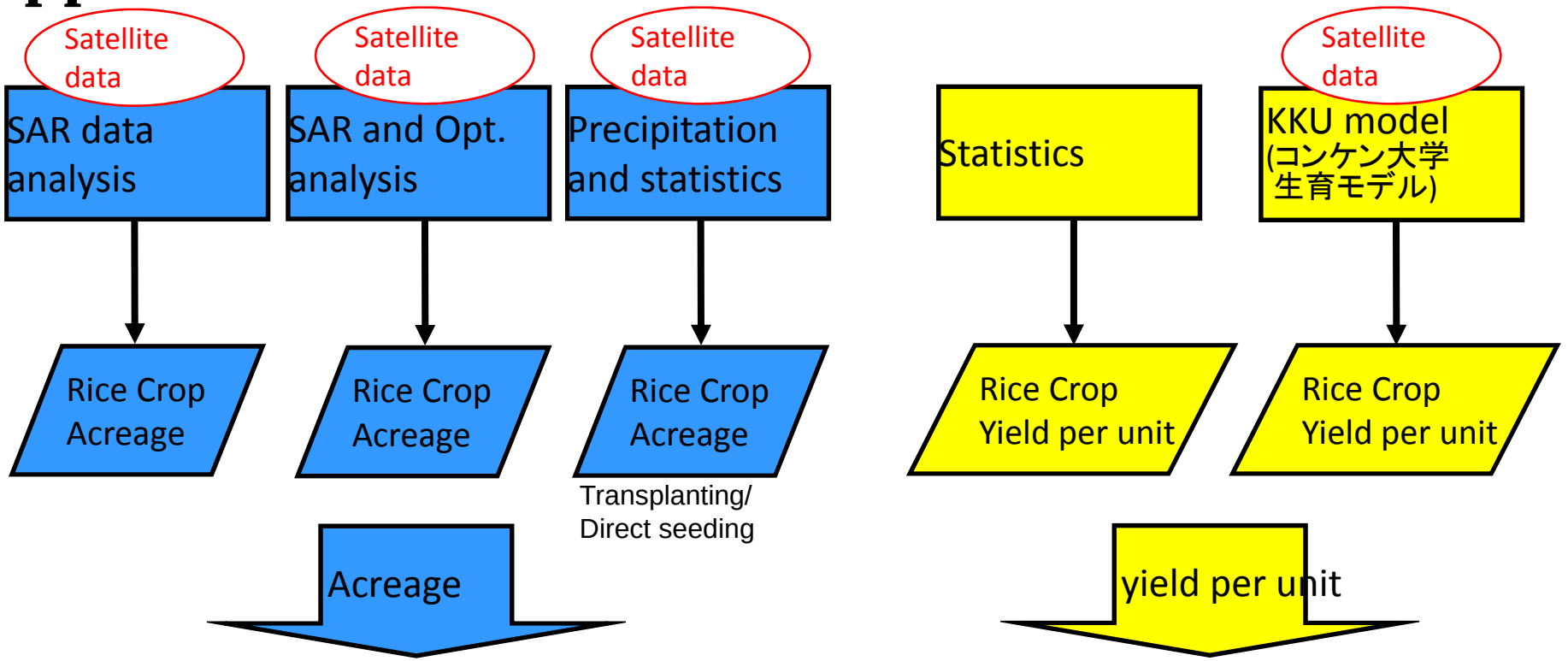
Aqua AMSR-E/GCOM-W1 AMSR2



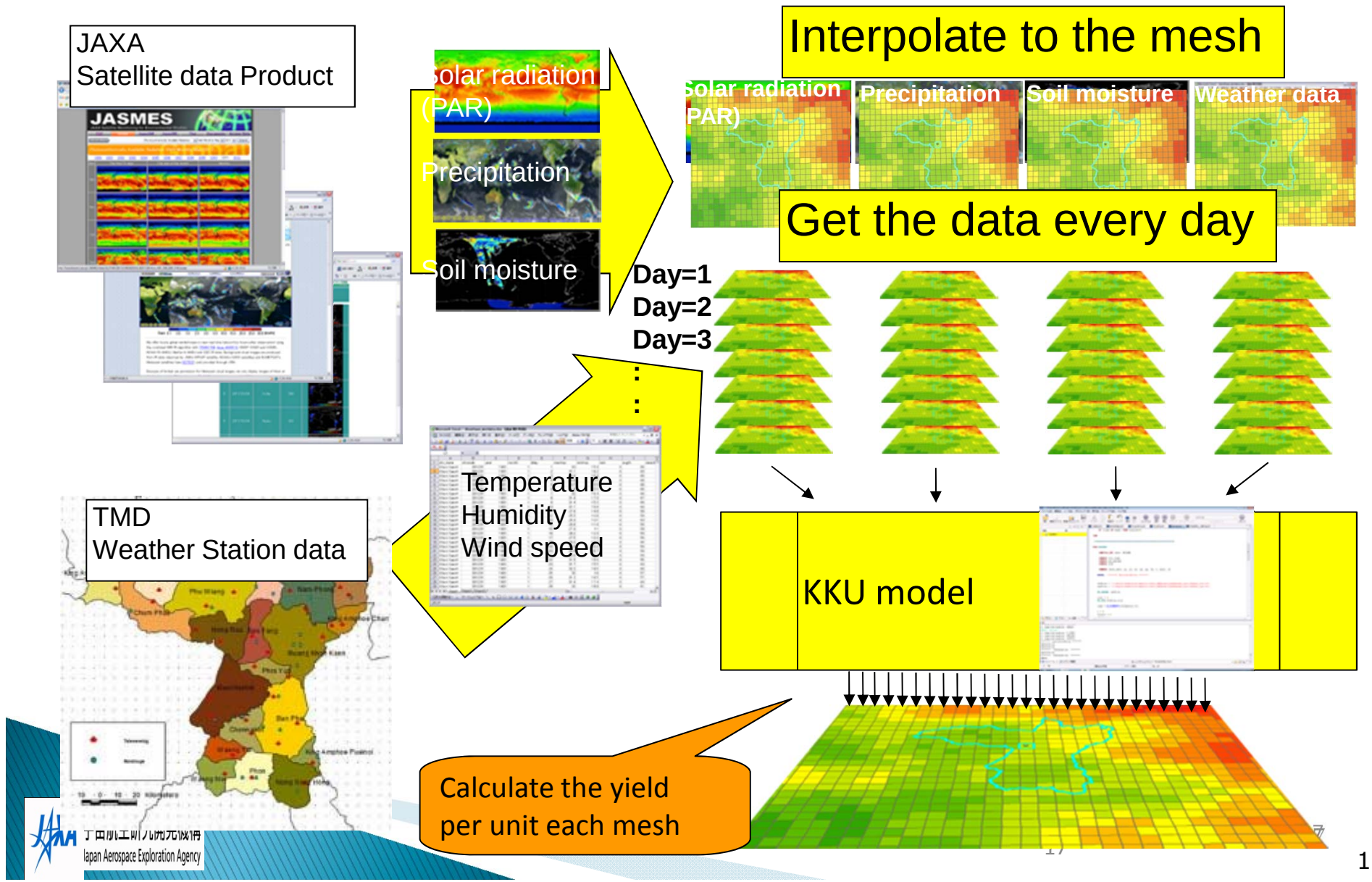
Soil Moisture (drought)



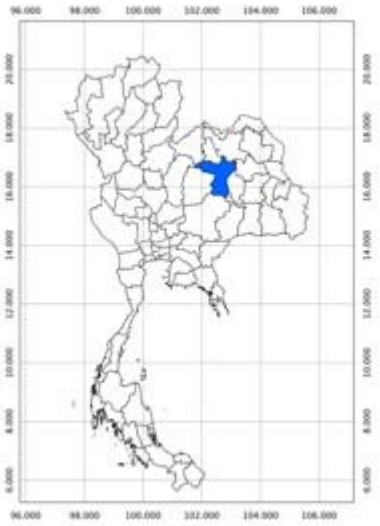
Approach


Satellite data
SAR data analysis
Satellite data
SAR and Opt. analysis
Satellite data
Precipitation and statistics
Statistics
Satellite data
KKU model (コンケン大学 生育モデル)
Rice Crop Acreage
Rice Crop Acreage
Rice Crop Acreage
Rice Crop Yield per unit
Rice Crop Yield per unit
Transplanting/ Direct seeding
Acreage
yield per unit
Yield = Acreage * yield per unit

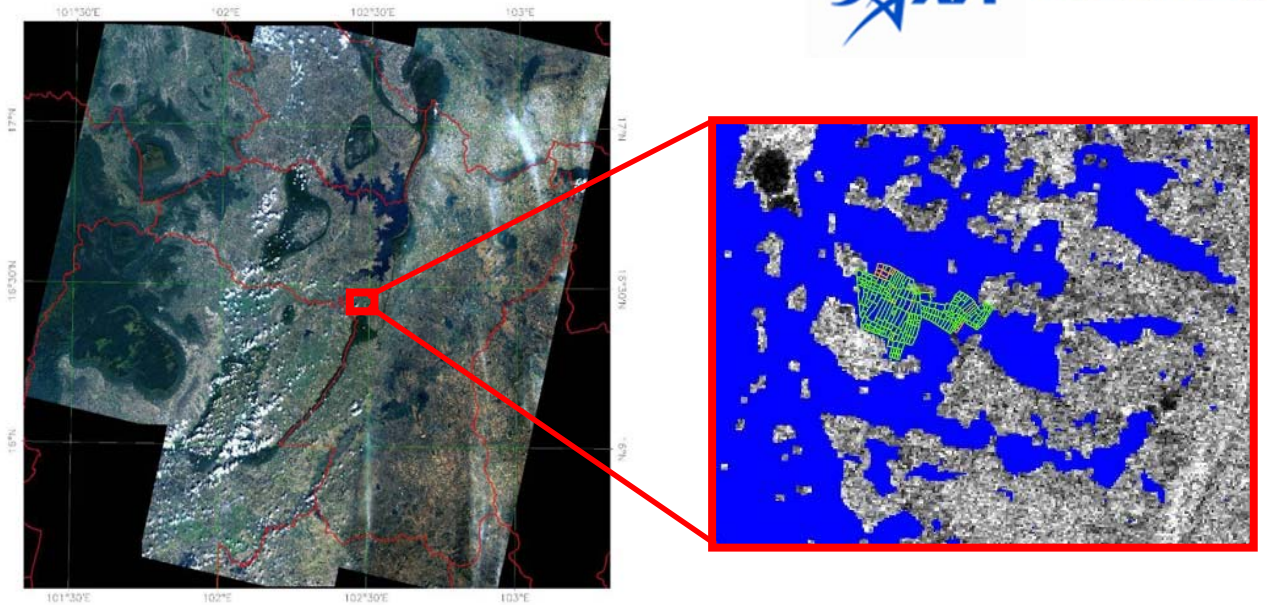
Yield per unit information estimation with model



Rice crop yield estimation result



Khon Kaen
Rain-fed cultivation



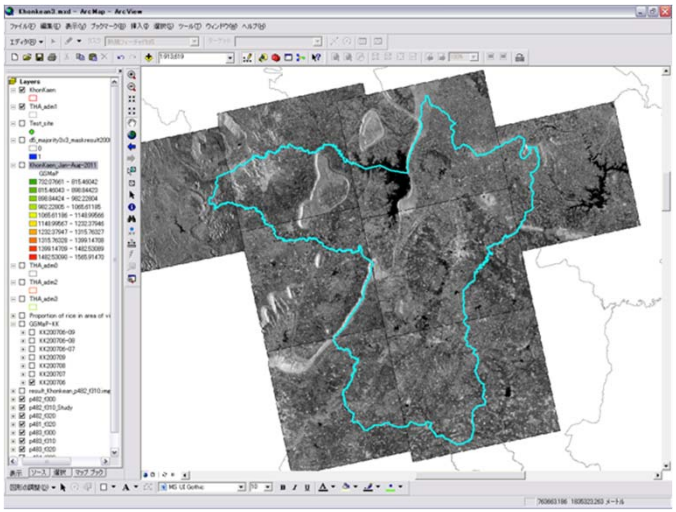
Result of Yield Estimation

The estimated results agree with the validation data.

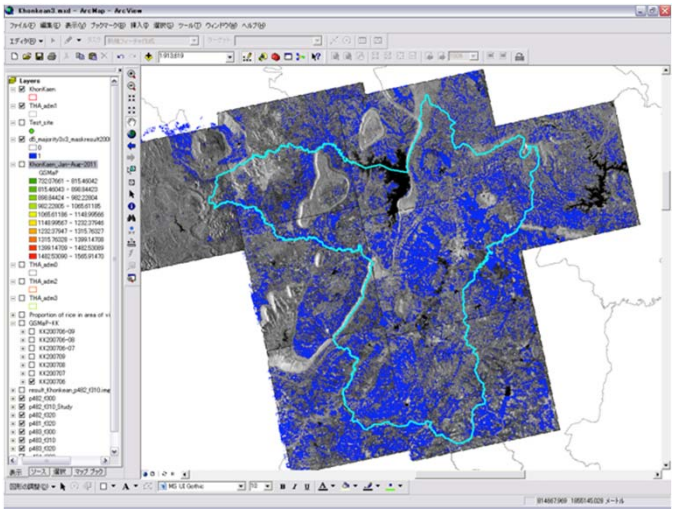
	Acreage [m2]	Yield per unit [g/m2]	Yield [ton]
Result of estimation	164,405.99	203.96	33.53
Validation data by field survey	166,766.39	2.47 – 750.08	40.96
Accuracy	98.58%	–	81.87%

Rice crop yield estimation pilot project by GISTDA and JAXA in Thailand

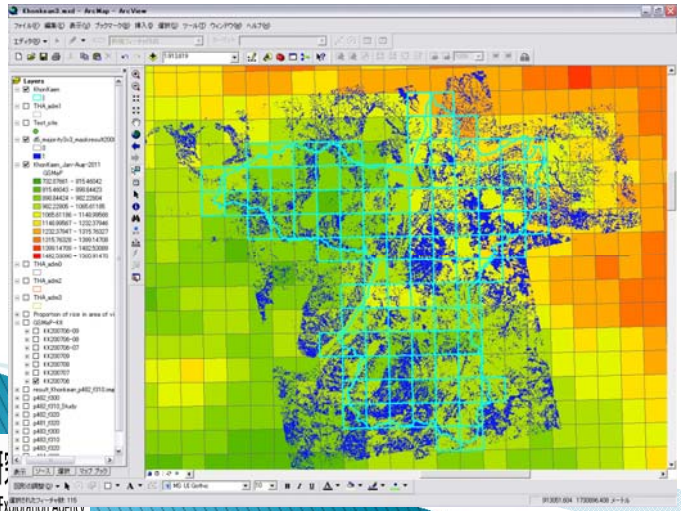
1. SAR data



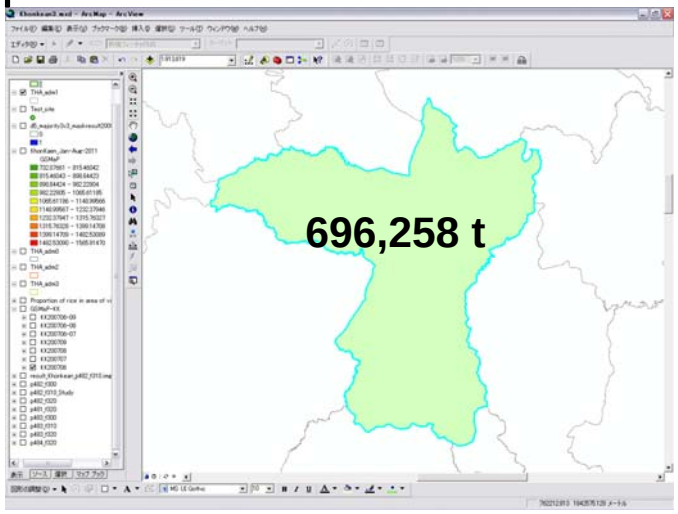
2. Cultivate area estimation



3. Derive yield per unit with model



4. Calculation of rice crop yield in a province



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Japan Aerospace Exploration Agency

Flood damage assessment

- Suphanburi observation by Pi-SAR-L during 2011 Thai flood

Pi-SAR-L

HH:HV:VV = R:G:B

27 September 2011

8 November 2011

Field Router
(automatic data collection system)

[Courtesy Prof. Mizoguchi, U.Tokyo]