# **MAFF/AFFRIC** Applications of MODIS data

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#### **INMARSAT** 90cm







# The MAFF Computer Center (AFFCC) The MAFF Research Information Center (AFFRIC)



# **Location of the MAFF CC and AFFRIC**



# SIDaB (Satellite Image Database System for AFF research)



http://rms1.agsearch.agropedia.affrc.go.jp/menu\_en.html

# Satellite receiving systems

#### MODIS

## NOAA, DMSP,...



TeraScan system



NOAA of SE-Asia

## **Search result in SIDaB**



# **SIDaB products**



NOAA products (1993-)



#### Global DMSP-OLS (1997-) Night-time light



GMS / GOES Solar Radiation



# **Research project using MODIS data**



Assessment of the Impact of Global-Scale Change in Water Cycles on Food Production and Alternative Policy Scenarios



Contact: National Institute for Rumi Engineering 2-1-8 Kashoridal, Technicary, Iburaki 305-8609 Phone and Fait: 461-29-638-7550

# **"For Sustainable Water Use and Food Production"**

In recent years, water problems resulting from changes in water cycles – such as frequent droughts, drying-up of rivers and lakes, and deterioration of water quality – have become increasingly serious in every corner of the earth.

We are evaluating and predicting the influence of water cycle change on a global scale on food production. As part of this project we are formulating various scenarios to assure a stable supply of food in Japan, to solve global water problems, and to stabilize food supply and demand. Assessment of the Impact of Global-Scale Change in Water Cycles on Food Production and Alternative Policy Scenarios

GWCH

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Funded by Agriculture, Forestry and Fisheries Research Council Secretariat, MAFF, Japan



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# Target Year:2003-2007 Target Area: Mekong River Basin and/or Asian Monsoon Region

Participants

Domestic: National Institute for Rural Engineering (NIRE) Japan International Research Center for Agricultural Sciences (JIRCAS) National Institute for Agro-Environmental Sciences (NIAES) Forestry and Forest Products Research Institute (FFPRI) The University of Tokyo Kyoto University University of Tsukuba Kinki University

International: Mekong River Commission (MRC) International Water Management Institute (IWMI) International Center for Tropical Agriculture (CIAT) Cambodian Agricultural Research and Development Institute (CARDI) Forest Administration of Cambodia Can Tho University Kasetsart University Khon Kaen University Assessment of the Impact of Global-Scale Change in Water Cycles on Food Production and Alternative Policy Scenarios

GWCII

Funded by Agriculture, Forestry and Fisheries Research Council Secretariat, MAFF, Japan



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- Monitoring changes in water cycle in forest areas (FFPRI)
- Evaluating interactions between water cycle change and demand for water for food production (NIAES)
- Evaluating interactions between changes in irrigation water supply and water cycles (NIRE)
- Formulation countermeasure scenarios to minimize the effects of water cycle change (JIRCAS)



# **Mekong River Basin**





# Cropping Pattern Estimation using Waveletbased Filter



T. Sakamoto et al., Remote Sensing of Environment 100 (2006) 1-16



# **Comparison of Inundation Date (2000-2004) NIAES**



T. Sakamoto et al., Remote Sensing of Environment 109 (2007) 295-313

# Automatic Forest Fire Information Reporting **AFFIRE** (AFFIRE) System



http://hinimoyagura.dc.affrc.go.jp/

# MODIS and NOAA fire-spot information system **FFRI**





# Predicting vegetation-dryness from time-series MODINI



## **Forest Fire Monitoring for North-East Asia**

#### The system for R&D



# **Image Coverage**



#### NASA Rapid Response





# **MODIS BT21 median filter (5x5)**





# Threshold setting BT21median(5x5) vs. BT21



BT21: MODIS\_ch21(4µm)

# Forest fire in Korea on April 16, 2004



#### MAFF/AFFRIC



NASA Rapid Response

# Field-burning in Japan on March 5, 2006



#### MAFF/AFFRIC



NASA Rapid Response

## **Collaborative project with JAXA**



## **Vegetation Monitoring System for East Asia**



#### **MODIS vegetation water index**

 $NDWI = (mod_ch2 - mod_ch5) / (mod_ch2 + mod_ch5)$ (Gao, 1996)

 $LSWI = (mod\_ch2 - mod\_ch6) / (mod\_ch2+mod\_ch6)$ (Xiao et al, 2002)

 $NDII = (mod_ch2 - mod_ch7) / (mod_ch2 + mod_ch7)$ 

# **Comparing three vegetation water index**



Reed-land

## **Comparison between Terra and Aqua**



# NDII anomaly (MOD09 8-day composite)







# **NDII** anomalies on Google Earth

#### Jun. 27-Jul.3, 2007



#### Aug. 29-Sep.5, 2007



# WMO Precipitation and Temperature in Harbin



#### **Collaborative project with the National Institute of Advanced Industrial Science and Technology (AIST)**







# Main Software for MODIS processing

- TeraScan
- MODISL1DB
- CREFL
- MOD14
- GBAD
- MRT
- MRTSwath
- MODAPS for MOD09, MOD13, etc.

# Summary

**MODIS** applications

- Cropping pattern estimation in Mekong river basin
- Forest fire monitoring and warning system
- Vegetation dryness prediction
- Grasp the drought affected area in NE-Asia
- GEO grid research collaboration

DRL Software/Algorithms are useful for us. These software have been used in operational systems.