

# GEC Researches in CGER/NIES

Nobuko Saigusa  
Center for Global Environmental Research  
National Institute for Environmental Studies

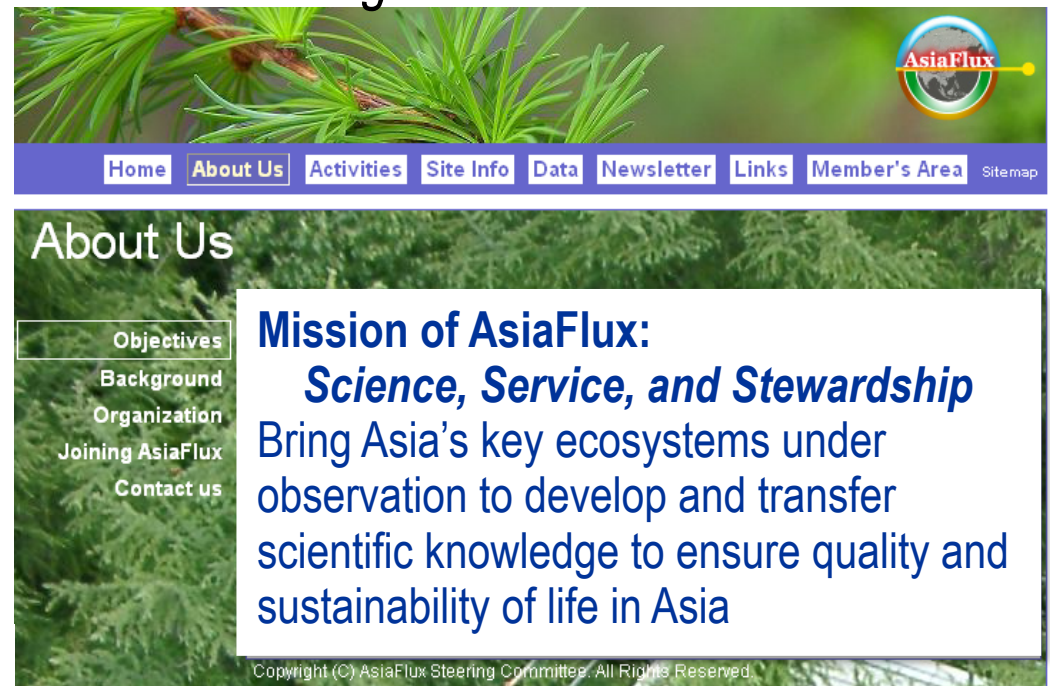
## 1. Global Environmental Monitoring in CGER

Center for  
Global Environmental  
Research



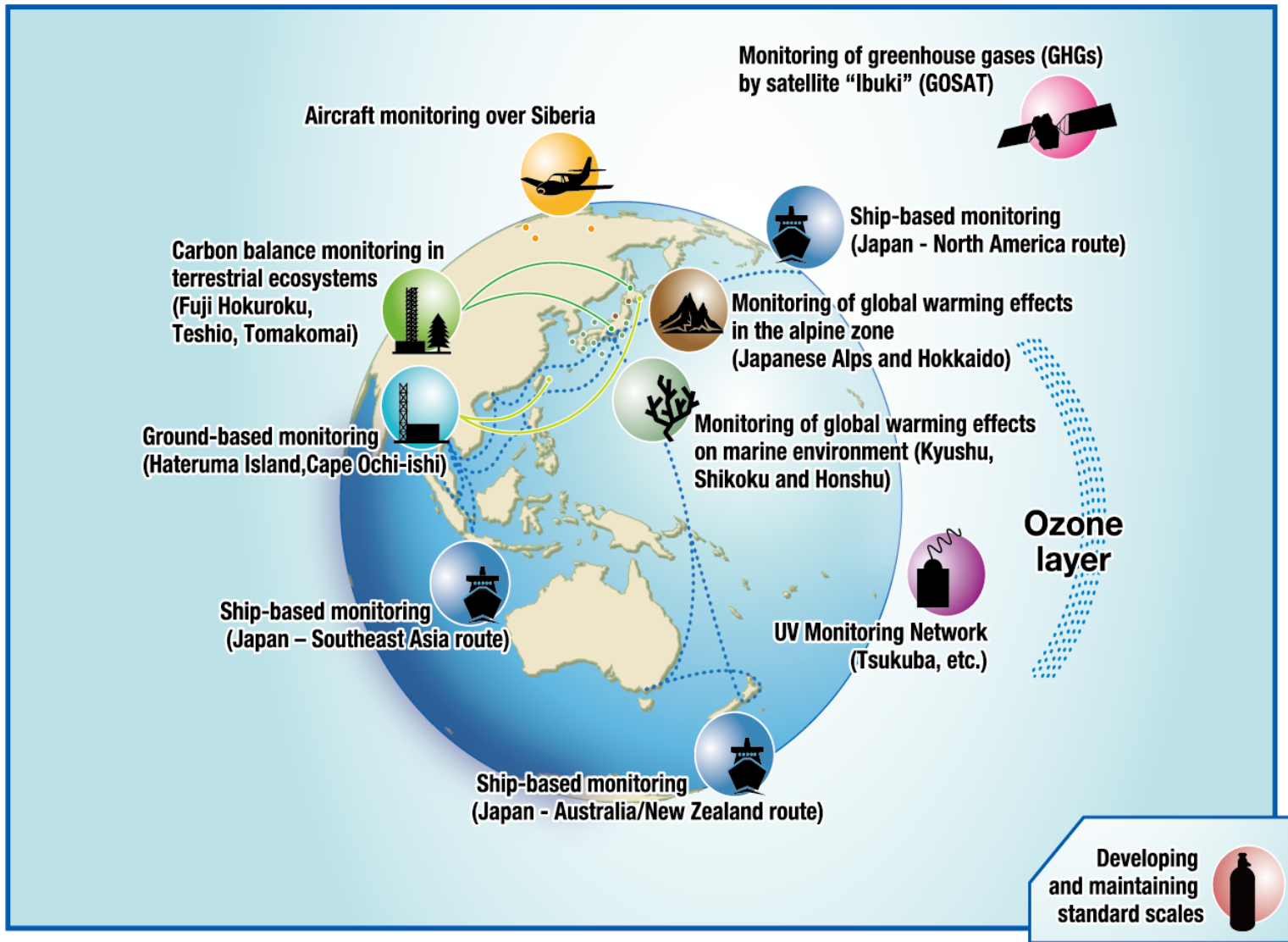
## 2. Challenges toward Science- Society Interface in Asia

*AsiaFlux: a regional network of FLUXNET*



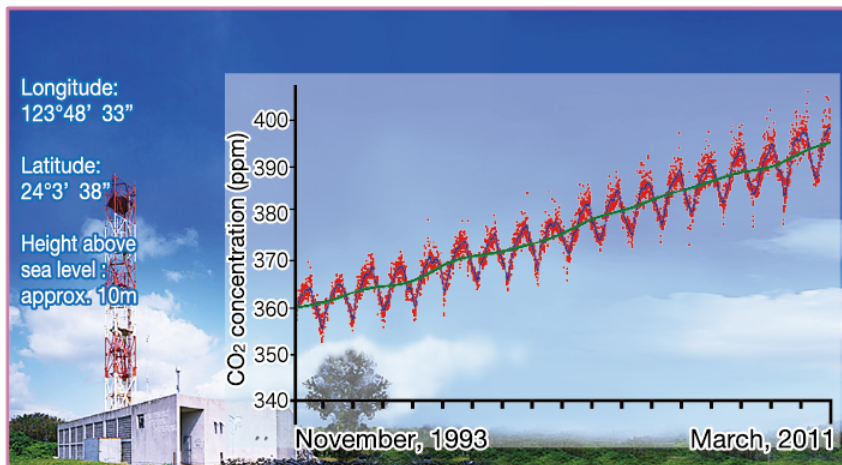
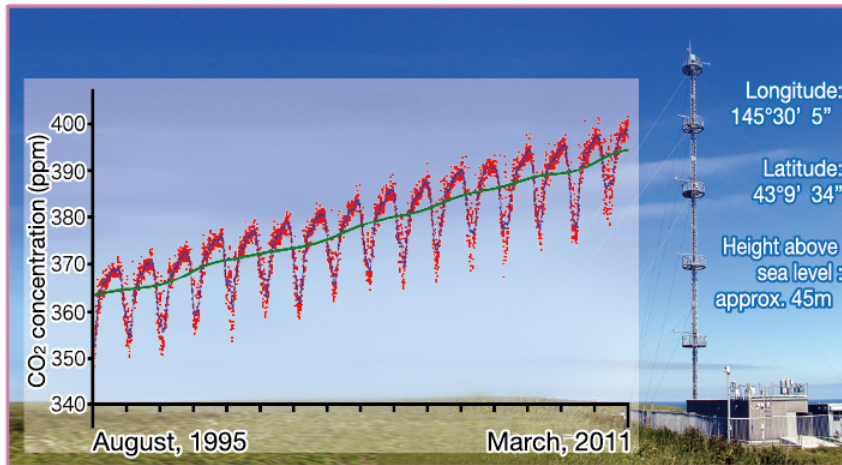
<http://asiaflux.net>

# Global Environmental Monitoring



# Strategic monitoring of the global environment

## Ground-based monitoring of greenhouse gases



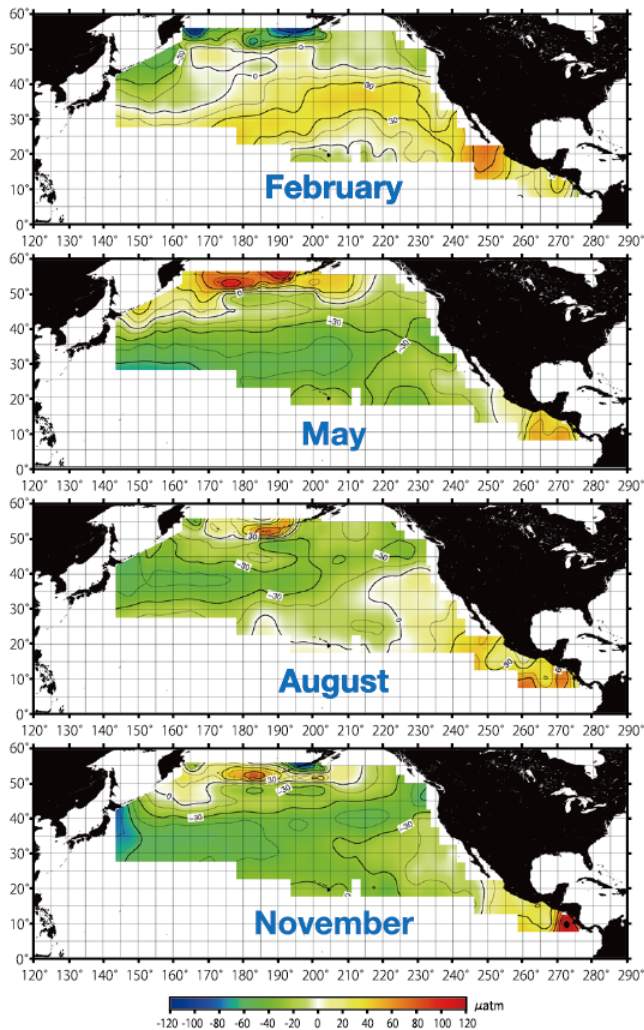
We carry out long-term, high-frequency observations of greenhouse gases at our Cape Ochiishi and Hateruma monitoring stations. Taking advantage of these fixed monitoring platforms, we can concurrently observe various atmospheric components and develop observation techniques.





# Strategic monitoring of the global environment

## Ship-based monitoring of greenhouse gases



▲ PYXIS  
Car freighter,  
Toyofuji Shipping Co., Ltd.

Through monitoring of the partial pressure of  $\text{CO}_2$  ( $p\text{CO}_2$ ) in the sea surface water on the Northern Pacific and Japan-Australia routes, we clarify the distributions and long-term variations of the difference in  $p\text{CO}_2$  between the ocean and the atmosphere. We carry out simultaneous atmospheric observations of the longitudinal distributions and temporal variations of GHGs and related gases. In addition, on the Asian ship route we investigate the temporal variation and the distribution of atmospheric tracer gas emissions from Asian countries.

◀ Difference of  $p\text{CO}_2$  between the ocean and the atmosphere in February, May, August and November averaged through 1995-2006. Positive value denotes emission from ocean and negative value denotes absorption.

定期 日豪  
船舶 アジア  
北太平洋 ア

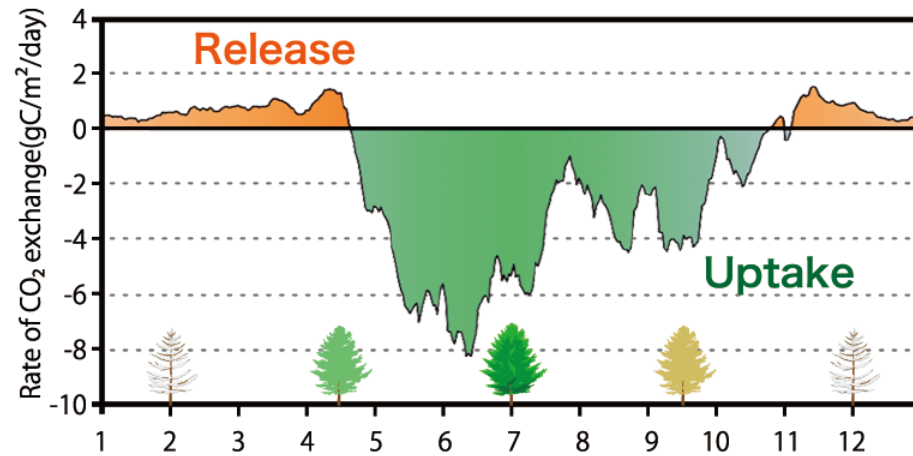


## Strategic monitoring of the global environment



### Carbon balance monitoring in forest ecosystems

We conduct monitoring of CO<sub>2</sub> and other greenhouse gas fluxes in larch forests at the Fuji Hokuroku, Teshio and Tomakomai monitoring sites in Japan. We also monitor the carbon sequestration processes in forest ecosystems by means of direct observation from observation towers and by indirect means using spectral reflection. Furthermore, by standardizing observation methods and facilitating data distribution, we contribute to the strengthening of the Asian monitoring network.



▲ Carbon balance in a forest at Fuji Hokuroku (2009)

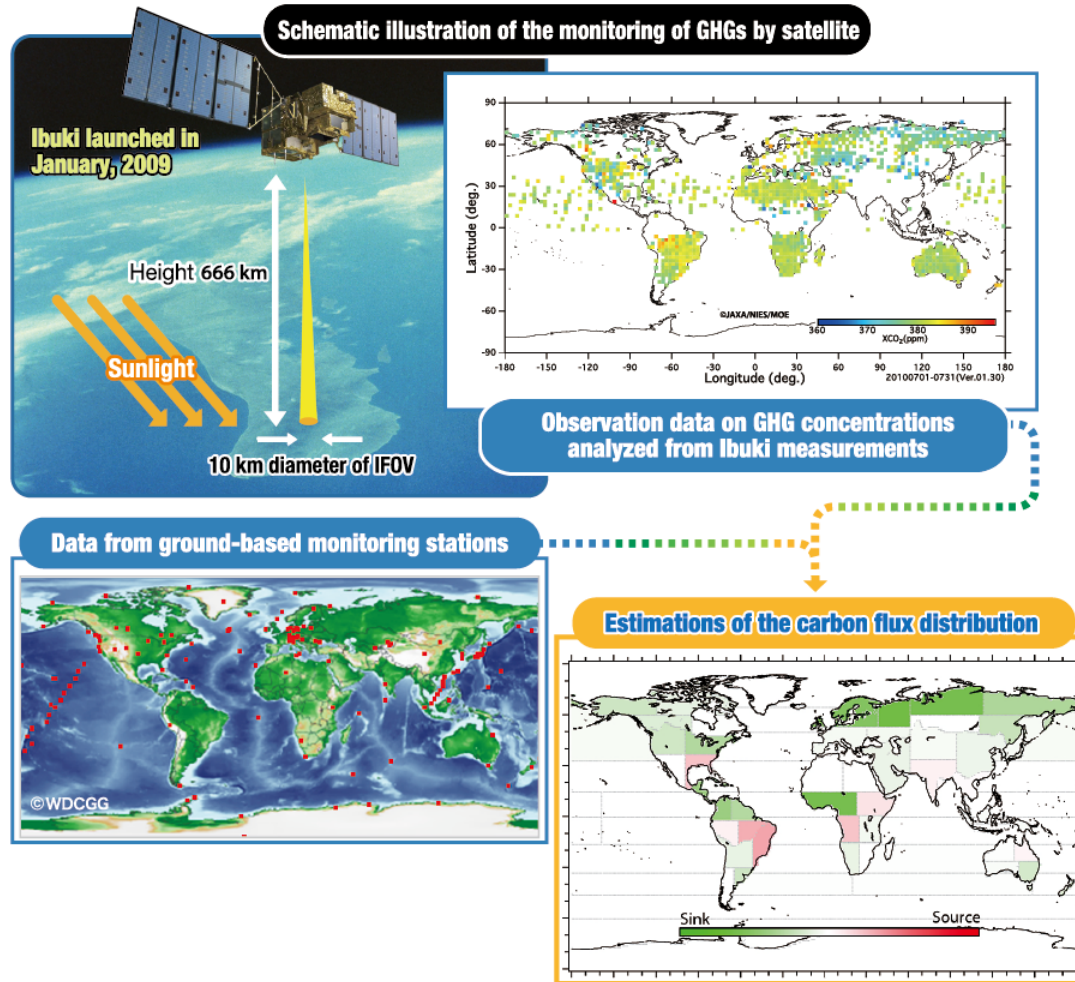
FLUXカ  
ラ天塩  
赫マ苦小牧  
ツ富士北麓

Monitoring tower ▶



# Strategic monitoring of the global environment

## Global greenhouse gases observation by satellite



Through the analysis of monitoring data collected by the Greenhouse gases Observing SATellite (GOSAT) called Ibuki, we work to refine the global distribution and seasonal and annual variation of CO<sub>2</sub> and CH<sub>4</sub> concentrations as well as terrestrial GHG sources and sinks in sub-continental regions.

宇宙からいぶ  
観測する  
きGOSAT

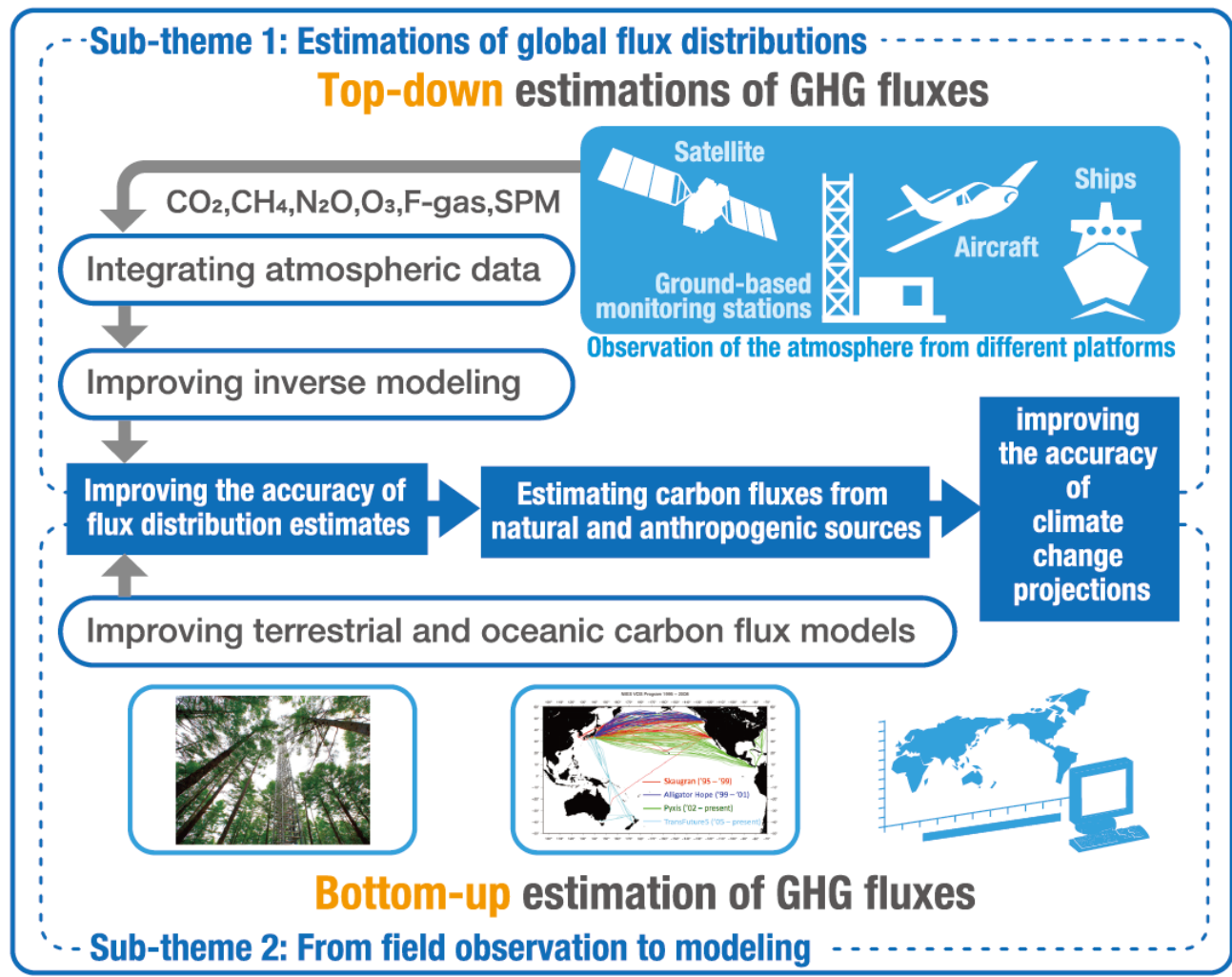
# Climate change research program



## Characteristics of the variation of greenhouse gas concentrations and projections for the future

### Project 1

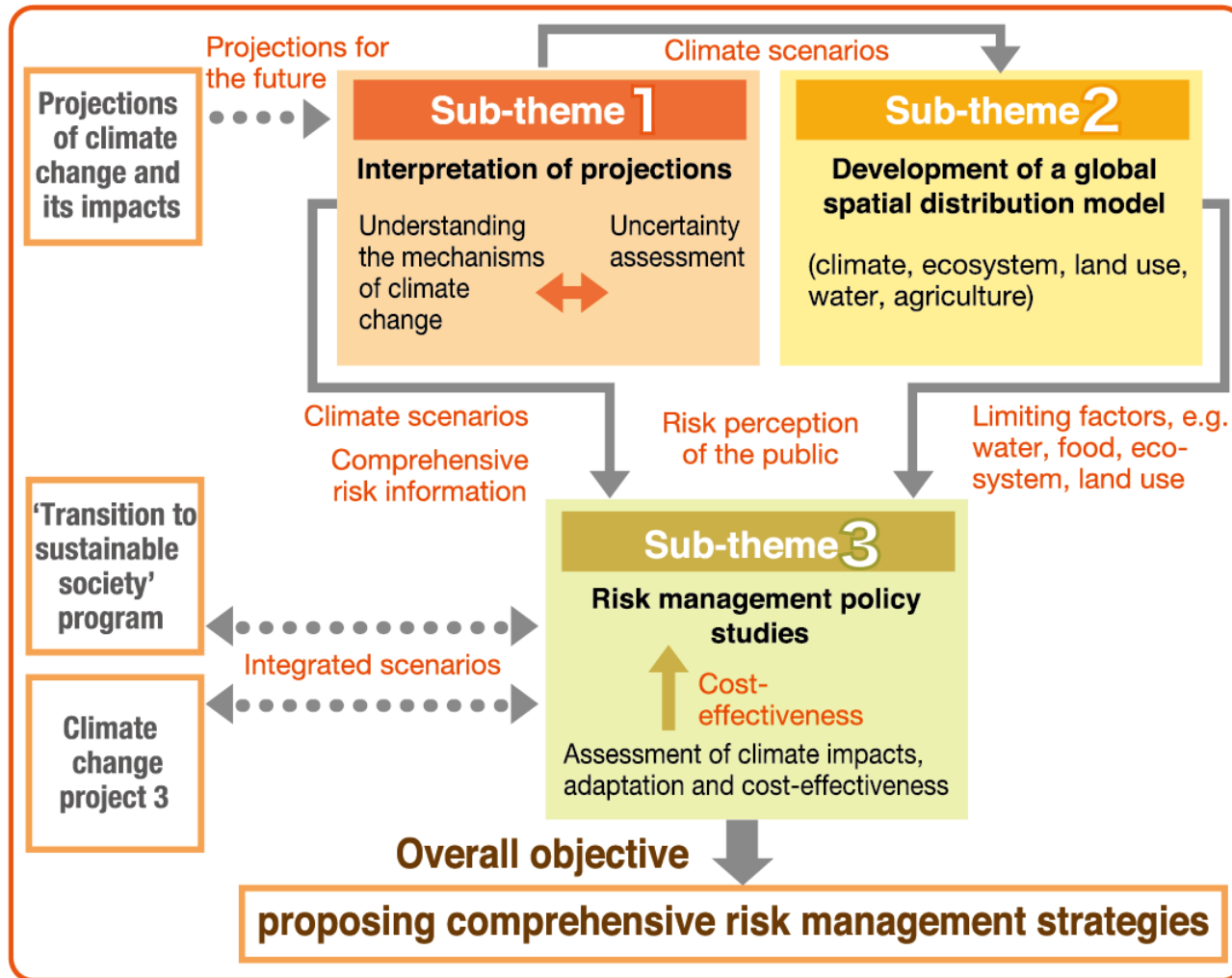
Based on global and regional observations and analysis of the atmosphere and GHGs, with emphasis on East Asia, we seek to clarify the actual conditions of the material and carbon cycles in these areas, as well as to improve the accuracy of projections of future GHG concentrations and climate change impacts.





# Climate change research program

## Climate change and global risk assessment

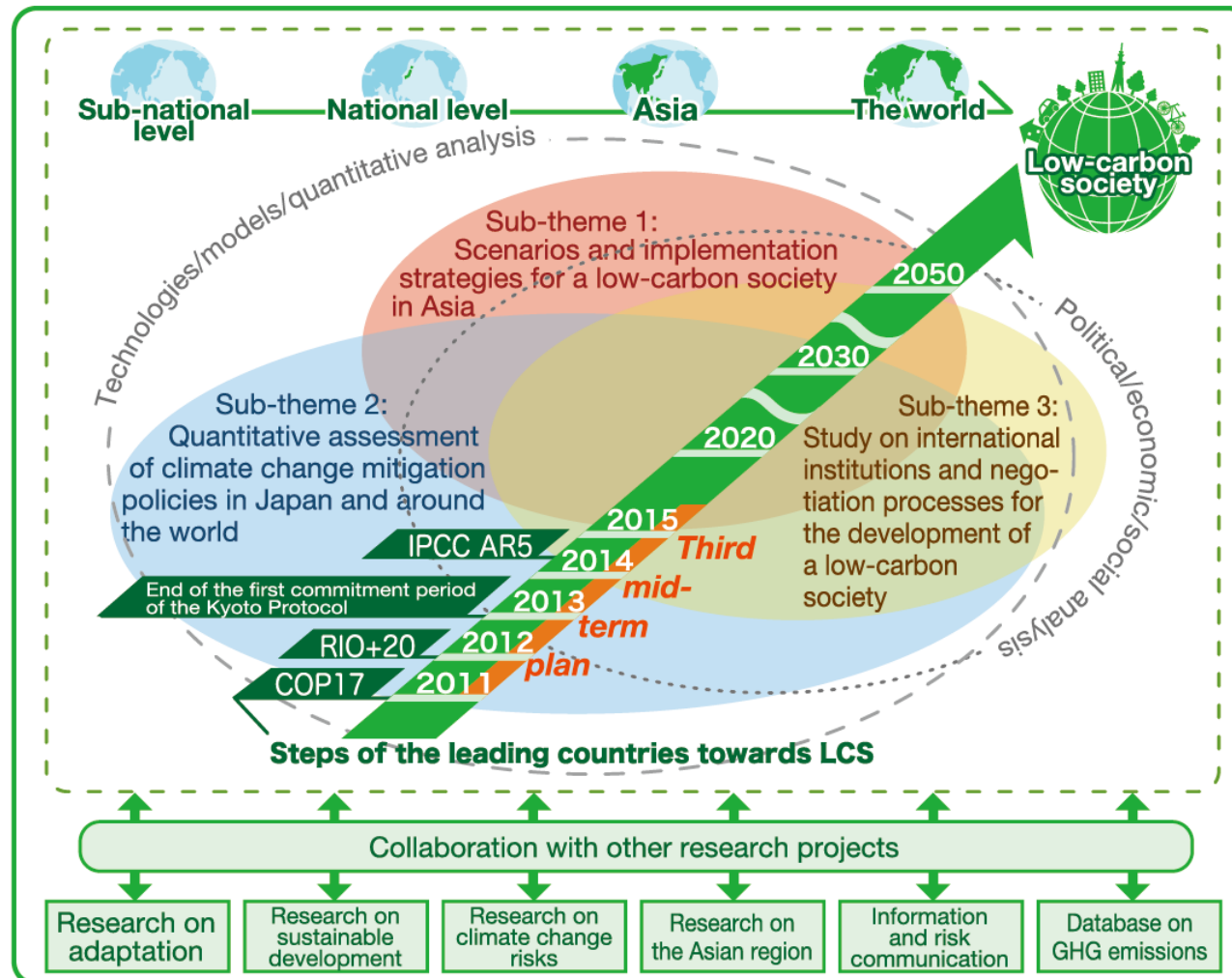


## Project 2

Through clarifying the actual climate change conditions and improving the accuracy of future projections, as well as assessing the risks of global climate change impacts, we provide scientific knowledge which will contribute to the drafting of climate change policies.

## Climate change research program

### Comprehensive climate policy assessment and development of visions and scenarios towards a low-carbon society



## Project 3

We provide scientific knowledge to promote the implementation of international climate change mitigation and adaptation policies by performing integrated assessment of various measures for the limitation of global GHG emissions and climate change impacts, and by proposing possible policy options which take into consideration the current international negotiations on climate change.



### **NIES GOSAT Project Office**

The NIES GOSAT Project Office carries out routine processing of monitoring data from the Greenhouse gases Observing SATellite (GOSAT) "Ibuki", performs data validation in order to assess and improve the quality of data, and provides data products to registered researchers and to the public.

[http://www.gosat.nies.go.jp/index\\_e.html](http://www.gosat.nies.go.jp/index_e.html)



### **Global Carbon Project (GCP) Tsukuba International Office**

The GCP is engaged in developing an international research network and program on carbon cycle research and carbon management.

<http://www.cger.nies.go.jp/gcp/>



### **Office for Coordination of Climate Change Observation, Japan (OCCCO)**

The OCCCO, the secretariat of the Japanese Alliance for Climate Change Observation (JACCO), supports the activities of JACCO to promote cooperation among organizations, ministries and institutions with the aim of developing a comprehensive climate change observation system in Japan.

[http://occco.nies.go.jp/e\\_index.html](http://occco.nies.go.jp/e_index.html)



### **Greenhouse Gas Inventory Office of Japan (GIO)**

GIO engages in the preparation of Japan's national greenhouse gas (GHG) inventory, as well as assists developing countries in Asia primarily by capacity building activities in improving their national GHG inventories.

<http://www-gio.nies.go.jp/index.html>



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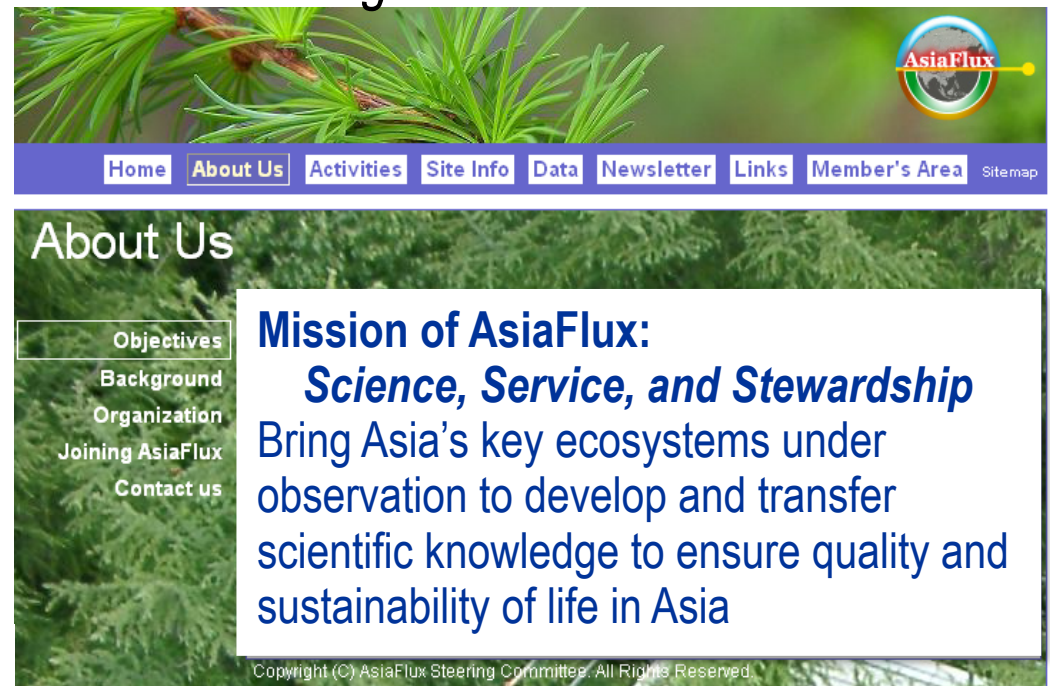
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## 2. Challenges toward Science- Society Interface in Asia

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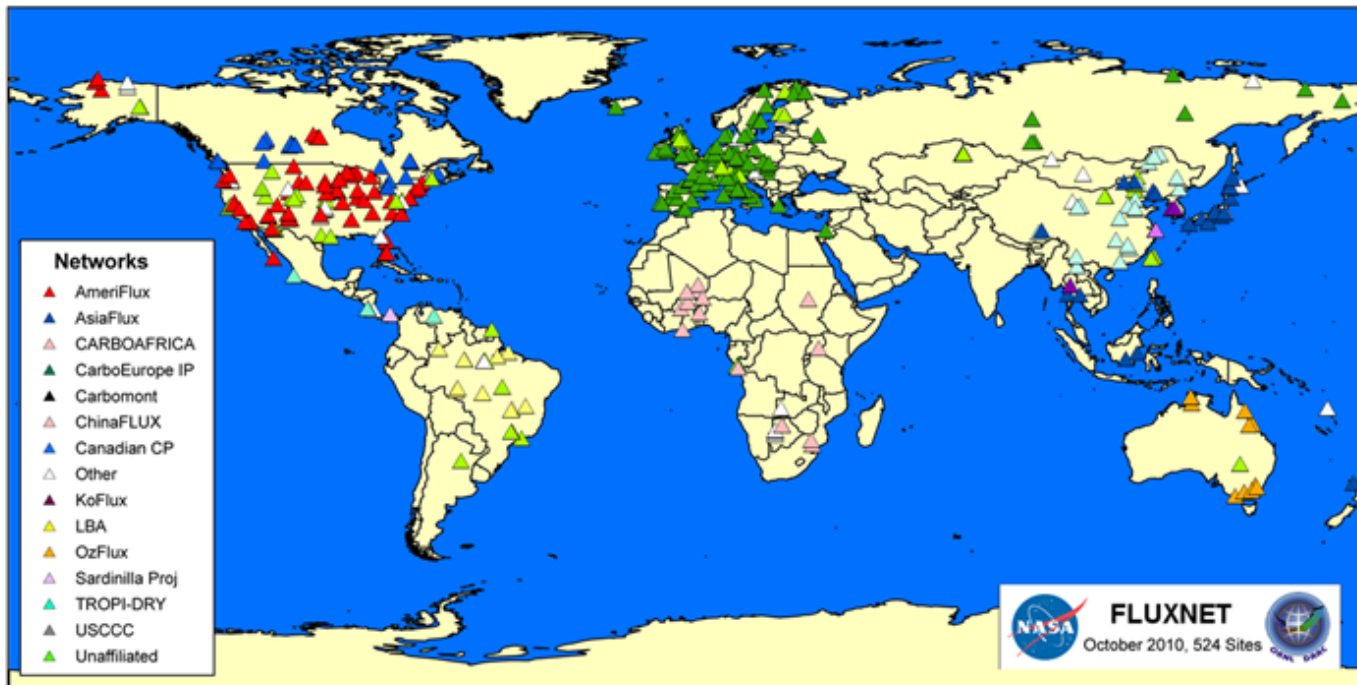
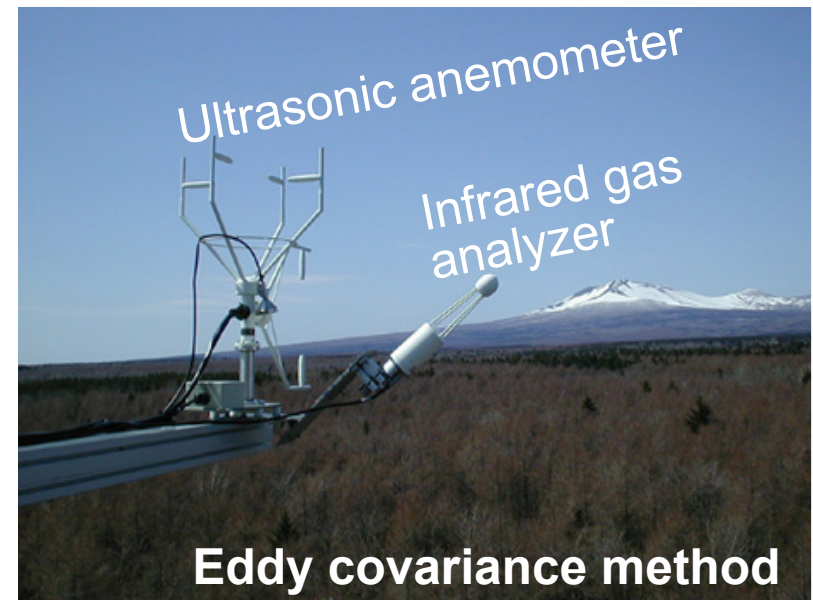
<http://asiaflux.net>

# Bring Asia's key ecosystems under observation

## FLUXNET (1996~)

World-wide network for monitoring CO<sub>2</sub>, H<sub>2</sub>O, and energy exchanges between terrestrial ecosystems and the atmosphere (> 500 sites)

Archiving CH<sub>4</sub>, N<sub>2</sub>O flux data (started)



Location of FLUXNET sites

<http://fluxnet.ornl.gov>

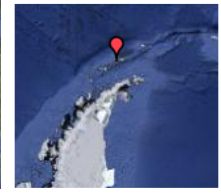




# AsiaFlux: a regional network in FLUXNET

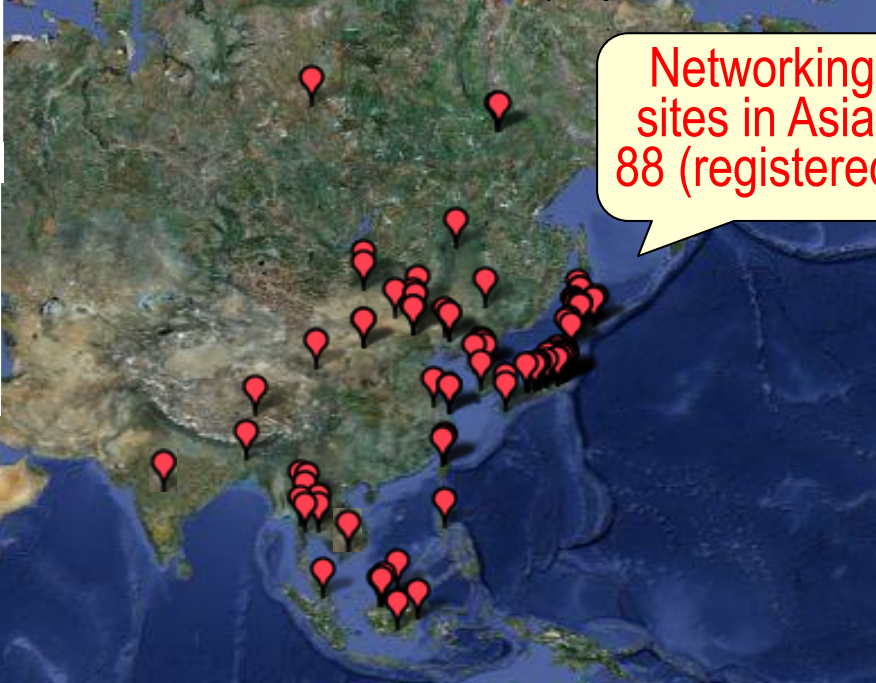


Norway



Antarctica

Location of AsiaFlux sites (<http://asiaflux.net/>)



Networking sites in Asia: 88 (registered)

AsiaFlux Chair: Kim J (KR)  
Vice-chairs: Miyata A (JP), Li SG (CN)  
AsiaFlux Tsukuba Office (CGER/NIES)

CarboEastAsia Workshop “Data-Model Synthesis” (Tokyo, Feb. 2011)



Leading synthesis studies

Training new sites and next generations

Capacity building



Dec 19-21, 2012  
Kuching, Sarawak Malaysia

AsiaFlux short training seminar on data analysis for the eddy covariance method

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> Application Form

10<sup>th</sup> AsiaFlux Workshop “Bridging Ecosystem Science and Stewardship” (Johor Bahru, Malaysia, Nov. 2011)



Networking researchers in SE Asia

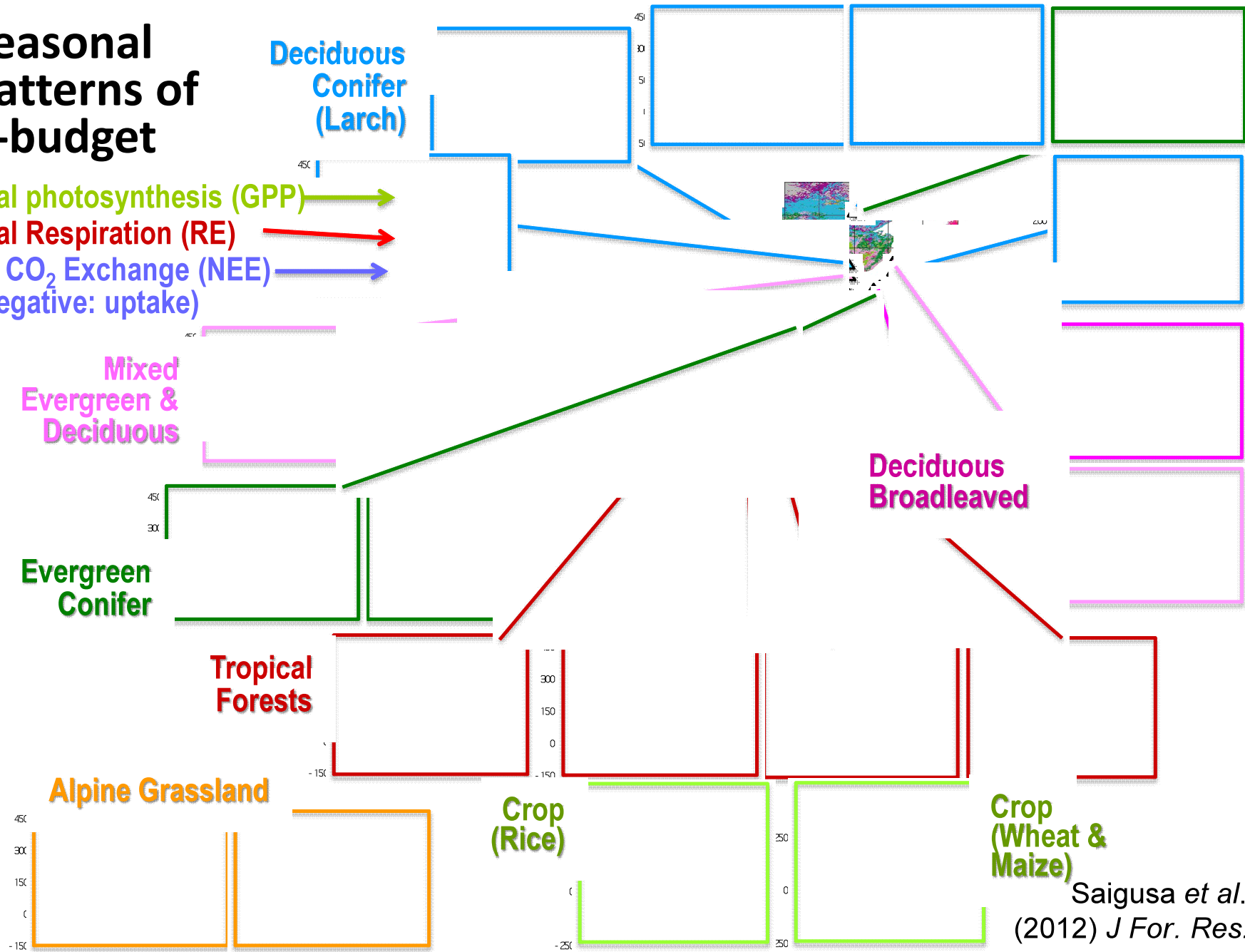
Host: Univ. Technology Malaysia



# Bring Asia's key ecosystems under observation

## Seasonal patterns of C-budget

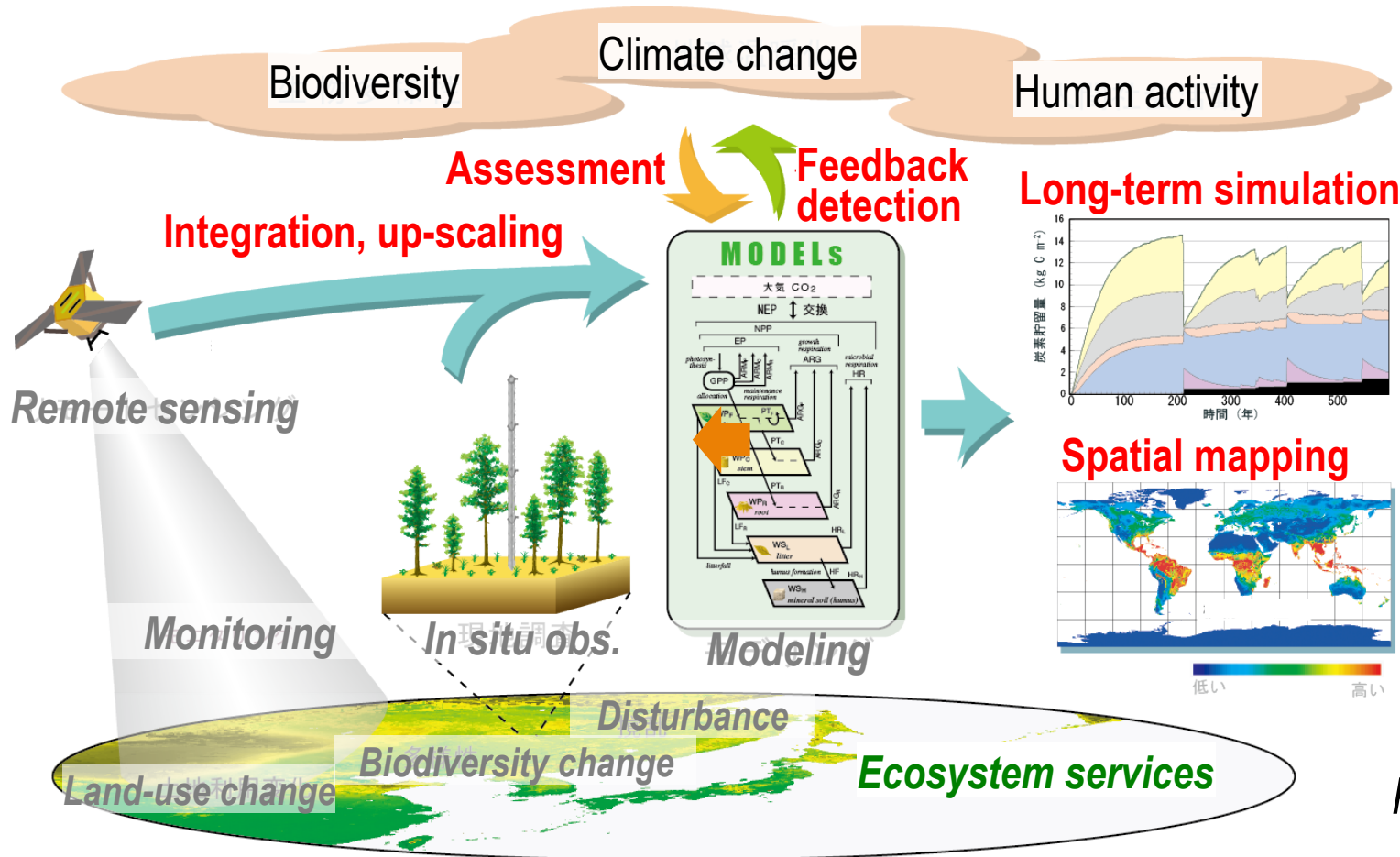
**Total photosynthesis (GPP)** →  
**Total Respiration (RE)** →  
**Net CO<sub>2</sub> Exchange (NEE)** →  
 (negative: uptake)



Saigusa *et al.*  
(2012) *J For. Res.*

# Develop and transfer scientific knowledge to ensure quality and sustainability of life in Asia

## Development of evaluation method of Ecosystem Services in Asia



*Integrating In situ observations, remote sensing, and terrestrial ecosystem models to estimate current and future ecosystem services in Asia*

PI: Akihiko Ito (NIES)  
 Environ Res Fund

*To find a good balance between climate change prevention and biodiversity conservation, particularly in tropical regions (SE Asia)*

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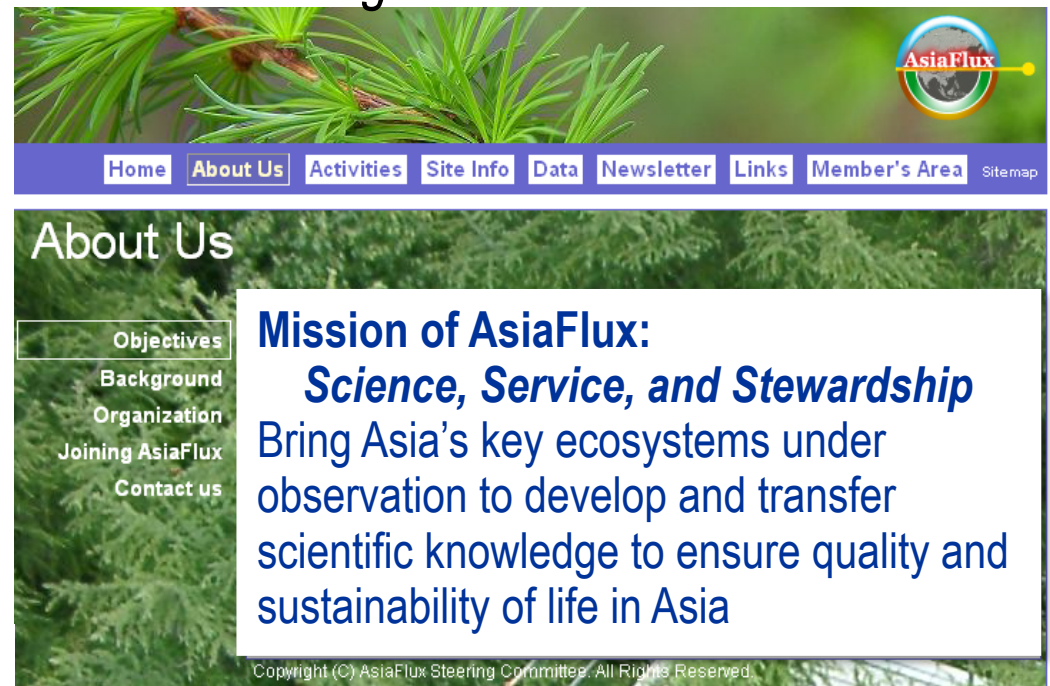
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