

- Making a Difference -
Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

Regional Participation in the US-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability

**Final Report for APN CAPaBLE Project:
CBA2008-10NSY-Dye**



Regional Participation in the US-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability

CBA2008-10NSY-Dye

Final Report submitted to APN

Overview of project work and outcomes

Non-technical summary

The project provided travel grants to researchers in Southeast Asian countries (Thailand, Indonesia, Malaysia) that enabled their participation in the "U.S.-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability" held in Khon Kaen, Thailand from January 8 to 11, 2009. Eleven (11) Southeast Asian researchers from outside the local area (4 from Indonesia and 7 from Thailand) were able to participate in the Workshop with travel support from the project. A total of at least fifty-seven (56) researchers and graduate students attended the Workshop, including 45 participants from Thailand, Indonesia, the United States, Japan, and Korea, and twelve (12) local observers (predominately graduate students) from Khon Kaen University.

Objectives

The project objectives were:

- Active participation by scientists and students from SE Asian countries in the "U.S.-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability".
- Strengthened communication and collaboration between researchers/students in SE Asian countries and their counterparts in the United States and Japan on policy-relevant science issues concerning carbon source/sink dynamics in tropical forests and their relation to local human activities (fire, logging), climate variability/change, and forest management.
- Develop plans for new international research collaborations on the above issues that engage SE Asian researchers and enhance capabilities for carbon cycle science and informed policy development and decision making in the SE Asia region.

Amount received and number years supported

The Grant awarded to this project was US\$ 12,000 for 1 year.

Work undertaken

Project members from Thailand, Malaysia and Indonesia served as Regional Coordinators and undertook responsibility for recommending researchers and students to participate in the Workshop with travel support from the Project. In coordination with the Project manager and workshop co-organizers, invitations were distributed and a final list of APN-sponsored invitees was compiled. Whenever possible, air travel was arranged directly through a US-based travel agent in consultation with the Project Manager and the University of Arizona Sponsored Programs Office. Overall Workshop planning was performed cooperatively among Project members, in coordination with principal collaborating organizations (NIES, Japan; Mekong Institute, Thailand; Asian Institute of Technology, Thailand).

Results

A joint U.S. - Japan Workshop on Tropical Forest Carbon Dynamics and Sustainability was successfully held at the Mekong Institute (<http://www.mekonginstitute.org>) in Khon Kaen, Thailand on January 9-11, 2009. The Workshop had at least 66 participants mostly consisting of U.S. and Japan scientists, postdocs, and students from research and public institutions. The participants included the chair of AsiaFlux from South Korea and participants from

several Southeast Asian countries (Indonesia, Malaysia, and Thailand), including local scientists and students from the Mekong Institute, the Thailand Space Agency (GISTDA), Khon Kaen University, and other Universities in Bangkok. The majority of the Workshop expenses and the travel costs of the U.S. participants were funded by a grant from the U.S. National Science Foundation (NSF) to Project Member Alfredo Huete (Univ. Arizona). In most cases, travel costs of Japanese participants were funded by Japan's National Institute of Environmental Studies (NIES). Workshop materials (field trip participant list, workshop agenda, full workshop participant list, APN-sponsored participant list) are presented in Appendix 1. The workshop also included a field trip on January 8th to the Sakaerat (Eddy-covariance) Flux Tower Site near Khao-Yai National Park, central Thailand.

The APN-sponsored participants included researchers engaged in activities relevant to policy and management for sustainability and/or forest ecosystem services in the context of the SE Asia regional carbon budget. The Workshop provided opportunities for professional development through presentations and extensive dialogue with workshop participants from both developed and developing countries. The APN-sponsored participants were active and vital contributors to the presentations and scientific discussions.

Relevance to the APN CAPaBLE Programme and its Objectives

The Project contributes to the APN CAPaBLE mission by the regional capacity for identifying, understanding and predicting changes in carbon cycling in forest ecosystems in tropical Monsoon Asia and their relation to climate variability/change and human activities such as deforestation and biomass burning.

Self evaluation

We deem our APN CAPaBLE project as broadly successful in achieving its principal goals. Eleven (11) Southeast Asian researchers from outside the local area (4 from Indonesia and 7 from Thailand) were able to participate in the Workshop with travel support from the project. The project played a critical role in enhancing communication among the Southeast Asian, Japanese and American participants on the Workshop theme of carbon dynamics in tropical forests and its relation to local human activities. Such enhanced communication was realized through presentations and group discussions in multiple plenary and break-out sessions, and through informal discussions during coffee breaks and meals. The APN-sponsored participants were actively engaged throughout the Workshop and their involvement was integral to the Workshop's overall success.

The Workshop concluded with a consensus on recommended research priorities and plans to develop and propose one or more new, bilateral or multilateral collaborations that will engage the community of Southeast Asian researchers and students represented at the Workshop on a set of priority issues addressing both natural and anthropogenic dimensions of tropical forest carbon dynamics in the Monsoon Asia Region. Although the unexpected cancellation by three project-sponsored participants from Malaysia in the week preceding the Workshop was a disappointment, the active participation by the other project-sponsored participants from Thailand and Indonesia enabled our APN CAPaBLE project and the Workshop itself to achieve their respective goals.

The Project was successful in meeting its major objectives, including enhanced communication and fostering of new international research plans. The active participation of the invited SE Asian researchers, which was made possible through this APN CAPaBLE project, was a critical factor underlying this success.

Potential for further work

The potential is strong for further work that builds on the success of the Workshop. Many new professional contacts were established among the SE Asian participants and those from outside the region (US, Japan, Korea). Common recognition and understanding of the research expertise, capabilities and interests of the participants has provided new opportunities for international networking that could facilitate new collaborative research activities in the SE Asia region. As a direct result of the workshop, at least one such international project was proposed to NASA (USA) in early 2009, and additional activities that may involve Workshop participants are now under consideration (e.g. related special session(s) at scientific symposia in the region).

Publications, Websites and Presentations

- Huete, A., Dye, D. and others, Meeting Report on the U.S.-Japan-Southeast Asia Workshop on Tropical Forest Carbon Dynamics and Sustainability, Jan. 9-11, 2009, Khon Kaen Thailand, to be submitted to EOS, Transactions, American Geophysical Union, in preparation.
- Website for the 2009 US-Japan-Southeast Asia Workshop on Tropical Forest Carbon Dynamics and Sustainability, URL: <http://tbrs.arizona.edu/tropical-asia/>
- Dye, D.G., 2009. Report on the US-Japan_SE Asia Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability. Oral presentation to Working Group 6 on Necessity and Possibility of Observations, Forecasting and Data Sharing through the "Interdisciplinary Collaboration of "Ecosystem-Climate Change-Disaster", The 3rd GEOSS Asia-Pacific Symposium, Kyoto, Japan, Feb. 4-6, 2009. Available online at URL: http://www2.restec.or.jp/geoss_090415/pdf/day2/WG/WG6/03/02_Dennis_Dye.pdf

Acknowledgments

Numerous individuals and organizations contributed to the success of this APN CAPaBLE Project and the associated Workshop. The Project members express thanks to all of the Workshop participants for committing their time and effort to attend the Workshop and share their knowledge with others. Thanks in particular to the APN-sponsored participants from Thailand, Malaysia and Indonesia, whose contributions were critical to Workshop's success. Appreciation is also expressed to the programs and staff at NIES (Japan), AIT (Thailand), Mekong Institute (Thailand), NSF (USA), GISTDA (Thailand), the University of Arizona (USA), and the Global Carbon Project for their support of the Workshop.

Technical Report

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1. Introduction

This APN CAPaBLE project provided travel grants to invited researchers from several Southeast Asian countries to enable their participation in the US-Japan-Southeast Asia Workshop on Monsoon Asia and Tropical Forest Carbon Dynamics and Sustainability. The Workshop was successfully held in Khon Kaen, Thailand during January 8th to 11th, 2009. A total of at least 56 individuals participated in the Workshop (44 researchers and 12 students), of which 11 received travel grants under this project. The APN-supported participants were from Thailand, Malaysia, and Indonesia. The Project was successful in meeting its major objectives, including enhanced communication and fostering of new international research plans. The active participation of the invited SE Asian researchers, which was made possible through this APN CAPaBLE project, was a critical factor underlying this success.

2. Methodology

Project members from Thailand, Malaysia and Indonesia served as Regional Coordinators and undertook responsibility for recommending researchers and students to participate in the Workshop with travel support from the Project. In coordination with the Project manager and workshop co-organizers, invitations were distributed and a final list of APN-sponsored invitees was compiled. Whenever possible, air travel was arranged directly through a US-based travel agent in consultation with the Project Manager and the University of Arizona Sponsored Programs Office. Overall Workshop planning was performed cooperatively among Project members, in coordination with principal collaborating organizations (NIES, Japan; Mekong Institute, Thailand; Asian Institute of Technology, Thailand). Advanced planning included arranging the Workshop venue at the Mekong Institute, development of the Workshop agenda, and preparations for the pre-Workshop field trips to the Asian Institute of Technology near Bangkok and the eddy covariance CO₂ flux tower site at Sakaerat.

The project team members and their principal roles were as follows:

Dr. Dennis Dye, USGS, USA, project manager and Workshop co-organizer
Dr. Nobuko Saigusa, AIST, Japan, international coordinator, Workshop co-organizer

Dr. Alfredo Huete, Univ. of Arizona, USA, principal Workshop organizer, Project-Workshop liason
Dr. Fadli Syamsudin, BPPT, Indonesia, regional coordinator for invitees/grantees
Dr. Abdul Rahim Nik, FRIM, Malaysia, regional coordinator for invitees/grantees
Dr. Nipon Tantham, Kasetsart Univ., Thailand, regional coordinator for invitees/grantees

Additional support was provided by Workshop invitee Dr. Piyachat Ratana (Univ. of Arizona) for communications between the Workshop organizers and the collaborating organizations in Thailand, and logistics for the field trip and Workshop.

3. Results & Discussion

3.1 Pre-Workshop Field Trip

Many of the workshop invitees chose to participate in the pre-workshop fieldtrip to the Asian Institute of Technology (AIT) and the Sakaerat CO₂ flux tower site. The list of fieldtrip participants is presented in Appendix 1a. Workshop invitees from outside of Thailand arrived at the Rama Gardens Hotel in Bangkok on the evening of January 7, 2009, and were joined by local Thai invitees on the following morning. On the morning of January 8th, the group departed by limousine bus to AIT in the northern suburbs of Bangkok. The group arrived at the Geoinformatics Center (GIC) at AIT and was greeted by the GIC Director Dr. Lal Samarakoon and GIC Project Researcher Dr. Vivarad Phonekeo (both were Workshop participants). Drs. Lal and Vivarad led a tour of the GIC facilities and explained their mission and activities regarding remote sensing applications to environmental problems in the SE Asia region and associated programs for training and technology transfer. The information was well received by the group. For many of the participants, this was the first opportunity to visit and become familiar with AIT and GIC. Drs. Lal and Vivarad answered questions about the GIC facilities, areas of research, recent projects, and opportunities for international collaboration. The visit by the Workshop participants was highlighted in a report on the AIT-GIC website (<http://www.geoinfo.ait.ac.th/collaborations.php>). Sample photographs from the tour at AIT are presented in Figures 1 and 2.

Following the tour of AIT-GIC, the group continued by limousine bus to the eddy covariance CO₂ flux tower site near the Sakaerat Environmental Research Center at Sakaerat in Nakhon Ratchasima Province, Thailand. The flux tower is part of the AsiaFlux network and is managed by researchers at the National Institute of Advanced Industrial Science and Technology (AIST), Japan. The tower instruments measure the net ecosystem exchange of CO₂ at the this forest site (tropical seasonal evergreen forest). Details on the flux tower site are available online at URL http://asiaflux.yonsei.kr/network/018SKR_1.html.

Data collected at the Sakaerat flux site and other flux sites in the SE Asia region provide critical insights about the seasonality of tropical forest carbon dynamics in the Monsoon Asia region. The field trip provided an opportunity for the Workshop participants to learn directly about the various instruments, their operation, and the significant research findings for the Sakaerat site. The tour was an effective introduction to the key themes of the Workshop and stimulated discussion among participants. Photographs from the group's visit to the Sakaerat flux tower are shown in Figures 3, 4 and 5. Following the tour at Sakaerat, the group stayed overnight at the nearby mountain resort hotel.



Figure 1. Workshop participants in tour of the Geoinformatics Center (GIC) at the Asian Institute of Technology near Bangkok, Thailand.



Figure 2. Dr. Vivarad Phonekeo of the AIT Geoinformatics Center presenting information about the Center's activities to the Workshop participants.

The pre-workshop fieldtrip was instrumental in enabling many of the Workshop participants to become familiar with one another before the Workshop commenced. The visits to AIT-GIC and the Sakaerat flux tower provided a useful framework for informal discussions on many of the science questions that would be addressed in the subsequent Workshop.



Figure 3. Workshop participants at the eddy covariance CO₂ flux tower site at Sakaerat, Thailand on January 8, 2009.



Figure 4. Workshop invitee Dr. Scott Saleska (Univ. of Arizona, USA) climbing the Sakaerat CO₂ flux measurement tower during the pre-workshop field trip.



Figure 5. View from the top of the CO₂ flux tower site at Sakaerat, Thailand. Many of the Workshop participants climbed to top of the flux tower to gain this unique perspective on the closed-canopy forest.



Figure 6. Workshop participants at the Sakaerat Environmental Research Station during pre-workshop field trip.

3.2 The Workshop on Monsoon Asia Forest Carbon Dynamics and Sustainability

The non-local participants in the Workshop arrived at the meeting venue at the Mekong Institute in Khon Kaen, Thailand at mid-day on January 9, 2009. Invited participants from outside of the Khon Kaen were lodged at the Mekong Institute's guest house and took meals together there. The combination of structured discussions during the workshop meeting and informal conversation during meal times and in the evenings facilitated communication among the participants.

The Workshop commenced in the afternoon of January 9 at the Mekong Institute's main conference room. The Workshop Agenda is provided in Appendix 1b. The full list of participants is included in Appendix 1c, with notation indicating the APN-sponsored participants.

The Workshop began with welcoming remarks by the principal organizer, Dr. Alfredo Huete (Univ. of Arizona, USA). Additional introductory comments were made by guests and participants from the major collaborating or sponsoring organizations, including the Mekong Institute, Khon Kaen University, AIT, the National Institute of Environmental Studies (NIES, Japan), and the National Institute of Advanced Industrial Science and Technology (AIST, Japan). These introductions were followed by a summary of the Workshop objectives presented by the CAPaBLE Project Leader Dr. Dennis Dye (USGS, USA), and self introductions by all participants. The remainder of Day 1 was allocated to introductory presentations on an array of topics with overarching relevance to the workshop theme. These included overviews the Monsoon Asia Integrated Regional Study (MAIRS) program, the AsiaFlux program, carbon monitoring and the REDD program, the STORMA project at Sulawesi, Indonesia, and an invited talk on the traditional patterns of tree vegetation in the paddy fields of NE Thailand. These talks provided a useful foundation for subsequent presentations and discussions in the breakout groups.

Days 2 and 3 (January 10 and 11) were devoted to a combination of scientific and programmatic presentations and discussions in breakout groups and associated plenary reports (see Agenda, Appendix 1b). The session topics included surveys of the state-of-the science and current activities in SE Asia, and detailed science presentations on ecosystem processes and related research directions and needs. Several breakout groups were organized, with discussions focused on identification of research priorities and opportunities for new international collaborations on forest carbon dynamics and sustainability in the SE Asia region. Research posters were displayed near the meeting room and available for viewing and discussion during break periods and before and after the meeting hours on all days.

The Workshop was very productive in bringing together scientists and students to exchange and share information and frame cross-disciplinary research directions on tropical forest functioning and dynamic human-nature interactions in Monsoon Asia. It brought together leading experts and students involved in research over neotropical and Monsoon Asia tropical forests. As such, this effort was successful in capitalizing untapped synergies (field plot, tower, satellite, and modeling) in current scientific efforts in tropical forest dynamics and human and climate interactions.

There were several major findings to report related to future needs and directions for collaborative opportunities for joint cross-national research. These findings are in the process of being written up and be published. In addition, we were invited to submit a 'Carbon Interactions with Land Use Processes' synthesis manuscript for a special issue in the journal *Land Use Science*.

The general themes of breakouts explored, and findings included the following topics:

- (1) Carbon dynamics in tropical ecosystems of SE Asia, spatial (geographic) and temporal distributions of major pools and fluxes.
- (2) Trends and shifts in seasonality in the tropics and its relationship to carbon fluxes, climate, and disturbance.
- (3) Synthesis and scaling of flux tower measurements to regional scale with satellite data and models.
- (4) Ecosystem processes, controls, feedbacks, and interactions with climate and land use activities and disturbance (drought, fire).
- (5) Future dynamics and scenarios of carbon: forest vulnerability, degradation, resilience, and sustainability.
- (6) Summaries of recent, ongoing or planned programs and projects that address the above topics in SE Asia.

A surprising finding was the lack of awareness and knowledge regarding the activities currently ongoing in Southeast Asia related to Carbon science.

The Workshop concluded in the afternoon of January 11th with summary presentations by the Workshop organizers. A general consensus was reached on the importance of collaborative research within the region to resolve the major research challenges, with an expression of commitment among the participants to pursue such collaboration in follow-up to the Workshop.

Selected photographs from the Workshop are presented in Figures 6, 7, 8 and 9.



Figure 7. Dr. Yoshifumi Yasuoka (NIES, Japan) giving introductory remarks at the outset of the Workshop.



Figure 8. Workshop participants in the plenary session.



Figure 10. Workshop participants discussing a poster presentation.

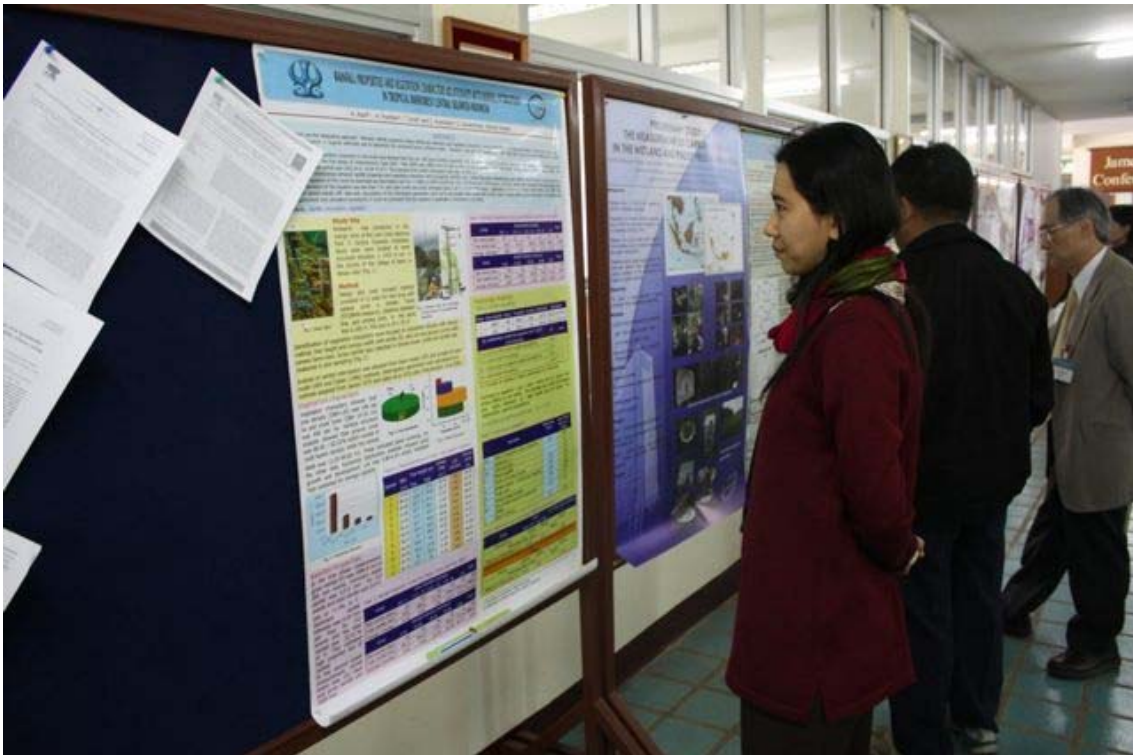


Figure 11. Poster presentations at the Workshop.

4. Conclusions

To summarize, the major objectives of this CAPaBLE project were:

- A) Active participation by scientists and students from SE Asian countries in the "U.S.-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability".
- B) Strengthened communication and collaboration between researchers/students in SE Asian countries and their counterparts in the United States and Japan on policy-relevant science issues concerning carbon source/sink dynamics in tropical forests and their relation to local human activities, climate variability/change, and forest management.
- C) Genesis of plans for new international research collaboration(s) on the above issues that engage SE Asian researchers and enhance capabilities for carbon cycle science and informed policy development and decision making in the SE Asia region.

We deem the project to have been broadly successful in achieving its principal goals. Eleven (11) Southeast Asian researchers from outside the local area (4 from Indonesia and 7 from Thailand) were able to participate in the Workshop with travel support from the project. The project played a critical role in enhancing communication among the Southeast Asian, Japanese and American participants on the Workshop theme of carbon dynamics in tropical forests and its relation to local human activities. Such enhanced communication was realized through presentations and group discussions in multiple plenary and break-out sessions, and through informal discussions during coffee breaks and meals. The APN-sponsored participants were actively engaged throughout the Workshop and their involvement was integral to the Workshop's overall success. The Workshop concluded with a consensus on recommended research priorities and plans to develop and propose one or more new, bilateral or multilateral collaborations that will engage the community of Southeast Asian researchers and students represented at the Workshop on a set of priority issues addressing both natural and anthropogenic dimensions of tropical forest carbon dynamics in the Monsoon Asia Region. We are aware of at least one major research proposal that was developed as a direct result of the interactions at the workshop (a proposal to the NASA PIRE program for a study of seasonal carbon dynamics in SE Asia with strong international cooperation). There were several major findings to report related to future needs and directions for collaborative opportunities for joint cross-national research. These findings are in the process of being written up and be published. In addition, we were invited to submit a 'Carbon Interactions with Land Use Processes' synthesis manuscript for a special issue in the journal Land Use Science. The numerous new professional contacts established among the APN-sponsored participants and other participants are facilitate other fruitful collaborations in the future.

5. Future Directions

This APN CAPaBLE project was instrumental in facilitating communication and sharing state-of-the-art knowledge and information among an international group of researchers and students concerned with a variety of science and management issues related to the carbon dynamics of tropical forests in the Monsoon Asia region. This informal network provides a basis for further interaction and collaboration aimed at further advancing the research. Continued dialogue among the Workshop participants, their colleagues, and other young researchers and students is desirable, and may be realized by soliciting participation in special sessions and workshops at relevant international symposia in the region. Ongoing attention should be given to identification of funding resources to support international research project proposals that emerge from these interactions (such as the NASA PIRE project proposal that developed from this Project's workshop). The APN funding program can be particularly effective for this purpose.

Appendices

Appendix 1. Conferences/Symposia/Workshops

Appendix 1a

List of Participants in Pre-Workshop Field Trip

(names in **bold type** indicate APN CAPaBLE-sponsored participant)

Dr. Alfredo Huete, USA, University of Arizona
Dr. Dennis Dye, USA, USGS
Dr. Tomoaki Miura, USA, University of Hawaii
Dr. Piyachat Ratana, USA, University of Arizona
Dr. Scott Saleska, USA, University of Arizona
Dr. Lucy Hutyra, USA, University of Washington
Dr. Xiangming Xiao, USA, University of Oklahoma
Dr. Fadli Syamsudin, Indonesia, BPPT
Dr. Ruandha Agung Sugardiman, Indonesia, Center for Forest Inventory and Mapping
Ms. Damyanti Sarodja, Indonesia, BPPT
Dr. Abdul Rauf, Indonesia, University of Tadulako
Mr. Samreong Panuthai, Thailand, National Park
Dr. Amnat Chidthaisong, Thailand, King Mongkut's University of Technology, Thonburi
Dr. Nobuko Saigusa, Japan, NIES
Dr. Akihiko Ito, Japan, NIES
Dr. Takashi Hirano, Japan, Hokkaido University
Dr. Hiroaki Kondo, Japan, AIST
Dr. Takahisa Maeda, Japan, AIST
Dr. Hideki Kobayashi, Japan, JAMSTEC, and USA, UC Berkeley
Ms. Akiko Ogawa, Japan, NIES
Dr. Shin Nagai, Japan, Gifu University

Appendix 1b
Workshop Agenda

AGENDA (January 6, 2009)
Workshop on Monsoon Asia Tropical Forest Carbon
Dynamics and Sustainability
Jan. 8 -11 (Thurs.-Sun.) 2009, Mekong Institute, Khon Kaen, Thailand
Website: <http://tbrs.arizona.edu/tropical-asia>

Objectives

1. Strengthen communication and collaboration between researchers/students in SE Asian countries and their counterparts in the U.S. and Japan on policy-relevant science issues concerning carbon source/sink dynamics in tropical forests and their relation to local human activities (e.g., fire, logging, climate variability/change and forest management).
2. Genesis of plans for new international research collaboration(s) on the above topics among SE Asian, U.S., and Japanese and other interested researchers that will enhance capabilities for carbon cycle science and informed policy development and decision making in the SE Asia region.
3. Presentation of current activities and state of and identify key science questions,
4. issues, needs, and opportunities under the theme of Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability
5. Provide the scientific rationale and study design concepts for future research campaigns and related collaborative team projects.

General Topics:

- Carbon dynamics in tropical ecosystems of SE Asia, spatial (geographic) and temporal distributions of major pools and fluxes.
- Trends and shifts in seasonality in the tropics and its relationship to carbon fluxes, climate, and disturbance.
- Synthesis and scaling of flux tower measurements to regional scale with satellite data and models.
- Ecosystem processes, controls, feedbacks, and interactions with climate and land use activities and disturbance (drought, fire).
- Future dynamics and scenarios of carbon: forest vulnerability, degradation, resilience, and sustainability.
- Summaries of recent, ongoing or planned programs and projects that address the above topics in SE Asia.

Workshop Structure:

The 3 1/2 day workshop will consist of a flux tower site field trip and a combination of plenary sessions, breakout sessions and poster sessions. Because of the severe time limitations for scheduling plenary oral presentations, all invited participants are asked to display a poster describing their relevant research or projects. Poster viewing is scheduled during break periods throughout the duration of the workshop.

Poster Ideas:

- Flux tower results over tropical ecosystems
- Forest dynamics in SE Asia and global tropical regions
- Socio-ecological systems in the tropics, including land use/ land cover change
- Remote sensing studies in the tropics

LOGISTICS

Arrival in Bangkok January 7 and 8, 2009 (Weds / Thurs night)

- Field trip participants arrive in Bangkok, Thailand on night of Jan. 7 and stay at

Rama Gardens Hotel. Rooms are reserved and a name list provided to Hotel.

- Participants not attending the field trip arrive in Bangkok on Jan 8 and stay at Rama Gardens Hotel (rooms are reserved and name list provided to the Hotel) and fly to Khon Kaen on Jan. 9, on the morning Thai Airways flight. Mekong Institute will provide pick up service and transport to the meeting from Khon Kaen airport.

FIELD TRIP (January 8, & 9, 2009 (Thurs/ Fri morning))

January 8

- 8.30h Bus leaves hotel for Asian Institute of Technology (AIT).
- 9.00 Tour of Asian Institute of Technology (AIT) Geoinformatics Center and MODIS receiving station (Drs. Vivarad and Lal).
- 10.00 Travel by bus/minivan to Sakaerat Flux Tower site near Khao-Yai National Park.
- 12.30 Lunch Stop at Lake.
- 15.00 Arrival and tour of Sakaerat tower site with presentations (Kondo, Maeda, Panuthai).
- 18.00 Dinner and overnight stay at Katomhin resort hotel (temperatures at the site location will be cool at night at ~5C).

January 9

- 7.30h Bus/ minivan leaves hotel for Khon Kaen
- 12.30 Lunch and check into Mekong Institute dormitories

WORKSHOP PLENARY, POSTERS, & BREAKOUTS

January 9 2009 (Friday)

Introduction and Opening Comments

- 15.00h Dr. Alfredo Huete, University of Arizona, Background of Workshop
Dr. Suchat Katima, Director of Mekong Institute
Dr. Charat Mongkolsawat, Regional Center for Geo_informatics
Space Technology, Khon Kaen University
Dr. Lal Samarakoon, Asian Institute of Technology (AIT)
Dr. Yoshifumi Yasuoka, National Institute for Environmental Studies (NIES)
Dr. Hiroaki Kondo, National Institute of Advanced Industrial Science and
Technology (AIST)
Dr. Dennis Dye, USGS, Objectives of the Workshop
Group Introductions
- 16.45 Coffee Break
- 19.00h Welcome Dinner with traditional culture show at Mekong Institute

Session 1 17.15-19.00h *Introduction talks* (Chair Dr. Suchat Katima)

1. Asia Flux program, Dr. Joon Kim, chair of AsiaFlux
2. Forest carbon monitoring program, Dr. Hozuma Sekine
3. Networking Asia for Monitoring and Modeling of Forest Ecosystems, Yoshifumi Yasuoka
4. Invited talk *The traditional trees in paddy fields of NE Thailand*, Dr. Patma Vityakon, Khon Kaen University

January 10 2009 (Saturday)

- 7- 8.15h Breakfast and set-up posters

10.30h Coffee Break & Poster Display

11.15h **Breakout groups and tentative topics** (key issues, questions, and goals)

1. Current state-of-science in carbon dynamics (in- situ measurements)
2. Current state-of-science in tropical carbon remote sensing
3. Current state-of-science in tropical carbon modeling
4. Key science questions and problems in tropical studies (needs and next steps)
5. The role of human systems in tropical carbon studies (land use science, etc.)

13.00h Lunch and Poster Display

14.30 Summary Breakout Group Reports & Discussion

15:30 Coffee Break

19.00h Group Dinner at Smile Restaurant (hosted by Khon Kaen University)

Session 2 8.15-10.30h State-of-the-Science and current activities in SE Asia

1. Current SE Asia Flux Towers and Research in Tropical Forests and Peatlands, Dr. Hirano, chair of JapanFlux
2. Modeling tropical C fluxes /dynamics in SE Asia, Akihiko Ito
3. Remote sensing and tropical ecosystem function, Piyachat Ratana and Alfredo Huete
4. Current activities/ science - Indonesia Fadli Syamsudin
5. Current activities/ science - Thailand Poonpipope Kasemsap
6. The STORMA Project at Sulawesi, Indonesia Dr. Abdul Rauf

Session 3 16.00- 18.00 Ecosystem processes, current research directions & needs

1. Regional flux studies in SE Asia, Nobuko Saigusa
2. Validation of eddy flux observations, Lucy Hutyra
3. Remote sensing of tropical phenology in Hawaii, Tomoaki Miura and Chris Lepczyk
4. Monitoring of terrestrial scenes from space, Haruo Sawada
5. Tropical forest dynamics (Smithsonian CTFS plots in SE Asia), Shirley Dong
6. Radiation controls on tropical forest functioning in Borneo, Dennis Dye

January 11 2009 (Sunday)

7- 8.15h Breakfast and Poster Display

10.30 Coffee Break and Poster Display

11.15h **Breakout groups and tentative topics** (key issues, questions, and goals)

1. Future missions, scoping studies, team projects, and funding opportunities
2. Pan-tropical studies and opportunities
3. Land use and climate interactions with tropical forests
4. Synthesis research opportunities involving ecosystem models, processes, controls, feedbacks, and interactions
5. Future dynamics and scenarios of carbon; forest degradation and resilience.

13.00 Lunch and Poster Display

14.00 **Summary Breakout group reports, group conclusions and recommendations**

- plans for future meetings and special sessions at scientific conferences

16.00- 16:40 Closing Ceremony, Final Report Writing (Workshop organizers)

17.30 Group Dinner at Mekong Institute

18.30 Transportation to Khon Kaen Airport

Appendix 1c
List of Workshop Participants

Participant List
Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability
January 8-11, 2009 at Mekong Institute, Khon Kaen, Thailand

(Names in bold type indicate APN-CAPaBLE-sponsored Participants)

1. Ms. Urawan Chanket
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9. Ms. Khaesaet Mongkolsawat
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Appendix 2. Funding sources outside the APN

1. National Science Foundation (USA), Office of International Science and Engineering, Project title: "U.S-Japan Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability", Alfredo Huete, Principal Investigator, US \$49,797 for 2 years.
2. National Institute of Environmental Studies (Japan). Travel subsidies for Japanese participants in the Workshop. Specific cost was undisclosed.
3. Geoinformatics and Space Technology Development Agency (GISTDA), Thailand. Arranged and hosted reception dinner for Workshop participants. Specific cost was undisclosed.
4. Khon Kaen University, Thailand. Arranged and hosted reception dinner for Workshop participants. Specific cost was undisclosed.

Appendix 3. Workshop Report Presented at the 3rd GEOSS Asia-Pacific Symposium
(Feb. 4-6, 2009, Kyoto, Japan) by Project Leader Dennis Dye



Report on the US-Japan-SE Asia Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability

January 8-11, 2009, Mekong Institute, Khon Kaen,
Thailand

Dennis G. Dye

U.S. Geological Survey (USGS)
Southwest Geographic Science Center
Flagstaff, Arizona, USA

U.S. Department of the Interior
U.S. Geological Survey

Outline

- Workshop background and motivations
- Workshop objectives
- Selected carbon-related activities in SE Asia countries
- Workshop results and potential plans



Origins:

Japan-U.S. Joint Workshop on Global Change: *Biodiversity, Ecosystem Function, and Dynamic Human-Nature Interaction*

- Oct. 31-Nov. 2, 2005, JAMSTEC Frontier Research Center for Global Change (FRCGC), Yokohama, Japan
- Recommended that Japan and U.S. Researchers:
 - “Develop new research activities on ecosystem function, diversity and human-nature interaction through innovative approaches in modeling, observation and model-data fusion
 - “Conduct follow-on workshop(s) to identify opportunities for bilateral or multilateral research collaboration...”



Timeline

- November 2005, Japan-U.S. Workshop on Global Change
- August 2006, Western Pacific Geophysical Meeting (WPGM), Beijing, China. Special session on satellite time series analysis (US-Japan organizers)
- October 2006, Proposals submitted to US-NSF and JSPS for collaborative funding
- November 2006, Planning discussions at AsiaFlux Meeting in Chiang Mai, Thailand (special session on remote sensing and flux towers)
- August 2007, NSF proposal accepted for workshop in Japan; Venue moved to Thailand
- March 2008, Received APN CAPaBLE grant to support participation of SE Asian researchers
- January, 2009, Workshop is held in Khon Kaen, Thailand



Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability Workshop:

Organizers

- U.S.A.
 - Alfredo Huete, Scott Seleska (U. Arizona)
 - Dennis Dye (USGS), Xiangming Xiao (U. Oklahoma)
- Japan
 - Nobuko Saigusa, Akhiko Ito (NIES)
 - Hiroaki Kondo, Takahisa Maeda (AIST)
- Indonesia
 - Fadli Syamsudin (BPPT)
- Thailand
 - Poonpipope Kasemsap (Kasetsart U.)
- Malaysia
 - Dr. Mohd Haniff Harun, Dr. Firdaus, et al.,



Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability Workshop:

Sponsors

- Financial support
 - NSF (USA), APN CAPaBLE, NIES (Japan)
- Logistic and Programmatic support:
 - Asian Institute of Technology (Thailand)
 - Mekong Institute (Thailand), HOST INSTITUTION
- Sponsorship:
 - Global Carbon Project (GCP)



Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability
January 8-11, 2009, Khon Kaen, Thailand

Workshop Objectives

- Facilitate/enhance international communication among researchers/students concerning Monsoon Asia tropical forest carbon dynamics and sustainability
- Survey research activities and results in tropical Monsoon Asia and other regions (e.g. Amazon)







Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability
January 8-11, 2009, Khon Kaen, Thailand

Workshop Objectives (cont.)

- Identify key science questions and research priorities (including societal benefits), particularly those that require integrated approaches (field observations, process modeling, remote sensing)

Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability
January 8-11, 2009, Khon Kaen, Thailand

Workshop Objectives (additional)

- A framework for addressing the science questions and research priorities
 - individual, ad hoc projects
 - Larger bilateral/multilateral project(s)
 - Major "umbrella" mission (similar to STORMA, GAME, LBA)
- Plan/propose new international research collaborations





Pre-Workshop Field Trip: Bangkok to Khon Kaen




Tour of AIT GIC (Dr. Lal, Dr. Vivarad)

- Satellite receiving station
- Satellite data processing system
- Training facility





Tour of Sakaerat CO₂ Flux Tower Site (Dr. Samreong Panuthai, Dr. Kondo, Dr. Maeda)






Participation in US-Japan-SE Asia Workshop

- Total attendance: 57
 - 45 formal participants
 - 12 local observers
 - USA (11), Japan (11), Korea (1), Thailand (18), Indonesia (4), Malaysia (3, *cancelled*)
- Format:
 - Plenary sessions
 - Breakout sessions
 - Poster sessions



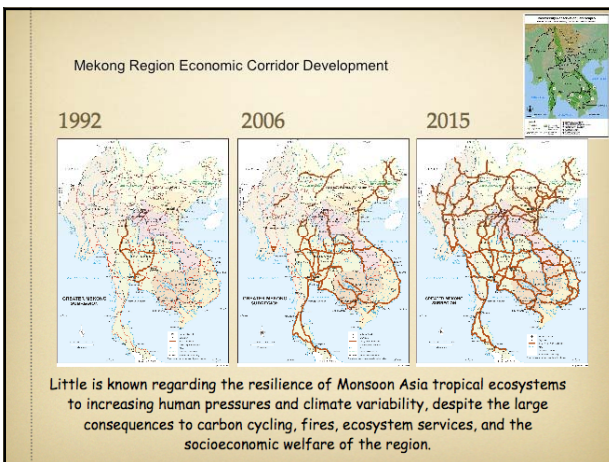
Importance of Tropical Monsoon Asian Forests



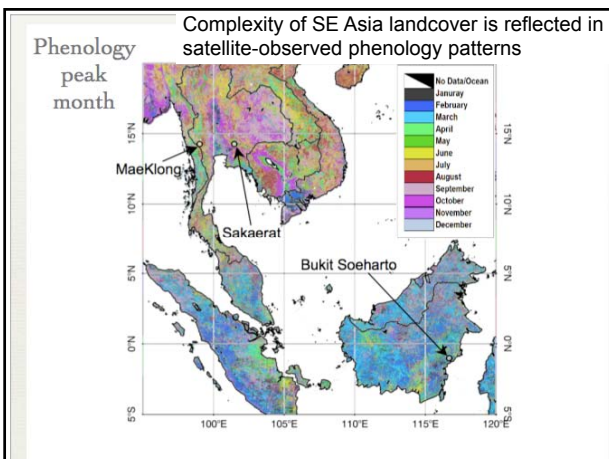
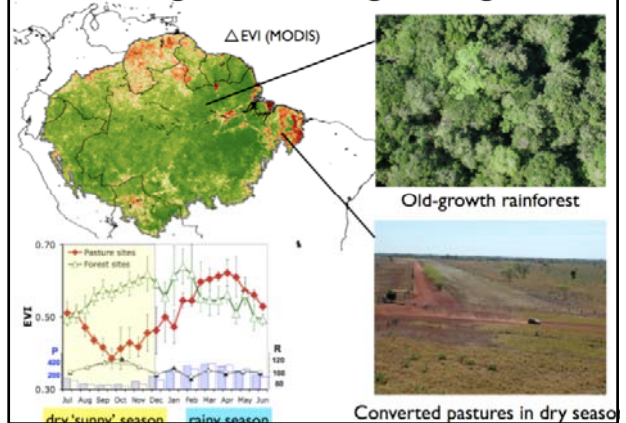
MODIS Fire Detections
SE Asia 04/03/03
(Descloitres et al.)

Tropical rainforests form a huge reservoir of biodiversity and play an enormous role in the cycling of carbon and water on this planet, yet their seasonal and inter-annual functioning and response to environmental change are poorly understood.

• Question: what is the role of climate change and human impacts on tropical forest functioning?



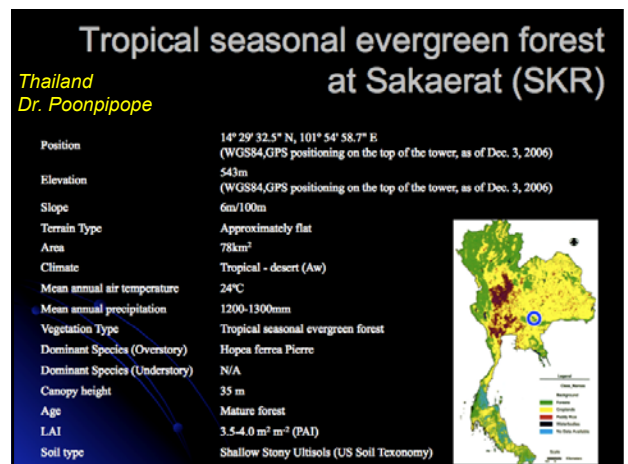
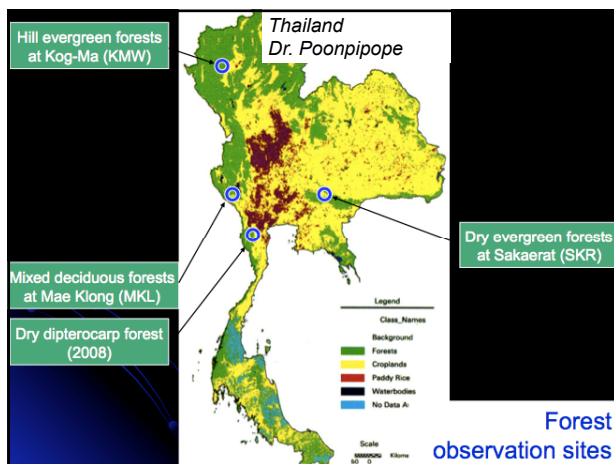
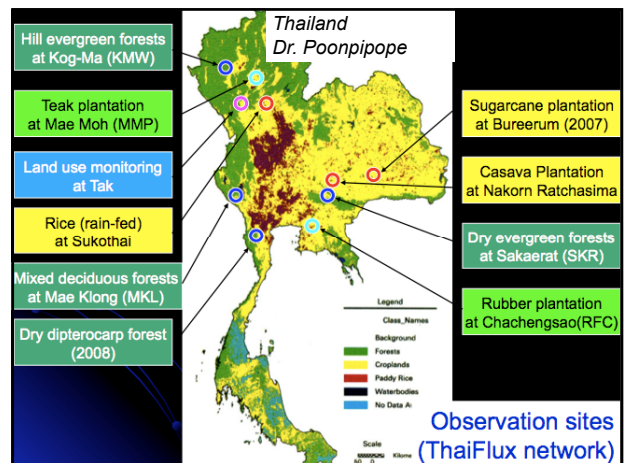
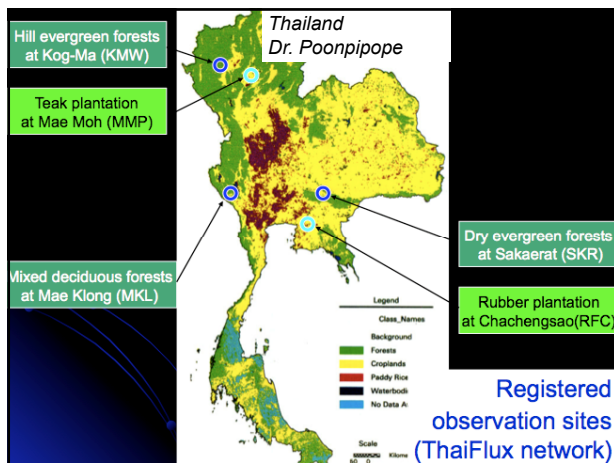
Seasonal change in satellite vegetation 'greenness'



Selected elements of Country Presentations: Thailand

ThaiFlux

Dr. Poonpipope Kasemsap
Katsetsart University



Selected elements of Country Presentations: Thailand

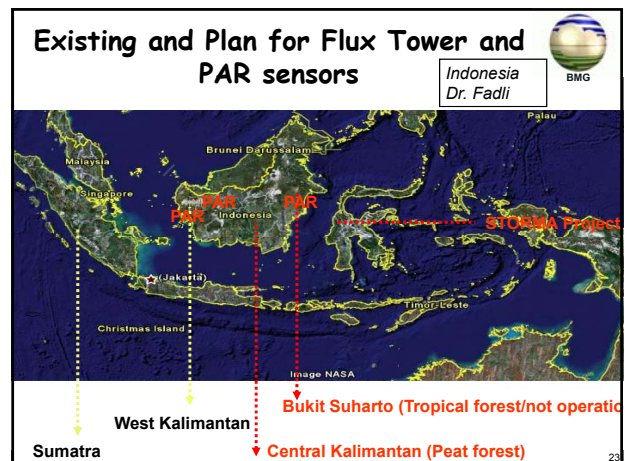
Indonesia Dr. Fadli

OCEAN AND CLIMATE RELATED PROGRAMS TO GLOBAL WARMING IN INDONESIA

Fadli Syamsudin
Agency for the Assessment and Application of Technology (BPPT)

- Technological roadmap on global warming
- Research facilities
- Ongoing programs
- HARIMAU
- Concluding remarks

Workshop on Monsoon Asia Tropical Forest Dynamics and Sustainability , Thailand 8-11 January, 2009



Workshop Conclusions (selected)

- **Research Priorities**
 - Improved mapping/quantification of deforestation and degradation (e.g. REDD)
 - Forest fire monitoring and related atmospheric haze
 - Biodiversity monitoring
 - Tropical monsoon asia ecosystem response to climate variation & change (pan-tropical comparative studies)



Workshop Conclusions

- **Opportunities**
 - Regional data sharing and capacity building
 - Regional scale synthesis
 - Collaboration among remote sensing, modeling and observation (e.g. flux) groups
- Common recognition of benefits for research coordination/collaboration among the participating countries
- Consensus to undertake discussions/planning for specific project(s)



Initial Prospects for Multilateral Project(s) in Monsoon Asia Region 2009

- New NASA Research Announcement for Interdisciplinary Research (expected mid-Feb. 2009), 1 to 2 million US\$ for 3 years
- NSF PIRE program (2 to 8 million US \$ total for 4 years) (JPY 200,000,000 to 800,000,000)



Potential PIRE Project Proposal Participants from Remote Sensing, Modeling and & Observation (Flux) Groups (preliminary)

- Principal Investigator: Xiangming Xiao, U. Oklahoma, USA
- USA (U. Oklahoma, U. Arizona, USGS, Purdue U.)
- Japan (NIES, AIST, U. Tokyo-IIS, others TBD)
- Thailand (AIT, Kasetsart U., others TBD)
- Indonesia (BPPT, others TBD)
- China (ChinaFlux)
- Malaysia (TBD)



U.S. National Science Foundation (NSF) Partnerships for International Research and Education (PIRE)

- promote international engagement in U.S. science community by supporting innovative, international research and education collaborations.
- promote U.S. scientists to establish collaborative relationships with international colleagues to advance new knowledge and discoveries at frontiers of science
- promote the development of a diverse, globally-engaged U.S. scientific workforce.
- facilitate greater student preparation for and participation in international research collaboration

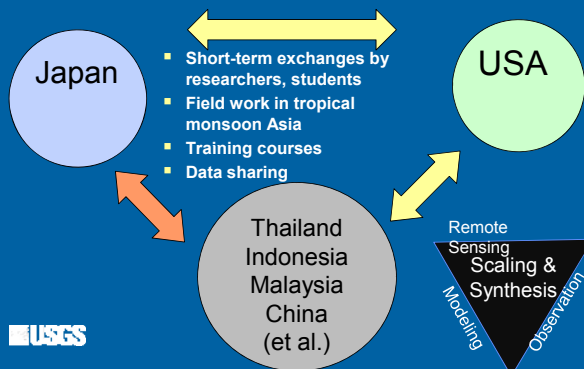


PIRE Project Proposal Concept: "Ecosystem Change and Ecological Forecasting in Monsoon Asia"

- 4 Initial Questions:
 - What are the effects of climate variation on carbon fluxes at multiple time scales (ENSO, Indian Ocean Dipole, etc.)?
 - What are the effects of land use changes and intensification on carbon fluxes in monsoon Asia?
 - What are the impacts of land use changes and intensification on monsoon climate?
 - What are the impacts of changes in land-climate interactions on food and forest production and ecosystem services?



Potential PIRE Project: Promoting International Exchange for Research & Education



Conclusions

- US-J-SEA Workshop was successful in:
 - Enhancing international communication on tropical forest carbon dynamics and sustainability in Monsoon Asia
 - Sharing of research activities and results in tropical Monsoon Asia and other regions (e.g. Amazon)
 - Identifying key science questions requiring integrated approaches (observations, modeling, remote sensing)
- *Contributes to strengthening regional and global networking essential for GEOSS*



US-Japan-SE Asia Workshop on Monsoon Asia Tropical Forest Carbon Dynamics and Sustainability



Thank you

