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AsiaFlux Newsletter

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International Pressure to Full and Quick Release of Monitoring Data?

- Report of Earth Observation Summit -

Gen INOUE

National Institute for Environmental Studies, Japan

The Integrated Earth Observation Summit was held on July 31, 2003, in Washington DC, with participants from 33 countries and 21 international organizations. This conference was initiated by the G-8 Evian Summit Declaration, which was aimed to enhance international cooperation in the field of Earth Observation. The delegation of Japan consisted of 30 members and lead by Mr. Kiichiro Tokai, Senior Vice-Minister of the Education, Culture, Sports, Science and Technology (MEXT) participated in the conference. Mr. Kazuhiko Takemoto, Councilor of Ministry of the Environment, and Dr. Gen Inoue, Director of CGER/NIES, were two of the members.

It is widely recognized that the global environmental monitoring is important for the understanding, detection, and prediction of the global warming. There are ongoing research and operational monitoring activities in each countries, and international co-operations and joint programs are proposed or in progress in many field of research in this direction. However, problems such as the shortage of budget in the Nonprofit Organization, the lack of manpower in the UN, and differences in the standpoint of each government, exist in the realization of effective and large-scale international activities.

It is highly desirable that such global observation issues be discussed on the table of G-8 Summit.

From Action Plans of G-8

Strengthening international cooperation on global observation

We will:

- Develop close co-ordination of our respective global observations strategies for the next ten years; identify new observations to minimize data gaps;
- Build on existing works to produce reliable data products on atmosphere, land, freshwater, oceans and ecosystems;
- Improve the world-wide reporting and archiving of these data and fill observation gaps of coverage in existing systems;
- Favor interoperability with reciprocal data-sharing;
- Develop an implementation plan to achieve these objectives by next spring's Tokyo ministerial conference.



A working group meeting named Group on Earth Observation (GEO) was followed by the Earth Observation Summit, and three co-chairs were elected; Dr. C. Lautenbacher, Secretary of NOAA, Dr. A. Mitsos, Science committee of EU, and Mr. Akio Yuki, Deputy Minister of MEXT. It was decided that one additional co-chair be elected from South Africa. The structure of GEO was formed as is shown in Fig.1. The

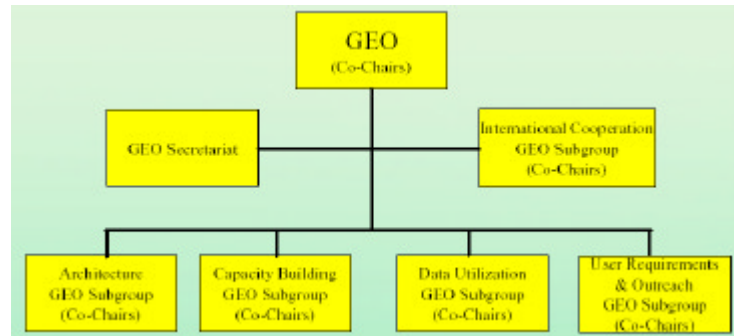


Fig.1 GEO Structure

secretary office was established in USA (see http://www.earthobservationsummit.gov/terms_of_reference.html). Japan expressed the intension to send delegates to all subgroups and we hope that the discussion will be developed. The outline of the report was decided as follows:

- 1) Introduction
- 2) Purpose
- 3) Benefits/Requirements
- 4) Elements of Earth Observation "system"
- 5) Architecture for the Future
- 6) Capacity Building
- 7) International Cooperation
- 8) Challenges

The discussion might stay on the issues of purpose, system, organization, or mechanism until next summer. Although it seems difficult to reach a conclusion on its practical contents, the vital issue of funding plan must be resolved.

The third article in the declaration "in a full and open

manner with minimum time delay and minimum cost, recognizing relevant international instruments and national policies and legislation" is a crucial one. We should pay more attention to the discussion of building systems that are effective and practical for producing significant scientific results from operational observations. Scientists may have to withhold new technologies or methodologies developed by themselves until sufficient data and papers, required by their projects, are produced. What we have been experiencing in AsiaFlux organization is that while scientists understand the importance of opening data quickly, they often have to postpone the data release so that they can first use the data in their papers or thesis for a doctoral degree. A proper system based on careful consideration of such situation should make a compromise between an acceptable level of delay for opening data and complying with the public requirement on the global environment issues. Therefore we must make considerable effort to solve the conflict.

From DECLARATION OF THE EARTH OBSERVATION SUMMIT

Affirm the need for timely, quality, long-term, global information as a basis for sound decision making. In order to monitor continuously the state of the Earth, to increase understanding of dynamic Earth processes, to enhance prediction of the Earth system, and to further implement our environmental treaty obligations, we recognize the need to support:

- (1) Improved coordination of strategies and systems for observations of the Earth and identification of measures to minimize data gaps, with a view to moving toward a comprehensive, coordinated, and sustained Earth observation system or systems;
- (2) A coordinated effort to involve and assist developing countries in improving and sustaining their contributions to observing systems, as well as their access to and effective utilization of observations, data and products, and the related technologies by addressing capacity-building needs related to Earth observations;
- (3) The exchange of observations recorded from in situ, aircraft, and satellite networks, dedicated to the purposes of this Declaration, in a full and open manner with minimum time delay and minimum cost, recognizing relevant international instruments and national policies and legislation; and
- (4) Preparation of a 10-year Implementation Plan, building on existing systems and initiatives, with the Framework being available by the Tokyo ministerial conference on Earth observations to be held during the second quarter of 2004, and the Plan being available by the ministerial conference to be hosted by the European Union during the fourth quarter of 2004.



Carbon Balance Researches in a Northern Larch Forest: Measurements of Component CO₂ Fluxes Using Multichannel Automated Chamber Approaches

Naishen LIANG

National Institute for Environmental Studies, Japan

Forests worldwide contain about 45% of the global stock of carbon, thus playing an important role in the global carbon balance. Larch (*Larix*) forests are one of the dominant forest types in Northern hemisphere, from northeastern Asia to North America, and throughout Europe and Siberia. Because of their high productivity, they constitute one of the greatest carbon sinks of the terrestrial ecosystems. However, the carbon balance of larch ecosystems has received little attention. Recently, the AsiaFlux network has established five tower-sites, from central Siberia to eastern Siberia, northern China and northern Japan (two sites), to quantify CO₂ flux at stand scales by eddy-covariance systems. However, understanding of the carbon ecology of forests in the current climate will be enhanced, together with current knowledge on partitioning of stand-scale CO₂ flux from photosynthetic and respiratory fluxes.

In this report, I will particularly concentrate on the measurements of component CO₂ fluxes in a 45-year-old Japanese larch forest at Tomakomai flux site (lat 42°44'N, long 141°31'E, 125 m elevation) – soil CO₂ efflux, root respiration, heterotrophic respiration, over-ground woody tissue respiration, and photosynthesis – by utilizing an alternative ecophysiological approach, i.e., multichannel automated chamber systems. Our focus is set by the need to provide values for parameters required by a process-based ecosystem model. The model integrates the processes for all components and estimates annual net ecosystem carbon exchange in relation to climate variables.

1. Forest floor CO₂ efflux

Soil CO₂ efflux has been estimated to account for 60–90% of the total ecosystem respiration in temperate forests. Therefore, accurate measurement of soil CO₂ efflux is critical for modeling the carbon cycle dynam-

ics of an ecosystem. However, for technical reasons, obtaining valid soil CO₂ efflux measurements is difficult.

1.1. Multichannel automated soil-chamber system

We deployed a multichannel automated chamber system intended to measure soil CO₂ efflux over entire seasons, as described by Liang et al. (*Tree Physiology* (2003) 23: 825-832). However, the current system has a flow-through, non-steady-state design. In brief, the system comprises 16 large automated chambers (90 × 90 × 50 cm, L × W × H) and a control box (70 × 50 × 35 cm). The control box includes a 16-channel gas sampler, an infrared gas analyzer (LI-820, LI-COR), a datalogger (CR10X, Campbell Scientific) and a compressor system. The 16 chambers are placed randomly on the forest floor within an area 40 m across (Fig. 1). The length of the polyurethane tubing used to sample air from each chamber is 20 m. Between measurements, the two sections of chamber lid are raised to allow precipitation and leaf litter to reach the enclosed soil surface, so as to keep the soil conditions as natural as possible. Over the course of an hour, the 16 chambers are closed in



Fig.1 Overview of field measurement of soil CO₂ efflux with the multichannel automated soil-chamber system at Tomakomai flux site.

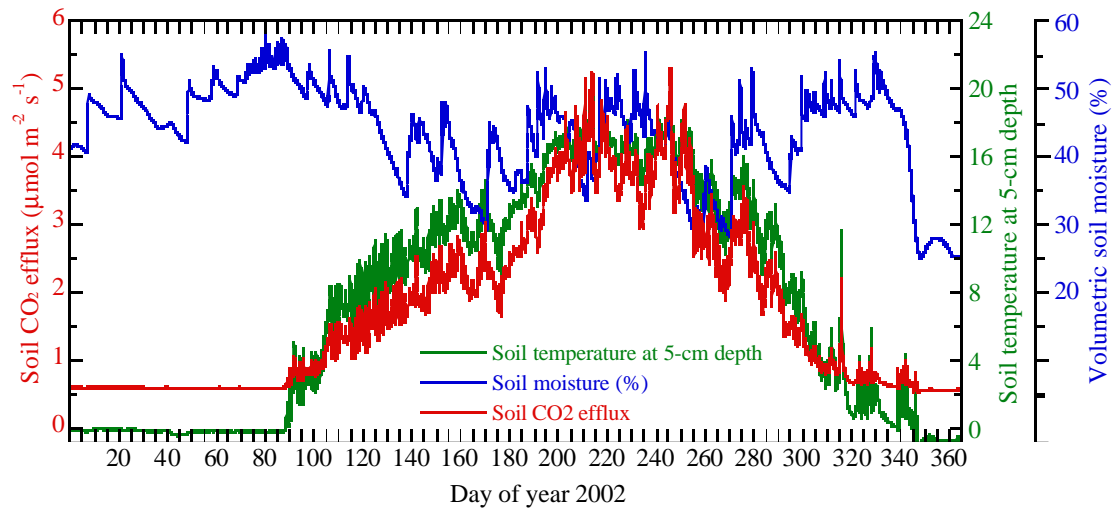


Fig.2 Seasonal trends in hourly soil temperatures at 5 cm depth (green line), volumetric soil water content at 5-15 cm depth (blue line), and mean soil CO₂ effluxes measured with the multichannel automated soil chambers at Tomakomai larch forest in 2002.

sequence by the 16-channel gas sampler programmed by the CR10X. We set the sampling period for each chamber to 225 s. The CR10X acquires output from the LI-820 at 1-s intervals and averaged and recorded it every 5 s.

The whole system has a mean power consumption of < 15 W. Therefore, a combination of two 75 W solar panels and three 150 Ah true deep cycle marine batteries has been found sufficient to power the system at study sites without electricity.

1.2. Temporal and spatial variability of forest floor CO₂ efflux

We have been measuring soil CO₂ efflux at Tomakomai site since June 2001. Forest floor CO₂ efflux showed asymmetric diurnal patterns as well as significant seasonality, with lower values (about 0.5 μmol m⁻² s⁻¹) during the winter with soil surface covered thickly by the snow between the end of December and beginning of April, and higher values (3.9 μmol m⁻² s⁻¹) during the warmest season between the beginning of July to middle of September (Fig. 2). Annual soil CO₂ efflux is estimated to be 678 gC m⁻² in 2001 and 665 gC m⁻² in 2002, matched the total annual ecosystem respiration of 659-786 gC m⁻² estimated by the above-canopy eddy covariance method (Hirano et al 2003, *Tellus* 55B: 244-257). However, the annual soil CO₂ efflux in

Tomakomai larch forest falls the lower range of values reported for most forests, consisting with the shallow soil and the deficiency of forest floor organic matter.

At Tomakomai site, variation in soil CO₂ efflux was found to depend strongly on change in soil temperature. The Q_{10} was 2.9 during the growing season between June and October; however, it decreased to 2.3 when presenting a complete annual soil CO₂ efflux. We find weak correlation between soil CO₂ efflux and soil moisture, due probably to abundant precipitation in this larch forest, coupled with good soil drainage, resulted in a volumetric soil moisture, usually 30–40%, that is uniformly favorable to microbial activity and root respiration. Therefore, it is not surprising that soil CO₂ efflux and temperature in Fig. 2 show remarkable similarity in their shape.

2. Partitioning soil CO₂ efflux

Soil CO₂ efflux has two components: respiration from micro-organisms (heterotrophic respiration), and respiration from plant roots, including rhizosphere (root respiration). Heterotrophic respiration is composed of the respiration from free-living soil micro-organisms and saprophytic fungi. Root respiration is contributed to autotrophic respiration by the roots and heterotrophic respiration by the mycorrhiza. Although root and myc-

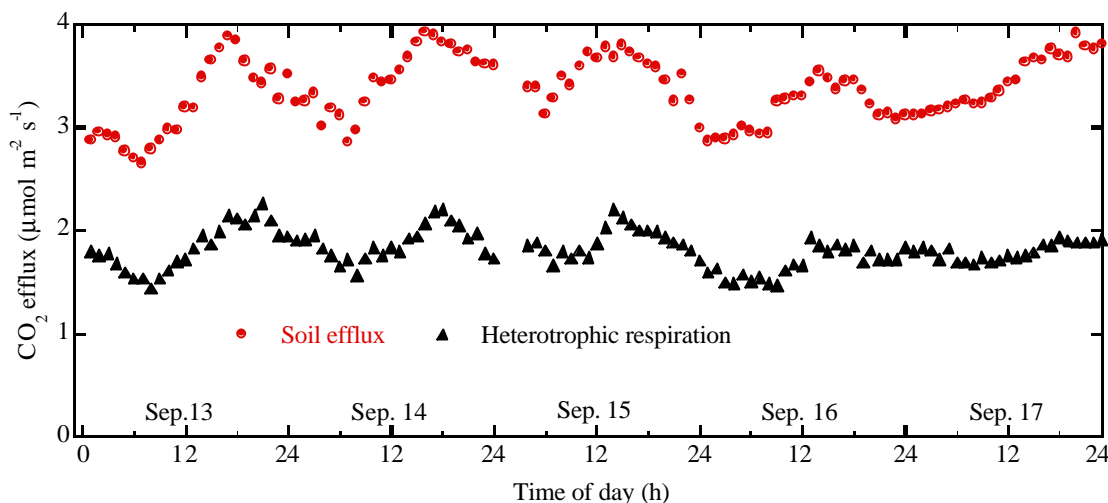


Fig.3 Diurnal patterns of soil CO₂ effluxes (red circles) and heterotrophic respirations (dark triangles) at Tomakomai larch forest. Data points are means for five automated soil chambers.

orrhiza respiration are not the same, a distinction between the two is difficult and they are clearly not independent from each other, so in most of this project, no distinction will be drawn.

2.1. Root exclusion approach

Roots were removed in June 2002 from five 1 × 1 m areas to a depth of 30 cm and soils were placed back in reverse order of removal, and further root growth was prevented by buried four 1 × 0.3 m plastic sheets to each plots.

2.2. Measurements of root respiration and heterotrophic respiration

The removed roots were immediately put into a temperature-controlled (0-25 °C; 70 × 30 × 30 cm in size) chamber, and steady state temperature response curves of root respiration were conducted. Inside the chamber, humidity and reference CO₂ concentration were maintained at 100% and 1000 μmol mol⁻¹, respectively. On the other hand, an automated chamber was installed to each root exclusion plot to measure heterotrophic respiration throughout an annual cycle following the same procedure of soil CO₂ efflux measurement.

2.3. Contributions of root and heterotrophic respirations to forest floor CO₂ efflux

The Q_{10} of root respiration was estimated to be 2.3, consistent with the Q_{10} for annual soil CO₂ efflux. When compared with the intact plots, root respiration obtained with the temperature-controlled chamber approach contributed about 20% of forest floor CO₂ efflux. However, the continuous measurement at root exclusion plots with automated chambers showed that heterotrophic respiration accounted for about 53% of soil CO₂ efflux, i.e., the contribution of root respiration was approximately 47% (Fig. 3). Disagreement between the two approaches cannot currently be identified. If the error was predominantly on the side of temperature-controlled chamber-based measurement, the only mechanism that we could invoke that might explain underestimation of root respiration by direct measurement of the detached root tissues would be consistent underestimation of CO₂ production from rhizosphere, as well as injury of root tissues due to disturbance artifacts.

3. Aboveground woody tissue respiration

The relationship between gross primary productivity (GPP) and net primary productivity (NPP) is not fully understood. One of the uncertainties relevant to this issue is the magnitude of woody tissue respiration. Particularly, woody tissue respiration is important for deciduous forests because it occurs continuously, even in the dormant season. Furthermore, understanding tem-



poral variation of woody tissue respiration and the influence of environmental changes are essential for developing and validating forest productivity models.

3.1. Multichannel automated stem-chamber system

The automated system consists of 16 automated chambers and a control box. The control box is designed as the same as used in soil CO₂ efflux system. The cylinder design chamber is made of 0.1 mm thick transparent polyester film, and completely envelops a segment of the tree stem or branch by pasting to two permanently neoprene flexible-rings which are sealed against the stem with fast curing silicone caulk (Fig. 4). We design the stem chamber can exchange the chamber air with the ambient air between the measurements. During the measurement, the chamber is closed, and the increase in CO₂ concentration is measured. At the end of August 2002, we selected five individuals for continuous measurement of woody tissue respiration at stem heights of 2 m, 8 - 10 m (just beneath the crown) and 12 - 14 m (branches at the top of the tree crown). Another one chamber was used as a control chamber. The measurement procedure is as the same as that for soil CO₂ efflux.

3.2. Temporal and spatial variability of woody tissue respiration

Woody tissue respiration showed significant diurnal and seasonal patterns, with averaged volume-based respiration rate of 54 $\mu\text{mol m}^{-3} \text{s}^{-1}$ at the end of August and decreased to 8 $\mu\text{mol m}^{-3} \text{s}^{-1}$ during the winter between 10 November and 10 March, and then increased steadily and quickly to 101 $\mu\text{mol m}^{-3} \text{s}^{-1}$ at the beginning of May (Fig. 5). Results suggest that the seasonality of woody tissue respiration closely links with tree phenology. On the other hand, volume-based woody tissue respiration rate was lowest at stem height of 2 m, moderate at 8-10 m, and highest for branches. Correspondingly, the Q_{10} of woody tissue respiration was 2.4, 2.8 and 4.1 for stem height of 2 m, 8 - 10 m and branches, respectively.

3.3. Contribution of woody tissue respiration to ecosystem respiration



Fig.4 Overview of field measurement of woody tissue respiration with the multichannel automated stem-chamber system at Tomakomai flux site.

During the non-growing season, ecosystem respiration of larch forest measured by the eddy covariance method was the sum of aboveground woody tissue respiration and soil CO₂ efflux. Aboveground woody tissue respiration was integrated to be 77 gC m⁻² from 27 October to 12 May (198 days) by using volume-based woody tissue respiration and stem and branch biomass data. Simultaneously, soil CO₂ efflux was estimated to be 170 gC m⁻². Thus, aboveground woody tissue respiration contributed approximately 31% of ecosystem respiration during the non-growing season. During the growing season, however, the contribution of aboveground woody tissue respiration is assumed to be less than 31% due to the significant increase in soil efflux as well as existence of foliage respiration.

4. Photosynthesis

The dominant components in forest carbon balance are photosynthesis and soil CO₂ efflux, and show strong diurnal, seasonal, and annual variations. We have developed a method to scale shoot-level photosynthesis to the canopy level photosynthesis using measurements of shoot-level photosynthesis, canopy architecture and models of radiative transfer.

4.1. Multichannel automated branch-chamber system

The system comprises 24 automated branch-chambers and a control box. The control box is designed as the

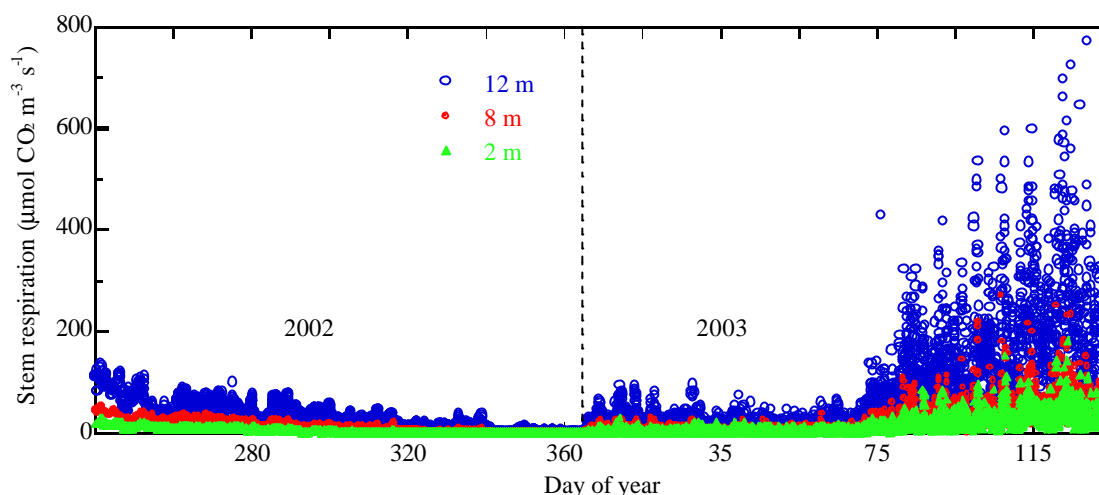


Fig.5 Seasonal changes in hourly woody tissue respiration at stem height of 2 m (green triangles) and 8-10 m (red closed-circles), and branch height of 12 - 14 m (blue open-circles) measured with the multichannel automated stem chambers at Tomakomai larch forest between 28 August (day 240) 2002 and 12 May (day 132) 2003.

same as used in soil CO₂ efflux and woody tissue respiration systems, except that channels of the gas sampler have been extended from 16 to 24. The cylinder design chambers (12 cm diameter by 30 cm long) are constructed of 0.05 mm high-transmittance polyester film pasted to an acrylic frame. The chamber can completely envelop a segment of tree branch with several short shoots (Fig. 6). Between measurements the two compass-windows, one in each end of the chamber, are opened to allow wind to pass through the chamber and prevent temperature increase inside the chamber. During the measurement, the chamber is closed and the change in CO₂ concentration is measured. The measurement procedure is as the same as that for soil CO₂ efflux and woody tissue respiration, except that the sampling period for each chamber is set to be 150 s.

4.2. Measurement of canopy photosynthesis

In June 2003, the automated system was installed to Tomakomai site. Ten trees around a canopy scaffold were sampled for measurement of canopy photosynthesis, with twelve chambers in the sunlit portion, eight chambers in the mid-crown, and four chambers in the lower portion. So far, we have not analyzed the collected data. However, measurements were not interrupted by either rain or wind, even the chambers could work well during wind speed of 10-15 m s⁻¹. Therefore, we

dare argue that our multichannel automated branch-chamber system can be used for long-term measurement of shoot-level photosynthesis as well as has an important role in validating scale-up chamber-based estimates of stand scale photosynthesis.



Fig.6 Overview of field in situ measurement of shoot-level photosynthesis with the multichannel automated branch-chamber system at Tomakomai flux site.



Symposium on Advanced Research of CO₂ and Carbon Budgets in Forest and Ocean Ecosystems

Yoshikazu OHTANI

Forestry & Forest Products Research Institute, Japan

The symposium on "Advanced Research of CO₂ and Carbon Budgets in Forest and Ocean Ecosystems" was held on September 29, 2003 at the Ichijo-hall, University of Tokyo, sponsored by Forestry and Forest Products Research Institute (FFPRI) and National Research Institute of Fisheries Science (NRIFS). This symposium was part of the activities of a project sponsored in April, 1999 by the Agriculture, Forestry and Fisheries Research Council Secretariat, and was carried on after the institutes became independent administrative entities. The project was completed in March, 2003.

After the keynote address and the talks of the principal results from the research works of forest and ocean ecosystems, a panel discussion on the future research subjects of the carbon budget in forest and ocean

ecosystems was taken place. Following the summarization of the present situation and the point at issue in the evaluation of the carbon budget in both ecosystems, the talks and commentaries on the topics were recommended for further studies: the more accurate estimation of the carbon budget in forest and ocean ecosystems the method and strategy-; the importance of combined intensive observation in the forest ecosystems; and the better estimation of oceanic biomass and carbon flux, etc. The discussion of the common subjects such as the scale-up methodology, the shift to non-study based flux monitoring and expansion of database for the carbon budget estimation were also planned.

Flux Observations at Yamashiro Experimental Forest in Southern Kyoto Prefecture

Koji TAMAI, Yuji KOMINAMI, Takafumi MIYAMA, and Yoshiaki GOTO

Kansai Research Center, Forestry & Forest Products Research Institute, Japan

Flux observations have been performed at Yamashiro Experimental Forest in southern Kyoto Prefecture since the Forestry and Forest Products Research Institute (FFPRI) began the Flux Net research project in 1999. Yamashiro Experimental Forest is distinct, in that it features complex terrain and has been monitored for above-ground biomass.

The 1.6-ha site is located in an upstream watershed (34°47'N, 135°50'E, 180 ~ 250 m AL) in Yamashiro, Kyoto Prefecture. The annual mean temperature is 15.5°C, the monthly warmth index is 125.6°C, and mean annual precipitation is 1,449.1 mm. The vegetation at and around the site is secondary deciduous forest. Two flux observation towers monitor the site, one on an adjacent ridge and one on the valley bottom. The maximum altitude difference within the site is 70 m. Flat terrain is not a major fea-



Observation tower located on the ridge

ture; rather, undulating terrain varying by a few dozen meters in height covers the site and its surroundings. Undulating hills extend over 5 km to the north and east of the site, about 2 km to the west, and approximately 3 km to the south.

In addition to eddy correlation observations, permanent photosynthesis observations (Miyama et al., 2003) and soil respiration monitoring (Nobuhiro et al., in press) using an automated chamber have also taken place at this site. The study results are being analyzed to determine the carbon cycle characteristics in this complex-terrain forest (Kominami et al., 2003). Furthermore, diameter-at-breast-height (DBH) censuses conducted at the site since 1994 have measured all trees and

shrubs. Goto et al. (2003) reported on the site's above-ground biomass and net primary production.

The following cooperative research programs with



Kobe University are also underway at the site: 1) CO₂ efflux estimation from fallen or standing dead stems; 2) estimation of underground biomass and root respiration; and 3) estimation of above-ground biomass change over decades, using dendrochronology. Through these various studies, we hope to understand the CO₂ balance and carbon cycle characteristics of this forest located on complex terrain.

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Kominami Y., Miyama T., Tamai K., Nobuhiro T. and Goto Y. (2003): Characteristics of CO₂ flux over a forest on complex topography. *TELLUS*, **55B**, 313-321.

Miyama T., Kominami Y., Tamai K., Nobuhiro T. and Goto Y. (2003): Automated foliage chamber method for long-term measurement of CO₂ flux in the uppermost canopy.

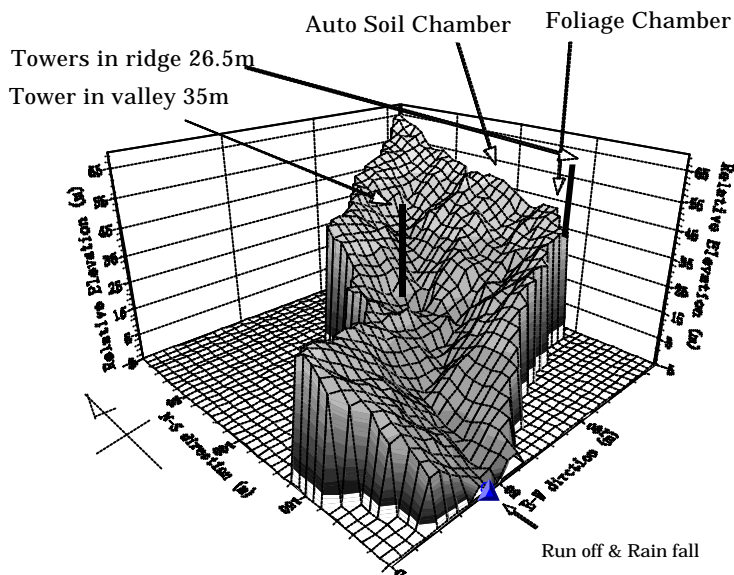


Fig.1 The bird's-eye view of Yamashiro Experimental Forest

TELLUS, **55B**, 322-330.

Nobuhiro T., Tamai K., Kominami Y., Miyama T., Goto Y. and Kanazawa Y. (in Press): Development of IRGA enclosed-chamber method for soil efflux measurement and its application to a spatial variation measurement. *J. Forest Research*, **8**.

International Workshop on Flux Observation Research in Asia

(Beijing, Dec 1-3, 2003 :ChinaFLUX and AsiaFlux)

The International Workshop on Flux Observation Research in Asia will be held in Beijing, China, on December 1-3, 2003. It is sponsored by AsiaFlux and Chinese Terrestrial Ecosystem Flux Observational Research Network in Institute of Geographic Sciences and Natural Resources (ChinaFLUX), Chinese Academy of Sciences (AsiaFlux Newsletter Issue No.4) (http://www-cger/~moni/flux/asia_flux/nl/2003/no04e_2003.pdf). The WS had been postponed because of the SARS epidemic. Along with the overview for the progress of ChinaFLUX in its second year of establishment, researchers will present the results from monitoring studies and share the fruit of their effort in and outside China. The WS will discuss the basic theories and application techniques on flux observation in order to improve the study of flux observation in Asia in cooperation with the researchers from AsiaFlux and KoFlux, USA, Europe, and other countries. Enhancing the systematic collaboration and data exchange will be a crucial issue between AsiaFlux and ChinaFLUX. It is also expected that the domestic network in China will be extended to strengthen the tight collaboration among international researchers. We hope that this WS will make further progress in the development of monitoring study in Asia. AsiaFlux will make every effort to the success of this WS.

In principal, the deadline for the registration is September 25, 2003, and for abstract submission, October 20, 2003. A late registration might be acceptable when there are still vacancies.

For more detailed, please contact chinaflux@cern.ac.cn.



Larch Planting Ceremony and Workshop will be Held at CC-LaG (Carbon Cycle and Larch Growth) Experiment Site in Northernmost Hokkaido, Japan

Teshio Experiment Forest, FSC-Northern Biosphere, Hokkaido University has started on a study project of the carbon cycle monitoring on a larch plantation in 2001 in collaboration with CGER-NIES and Hokkaido Electric Power CO., Inc. In this project, 14 ha of a conifer-hardwood mixed forest was clear cut in January 2003, then 33,000 saplings of 2-year old hybrid larch (*Larix gmelinii* × *L. kaempferi*) will be planted. The main purpose of this project is to evaluate the carbon sequestration capacity of the young larch plantation and to clarify the watershed scale circulation of materials. However, since the observation had been conducted on the mixed forest for 1.5 years before the clear-cutting, and is continued during the series of the management, the effects of forest clear cutting and of the larch planting on the watershed scale carbon and materials dynamics can also be clarified.

As a commemoration of the larch planting in this October, we open the planting ceremony and small workshop. Please contact us by E-mail, if you would like to join the meeting.

Contact address: kentt@exfor.agr.hokudai.ac.jp

Please refer further information of this project to:

- AsiaFlux HP : http://www-cger.nies.go.jp/~moni/flux/asia_flux/index.html
- AsiaFlux Newsletter : http://www-cger.nies.go.jp/~moni/flux/asia_flux/nl/2003/no05e_2003.pdf



Schedule

28 Oct. 2003

- 14:00 ~ 15:30 Larch planting ceremony at Flux observation site
16:00 ~ 17:00 "Outline of this project"
K. Sasa and M. Nomura (Hokkaido University)
17:30 ~ 19:30 Banquet (¥5000)

29 Oct. 2003 Workshop

- 9:00 ~ 9:20 "Expectations from FFPRI Flux Network"
Y. Ohtani (Forestry and Forest Products Research Institute)
9:20 ~ 9:40 "Expectations from Tomakomai Flux Research site"
T. Hirano (Hokkaido University)
9:40 ~ 10:00 "Current researches on the breeding of the hybrid larch"
R. Kuromaru (Hokkaido Forestry Research Institute)
10:15 ~ 10:30 "Carbon sequestration rate of a boreal forest in CC-LaG experiment site"
K. Takagi (Hokkaido University)
10:30 ~ 10:45 "Carbon dynamics in a watershed in CC-LaG experiment site"
H. Shibata, M. Nomura and K. Fukusawa (Hokkaido University)
10:45 ~ 11:00 "Deposition and runoff rates of Air pollution materials in CC-LaG experiment site"
T. Fukasawa (Hokkaido University)



- 11:00 ~ 11:15 "Year-to year variation in stable isotope ratios in cellulose using tree-rings obtained in CC-LaG experiment site"
H. Tsuji and T. Nakatsuka (Hokkaido University)
- 11:15 ~ 11:30 "Seasonal variation in photosynthetic capacities of larch canopy leaves"
M. Kayama and T. Koike (Hokkaido University)
- 11:30 ~ 11:45 "Carbon budget in clear-cut site in CC-LaG experiment site"
N. Liang and Y. Fujinuma (National Institute of Environmental Studies)
- 11:45 ~ 12:00 "Impacts of forestry activities on forest biomass and carbon flows"
Y. Akibayashi, T. Yoshida, H. Takahashi (Hokkaido University),
M. Maebayashi and K Watanabe(Hokkaido Electric Power CO., Inc.)
- 12:00 ~ 12:15 "Remote sensing studies on forests"
H. Oguma and Y. Fujinuma (National Institute of Environmental Studies)
- 12:30 ~ 13:00 Discussion having lunch

* Official Language: Japanese (English explanation is available)



The URL of AsiaFlux web page will be changed on October 10, 2003

from

http://www-cger.nies.go.jp/~moni/flux/asia_flux/index.html

to

<http://www-cger2.nies.go.jp/asiaflux/>

The current URL will be accessible for a few months after the change.

Editor's Note

The weather in this summer appeared unusual worldwide. I expect that many sites may have observed interesting seasonal variations. Such a phenomena proves the importance of long-term flux monitoring.



The editor of AsiaFlux Newsletter No.7:
Koji TAMAI

(Kansai Research Center, Forestry & Forest Products Research Institute)

The editor of AsiaFlux Newsletter No.8 will be Nobuko SAIGUSA (National Institute of Advanced Industrial Science and Technology).



AsiaFlux Newsletter
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Editorial board: Gen INOUE (Secretary-General)

Yasumi FUJINUMA, Koh INUKAI, Yoko ARIHARA

c/o Center for Global Environmental Research

National Institute for Environmental Studies

16-2 Onogawa, Tsukuba, Ibaraki 305-8506 Japan

TEL: +81-29-850-2348, FAX: +81-29-858-2645

E-mail: asiaflux@nies.go.jp

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