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Contents

21st Century COE Program: "Satellite Ecology"

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Deeper understanding of mechanisms and functions of ecosystems has been crucial theme in ecology, geology and climatology. The research on ecosystem functions has a great importance for estimating effects of global climate change on ecosystem structure and function. The global scale behavior of ecosystems are the integration of many regional ecosystems, and we need to investigate the mechanisms many types of small ecosystems such as forest, agricultural fields, river and urban. Recent developments of remote sensing techniques, ecological research and meteorological observation and modeling are going to enable us to understand how the ecosystems are distributed, how the ecosystems work and how the ecosystems interact with each other. Our 21st century COE program at Gifu University, "Satellite Ecology", aims to provide detailed and reliable techniques to understand and evaluate the mechanisms and functions of ecosystems.

Our program is composed from three research groups, i.e. ecological process research, remote sensing observation and meteorological observation and modelling. The members belong to three institutes in Gifu University; River Basin Research Center, United Graduate School of Agricultural Science and Graduate School of Engineering. The research will be conducted in a basin ecosystem which includes forests, agricultural fields, river and small urban along a gradient of altitude. Major objectives of the research are to reveal the carbon and water dynamics in the ecosystems and their interactions. Our remote sensing and meteorological observations/analysis for ecosystem scale behavior in carbon and water flow will be confirmed by field census including leaf ecophysiology, forest structure and CO_2 efflux from soil. Distribution of each ecosystem types (functional types) are measured by remote sensing analysis and thus the function of the basin ecosystem will be evaluated by scaling from single leaf to whole forest. Measurements of CO_2 and water flux by a flux-tower provide validation analysis of the models. These cross-check study will provide us reliable techniques

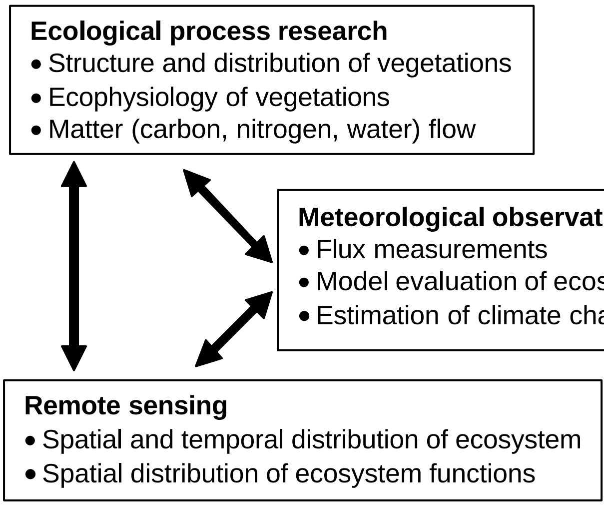

Fig.1 Workflow of the Satellite Ecology

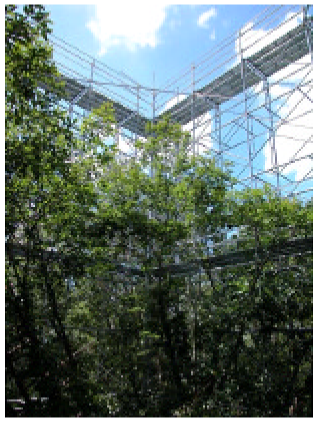

Fig.2 Canopy access tower for ecological process research

and reliable outputs which are applicapable to other, larger ecosystems ranging from basin to regional and then to Asia (Fig.1, 2).

The aim of the program is not only the progress of the scientific research, but also education of graduate students as the scientists who progress the study of ecosystems and environmental managements. Since the ecosystem includes human activity and life, interaction of natural ecosystems and human activities should be considered in the study. Therefore the program welcomes joint meetings and studies with technicians in environmental managements and citizens. Our future objectives are to provide the knowledge for conservation and sustainable use of our natural environments.

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Report on the American Meteorological Society 26th Conference on Agriculture and Forest Meteorology Vancouver, British Columbia, Canada 23-26 August, 2004

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A conference on agriculture and forest meteorology is held every two years by the American Meteorological Society (AMS). The 26th conference was held in Vancouver, British Columbia, Canada, from August 23 to 26, 2004. It was held in parallel with the 13th Joint Conference on the Applications of Air Pollution Meteorology with the Air and Waste Management Association, the 16th Conference on Biometeorology and Aerobiology, and the 5th Symposium on the Urban Environment. These conferences attracted more than 400 participants from all over the world, mostly from North America and Europe.

There were 12 sessions in the Conference on Agriculture and Forest Meteorology, starting at 9:00 am on Monday, August 23, and ending at 5:00 pm on Thursday, August 26. Some sessions on Wednesday and Thursday were held as parallel sessions, causing some interesting presentations to overlap. The poster session was held jointly with those from the other three conferences on Wednesday evening, August 25. More than 30 posters presented during the poster session were associated with the conference on Agriculture and Forest Meteorology. The sessions were as follows:

August 23:

Session 1: Canopy Micrometeorology 1

Session 2: Carbon Dioxide Exchange 1

August 24:

Session 3: Canopy Micrometeorology 2

Session 4: Carbon Dioxide Exchange 2

August 25:

Session 5: Effects of Weather and Climate on Plant Growth

Session 6: Regional Land/Atmosphere Interactions

[Sessions 5 and 6 were parallel sessions.]

Session 7: Impacts and Implications of Climate/ Weather Variability and Change

Session 8: Turbulence and Dispersion in Canopies

[Sessions 7 and 8 were parallel sessions.]

Session 9: Evaporation and the Energy Balance 1

August 26:

Session 10: Trace Gases Exchange

Session 11: Evaporation and the Energy Balance 2

[Sessions 10 and 11 were parallel sessions.]

Session 12: Carbon Dioxide Exchange 3

There were many interesting presentations, but here are some, albeit biased, highlights.

Majority of the papers presented results characterizing the carbon, water and energy cycles at various forest and agricultural sites in North America, Europe and Australia. There were several presentations made by people from the University of British Columbia group led by Andy Black. The group operates a temperate rainforest site at Campbell River on Vancouver Island. T. Cai from the UBC group started off the conference with a set of results showing the importance of indirect radiation in photosynthetic CO_2 absorption by Douglas-Fir forest. Another paper by the UBC group was presented by Kai Morgenstern, who investigated six years of CO_2 and water vapor exchange at the same Douglas-Fir stand. The measurements showed that there is a good correlation between water vapor and CO_2 fluxes.

Boreal forest ecosystems constitute a significant portion of the Northern Hemisphere carbon storage and exchange. Given the background of changing climate, it is of interest to know how various ecosystems respond to changes in climate forcing. A paper co-authored by N. Kljun (Institute for Atmospheric and Climate Sciences, ETH, Zurich, Switzerland) and presented by Andy Black from UBC showed results from the analyses of 2000-2003 eddy covariance flux measurements of CO_2 obtained at three sites in the Boreal Research and Monitoring Sites (BERMS) in the northern Saskatchewan during the recent period of drought. BERMS is part of the Fluxnet Canada Research Network. Three sites are mature aspen stands (SOA), black spruce (SOBS) and jack pine (SOJP). All three sites are within 100 km of each other. Even though these sites are closely located, the effect of drought on the deciduous aspen was much more significant than on the coniferous trees. The first year of the drought saw a reduction in respiration at the SOA site due to low soil water content. This resulted in a large sequestration of CO_2. During the following two years of the drought, photosynthesis at SOA was reduced due to water stress. The authors of the study concluded that over the 2000-2003 period, NEP was greater at the deciduous aspen stand than at the coniferous stands, even though all three sites experienced similar levels of drought.

Another form of NEP inter-comparison among the flux sites at BERMS was presented by Brian Amiro (University of Manitoba) and his co-authors. The study examined the effect of forest disturbances on NEP using data from six BERMS sites; these are SOBS, SOA, SOJP, HJP94, F89, and F98. The first three sites represent mature forest sites, while the latter three represent disturbed sites. The F89 and F98 sites experienced fire in 1989 and 1998, respectively. The HJP94 site is a jack pine harvested site where AIST has been making eddy covariance flux measurements since 2001. (The HJP94 site has been taken over by the Meteorological Service of Canada in 2004.) The mature boreal forest sites are shown to be net carbon sink, but the disturbed sites show a much complicated seasonal pattern. Using the data from 2001 and 2002, the study shows that HJP94 and F98 were net sources of carbon each year. During the growing season, however, F98 and F89 did behave both as sources and sinks of carbon, depending on the time of the growing season. The study emphasized the need for long-term flux measurements at disturbed sites in order to obtain a clear evolution of seasonal NEP at forest sites after disturbances, such as fire and harvesting.

Nobuko Saigusa from AIST presented results of 10-year flux measurements at the Takayama site in Japan. The site is located in a cool temperate deciduous forest influenced significantly by the Asian monsoon. The data show that the inter-annual variability in NEP at Takayama is influenced mainly by the photosynthetic or gross primary productivity (GPP) than by ecosystem respiration (sum of autotrophic and heterotrophic respirations). This conclusion is consistent with the simulation results obtained by BEPS (Boreal Ecosystem Productivity Simulator) ecosystem model for the Takayama site (Higuchi et al.).

Poster session of the 26th Conference on Agriculture and Forest Meteorology. (provided by S.Inoue)

Upscaling fluxes from tower to landscape was one of the interesting topics presented at the conference. Joon Kim from Yonsei University described the process of assessing tower footprint climatology, spatial variability of site vegetation based on high resolution IKONOS images, and the sensor location bias in scaling up to 1 km^2 patch at three AmeriFlux tower sites. The results show that scaling tower flux to a 1 km^2 patch would require accounting of a large sensor location bias at the grassland site. Furthermore, the validation data for carbon flux products derived from satellites and/or models with grid size of about 1 km^2 should be averaged at least for several days to properly incorporate the time and space scales of the measured processes.

An impressive simulation of canopy flow over a complex terrain, and how that influences the net CO_2 exchange between the atmosphere and the biosphere was presented by Haizhen Sun from the University of British Columbia. Using the mesoscale atmospheric dynamical model developed by Terry Clark, the simulation results show how CO_2 concentration is built up in the surface layer during the nighttime, and how CO_2 disperses with the development of convective regime during the day time. The complexity of the within and above canopy flows and their interaction dictates the movement of CO_2 concentration pattern within the planetary boundary layer. This was also clearly demonstrated by large-eddy simulation (LES) of flow within and above the canopy presented by Roger Shaw (University of California, Davis) and Tsutomu Watanabe (Forestry and Forest Products Research Institute, Tsukuba, Japan).

Another interesting model result of the biosphere-atmosphere CO_2 interaction was presented by Douglas Chan (Meteorological Service of Canada). The study identified the important role of synoptic and mesoscale atmospheric motions in transporting the signature of net biospheric CO_2 flux at the surface into the free troposphere. The study showed that these processes contribute significantly to the CO_2 flux covariance between the atmosphere and the biosphere, popularly known as the rectifier effect. The importance of the online coupling between the atmosphere and the biosphere to properly represent the rectifier effect was emphasized.

There were many other papers that showed interesting results, such as (1) the use $d^{13}C$ to partition the net CO_2 flux of a deciduous forest into respiration and assimilation (Knohl and Buchmann), (2) the use of a new infrared CO_2 sensor to evaluate autotrophic and heterotrophic respiration by flux-gradient measurements of soil respiration (D. Baldocchi et al.), (3) carbon and water fluxes in two contrasting ecosystems in Australia, and a comparison of LAI and GPP between measured and estimated from the MODIS remote sensing data (R. Leuning et al.), and (4) the assessment of the importance of subcanopy flows at the Harvard Forest site and the Borden Forest Research Station (Staebler and Fitzjarrald). The reader is invited to visit the American Meteorological Society website to look at extended abstracts of many of the presentations made at the conference.

http://www.ametsoc.org/meet/fainst/vancouver2004.html

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Report on Two Small Meetings on Carbon Flux during the 51st Annual Meeting of the Ecological Society of Japan

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Two small meetings on carbon flux were held during the 51st Annual Meeting of the Ecological Society of Japan held in Kushiro, Hokkaido in late August 2004. They were entitled "Temporal and spatial variations in carbon flux" and "CO_2 uptake by forests in Hokkaido", respectively. Although the start time of the meetings was late, there were 40-50 participants each. I report the meetings briefly.

1. Temporal and spatial variations in carbon flux

Three researchers talked about long-term and three-dimensional variations in carbon flux, mainly CO_2 flux, in temperate ecosystems from the standpoint of ecology.

Hiroshi Koizumi, Gifu Univ., talked about the change of carbon balance in deciduous forests through deforestation and the effects of *Sasa* plants on carbon balance. He pointed out the importance of taking a succession process into account for studies on carbon cycles. Masayuki Yokozawa, National Institute for Agro-Environmental Sciences, showed the present condition and issues of the process models to predict soil carbon balance. He also showed comparisons between measured and estimated values, and pointed out the necessity of including the vertical distribution of soil organic matter (SOM) in models. Shigeru Mariko, Univ. of Tsukuba, talked about five topics: 1) the necessity of the standard method for measuring soil carbon flux, 2) spatial variation in soil carbon flux, 3) temporal variation in soil carbon flux following succession, 4) contribution of carbon uptake through CH_4 flux to soil CO_2 efflux, and 5) soil carbon flux during the snowy season. Finally, he showed a direction in studies on carbon flux.

2. CO_2 uptake by forests in Hokkaido Island

In Hokkaido Island, CO_2 flux has been measured by the eddy covariance technique for more than three years at four forest sites: Tomakomai flux research site (FRS) (a larch forest), Tomakomai Experimental Forest, Hokkaido Univ. (a deciduous broadleaf forest), Hokkaido Research Center, Forestry and Forest Products Research Institute (a deciduous broadleaf forest in Sapporo), and Teshio Experimental Forest, Hokkaido Univ. (a young larch plantation made after clear cutting a mixed forest). In this meeting, five researchers talked about the results of the field experiments from the sites except Tomakomai Experimental Forest.

Takashi Hirano, Hokkaido Univ., analyzed three-year data measured in Tomakomai FRS from 2001 to 2003, and talked about some factors that cause an error in the measurement of CO_2 flux, and seasonal and interannual variations in CO_2 exchange between the atmosphere and the larch forest. He showed that there was a large systematic difference between annual NEE estimated from the open-path and closed-path measurements. Naiseng Liang, National Institute for Environmental Studies (NIES), introduced high performances of a multichannel automated chamber system that he developed himself, and the applications of the chamber system to the continuous measurement of soil respiration, stem respiration and photosynthesis in Tomakomai FRS. He pointed out that stem respiration increased with tree height and the contribution of stem respiration to total ecosystem respiration was much more than reported. Hiroyuki Oguma (NIES) talked about some results of remote-sensing experiments conducted at Tomakomai FRS. He showed spatial variations in tree heights, leaf area and tree growth measured with laser scanners, and seasonal variations in several plant indexes measured by spectrometry from the tower top. Kentaro Takagi, Hokkaido Univ., talked about the changes of carbon balance and water balance in a forest ecosystem through a forest management: clear cutting a mixed forest and the following plantation of larch trees. In addition, he showed dynamic variations in CO_2 concentration in snowpack and in soil under snowpack. Yuichiro Nakai, Forestry and Forest Products Research Institute (FFPRI), talked about the carbon balance of a mature birch-dominant deciduous forest, which is a principal site in the FFPRI FluxNet. He showed that photosynthesis in understory species, which mainly consisted of *Sasa* plants, regulated NEE in early spring and late fall, when the canopy was defoliate.

Discussion after the talk of
Hiroshi Koizumi (Vice chairman of AsiaFlux)

Assessing the Carbon Budget of Grasslands on the Qinghai-Tibetan Plateau

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The Qinghai-Tibetan Plateau, stretching between Eurasia and India continents, extends some 2700km from west to east and about 1400km from south to north, with a total area of 2.5 million km^2. Not only is the largest plateau in the world, averaging more than 4000 m in elevation, the plateau is also the highest area on the earth. With the high elevation and unique geological feature, the extensive plateau is considered to be one of the most ecologically fragile and environmentally sensitive ecosystems in the world.

Within the plateau, grasslands cover some 60% of the total area. Most of these grasslands develop in the area higher than 3000m in elevation. Cold alpine meadow or cold alpine steppe can even climb up to those areas higher than 5000m. It seems no doubt that these vegetations form the highest grassland ecosystems in the world.

The grassland ecosystems on the Qinghai-Tibetan plateau may have one of the most productive alpine environments in the world. Because of the high elevation, these grasslands receive much higher solar radiation as compared with any other ecosystems at similar latitudes. Most of these alpine ecosystems are also favored by relatively good water condition. Alpine meadow ecosystems including cold alpine meadow, alpine shrub-meadow and alpine swamp meadow, for example, distribute often in area with mean annual rainfall of more than 400mm and the rain event occurs almost all within the growing season from May to September. In addition to sufficient solar radiation and fairly high precipitation, alpine meadow ecosystems on the plateau also possess high daytime temperature during the growing season. All these environmental conditions seem favor a high photosynthetic CO_2 uptake of plants in the alpine ecosystems. On the other hand, it should be mentioned here that the low nighttime temperature and long-cold winter period may limit the decomposition of organic matter in these ecosystems. As a result, the alpine grassland ecosystems may have a high potential to absorb CO_2 from the atmosphere.

How much CO_2 is now absorbed by the alpine grassland ecosystems on the Qinghai-Tibetan Plateau? How these grassland ecosystems will behave in terms of carbon budgets under global warming conditions? These are major questions for two ongoing projects supported by the Ministry of the Environment and Japan Society for the Promotion of Science, respectively. Both of the projects are comprehensive joint studies that started from the year 2000. One project aims at assessing carbon budget of the grassland ecosystems on the Qinghai-Tibetan plateau and the other focuses on the ecological mechanism underlie the carbon dynamics of alpine meadow ecosystems. Here I will try to brief some of the major findings that we have obtained from our ongoing research projects during last three years.

A carbon sink or source?

Grasslands on the Qinghai-Tibetan Plateau may be a net CO_2 absorber. The hypothesis is based on the fact that photosynthetic CO_2 uptake of the alpine grasslands seems to be favored by sufficient light energy, less water stress and warm daytime temperature environment during the growing season, while decomposition of organic matter is likely to be limited by low night temperature, long and cold winter.

To examine the hypothesis, we focused our attention on an alpine *Kobresia* meadow ecosystem. We choose the meadow because it is perhaps the most representative grassland vegetation on the plateau. *Kobresia* meadow covers the most extensive area, which is estimated as high as 40% of the total area covered by grassland vegetation. The alpine meadow does not only hold the largest area, but also have high environmental heterogeneity. Most of the alpine meadow ecosystems distribute over the area from about 3000m to 5000m. *Kobresia* meadow also supports the highest species diversity among grassland ecosystems on the plateau.

To evaluate ecosystem carbon budget, we set up a CO_2 flux measurement system with eddy covariance method in a *Kobresia* meadow on the northern-east edge of the Qinghai-Tibetan Plateau in August, 2001 (Fig.1). As the first long-term CO_2/H_2O and energy flux observation system on the Qinghai-Tibetan Plateau, the flux tower is located at a wide-spread alpine meadow at the elevation of 3250m (Fig. 2). With an extensive fetch area, the measurement system seems find the most appropriate location for eddy covariance observation (Fig. 3). for details see Gu et al. 2003 and Kato et al. 2004ab).

Some observation results have been reported recently by Gu et al. (2003) and Kato et al. (2004ab). Data obtained during the early period of the observation from August 9 to August 31, 2001 when leaf area index was

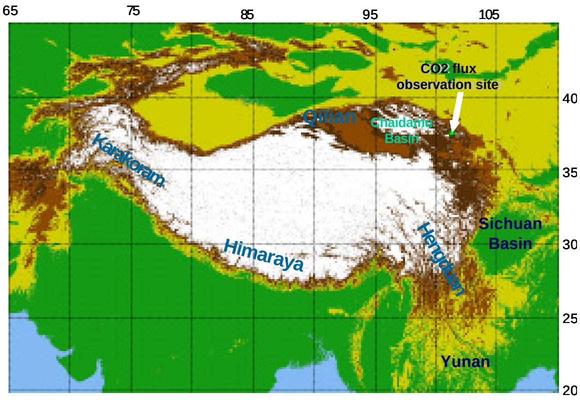

Fig. 1 Qinghai-Tibetan Plateau and the major study site of current research project indicated by the blue circle

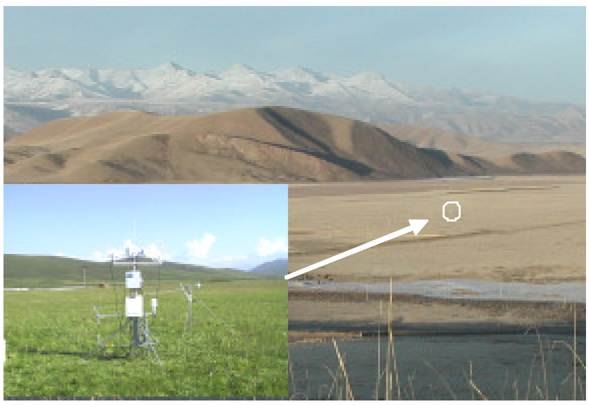

Fig. 2 CO_2 flux observation site in winter and in summer season (inner figure). White circle indicates the position of CO_2 flux tower.

the maximum and kept very constant, showed that the average of net ecosystem CO_2 uptake reached 8.8 g m^{-2} day^{-1} with a maximum of about 15.9 g m^{-2} day^{-1}(Gu et al. 2003). During the period, the daytime CO_2 uptake averaged about 17g m^{-2} and the maximum reached 22 g m^{-2}. In another report, the maximum rates of CO_2 uptake and release derived from the diurnal course of CO_2 flux in the 2001 and 2002 growing seasons were 10.8 and 4.4 μmol m^{-2} s^{-1}, respectively (Kato et al. 2004a). These findings provide evidence that there is a high potential for the alpine meadow ecosystem to absorb CO_2 during the growing season. In fact, the magnitude of potential strength is comparable to that reported for subalpine coniferous forest at similar elevation and latitude (Kato et al. 2004b). The daily CO_2 uptake observed during the measurement period seems therefore suggests that the *Kobresia* meadow ecosystem might behave as a sink of atmospheric CO_2 during the growing season.

On a yearly basis, the gross primary productivity was estimated as 575g C $m^{-2}year^{-1}$, with net ecosystem CO_2 uptake as 75.5g C m^{-2} $year^{-1}$ using the flux measurement data obtained in 2001 and 2002. The alpine meadow is therefore likely to behave as a CO_2 sink, though the sink strength seems rather small as compared with similar alpine ecosystem (Kato et al. 2004). The sink strength in 2003 also fell within the range. If we assume all the meadows absorb the 150g C m^{-2} $year^{-1}$, a rough estimation of carbon absorbed by the alpine meadow ecosystem was 8.7 x 10^7 ton on the whole Qinghai-Tibetan Plateau. From large-scale survey of vegetation and soil carbon storage conducted by another group within our project, we guess that the magnitude of carbon sink for the *Kobresia* meadow should be at the up-middle class among various grassland vegetations on the plateau.

Radiation environment and CO_2 uptake of alpine plants

We have examined different environmental constrains on carbon budget of the Kobresia meadow (Fig. 4). Here we only present some findings concerning with radiation and carbon dynamics. Alpine radiation environment provides sufficient light energy for photosynthetic CO_2 uptake by alpine plants. However, excessive light energy will often cause down-regulation of photosynthetic CO_2 uptake rate, in particular under extremely high temperatures and/or other environmental stress. From the ecosystem level, we found that ecosystem net CO_2 uptake under high radiation conditions decreased as air temperature increased in the range from 10°C to 23°C. The decrease of ecosystem net CO_2 uptake could

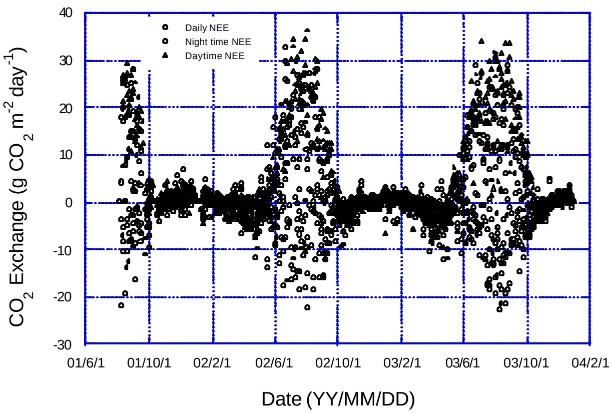

Fig. 3 Net ecosystem CO_2 change for daytime (triangles), night time (open circles) and daily integrates (blacked circles) in the Haibei alpine Kobresia meadow (unpublished data)

Fig. 4 Measurement of photosynthetic CO_2 uptake (Left) and chlorophyll fluorescence response (right) of alpine plants under high radiation

result in from either the increase of ecosystem respiration rate or the decrease of photosynthesis (Gu et al. 2003).

To clarify whether photosynthetic down regulation occurs in plants from the alpine meadow, we examined leaf photosynthetic gas exchange and fluorescence emission in response to the changes in photosynthetic photon flux density for two herbaceous species: prostrate *Saussurea superba* and erect-leaved *Saussurea katochaete*(Cui et al. 2003, 2004). The prostrate *S. superba* intercepted a much higher maximum PPFD and experienced also higher leaf temperature than the erect-leaved *S. katochaete*. We found that *S. superba* exhibited a much higher light saturation point for photosynthesis than the other species. Although we were not able to observe significant photosynthetic down-regulation at high PPFD for both the species, we found that electron transport rate, which may cause down-regulation of photosynthesis, was low at high PPFD for both species. This study seems suggest that the high radiation on the Qinghai-Tibet Plateau is likely to induce rapidly photosynthetic down-regulation, and thus constrain photosynthetic CO_2 uptake.

High UV-radiation on the plateau could be another important factor affecting photosynthetic CO_2 uptake. By artificially increasing UV-B radiation, we examined photosynthetic CO_2 uptake for different alpine species from the *Kobresia* meadow (Shi et al. 2003). We found that neither photosynthetic CO_2 uptake rate nor photosynthetic O_2 evolution rate changed significantly after a long period of enhanced UV-B radiation treatment. However, UV-B absorbing compounds, detected by the absorbance values at 300 mm, seemed to increase after enhanced UV-B radiation. Both biochemical component and leaf thickness increased significantly under high UV-B radiation. It seems that these alpine plants changed their leaf morphology and biochemistry to avoid significant decrease of CO_2 uptake under UV-B elevation.

Fig. 5 Livestock grazing intensity has rapidly increased on the Qinghai-Tibetan plateau during last decades.

Grazing plays an important role in carbon dynamics of grassland ecosystem

Almost all grassland ecosystems on the Qinghai-Tibetan Plateau are utilized by livestock grazing (Fig. 5). Livestock grazing can impact directly ecosystem carbon budget by removing leaf area and then reducing CO_2 uptake ability of alpine plants. Indirect effects of grazing can be more complicated. The effects of overgrazing will alter plant community structure, species diversity, soil structure and many other properties of grassland ecosystems. It should be mentioned here that during last decades, the number of livestock has increased tremendously due to the economic development in China (Du et al. 2004). The increase of livestock is still ongoing and seems to keep for a period.

To evaluate the influence of grazing on carbon dynamics of alpine grasslands on the Qinghai-Tibetan Plateau, we have examined the influence of grazing intensity on temporal variations of soil respiration in two alpine meadow ecosystems with different grazing intensity. We found that CO_2 efflux from soil was almost twice as great at the low grazing site as at the high grazing site during the growing season, though the diurnal and seasonal patterns of soil respiration rate were similar for the two sites (Cao et al. 2004). The Q_{10} value, which indicates the temperature sensitivity of soil respiration, was lower for the high grazing site (2.75) than for the low grazing site (3.22). The authors then estimated net ecosystem CO_2 exchange from monthly measurements of biomass and soil respiration and reported that during the period from May 1998 to April

1999, the low grazing site released about 2 kg CO_2 m^{-2} $year^{-1}$ to the atmosphere, which was about one third more than the 1.5kg CO_2 m^{-2} $year^{-1}$ released at the high grazing site. The result indicated that both of the meadow ecosystems behaved as CO_2 source under grazing conditions and the source strength could change under different grazing intensities. It should be mentioned, however, that the soil respiration in the study might be overestimated due to the measurement after clipping aboveground biomass. Further studies are needed to confirm the soil respiration under no or less experiment disturbance.

Livestock grazing not only affect CO_2 emission from the ecosystem, it can also largely alter CH_4 releasing from alpine swamp ecosystem (Hirota 2004). Since the CH_4 efflux rate was found to highly depend on plant species and aboveground biomass (Hirota et al. 2004), overgrazing may change emission speed of global warming gas from alpine swamp ecosystems.

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Two AsiaFlux Sites Damaged by Typhoon SONGDA (Flash Report)

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1. General Information

Tropical storm "Typhoon 200418 (SONGDA)" surged toward Japan's northernmost main island Hokkaido on September 8, 2004 and strong wind attacked to the southwestern Hokkaido district. The maximum instantaneous wind speed of 50.2 ms^{-1} observed in the Sapporo local meteorological observatory updated the record. The strong wind widely damaged forests in this area. Flux observation towers in Sapporo and Tomakomai collapsed during the storm. These towers are maintained by Forestry and Forest Products Research Institute (FFPRI) and National Institute for Environmental Studies (NIES), respectively.

2. Site Information

a. FFPRI site at Sapporo

In the Sapporo forest meteorological research site (FFPRI FluxNet, AsiaFlux), two 41m tall towers were folded down (Photo 1). Many white birch and Mizunara oak trees around the towers uprooted or snapped off (Photo 2). The tower flux observations became impossible. FFPRI immediately started investigating the instruments installed on the towers for early restoration, but the observation resumption seems to be difficult within this year. Urgent and important task is to check the current research state and insufficient parameters in the remained forest, as well as to get a footing to detect the change of forest carbon budget after the natural disturbance.

Photo. 1 At FFPRI site (provided by Y. Ohtani)

Photo. 2 At FFPRI site (provided by G. Utsugi)

b. NIES site at Tomakomai

In the Tomakomai flux research site (NIES global environment monitoring site, AsiaFlux), two towers (41m and 25 m) were folded down (Photo 3). Flux observation became impossible in the larch forest for years to come, because most trees were uprooted. NIES is now discussing an alternative site to continue the observation study.

Photo. 3 At NIES site (provided by K. Inukai)

Announcement for the FLUXNET 2004 Open Workshop in Firenze, Italy

The FLUXNET 2004 Open Workshop, Celebrating 10 years since La Thuile and Planning for the Future, will be held. The aim of this workshop is to discuss how FLUXNET data can be applied to address thematic and big picture questions in biogeosciences and plan for its future evolution and development.

Date: Dec. 13 - 15, 2004
Venue: Convitto della Calza Conference Center, Firenze, Italy

Conveners: D. BALDOCCHI and R. VALENTINI
Local Organizing Committee: F. MIGLIETTA, M. FALK, S. DORE, D. PAPALE
Steering Committee: B. LAW, B. COOK, H. DOLMAN, R. LEUNING, S. YAMAMOTO

For more details, please see: http://nature.berkeley.edu/biometlab/Fluxnet/

Editor's Note

I sincerely regret that several flux towers were damaged in Hokkaido due to the Typhoon "SONGDA". This summer, several meteorological records were renewed. I look forward to seeing new results obtained from survived flux towers.

The editor of AsiaFlux Newsletter No.11:
Tetsuya HIYAMA
(Nagoya University)

The editor of AsiaFlux Newsletter No.12 will be Dongho LEE (Yonsei University, Korea).

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