

● Workshop on high-latitude ecosystem research with students

Date: December 10th, 2010, 10:00~12:00

Place: A102

Presenter: Koji NAKASAKA, Maochang LIANG, Shunsuke TEI, Yu-Hyeon PARK,
Akihiro UETA, Yuka KAWAI

Chair: Alexandra POPOVA

< Details for the presentations >

• Koji NAKASAKA

Time: 10:10~10:25

-Title-

The widespread assessment of forest fire severity in Mongolia

-Abstract-

Fires frequently happen in Mongolian boreal forest. This is mainly because of human activity. The purpose of this study is to assess the damage by using remote sensing data. We estimated the fire severity from the field data, and confirmed the compliance between the two data. The research will provide new approaches to monitoring landscape change as a result of fire in Mongolia.

• Maochang LIANG

Time: 10:25~10:40

-Title-

Investigation of Plants photosynthetic activity and stable isotopic composition in Eastern Siberian Taiga-tundra region

-Abstract-

The observation field place is located at 70° 37'N, 147° 53'E, where taiga-tundra ecosystem is distributed. Several sites are observed, which include taiga forest (VK site), taiga-tundra boundary ecosystem (Flat K site and Mound A site), tundra ecosystem (B site). Tree density is totally different among these sites. The in situ photosynthetic rate of larch trees is observed. Needles are taken used for N and C stable isotope analysis. The results shows that from 2009 to 2010, temperature increase lead to soil moisture and soil nitrogen supply increase for every site. The soil moisture is the main factor to affect trees growth in local area. Trees grow well in dry site relative to wet site. But the taiga forest is on degrading and tundra trees growing condition is on declining. Only taiga-tundra boundary ecosystem is on expanding.

• Shunsuke TEI

Time: 10:40~10:55

~~-Title-~~

Reconstruction of past interannual variation in soil moisture based on $\delta^{13}\text{C}$ of larch tree rings in Eastern Siberia

~~-Abstract-~~

Taiga forests in eastern Siberia have experienced significant climate changes over the past few decades. Changes in soil moisture in this region are closely related to the variability of climate (e.g. precipitations) and permafrost condition. Fluctuation of soil moisture also affects on not only vegetation but also stream flow through a change in runoff from the system to a river. Therefore, it can be said that soil moistures in this region play an important role in the hydrological cycle of the ecosystem.

Here, we reconstructed the past soil moisture from tree-ring $\delta^{13}\text{C}$ of Cajander larch trees in Yakutsk (62°N, 129°E), central eastern Siberia. The samples were crossdated with ITRDB's ring-width records in eastern Siberia, showing satisfactorily good matches. At this site, soil moisture shows large seasonal and interannual variations. Therefore, seasonal variability in soil moisture is expected to cause great difference in $\delta^{13}\text{C}$ between early- and late-wood. We carefully divided each of the annual rings into two parts, i.e., early- and late-wood. These were analyzed on mass spectrometer to obtain $\delta^{13}\text{C}$ independently. Time series of the $\delta^{13}\text{C}$ data were compared with hydrological records for the recent 10 years for reconstructing the soil moisture over the past 100 years.

$\delta^{13}\text{C}$ in early- and late-wood correlated negatively with average soil moisture in late growing season (7/15-9/15) of the previous and current year, respectively. We therefore developed a multiple linear regression model from the data set for the recent 10 years to estimate soil moisture in the late growing season using the $\delta^{13}\text{C}$ values in latewood of the current year and those in earlywood of the successive year. Soil moisture over the past 100 years was estimated using the liner regression model. Compared with the total precipitation from June to August and the thaw depth of active layers at the end of August, the variation of the reconstructed soil moisture seems to be reasonable. The reconstruction may contribute to the better understanding of the hydrological cycle in the boreal ecosystem.

• **Yu-Hyeon PARK**

Time: 11:05~11:20

-Title-

Applications of TEX₈₆ and MBT/CBT indices paleotemperature estimations in Holocene sediments from the Chukchi Shelf

-Abstract-

Paleotemperature estimation is required to understand environmental changes in the Arctic region. We investigated the molecular distribution of glycerol dialkyl glycerol tetraethers (GDGTs) to explore possibilities in the paleotemperature estimation in the Chukchi-Alaskan margin sediments using core sediment. We try to apply several calibrations proposed by Kim et al. (2008) and Kim et al. (2010) to estimate paleotemperatures from GDGT compositions and found that the GDGT-1 (TEX_{86L}) calibration of Kim et al. (2010) gives the most probable values. We also apply MBT/CBT index to estimate paleo-air temperatures. The calibration based on the world soils by Weijers et al. (2008) gives the most probable values.

• **Akihiro UETA**

Time: 11:20~11:35

-Title-

Study on water cycle system in Eastern Siberian taiga

-Abstract-

Eastern Siberian taiga is characterized by continental severe arid climate with annual precipitation amount of less than 300mm and it occupies 1/4 of surface forest. Since it is reported that evapotranspiration exceeds precipitation occasionally and 2/3 of annual precipitation is observed during growing season (summer period), contribution of water vapor generated through transpiration of vast taiga forest to atmosphere is considered as an important source of rain in this season and plays an essential role for water cycle system which maintains taiga for a long time. In my study, variations in isotopic compositions of atmospheric water vapor, rain water, soil water, and sap water in eastern Siberia taiga during summer period were observed to see the water movement from taiga forest to atmosphere through tree transpiration. The result of variations in isotopic composition of water vapor showed good correlation with atmospheric mixing ratio and indicated that contribution of water vapor generated from transpiration occupied nearly 80% of atmosphere during summer. Thus the result revealed importance of contribution of transpiration of taiga for water cycle system.

• Yuka KAWAI

Time: 11:35~11:50

-Title-

Effects of snowmelt conditions on the life history traits of an alpine herb *Gentiana nipponica*

-Abstract-

I compared life-history traits (growth rate, survival rate, reproductive size), reproductive phenology (flowering and fruiting times) and thermal requirement for flowering of an alpine-snowbed herbaceous species, *Gentiana nipponica*, among populations inhabiting different snowmelt conditions. This species is distributed widely along the range of the snowmelt gradient, and this implies the possibility of local adaptation to habitat-specific environments along the snowmelt gradient.