# Seasonal dynamics of biomass and carbon fluxes in a Mongolian grassland

# Tadaaki Urano[1]; Shigeru Mariko[2]; Kiyokazu Kawada[3]; Giljae Li[3]; Takehisa Oikawa[4]

[1] Environmental Sci, Tsukuba Univ; [2] Biological Sci, Tsukuba Univ; [3] Life and Environmental Sci, Tsukuba Univ; [4] Institute of Biological Sci, Tsukuba Univ

Grassland ecosystems, occupying about a half of land area, play an important role on carbon budget on the earth. Mongolia locates in the center of the Asian continent and grassland ecosystems occupy 80% of this country. However there are a few studies in carbon cycle in Mongolian grasslands.

The characteristics of the Mongolian grasslands are typical continental climate and as high altitude as 1580m above mean sea level, so seasonal and annual variation of temperature and rainfall are large. In addition, grazing is an important factor of determining carbon cycle in the Mongolian grasslands. We studied temporal changes in biomass and carbon fluxes.

The study site is a steppe grassland in Kherlen Bayaan-Ulaan (47◦28'N, 108◦78'E, 1300m above mean sea level), and locates 100km southeast of Ulaanbaatar. The mean annual temperature is 1.4◦C and the mean annual precipitation is 202mm during 1993-1998. Vegetation has been grazed through all the year around. In this area, a protected area (200m X 170m) was constructed in autumn 2002 in order to study grazing impact. Vegetation is dominated by Stipa and Artemisia. C4 plant species are about 10% of all plant species, e.g. Cleistogenes squarrosa and Salsola collina.

Aboveground biomass and leaf area index (LAI) were measured between June and September. As a result, aboveground biomass increased rapidly from June to July, it reached to the peak in August, and decreased from August to September. The decreased biomass in September was caused by death of C4 plants which contributed to more than 20% of biomass in August. Leaf area index (LAI) temporally sifted almost the same pattern as biomass. The protected site showed significantly higher aboveground biomass than the grazed site in July and September. However, there was no significant difference in LAI between the protected site and the grazed site and no correlation of LAI with aboveground biomass between both sites.

NEP was measured in July, August, and October and soil respiration measured in May, June to August, and November. As a result, the light response patterns of NEP were almost same in July and August, but maximum value of NEP decreased in October. Soil respiration in June was low as compared to those in July and August, and no correlation with soil temperature when soil was very dry and soil water content was about 4%. There was exponential correlation at soil respiration with temperature in July, August, and October. Low soil respiration in November was due to low soil temperature. There was no significant difference in soil respiration between grazed and protected site.

In conclusion, aboveground biomass and $CO_2$ fluxes varied during a growth period in relation to temperature and soil moisture. In particular, Mongolian grasslands show $CO_2$ fluxes decrease despite of high temperature. This indicates that rainfall events control $CO_2$ fluxes in the dried grassland.