L137-P002 **Room: Poster Session Hall** **Time: May 19**

The impact of climatic warming on the ecosystem carbon cycle of a high Arctic glacier foreland II: long-term simulation

Masaki Uchida[1]; Hiroyuki Muraoka[2]; Hiroshi Kanda[1]; Takayuki Nakatsubo[3]

[1] NIPR; [2] IBES, Gifu Univ.; [3] Biosphere Science, Hiroshima Univ.

The general circulation models predict that future global climate change will have highest impact in the polar region. Carbon cycle in the Arctic terrestrial ecosystem is limited largely by temperature condition, and therefore, most likely to be sensitive to climatic warming. In order to investigate how carbon flows in the high Arctic terrestrial ecosystem will respond to projected climate warming, we constructed a process-based model for simulating stand-level photosynthesis, root respiration and heterotrophic respiration on a glacier foreland in the high Arctic, Svalbard.

The compartment model was composed of six carbon pools: biomasses of aboveground and belowground parts of vascular plants, biomass of cryptogams, organic layers of vascular plants and cryptogams, and mineral soil layer. In this study, field measurements and modelling were conducted for the three study plots (A, B, C) of *Salix polaris* and the moss *Sanionia uncinata* community in the later stage. Responses of each carbon flow to environmental factors were expressed by functions determined in the previous studies (Nakatsubo et al. 1998; Muraoka et al. 2002; Uchida et al. 2002; Bekku et al. 2003). Heterotrophic respiration rate per gram soil carbon in each soil compartment could not be determined experimentally. Therefore, it was calculated based on the net ecosystem production (NEP) values determined in the middle of the summer season, on 18 July or 2 August 2001.

Long-term changes in NEP were estimated by the model assuming that temperature will be increased linearly by 3^{o}C in 100 years. In this simulation, leaf longevity and biomass of the plants are assumed constant.

Net primary production of *S. polaris* decreased slightly in all plots, whereas the production of *S. uncinata* showed little change. Belowground respiration of *S. polaris* at all plots was increased year by year. On the other hand, soil microbial respiration showed different pattern among the plots. The respiration of two plots increased saturation increase, whereas the respiration of the other plot was increasing for a hundred years. NEP was decreased for all plots. However, the decreasing rate differed largely among the plots. In this simulation, NEP became negative after approximately 40-90 years. Our results suggest that although warming might negative effect on NEP, site-to-site differences in response of NEP to climate warming are large because of differences in biomass, soil carbon stocks and in responses of each carbon flow to warming.