Category and Session number: BG2 (Dynamics of the Coupled Carbon Climate Human System)

Preferred Mode of Presentation: Oral

Characterization of climate feedbacks from terrestrial carbon cycle

GEORGII A. ALEXANDROV[1] AND YOSHIKI YAMAGATA[2]

[1]*National Insitute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan, g.alexandrov@nies.go.jp*

[2]*National Insitute for Environmental Studies, Onogawa 16-2, Tsukuba, Ibaraki 305-8506, Japan, yamagata@nies.go.jp*

A terrestrial ecosystem contributes to climate regulation by either sequestering or emitting carbon dioxide. Since the gas exchange between a terrestrial ecosystem and the atmosphere depends on climate, terrestrial ecosystems can be considered as climate regulators with feedbacks[1]. A feedback may be either negative or positive. Positive feedbacks amplify a climate disturbance, whereas negative feedbacks suppress it. The earlier models of terrestrial carbon cycle suggest certain temperature threshold on which the sign of feedback changes from negative to positive. According to the Osnabrueck Biosphere Model[2] the threshold coincides with the 10°C mean annual temperature isoline in case of regions of sufficient water supply. Recent models, however, do not allow us to quantify the temperature threshold by one number (complexity is enemy of clarity). Therefore, we address the issue of how to characterize the temperature threshold on which the sign of feedback changes from negative to positive. We discuss the available models and possibility of getting crucial data for resolving diversity of opinion regarding the regulating role of the regions. Our own research is based on TsuBiMo – a model which was calibrated[3] by use of the same data[4] as the Osnabrueck Biosphere Model and which we are adjusting now to the data coming from FLUXNET program[5]. Clear understanding of climate feedbacks from terrestrial carbon cycle should help guide the allocation of resources[6] for protecting vulnerable terrestrial carbon sinks.

Keywords: Climate feedbacks; carbon sink; model calibration; plant responses to environment; net ecosystem production; temperature threshold.

1. References

[1] G.A. Alexandrov, *Doklady Akademii Nauk* **337(4)**, 514 (1994).
[2] G. Esser, *Tellus* **39B**, 245 (1987).
[3] G.A. Alexandrov, T. Oikawa and Y. Yamagata, *Ecol. Model.* **148**, 293 (2002).
[4] G.A. Alexandrov, T. Oikawa and G. Esser, *Ecol. Model.* **117**, 361 (1999).
[5] R. Valentini, D. Baldocchi and R. Olson, *IGBP Newsletter* **37**, 15 (1999).
[6] Y. Yamagata and G.A. Alexandrov, *Climate Policy* **1**, 27 (2001).