Oral | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-CG Complex & General

[A-CG34_1PM2]Integrated studies for Interactions between Land-Ecological, Hydrological, and Atmospheric processes

Convener:*Hisashi Sato(Nagoya University), Takeshi Ise(Graduate School of Simulation Studies, University of Hyogo), Tomo'omi Kumagai(Hydrospheric Atmospheric Research Center, Nagoya University), Chair:Hisashi Sato(Nagoya University)

Thu. May 1, 2014 4:15 PM - 5:00 PM 213 (2F)

Global environmental changes, such as global warming, are being substantial, and its effects on the vegetation, including biome-distribution changes, are also becoming apparent. Such changes are forecasted to be continuing and, in many cases, accelerating during next few centuries. However, current modeling studies vary in their predictions, partly due to that this issue is a result of wide range of processes including plant ecology, climatology, hydrology, and land use. The aim of this session is to stimulate such integrated studies for interactions between land-ecological, hydrological, and atmospheric processes.

4:45 PM - 5:00 PM

[ACG34-P03_PG]Modeling Interactions between Vegetation and Aeolian Processes

3-min talk in an oral session

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Keywords:Temperate grassland, dust, vegetation, model

The sustainability of temperate grassland (TGs) ecosystems is determined by the feedbacks between climate, vegetation and human activities, in which Aeolian processes play a key role. Current existing dust models do not have sufficient capability in simulating vegetation growth and decay effects that play a major role in TG aeolian processes. In this study, we purposed to couple the DAYCENT, a vegetation-growth and nutrient-cycle model (the most prominent biogeochemical model), with QF2003, a wind-erosion model. The DAYCENT-QF2003 modeling system enables an examination of the feedbacks between grassland-grazing and aeolian processes. This approach is a completely new approach. First, we assessed the DAYCENT for its capability to provide estimations of vegetation dynamics under different grazing conditions in order to incorporate into the QF2003. DAYCENT was parameterized with the field experiment data (soil physical/chemical properties, vegetation and grazing) at the Bayan-Unjuul (BU) site in 2010-2012. BU is located in north of the most frequent dust outbreak region in Mongolia. Results showed that the DAYCENT could simulate realistically vegetation growth-decay, nutrient-cycle and the effect of grazing on grasslands, which are the factors controlling dust outbreaks in TGs. Then, the DAYCENT model was coupled into the QF2003 wind-erosion scheme. We conducted the numerical test of the coupled DAYCENT-QF2003 model to predict dust flux. With the initial results, we have demonstrated the potential of the DAYCENT-QF2003 coupled model. Therefore, the integrated DAYCENT-QF2003 modeling system will provide a useful tool for an early warning system and the future projection of dust events over dust source areas in TGs region.