Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

MIS03-P04 会場:コンベンションホール 時間:5 月 27 日 18:15-19:30

Decomposing global soil carbon projection uncertainties in ISI-MIP study

Decomposing global soil carbon projection uncertainties in ISI-MIP study

仁科 一哉 [1*] ; 伊藤 昭彦 [1]
NISHINA, Kazuya[1*] ; ITO, Akihiko[1]

[1] 国立環境研究所
[1]National Institute for Environmental Studies

In earth system processes, because of the vast carbon pool of soil organic carbon (SOC), the behavior of SOC is the key to understanding the feedback of terrestrial ecosystems to atmospheric CO_2 concentration in a warmer world. There seem to be still large uncertainties in SOC projection. Therefore, how the uncertainties in SOC projection matters in future C projection and which uncertainty sources cause SOC projection uncertainty should be clarified to reduce SOC projection uncertainties. In this study, we performed simulations using six global vegetation models (GVM) using climate projections based on five climate models (GCM) forced by four RCP-based atmospheric concentration scenarios, aiming at specifying the relative uncertainty in the projection of global SOC stocks from global and regional perspectives.

At the end of the simulation period (2099), global △net primary production ranged from -7.0 to 54.3 Pg-C Year^{-1}, global △vegetation biomass C ranged from -27 to 543 Pg-C Year^{-1}, and global △SOC ranged from -195 to 471 Pg-C Year^{-1} in the entire simulation set. Thus, SOC projection uncertainty was relatively large compared to above biomass changes. We conducted ANOVA to the changes in NPP, VegC, and SOC as factors to be RCP, GCM, and GVM in global and regional scale, which enable us to know relative importance of these factors to changes in C. For △NPP, the GCM uncertainty dominated before the year 2020, and the RCP uncertainty increased and dominated after 2040. The GVM uncertainties were approximately 20% in most of the simulation period. GVM dominate uncertainties (60% and 90%, respectively) rather than climate driving scenarios (i.e., GCM and RCP) in the global △VegC, and △SOC projections. In addition, we found that the contributions of each uncertainty source were spatio-temporally heterogeneous and differed among the GVM variables (Fig. 1). These results indicated to improve the SOC process in GVM is essential to reduce global C projection uncertainty. In the poster presentation, we will discuss about the difference in SOC processes of GVM in detail.

Figure 1. Relative importance of each uncertainty source to △NPP, △VegC, and △SOC (from Nishina et al., 2014 in ESDD)