Recommended by Liu, Jih-Shun

Title: Long-Term Variation of Runoff Coefficient during Dry and Wet Seasons Due to Climate Change

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Abstract:

This study investigates the future long-term variation of the runoff coefficient during dry and wet seasons in five major basins in South Korea. The variation is estimated from the Soil and Water Assessment Tool (SWAT) model outputs based on an ensemble of 13 different Coupled Model Intercomparison Project Phase 5 (CMIP5) general circulation models (GCMs) in representative concentration pathway (RCP) 4.5 and RCP 8.5 scenarios. The estimates show a temporal non-considerable increase rate of the runoff coefficient during the 21st century in both RCPs, in which the trend and uncertainty of the runoff coefficient in the dry season is projected as higher than that in the wet season. A sharp contrast between the trends of the two components of the runoff coefficient is found during the dry and wet seasons. Over the five major basins, a higher increase rate of runoff coefficient is projected in the northeastern part of the Han River basin and most of the area of the Nakdong River basin. The spatial variation in the runoff coefficient change also represents a relationship with the change in the percentage of each land cover/land use type over 109 subbasins, where the correlation of the wet-season runoff coefficient is calculated as higher than that of the dry season. This relationship is expected to vary with changes in temperature and precipitation during both seasons in three future periods.

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Title: Integrated Solutions for the Water-Energy-Land Nexus: Are Global Models Rising to the Challenge?

Authors: Nils Johnson, Peter Burek, Edward Byers, Giacomo Falchetta, Martina Flörke, Shinichiro Fujimori, Petr Havlik, Mohamad Hejazi, Julian Hunt,Volker Krey, Simon Langan, Nebojsa Nakicenovic, Amanda Palazzo, Alexander Popp, Keywan Riahi, Michiel van Dijk, Michelle T.H. van Vliet, Detlef P. van Vuuren, Yoshihide Wada, David Wiberg, Barbara Willaarts, Caroline Zimm and Simon Parkinson*

Increasing human demands for water, energy, food and materials, are expected to accentuate resource supply challenges over the coming decades. Experience suggests that long-term strategies for a single sector could yield both trade-offs and synergies for other sectors. Thus, long-term transition pathways for linked resource systems should be informed using nexus approaches. Global integrated assessment models can represent the synergies and trade-offs inherent in the exploitation of water, energy and land (WEL) resources, including the impacts of international trade and climate policies. In this study, we review the current state-of-the-science in global integrated assessment modeling with an emphasis on how models have incorporated integrated WEL solutions. A large-scale assessment of the relevant literature was performed using online databases and structured keyword search queries. The results point to the following main opportunities for future research and model development: (1) improving the temporal and spatial resolution of economic models for the energy and water sectors; (2) balancing energy and land requirements across sectors; (3) integrated representation of the role of distribution infrastructure in alleviating resource challenges; (4) modeling of solution impacts on downstream environmental quality; (5) improved representation of the implementation challenges stemming from regional financial and institutional capacity; (6) enabling dynamic multi-sectoral vulnerability and adaptation needs assessment; and (7) the development of fully-coupled assessment frameworks based on consistent, scalable, and regionally-transferable platforms. Improved database management and computational power are needed to address many of these modeling challenges at a global-scale.

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