Geophysical Research Abstracts
Vol. 17, EGU2015-4225, 2015
EGU General Assembly 2015

The uncertainties of the net primary production due to regional and seasonal temperature changes in China

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A kind of temperature change scenario is supplied by the approach of conditional nonlinear optimal perturbation related to parameter (CNOP-P) to estimate the variation of the net primary production (NPP)in North–South transect of eastern China within a state-of-the-art Lund-Potsdam-Jena dynamical global vegetation model (LPJ DGVM). There are two traits for the kind of temperature change scenario. Firstly, the kind of temperature change scenario considers the regional and seasonal differences in North–South transect of eastern China. The character of the temperature change is similar to the observation data due to the observational constraint. Secondly, the kind of temperature change scenario causes the maximal possible impact on the simulated NPP to discuss the maximal uncertainty in the simulated NPP to the temperature change in North–South transect of eastern China. Other two kinds of temperature change scenarios are also applied to explain the above two traits and to analyze variations due to different kinds of temperature change scenarios. It is shown that the kind of temperature change scenario resulted of the CNOP-P approach, which is called as the CNOP-P-type temperature change scenario, exhibits the regional and seasonal temperature differences in North–South transect of eastern China. The NPP decreases by 1.84% in northern China, and respectively increases by 4.09% and 18.99% in northeastern and southern China as the results of the CNOP-P-type temperature change scenario, though the NPP increases in small part of northern China and decreases in part of northeastern China. The variations in the NPP caused by the CNOP-P-type temperature change scenario are different to those by the other two types of temperature change scenarios in northern, northeastern China and southern China. The impact of the CNOP-P-type temperature change scenario on the NPP is intenser than that of the other two types of temperature change scenarios. The seasonal analyses demonstrate that the differences among the variations in the NPP due to three types of temperature change scenarios principally stem from the variations in spring, summer and autumn. The above results imply that the regional and seasonal temperature change play a key role in estimating the uncertainty of the NPP, and the CNOP-P approach could afford a possible temperature change scenarioto reflect the regional and seasonal temperature change.