Future climate change risk to forests in China responding to intensified dryness

Yunhe Yin, Danyang Ma, and Shaohong Wu
Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China (yinyh@igsnrr.ac.cn)

Variations in forest net primary productivity (NPP) reflects the combined effects of key climate variables on ecosystem structure and function, especially on the carbon cycle. We performed risk analysis indicated by the magnitude of future negative anomalies in NPP in comparison with the natural interannual variability to investigate the impact of future climatic projections on forests in China. The analysis was conducted mainly based on modifying the Lund–Potsdam–Jena Dynamic Global Vegetation Model, which was driven by five general circulation models (GCMs) simulations. Results from the multi-model ensemble showed that climate change risk of decreases in forest NPP would be more significant in higher emission scenario in China. Under relatively low emission scenarios, the total area of risk was predicted to decline, while for RCP8.5, it was predicted to first decrease and then increase after the middle of 21st century. The rapid temperature increases predicted under the RCP8.5 scenario would be probably unfavorable for forest vegetation growth in the long term. High-level risk area was likely to increase except RCP2.6. The percentage area at high risk was predicted to increase from 5.39% (2021–2050) to 27.62% (2071–2099) under RCP8.5. Climate change risk to forests was mostly concentrated in southern subtropical and tropical regions, generally significant under high emission scenario of RCP8.5, which was mainly attributed to the intensified dryness in south China.