



## **Worsening of heat stress due to global warming in South Korea based on multi-RCM ensemble projections**

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This study assesses the future changes in summer (June-July-August; JJA) heat stress over South Korea under global warming. To better resolve the region-specific changes in terms of geographical patterns and severity of heat stress in the Korean peninsula, four regional climate models (RCMs) are used for dynamical downscaling of HadGEM2-AO global projections forced by two Representative Concentration Pathway (RCP4.5 and RCP8.5) scenarios. Dynamically downscaled simulations (horizontal resolution of 12.5 km and output interval of 3 hours) facilitate in-depth analysis of diurnal variation and extremes over South Korea, as well as even at each particular location characterized by high vulnerability to rising temperature. Both maximum temperature and heat stress indices such as wet-bulb globe temperature and apparent temperature, which include the effect of humidity, are examined in order to comprehensively interpret the behaviors of heat stress in response to anthropogenic climate change. Ensemble projections reveal robust patterns of temperature and resultant humidity increases that are roughly constrained by the approximate 7% / K increase in the moisture holding capacity. The changes in temperature and humidity are directly transmitted to the heat stress indices, showing a significant increase. The heat stress is exacerbated in a differentiated way, with more intensification in diurnal variation at nighttime and in regional variation at low-elevation basins. Both RCP4.5 and RCP8.5 scenarios project the statistical likelihood of a notable increase of extreme heat stress indices, much stronger and more extended heat waves, and the emergence of a long period of consecutive tropical nights.

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