Will global climate change make people more comfortable? A scenario analysis based on the weather preference index

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Weather conditions refer to the state of the atmosphere at a specific time in a specific place. Changes in weather conditions influence human well-being by affecting the productivity of ecosystems and the quality of life. Climate change can affect weather conditions by changing the trend, frequency and extreme values of meteorological elements such as temperature, precipitation and humidity. The changes in weather conditions caused by climate change have had a serious impact on human well-being and will continue in the future. Therefore, assessing the impact of future climate change on weather conditions is of great significance for addressing climate change and promoting global sustainable development. However, the commonly used assessment indicators only describe the changes of weather conditions and do not consider the population exposure and people’s perceptions to the changes of weather conditions, which limits the significance of the evaluation results in improving human well-being and promoting regional sustainable development. Thus, taking the weather preference index (WPI) as the evaluation index and combined with the scenario framework provided by the Scenario Model Intercomparison Project (ScenarioMIP), we evaluated the impact of global climate change on weather conditions under different scenarios from 2015 to 2100. First, we quantified global WPI from 1980 to 2015 based on global meteorological observation data. Then, combined with global climate model data, we analyzed global WPI from 2015 to 2100 under different scenarios. Finally, we used trend analysis to evaluate the impact of global climate change on weather conditions. We found that global weather conditions will deteriorate from 2015 to 2100, and the global average WPI will change at a rate of -0.05/10a. At the same time, we also found that more than 60% of the world’s urban residents will live in regions with deteriorated weather conditions in the future. Under any scenario, there will still be 1.46 billion urban population living in regions with deteriorated weather conditions in 2100, accounting for 61.55% of the total urban population. Therefore, we suggest that countries should be as close to the narrative line of the green revival scenario (SSP1-2.6) as possible in the development process, and reduce greenhouse gas emissions by means of terminal emission control, the development of clean energy and the introduction of ultra-low emission technologies. On top of that, resilience to climate change needs to be improved by improving public infrastructure and living conditions.