Using the General Lake Model and Shared Socio-Economic Pathways to Understand Climate Change Impacts on Lake Evaporation

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The following is an excerpt from a longer piece. For the full text, please scan the QR code.

Abstract

It is critical to understand how climate change will impact our world. Lake evaporation will be impacted by climate change, having large implications on water supply and demand for drinking, irrigation, and recreational water uses. Understanding how lake evaporation changes under different climate change scenarios is critical for proper water management and policy. Using the General Lake Model, I simulated lake evaporation at Standley Lake reservoir in Westminster, Colorado, under four different climate change scenarios using the SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5 scenarios for June, July, and August in 2020. In my study, I looked specifically at changes to air temperature, relative humidity, and wind speed, which are meteorological variables known to have large impacts on evaporation at the lake surface. These variables were tested individually and then coupled together. I found that with only changes to air temperature, the total evaporation decreased due to the decreasing vapor pressure gradient over the study period; changes to just the relative humidity showed an increase in evaporation between scenarios; and when only wind speed was changed, lake evaporation increased or decreased when wind speed increased or decreased, respectively. When the study variables were coupled together, the total evaporation decreased over the first three scenarios and increased for the last scenario. This points to the change in wind speed being the largest driver of lake evaporation at Standley Lake over the study period and highlights the significance of considering more than just air temperature in future water policy plans and discussions. This study also shows the value in isolating meteorological variables to see the extent of their impact on lake evaporation.