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TITLE: Ocean Salinities Reveal Strong Global Water Cycle Intensification During 1950 to 2000

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ABSTRACT:

Fundamental thermodynamics and climate models suggest that dry regions will become drier and wet regions will become wetter in response to warming. Efforts to detect this long-term response in sparse surface observations of rainfall and evaporation remain ambiguous. We show that ocean salinity patterns express an identifiable fingerprint of an intensifying water cycle. Our 50-year observed global surface salinity changes, combined with changes from global climate models, present robust evidence of an intensified global water cycle at a rate of $8 \pm 5\%$ per degree of surface warming. This rate is double the response projected by current-generation climate models and suggests that a substantial (16 to 24%) intensification of the global water cycle will occur in a future 2° to 3° warmer world.

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CONCEPTS: ['Water cycle', 'Environmental science', 'Salinity', 'Global warming', 'Climatology', 'Climate change', 'Evaporation', 'Climate model', 'Global temperature', 'Atmospheric sciences', 'Global change', 'Oceanography', 'Meteorology', 'Ecology', 'Geology', 'Geography', 'Biology']