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UC Davis Tahoe Environmental Research Center Researchers Advance Methane Emission Modeling Techniques for Freshwater Reservoirs

Incline Village, NV – Researchers at the UC Davis Tahoe Environmental Research Center (TERC) and Civil & Environmental Engineering (CEE) have advanced greenhouse gas (GHG) emission research by advancing existing modeling techniques to enhance understanding of methane emissions from inland freshwater lakes and reservoirs, specifically focusing on the substrate (sediment) type and variability in space and time.

This pioneering study, executed in collaboration with Valley Water of Santa Clara County and researchers at the University of Granada (Spain), integrates hydroacoustic measurements with sediment sampling and gas analysis to assess methane generation and release from freshwater lakes and reservoirs more accurately. By adapting older acoustic techniques to account for varying substrate types and conditions, the TERC team has significantly improved our understanding of how to quantify methane emissions from inland waterbodies, contributing vital insights to climate change mitigation efforts.

Methane, a potent greenhouse gas, is generated by natural processes in the sediments of reservoirs and lakes in no-to-low-oxygen environments, which usually occur in the warmer spring-fall months. The TERC team's research reveals significant variability in methane emissions based on the sediment characteristics at the bottom of the reservoir. The previously established acoustic predictive models tended to underestimate gas present in shallower, siltier areas and overestimate it in larger-grained sediment zones.

"By applying these new advanced hydroacoustic techniques, we can efficiently gather extensive data on methane production across the entire reservoir, providing a clearer picture than older methods. These advanced acoustic techniques offer a relatively easy and comprehensive way to more accurately estimate methane generation and emissions," said Ruth Thirkill, Ph.D., lead researcher at TERC for this study. "This work offers valuable data and methodological insights to refine greenhouse gas modeling and carbon footprint for reservoirs, a current knowledge gap in climate change research."

This research has also shown a significant correlation between lower water levels and higher methane release rates, which could help inform reservoir management strategies and influence policy decisions aimed at reducing GHG emissions.

“This research allows us to better understand methane flux in Mediterranean climates like we have in California, where we have relatively little information as a global community,” said Prof. Alex Forrest, interim director of TERC. “Capturing the spatial variability of methane flux in a lake allows us to better understand the primary drivers of GHG emissions and refine our predictive models for future climate change scenarios.”

The implications of this work are far-reaching. These refined models can provide knowledge that could inform policy decisions and provide evidence for regulations aimed at reducing GHG emissions from reservoirs. They can also justify funding for mitigation technologies or even influence the planning and design of future reservoirs to minimize their environmental footprint.

Measurements for this study were made at four freshwater reservoirs in the Mediterranean climates of Santa Clara County Valley Water District in Northern California, USA, and two Spanish reservoirs in the country's southern region of Andalusia.

The findings from this study have been published in the Journal of Geophysical Research: Biogeosciences and can be accessed by clicking [here](#).

TERC is committed to advancing research that informs conservation efforts and supports sustainable water management practices.

Images:

<https://drive.google.com/drive/u/2/folders/128wPp0szdCARaA4SMD1g8iE3OXDSKxim>

About the UC Davis Tahoe Environmental Research Center

The UC Davis Tahoe Environmental Research Center is dedicated to interdisciplinary research and education to advance the knowledge of aquatic and terrestrial ecosystems and their interactions within natural and developed Earth systems and to communicate science-informed solutions worldwide. You can also visit the UC Davis Tahoe Science Center on the north shore of Lake Tahoe to learn about the lake ecosystem, why it's changing, and how together we can protect Lake Tahoe and keep it clear and blue. Learn more at tahoeb.ucdavis.edu or plan a trip to the UC Davis Tahoe Science Center in Incline Village by visiting tahoeb.ucdavis.edu/tahoesciencecenter.