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Lakes and reservoirs as sentinels, integrators, and regulators of climate change

Williamson, Craig E., Jasmine E. Saros, Warwick F. Vincent, John P. Smol

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ABSTRACT: Climate change is generating complex responses in both natural and human ecosystems that vary in their geographic distribution, magnitude, and timing across the global landscape. One of the major issues that scientists and policy makers now confront is how to assess such massive changes over multiple scales of space and time. Lakes and reservoirs comprise a geographically distributed network of the lowest points in the surrounding landscape that make them important sentinels of climate change. Their physical, chemical, and biological responses to climate provide a variety of information-rich signals. Their sediments archive and integrate these signals, enabling paleolimnologists to document changes over years to millennia. Lakes are also hot spots of carbon cycling in the landscape and as such are important regulators of climate change, processing terrestrial and atmospheric as well as aquatic carbon. We provide an overview of this concept of lakes and reservoirs as sentinels, integrators, and regulators of climate change, as well as of the need for scaling and modeling these responses in the context of global climate change. We conclude by providing a brief look to the future and the creation of globally networked sensors in lakes and reservoirs around the world.

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