EGU2020-18400
https://doi.org/10.5194/egusphere-egu2020-18400
EGU General Assembly 2020

Hard thermal turbulence in Antarctic Subglacial Lakes

Martin Siegert[1] and **Louis-Alexandre Couston**[2]
[1]Imperial College London, Grantham Institute, London, United Kingdom of Great Britain and Northern Ireland (m.siegert@imperial.ac.uk)
[2]British Antarctic Survey, Cambridge, UK

Over 250 stable and isolated subglacial lakes exist at and close to the ice-sheet center in Antarctica. The physical conditions within subglacial lakes, and the differences between distinct lake settings, are critical to evaluating how and where life may best exist. Here, we demonstrate that upward heating by Earth's geothermal flux provides efficient stirring of Antarctic subglacial lakes' water, in a variety of ways related to their water depth, ice overburden and ceiling slope. We show that most lakes are in a regime of hard convective turbulence, enabling efficient mixing of nutrient- and oxygen-enriched top melt-water, which is essential for biome formation. Lakes beneath a thin (about less than 3 km) ice cover and lakes with a thick (more than 3 km) ice cover experience similarly-large velocities, but the latter have significantly larger temperature fluctuations and have a stable layer up to several tens of meters thick adjacent to the ice. We discuss the implications of hydrological conditions on the concentration of particulates in the water column.

How to cite: Siegert, M. and Couston, L.-A.: Hard thermal turbulence in Antarctic Subglacial Lakes, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-18400, https://doi.org/10.5194/egusphere-egu2020-18400, 2020