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How does iceberg shape affect melting? ERIC HESTER, The University of Sydney, CRAIG MCCONNOCHIE, The University of Canterbury, CLAUDIA CENEDESE, Woods Hole Oceanographic Institution, LOUIS-ALEXANDRE COUSTON, British Antarctic Survey, BENJAMIN FAVIER, Aix-Marseille University, KEATON BURNS, Massachusetts Institute of Technology, GEOFFREY VASIL, The University of Sydney — Iceberg melting is a critical freshwater flux from the cryosphere to oceans. Global climate simulations require simple and accurate parameterisations of the melting process, but most models still neglect many relevant details. Iceberg shape is an important but challenging aspect to include in models of melting. Icebergs come in enormously different shapes and sizes, and distinct processes dominate basal and side melting. We show how different aspect ratios and water velocities affect melting using combined experimental and numerical studies in warm salt water. We find that existing parameterisations misrepresent many aspects of iceberg melting. Our experiments reveal significant variations in melting within and between iceberg faces. We reproduce and explain these effects with novel multiphysics numerical simulations. Buoyancy is subdominant for high flow rates, and there is significant variation in basal melting. Buoyancy matters much more for low flow rates, where double-diffusive effects become important. We propose several improvements to capture these effects in parameterisations of iceberg melting.

Eric Hester
Univ of Sydney

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