EGU22-13263
https://doi.org/10.5194/egusphere-egu22-13263
EGU General Assembly 2022


# Modelling the wave-induced fragmentation of the sea ice cover

**Nicolas Mokus** and Fabien Montiel
University of Otago, New Zealand

Fragmentation of the sea ice cover by wind-generated waves is an important mechanism impacting ice evolution.
Fractured ice is more sensitive to melt, leading to a local reduction in concentration, facilitating wave propagation, hence introducing a positive feedback loop accelerating sea ice retreat.
Although this process and the concept of floe size distribution (FSD) have been incorporated in several sea ice components of global climate models (GCM), the physics governing ice breakup under wave action remains poorly understood, and its parametrisation highly simplified.
We propose a numerical model of wave-induced sea ice breakup to estimate the FSD resulting from repeated fracture events.
This model, based on linear water wave theory and viscoelastic sea ice rheology, solves for the scattering of an incoming wave spectrum by the ice cover and derives the corresponding strain field. Fracture occurs when the undergone strain exceeds a prescribed threshold.
We find that under realistic wave forcing, lognormal FSDs appear consistently in a large variety of model configurations.
This result contrasts with the power-law FSD behaviour often assumed by modellers.
We discuss the properties of these modelled distributions, and investigate the stochastic processes affecting their emergence.