Floe Scale Model of Anomalous Diffusion in Sea Ice Dynamics

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$$\left\langle \left| \mathbf{x}(t) - \mathbf{x}(0) - \left\langle \mathbf{x}(t) - \mathbf{x}(0) \right\rangle \right|^2 \right\rangle \sim t^{\alpha}$$

$\alpha =$ Hurst exponent, a measure of anomalous diffusion

Statistic of bouy position data. Detects ice pack crowding and advective forcing.

J. V. Lukovich, J. K. Hutchings and D. G. Barber Annals of Glaciology 2015

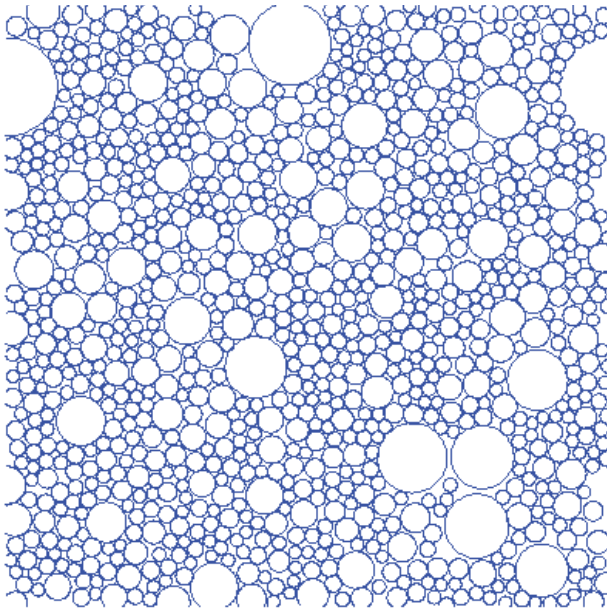
Model Approximations

Power Law Size Distribution: $N(D) \sim D^{-k}$

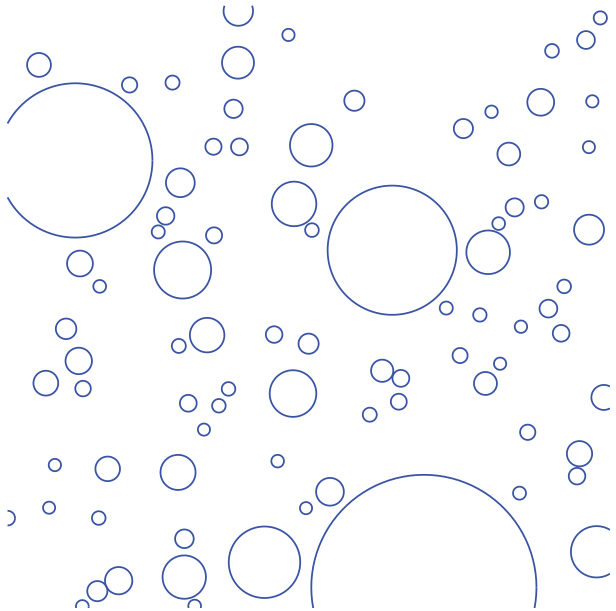
D. A. Rothrock and A. S. Thorndike Journal of Geophysical Research 1984

Floe-Floe Interactions: Linear Elastic Collisions

Advective Forcing: Passive, Linear Drag Law



$k = 2.9$ Concentration = 0.8



$k = 1.7$ Concentration = 0.1