Ising model for ferromagnets ⟶ Ising model for melt ponds

$$\mathcal{H} = -\sum_{i}^{N} H_i \, s_i - J \sum_{<i,j>}^{N} s_i s_j \qquad s_i = \begin{cases} \uparrow & +1 \quad \text{water} \quad \text{(spin up)} \\ \downarrow & -1 \quad \text{ice} \quad \text{(spin down)} \end{cases}$$

random magnetic field represents snow topography

magnetization M **pond area fraction** $F = \dfrac{(M+1)}{2}$ only nearest neighbor patches interact

~ albedo

Starting with random initial configurations, as Hamiltonian energy is minimized by Glauber spin flip dynamics, system "flows" toward metastable equilibria.

Order from Disorder