1116-76-1761 **Andrew J Wells*** (andrew.wells@physics.ox.ac.uk), AOPP, Clarendon Lab, Dept of Physics, University of Oxford, Oxford, OX1 3PU, United Kingdom, and **Joseph R. Hitchen**, **John S. Wettlaufer** and **Steven A. Orszag**. *Convection in Mushy Sea Ice: Nonlinear Dynamics and Asymptotic Structure.*

Sea ice is an example of a mushy layer: a reactive porous medium of ice crystals bathed in liquid brine. During the growth of young sea ice, buoyancy-driven convection drives the drainage of dense interstitial brine from the ice, controlling buoyancy fluxes for the ocean and biogeochemical transport through the ice interior. Flow-focussing instabilities lead to the development of localised brine drainage channels formed by dissolution of the ice. We review recent work on convection in mushy layers and brine channel dynamics based on a partial differential equation model using continuum conservation laws. A dimensionless Rayleigh number characterises the strength of convection compared to dissipation. We consider the nonlinear dynamics of brine channels, and their stability as both the Rayleigh number and the spacing between brine channels change. We determine asymptotic scalings for the structure of convective cells in the limit of large Rayleigh number. Finally, we consider the impact of this convective flow on biogeochemical tracer transport through porous sea ice, and determine asymptotic scaling laws for chemical tracer concentration in the ice interior. (Received September 21, 2015)