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Compositional transport in solidifying aqueous binary solution JIN-QIANG ZHONG, ZUO-CHAO YIN, Tongji University, Shanghai, China, QI-WEI XUE, Yale University, New Haven, CT, USA, JOHN WETTLAUFER, Yale University, New Haven, CT, USA and Oxford University, Oxford, UK — We observe the formation of double-diffusive layers adjacent to mushy layers that form during the directional solidification of aqueous ammonium chloride. The plumes emerging from chimney's in the mushy layers continuously supply a buoyancy flux in the (finite) liquid region above, driving downward motion of double-diffusive layers. The downward velocity of the layers is found to be in good agreement with a filling box model that captures the crucial hydrodynamics of the entraining buoyant plumes and compositional transport. We demonstrate that the buoyancy flux through the system decays according to a similarity solution. We note that the experimental findings provide some insight into the brine transport in growing sea ice.

> Jin-Qiang Zhong Tongji University, Shanghai, China

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