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Dynamics of double-diffusive lock-exchange gravity currents NATHAN KONOPLIV, ECKART MEIBURG, Univ of California - Santa Barbara — The dynamics of double-diffusive gravity currents exhibiting the fingering instability were examined using 2D simulations of a lock exchange initial configuration. Both the initial stability ratio and the diffusivity ratio were varied. It was found that although the spreading of the currents was governed by a balance of buoyancy and turbulent drag forces, currents with more intense fingering spread faster than those with less intense or no fingering. This was due to an increase in the buoyancy of the currents with stronger fingering, which had a stronger effect than the increased drag. The fingering also affected the thickness of the currents, with more fingering corresponding to thinner currents. The mechanism that caused the thinner currents was also responsible for the creation of secondary and tertiary currents after a long time in a simulation that had intense fingering. If no secondary or tertiary currents formed, the density of the current was governed by a balance of double-diffusive and diffusive fluxes. An energy budget analysis revealed that double diffusive currents released more potential energy, had more dissipation and converted a significant amount of internal energy into potential energy via the diffusion of heat and salinity.

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