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Buoyancy fluxes in stratified flows: observations and parameterizations STEPHEN MONISMITH, JEFFREY KOSEFF, Stanford University, RYAN WALTER, California Polytechnic State University, San Luis Obispo, MICHAEL SQUIBB, Stanford University, BROCK WOODSON, University of Georgia, KRISTEN DAVIS, U.C. Irvine, GENO PAWLAK, U.C. San Diego, JAMIE DUNCKLEY, EPRI — We present a synthesis of observations of turbulent buoyancy fluxes, B, made at five sites where flows and turbulence are primarily associated with internal waves, both breaking and non-breaking. In four cases, B was calculated from the covariance of velocity and density whereas in the fifth case, it was inferred from the rate of temperature variance dissipation,χ. Overall, we find that the flux Richardson number, Ri_f, depends on the Gibson number, $Gi = \varepsilon/\nu \mathrm{N}^2$: when Gi <100, $Ri_f \approx 0.27$, and when Gi >100 $Ri_f \approx 2.7\ Gi^{-0.5}$, in agreement with the functional relationship found originally using direct numerical simulation (DNS). Our observations do not match well other DNS-derived models that parameterize Ri_f in terms of the gradient Richardson number, Ri, or the turbulence Froude numbers, Fr_k and Fr_t. Similarly, $Ri_f(Gi)$ is found to be the same for all the covariance data sets, despite the fact that these 4 flows produce turbulence that falls in different regimes defined by several pairs chosen from the 5 non-dimensional numbers that the Buckingham Π theorem shows may affect Ri_f .

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