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**Joint downscale fluxes of energy and potential enstrophy in rotating stratified Boussinesq flows** SUSAN KURIEN, HUSSEIN ALUIE, Los Alamos National Laboratory — We use high-resolution simulations of Boussinesq flows, forced in the large-scales, with fixed rotation and stable stratification along the vertical axis, to study the cascades of energy and potential enstrophy to small-scales in three different regimes of stratification and rotation. For strongly stratified flow with moderate rotation, we observe constant fluxes of both energy and potential enstrophy into fourier modes with large vertical component $k_z$, while being entirely suppressed in modes with large horizontal component $k_h$. The fluxes in this regime are predominantly due to a highly non-local transfer from the large-scales directly to the smallest scales. On the other hand, for strongly rotating flow with moderate stratification, there are constant fluxes of energy and potential enstrophy to modes with large $k_h$ while being completely suppressed to modes with large $k_z$. We find that the fluxes in this regime are due to a "diffusely" local transfer much like in isotropic Navier-Stokes turbulence. In the third case of equally strong rotation and stratification, there are only slightly anisotropic constant fluxes of energy and potential enstrophy, mostly to modes with large $k_h$. The fluxes in this regime are due to an ultra-local transfer in which the energy gained by an inertial scale comes almost exclusively from the adjacent larger scales.

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