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**Turbulent convection in geostrophic circulation with wind and buoyancy forcing**[1] TAIMOOR SOHAIL, BISHAKHDATTA GAYEN, ANDY HOGG, Australian Natl Univ — We conduct a direct numerical simulation of geostrophic circulation forced by surface wind and buoyancy to model a circumpolar ocean. The imposed buoyancy forcing (represented by Rayleigh number) drives a zonal current and supports small-scale convection in the buoyancy destabilizing region. In addition, we observe eddy activity which transports heat southward, supporting a large amount of heat uptake. Increasing wind stress enhances the meridional buoyancy gradient, triggering more eddy activity inside the boundary layer. Therefore, heat uptake increases with higher wind stress. The majority of dissipation is confined within the surface boundary layer, while mixing is dominant inside the convective plume and the buoyancy destabilizing region of the domain. The relative strength of the mixing and dissipation in the system can be expressed by mixing efficiency. This study finds that mixing is much greater than viscous dissipation, resulting in higher values of mixing efficiency than previously used.

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