Abstract Submitted
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Experimental evidence of a new regime in horizontal convection at high Rayleigh and Schmidt numbers[1] PIERRE-YVES PASSAGGIA, NADIA COHEN, BRIAN WHITE, ALBERTO SCOTTI, Univ. of North Carolina a Chapel Hill, Dept. of Marine Sciences — Horizontal convection is a flow driven by differential buoyancy forcing across a horizontal surface. It has been considered as a simple model to study the influence of heating, cooling and freshwater fluxes at the ocean surface on the Meridional Overturning Circulation. We investigate the flow properties of horizontal convection by mean of scaling analysis at high Rayleigh and Schmidt numbers. The present experiment is driven by the diffusion of salt in water across membranes localized at the surface. Salt diffusion is controlled across porous dialysis membranes. The resulting experiments are performed for Schmidt numbers Sc $\approx$ 610 and Rayleigh numbers in the range $10^{12} < Ra = \Delta b L^3/(\nu\kappa) < 10^{17}$, where ν is the kinematic viscosity of water, κ is the diffusion coefficient of salt, $L = [.5, 2, 5]$m is the length of the different tanks and $\Delta b = g(\rho_{salt} - \rho_{fresh}/\rho_{fresh}$ is the reduced gravity difference. We show that the scaling follows a $Nu \sim Ra^{1/4}$ type scaling, which was recently theorized by Shishkina *et al.* (2016), and was also observed recently for another distribution of the buoyancy forcing at the surface (Griffiths & Gayen, 2015).

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