

Abstract Submitted  
for the DFD12 Meeting of  
The American Physical Society

**Geostrophic balance and the emergence of helicity in rotating stratified turbulence** RAFFAELE MARINO, PABLO D. MININNI, DUANE ROSENBERG, ANNICK POUQUET, Institute for Mathematics Applied to Geosciences (IMAGE), CISL/NCAR, P.O. Box 3000, Boulder, Colorado 80307-3000, USA — We perform numerical simulations of decaying rotating stratified turbulence and show, in the Boussinesq framework, that helicity (velocity-vorticity correlation), as observed in super-cell storms and hurricanes, is created due to geostrophic balance common to large-scale atmospheric and oceanic flows. Helicity emerges from the joint action of eddies and of inertial and gravity waves of respective frequencies  $f$  and  $N$ , and it occurs when the waves are sufficiently strong, with  $N/f < 3$ . Outside this regime, and up to the highest Reynolds number obtained in this study, namely  $Re \approx 10^4$ , helicity production is found to be persistent for  $N/f$  as large as  $\sim 17$ .

Raffaele Marino  
Institute for Mathematics Applied to Geosciences (IMAGE),  
CISL/NCAR, P.O. Box 3000, Boulder, Colorado 80307-3000, USA

Date submitted: 10 Aug 2012

Electronic form version 1.4