

Abstract Submitted
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What is turbulence and which way does it cascade? CARL H. GIBSON, University of California at San Diego — Turbulence is defined as an eddy-like state of fluid motion where the inertial vortex forces of the eddies are larger than any of the other forces that tend to damp the eddies out. Inertial vortex forces $v \times \omega$ are zero for irrotational flows, so irrotational flows are not turbulent by definition even though they may be random and induced by turbulence. Because the vorticity ω is always produced at small scales, turbulence always cascades from small scales to large. Turbulence growth is limited by vertical buoyancy forces at the Ozmidov scale of fossilization and by horizontal Coriolis forces at the Hopfinger scale of fossilization. Fossil turbulence is defined as a perturbation in any hydrophysical field produced by turbulence that persists after the fluid is no longer turbulent at the scale of the perturbation. Most turbulent mixing in the ocean and atmosphere occurs in fossil turbulence patches where most of the turbulent kinetic energy of the patch has radiated near vertically as fossil turbulence waves. Vertical heat, mass, momentum and information transport in the ocean is dominated by an intermittent generic process termed beamed zombie turbulence maser action mixing chimneys (see http://maeresearch.ucsd.edu/~cgibson/Documents2007/GibsonBB08Nov26_Alist.htm).

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