Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Energy transfer in stably stratified turbulence YOSHIFUMI KIMURA, Nagoya University, JACKSON HERRING, NCAR — Energy transfer in forced stable stratified turbulence is investigated using pseudo-spectral DNS of the Navier-Stokes equations under the Boussinesq approximation with 1024^3 grid points. Making use of the Craya-Herring decomposition, the velocity field is decomposed into vortex (Φ_1) and wave (Φ_2) modes. To understand the anisotropy of stably stratified turbulence, the energy flues in terms of the spherical, the horizontal and the vertical wave numbers, are investigated for the total kinetic, Φ_1, Φ_2 energies, respectively. Among the three fluxes, the spherical and the horizontal look similar for strong stratification, and Φ_1 flux shows a wave number region of constant value, which implies Kolmogorov's inertial range. The corresponding spectral power are, however, $k^{-5/2}$ for the spherical and $k_\perp^{-5/3}$ for the horizontal cases. In contrast to these, the vertical energy fluxes show completely different features. We have observed the saturation spectrum $E(k_z) \sim CN^2k_z^{-3}$ for strong stratification as before[1], but the mechanism to produce this spectrum seems different from the Kolmogorov picture.
[1] Y. Kimura & J.R. Herring: Energy spectra of stably stratified turbulence, *JFM*, **698** 19–50 (2012)

Yoshifumi Kimura
Nagoya University

Date submitted: 31 Jul 2015 Electronic form version 1.4