

# THEORY SEMINAR FALL 2015

SIO 219, 1 unit S/U

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Office: Keck room 366 - this is on the 3rd floor of Keck, south-west corner.

**Meetings** Friday 3:30pm, Keck Conference Room

**Description** The theme of the theory seminar this quarter is GEOSTROPHIC TURBULENCE. There'll be a mixture of research seminars and student-led presentations of key papers. Students are encouraged to register for the class, and participation by interested post-docs and faculty is very welcome.

**Course Requirements** Students should register as S/U. Registered students will be expected to present at least one paper during the quarter and participate in the discussion each week.

The reading list below is under development. Participants are encouraged to suggest papers that they like to read and discuss.

## READING LIST

1. [Fjortoft, R. 1953. On the Changes in the Spectral Distribution of Kinetic Energy for Twodimensional, Nondivergent Flow. Tellus, 5,225-230](#)
- 1a. [Salmon, R. 1998. Lectures on Geophysical Fluid Dynamics. Chapter 4: Vorticity and Turbulence \(sections 8 and 9\). Oxford University Press.](#)
2. [Salmon, R. 1982. Geostrophic Turbulence, in "Topics in Ocean Physics", Proceedings of the International School of Physics Enrico Fermi \(July 1980\), Course LXXX, published 1982, A. R. Osborne & P. Malanotte Rizzoli, editors.](#)
- 3a. [Larichev, V. D., and I. M. Held 1995. Eddy amplitudes and fluxes in a homogeneous model of fully developed baroclinic instability. J. Phys. Oceanogr., 25, 2285-2297.](#)
- 3b. [Held, I.M, and V.D. Larichev 1996. A scaling theory for horizontally homogeneous, baroclinically unstable flow on a beta plane. J. Atmos. Sci., 53, 946-952.](#)
4. [Smith, K. S., et al. 2002. Turbulent diffusion in the geostrophic inverse cascade J. Fluid Mech., 469, 13-48.](#)
- 5a. [Charney, G. C. 1971. Geostrophic Turbulence, J. Atmos. Sci., 28, 1087-1095.](#)
- 5b. [Nastrom, G. D., and K. So Gage 1985. A climatology of atmospheric wavenumber spectra of wind and temperature observed by commercial aircraft. J. Atmos. Sci. 42 \(1985\): 950-960.](#)
- 6a. [Tung, K. K., and Orlando, W. W. 2003. The k-3 and k-5/3 energy spectrum of atmospheric turbulence: Quasigeostrophic two-level model simulation. J. Atmos. Sci., 60, 824-835.](#)
- 6b. [Tulloch, R., & Smith, K. S. 2006. A theory for the atmospheric energy spectrum: Depth-limited temperature anomalies at the tropopause. Proc. Nat. Acad. Sci., 103, 14690-14694.](#)

- 7a. [Capet, X. et al. 2008. Mesoscale to submesoscale transition in the California Current System Part III: energy balance and flux 2008, J. Phys. Oceanogr., 38, 2256-2269.](#)
- 7b. [Molemaker, M.J. et al. 2010. Balanced and unbalanced routes to dissipation in an equilibrated Eady flow, 2010, J. Fluid. Mech., 654, 35-63.](#)
- 8a. [Klein, P. et al. 2008. Upper Ocean Turbulence from High-Resolution 3D Simulations. J. Phys. Oceanogr, 38, 1748-1763.](#)
- 8b. [Scott, R.K. 2006. Local and nonlocal advection of a passive scalar, Phys. Fluids, 18, 116601.](#)
10. [Rhines, P.B., The dynamics of unsteady currents. The Sea, ideas and observations on progress in the study of the seas ; v. 6: Marine Modeling.](#)

## SCHEDULE

- **September 25, 2015: Organizational meeting.**
- **October 2, 2015: CS Jones: Two-dimensional turbulence. Primary readings are papers 1 and 1a (sections 8 and 9).**
- **October 9, 2015: Rick Salmon "The equatorial tunneling effect". Primary reading is paper 2, especially section 5.**
- **October 16, 2015: Cesar Rocha "Eddy-fluxes in baroclinic geostrophic turbulence". Primary readings are paper 3a and 3b.**
- **October 23, 2015: Effie Fine "Generalized 2-D turbulence". Paper 4.**
- **October 30, 2015: Paola Cessi "Atmospheric geostrophic turbulence". Papers 5a and 5b.**
- **November 6, 2015: Navid Constantinou "Atmospheric turbulence spectrum: competing theories". Papers 6a and 6b.**
- **November 20, 2015: Stephen Holleman "Submesoscale turbulence I: dual cascade". Papers 7a and 7b.**
- **December 4, 2015: Greg Wagner "Submesoscale turbulence II: connection with SQG". Papers 8a and 8b.**

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