Internal tides and ocean mixing:
Lessons from the HOME experiment and its contemporaries

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Lecture 1 The tides, internal tides and ocean mixing

- The need for small-scale mixing in a large-scale ocean: Munk's abyssal recipe
- What does mixing look like? Early Observations
- Internal waves as a bridge between large and small scales
- Generation of the internal tide
- Rays, modes, and real-world propagation
- Wave breaking through convective and/or Kelvin Helmholtz instability
- Gregg, 1989 and the Gregg-Henyey Relationship

Lecture 2 The HOME Experiment

- Approach: to conduct a somewhat controlled physics experiment vs. "to observe"
- Goals: to determine a rough energy budget for the Hawaiian Ridge
  : to determine if locations such as Hawaii are sufficient to mix the ocean
- The Home field campaigns: Survey, Farfield and Nearfield
- The phenomenology of HOME: big, low-mode waves, upslope bores, and puzzling mixing

Lecture 3 Home Findings and Follow-ons

- The discovery of high-mode mid-water bores
- The (re-) discovery of up-slope bores as orchestrators of near-bottom mixing
- Parametric Subharmonic Instability: rampant in the Nearfield, detectable offshore
- Induced Diffusion: the link between large-scale internal-waves and mid-water mixing?
- Soliton formation, a limit to the size of the radiated tide?
- The shoaling tide: upslope bores in the S. China Sea

Lecture 4 The Observational Challenge

- Measurement of a highly strained medium
- Tracer tracking vs. velocity measuring
- Quantifying shear, strain and strain rate
- Doppler shifting and the interpretation of time series measurements in

Lagrangian and Eulerian Frames

- The midwater energy cascade: overturns related to shear and overturns related to strain-rate
- Is there “enough” mixing to keep the ocean in balance?