

OCP 5259
RINGS AND EDDIES AS HEAT EXCHANGE MECHANISM

Course Objectives

1. To provide a theoretical and observational background for the transfer of heat and salt by eddies and rings
2. To introduce the student to new discoveries and new theories in dynamical oceanography

Course Outline

1. Introduction
 - 1.1 Overview
 - 1.2 Fundamentals
 - 1.3 Shallow water equations
 - 1.4 The Bernoulli integral and the potential vorticity equations
2. The First Studies of Eddies
 - 2.1 Observational background
 - 2.2 Behavior of barotropic eddies on an f and β plane
 - 2.3 Rossby's analysis of intense vortices
3. Theories of Modons
 - 3.1 Stern's theory for a stationary barotropic Modon on a β plane
 - 3.2 Eastward and westward propagating Modons
4. Theories and Observations of Single Vortices on an f and β plane
 - 4.1 Introduction – the Rossby adjustment problem
 - 4.2 The formation of lenses and anticyclonic eddies by a collapse of a cylinder
 - 4.3 The propagation of anticyclonic lens-like eddies on a β plane
 - 4.4 Behavior of cold eddies in the deep ocean
 - 4.5 Migration of isolated cyclonic eddies and Gulf Stream rings

Grades

Final grade will be based on a mid-term exam (30%), a final exam (30%), a project that includes a 20 minute presentation (30%) and several homework assignments (10%). Exam questions will include several relatively long questions of the kind typically given in the comprehensive Ph.D. examination.

Text

A.R. Robinson – *Eddies in Marine Science* (useful, but does not cover theory, no need to purchase it)