

GFD Newsletter 2004

Faculty of Walsh College



The 2004 GFD Photograph.

Fleming and Penny Foster provided the administrative backbone to the Program, both during the summer and throughout the year beforehand. As always, we were grateful to Woods Hole Oceanographic Institution for the use of Walsh Cottage, and Keith Bradley's solid service could not be overlooked. Shilpa Ghadge and Shreyas Mandre are to be thanked for their part in comforting the fellows, developing the summer's proceedings volume (to be available on the GFD website soon) and for running the computer network.

Schedule of Principal Lectures

Week 1:

Monday, June 21: Introduction to ocean tides (Myrl Hendershott)

Tuesday, June 22: The role of tidal dissipation and the Laplace tidal equations (Myrl Hendershott)

Wednesday, June 23: Solutions to Laplace's Tidal Equations (Myrl Hendershott)

Thursday, June 24: Resonance and more solutions to Laplace's Tidal Equations (Myrl Hendershott and Chris Garrett)

Friday, June 25: The spectrum of free waves along the coasts (Myrl Hendershott)

Week 2:

Monday, June 28: Internal Tides (Myrl Hendershott and Chris Garrett)

Tuesday, June 29: Tidal bores (Chris Garrett)

Wednesday, June 30: Tidal Rectification and Stokes Drift (Chris Garrett)

Thursday, July 1: Rectification, Stratification and Mixing (Chris Garrett)

Friday, July 2: Tidal power (Chris Garrett)

A Sketch of the Summer

The summer of 2004 saw the GFD program tackle "Tides". Myrl Hendershott (Scripps Institution of Oceanography) gave a fabulous introduction to the subject in the first week of the course, laying the foundations from astronomy and classical geophysical fluid dynamics. In the second week, Chris Garrett (University of Victoria) admirably followed up with recent developments on the subject, including the recent observations from satellite altimetry, their implications to mixing and circulation, and even a memorable lecture on the noble theme of how we might solve the world's energy crisis. The principal lectures proved unusually popular this summer, and the seminar room at Walsh often overflowed in the first two weeks.

Following on from the lectures, the seminar schedule of the summer covered in greater detail the oceanographic issues with which researchers are actively grappling. We also heard about related problems regarding atmospheric, planetary and stellar tides, together with the usual mix of topics on GFD in general.

Neil Balmforth and Stefan Llewellyn Smith acted as co-Directors for the summer. Janet Fields, Jeanne



Experiments in the Coastal Research Lab: Anja's wrinkled, elastic-plated gravity current.

Fellows' Reports

Danielle Wain, University of Illinois, Urbana-Champaign

Laboratory Experiments on the Effect of Baroclinic Eddies on a Dense Plume in a Rotating Stratified Fluid

Eleanor Williams Frajka, University of Washington
Convection in a Fluid Loop

Lisa Neef, University of Toronto
Resonant Triads of Tidally-Forced Internal Gravity Waves

Yaron Toledo, Technion
High Order Boussinesq Models for Internal Interfacial Waves and Layered SQG

Anja Slim, University of Cambridge
Exotic Gravity Currents

Josefina Arraut, Brazilian Inst. for Space Research
Rossby Wave Scattering between Homogeneous Media

Marshall Ward, Florida State University
Double Diffusive Gravity Currents under Rotation

David Vener, Massachusetts Institute of Technology
Two-Dimensional Vortex Shedding from a Corner

Vineet Birman, Univ. California, Santa Barbara
Non-Normal Convection

Visweswaran Nageswaran, Univ. Mass., Amherst
Parametric Instability of Internal Waves with Rotation

Softball Report

When the fellows gathered for the first softball practice at Bell Tower field this year, the outlook was grim

indeed. One of them had not played since the age of eight and many others had never played. The prediction was that the season would be a frustrating one, but the summer turned out differently: Vineet took to the game immediately, becoming as good a center fielder as we could have desired, and catching the ball bare handed as often as he used his glove. Yaron turned into a good first baseman although he was out for much of the season with an injury suffered in the first game before he could even bat. Viswesh made remarkable catches and misses in the outfield, and David competently fielded at third. Eleanor, Anya, Josefina and Danielle all vied to play at second, but they sometimes had to settle for sharing the space out in right field.

With little contribution from the staff, we expected to lose every game. Although the summer certainly began that way, it did not continue so. Indeed, as is the case between Yale and Harvard, a win against our rival, PO, could make up for losses in the other games. And after an initial loss to PO by a score of 20 to 2, we came back and beat them by 23 to 16 (with a new WHOI scheduling system, we played them twice).

In the final game against the staff, the fellows were hyped up about destroying the opposition and did exactly that, winning by 18 to 4. We all gathered at Crooked Pond afterwards for water, fun and relaxation, and to wind the summer down in the traditional way.



Our esteemed principal lecturer, Myrl Hendershott, enjoying a quiet moment.

The GFD Website

The lectures notes and reports are available at gfd.whoi.edu. The GFD website also contains:

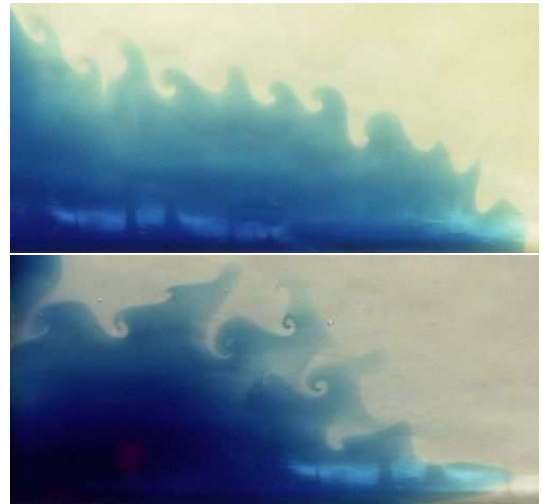
- lecture and seminar schedules
- electronic versions of proceedings and newsletters
- lists of alumni and visitors
- application materials
- picture galleries of life at GFD
- useful information and links.



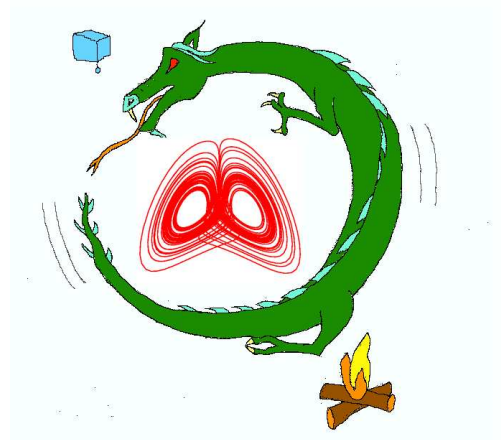
Presentation of fellows.

The GFD Public Lecture

Following on from the successful enterprise of last summer, GFD2004 once again featured a lecture for the general public in the Woods Hole area. Carl Wunsch delivered a very well received lecture entitled “Climate Change Stories,” in which he gave an impression of how scientists generally believe our climate is currently changing, whilst simultaneously urging caution against some of the more outrageous and exaggerated claims. The lecture was held at Lilly Auditorium, thanks to the hospitality of the Marine Biology Laboratory, and the reception following the lecture was enjoyed by all.



*Experiments from the Coastal Research Lab:
Marshall's gravity currents.*



*Thanks to Eleanor, the GFD dragon entered the
Welander Loop this summer.*



An alarmed director discovers a group of participants eagerly playing with a suspension of cornstarch in his basement.

The GFD Faculty

The GFD Faculty handles the scientific and administrative duties of the school. This group is made up of members of the scientific community, across several disciplines, united by their interest in GFD. These are the faces to be seen at GFD over future summers, and their research interests help to define the scientific direction and flavor of the Program.

Neil Balmforth *University of British Columbia*
 Oliver Buhler *New York University*
 Claudia Cenedese *W. H. O. I.*
 Eric Chassignet *University of Miami*
 Charles Doering *University of Michigan*
 Glenn Flierl *M. I. T.*
 Karl Helfrich *W. H. O. I.*
 Lou Howard *M. I. T. and Florida State University*
 Joseph Keller *Stanford University*
 Richard Kerswell *University of Bristol*
 Norman Lebovitz *University of Chicago*
 Willem Malkus *M. I. T.*
 Philip Morrison *University of Texas at Austin*
 Michael Proctor *University of Cambridge*
 Antonello Provenzale *ISAC-CNR, Torino*
 Richard Salmon *Scripps Institution of Oceanography*
 Edward Spiegel *Columbia University*
 Melvin Stern *Florida State University*
 Jean-Luc Thiffeault *Imperial College, London*
 George Veronis *Yale University*
 John Wettlaufer *Yale University*
 Jack Whitehead *W. H. O. I.*
 William Young *Scripps Institution of Oceanography*



Experimental slumping on the porch.

Contributions

The GFD program has established an endowment fund to help support the program in the future and for a specially funded position intended to help finance the extended visit of a key participant, such as the summer's Principal Lecturer. The fund is administered by WHOI, under the guidance of George Veronis. If you would like to contribute, please send your check (made payable to WHOI) to

Woods Hole Oceanographic Institution
 GFD Fund, MS 40
 Woods Hole, MA 02543

Donations can also be made by credit card by calling the Development office at 508-289-4895.

Please send comments to njb@math.ubc.ca or jeanluc@imperial.ac.uk if you have any suggestions regarding this newsletter or the GFD Program.

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