

## GFD Newsletter 2012

### Faculty of Walsh College



*The 2012 GFD Photograph.*



*Our Principal Lecturers:  
Edgar Knobloch (l) & Jeff Weiss (r)*

### *The Structure of the Summer*

*Coherent structures* was the theme at the 2012 GFD Program, and Professors Jeffrey Weiss of University of Colorado, Boulder and Edgar Knobloch of University of California, Berkeley were the principal lecturers. Together they introduced the audience in the cottage and on the porch to a fascinating mixture of models, mathematics and applications. Deep insights snaked through the whole summer, as the principal lecturers stayed on to participate in the traditional debates and contributed stoutly to the supervision of the fellows.

Charlie Doering and Oliver Buhler initially acted as the co-directors for the summer, with Colm-cille Caulfield stepping in to replace Oliver after he had to bow out. A large number of long-term staff members ensured that the fellows never lacked for guidance, and the seminar series was filled by a steady stream of visitors, talking about topics as diverse as how sharks smell and how to slice symmetry.

Anders Jensen worked his usual magic in the Lab, dealing inventively with aquarium sand, bentonite and ketchup as well as with more traditional experimental fluids, and Janet Fields and Jeanne Fleming smoothly ran the program behind the scenes.

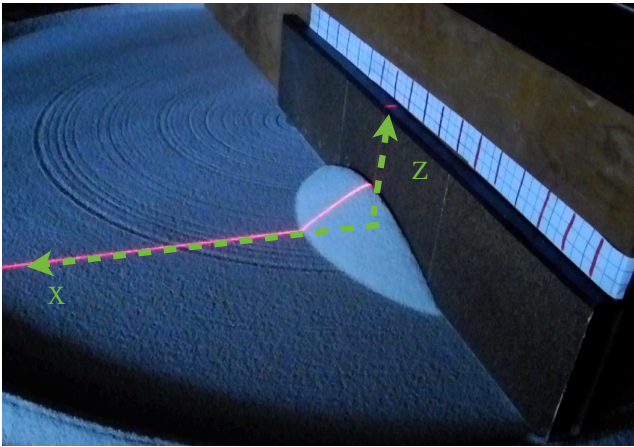
### *Schedule of Principal Lectures*

Week 1: Jeffrey Weiss  
*Dynamics of coherent structures and their impact on transport and predicability*

Week 2: Edgar Knobloch  
*Spatially localized structures: Theory & applications*



*Duncan found that ketchup flowed more slowly down a slope the longer one let it rest before tilting*



Alban used a laser line to determine the time-dependent sand-pile height as it was bulldozed on a rotating table



The fellows and the coach before the final victory

## Fellows' Reports

Duncan Hewitt, University of Cambridge  
*Thixotropic gravity currents and the ketchup question*

Alban Sauret, IRPHE, Marseille  
*Smoothing out sandpiles: Rotational bulldozing of granular material*

Rosalind Oglethorpe, University of Cambridge  
*Spindown of a stellar interior*

Srikanth Toppaladoddi, Yale University  
*Swimming slender rods in Stokes flow*

Yuan Guo, New York University  
*Scattering of internal waves over random topography*

Vamsi Chalamalla, University of California, San Diego

*What goes up doesn't come down: The effect of upwelling and downwelling on turbulent entrainment in a surface-stress-driven flow*

Felicity Graham, University of Tasmania  
*Equatorial quasi-geostrophy*

Bevin Maultsby, University of North Carolina  
*A 2-dimensional, 3-component model of Langmuir circulation*

Pedram Hassanzadeh, University of California, Berkeley

*Optimal transport: Wall to wall*

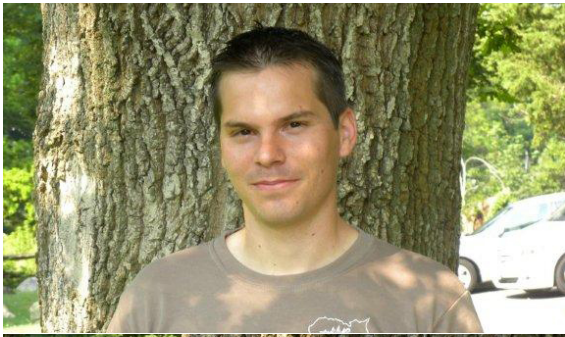
Cédric Beaume, IMFT, Toulouse  
*A reduced model for exact coherent structure in high Reynolds number shear flows*

## Softball Report

It was a challenging season for the GFD Dynamos. Despite working hard from the start of the summer to mold the team into a competitive unit, none of the eight WHOI League games resulted in victory. Nevertheless the fellows proved their mettle at season's end by soundly trouncing the staff during the final game of the summer. And there's no question that they all positioned themselves to return and play as experienced alumni in future summers: Srikanth's "funny stuff" from the pitcher's mound proved more and more difficult to deal with as the summer progressed, while Rosie's and Yuan's performance behind the plate steadily progressed as the summer proceeded. Bevin and Felicity reliably covered the right side of the infield while Alban, Cédric, Duncan, Pedram and Vamsi protected the left side and the outfield, sometimes even showing other teams how properly prepared cricket players can occasionally perform on either side of the bat.



Srikanth, Rosie and Joe are not particularly impressed with Duncan's technique; Charlie in his natural habitat



*The fellows:*

*Alban Sauret, Pedram Hassanzadeh, Bevin Maultsby, Rosie Oglethorpe, Cédric Beaume, Srikanth Toppaladoddi, Duncan Hewitt, Vamsi Chalamalla, Felicity Graham & Yuan Guo*

## 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*  
 Colm-cille Caulfield *University of Cambridge*  
 Claudia Cenedese *W. H. O. I.*  
 Eric Chassignet *University of Miami*  
 Steve Childress *New York University*  
 Charles Doering *University of Michigan*  
 Glenn Flierl *M. I. T.*  
 Pascale Garaud *U.C. Santa Cruz*  
 Karl Helfrich *W. H. O. I.*  
 Lou Howard *M. I. T. and Duke University*  
 Joseph B. Keller *Stanford University*  
 Norman Lebovitz *University of Chicago*  
 Stefan Llewellyn Smith *U. C. San Diego*  
 Willem Malkus *M. I. T.*  
 Philip Morrison *University of Texas at Austin*  
 Michael Proctor *University of Texas at Austin*  
 Antonello Provenzale *ISAC-CNR, Torino*  
 Edward Spiegel *Columbia University*  
 Jean-Luc Thiffeault *University of Wisconsin*  
 George Veronis *Yale University*  
 John Wettlaufer *Yale University*  
 Jack Whitehead *W. H. O. I.*  
 William Young *Scripps Institution of Oceanography*

## The GFD Website

The lectures notes and reports are available online at [gfd.whoi.edu](http://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

## The Sears Public Lecture

In 2012, the Sears Public Lecture was delivered by Professor Howard Bluestein, of the University of Oklahoma on the topic of “Probing tornadoes with mobile doppler radars”. Howie “Cb” showed how modern and innovative measurement techniques can yield valuable information about the formation and evolution of tornadoes, as well as truly amazing images. Over a hundred listeners filed into Redfield for the occasion, and then enjoyed refreshments in the evening air afterwards outside the auditorium.

Geophysical Fluid Dynamics Program  
Sears Lecture

Probing Tornadoes  
with Mobile Doppler Radars  
Professor Howard Bluestein  
University of Oklahoma

August 7 - 5:00 PM  
Redfield Auditorium  
Reception to follow

Tornadoes are one of the most violent of all atmospheric phenomena. Small and short-lived, they are difficult to observe safely and study. Since the 1980s, Howard Bluestein (a Massachusetts native) and his research group have been using increasingly sophisticated mobile Doppler radars to probe tornadoes with the objective of mapping their winds and catching them in the act of forming, with the ultimate aim of supplying structural engineers with data that can be used to help them design structures that are tornado proof. In this talk, Professor Bluestein will show some of his collection of photographs and videos of this dangerous yet beautiful natural phenomenon.

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## 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 [colm@bpi.cam.ac.uk](mailto:colm@bpi.cam.ac.uk) or [doering@umich.edu](mailto:doering@umich.edu) if you have any suggestions regarding this newsletter or the GFD Program.

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