



Theme-of-the-Year

The scientific leaders of The National Center for Atmospheric Research (NCAR) recognized early on that in order to understand the dynamics of the atmosphere and oceans and the planetary boundary layer, the sun and solar-terrestrial interactions, investigating relevant turbulent processes at a fundamental level would be essential. Turbulence has remained both a vital and challenging field, taking on added importance as the geosciences tackles the multi-scale interactions that characterize the Earth-Sun system. The difficulty of solving classical problems in turbulence through direct mathematical analysis has engendered a multidisciplinary approach where mathematical and physical models, computational science, observations and experiments are combined to make advances.

This Theme-of-the-Year (TOY) for 2008 is designed to support the geophysical and mathematical communities in this effort through a series of workshops exploring turbulence from these different perspectives with the goal of increasing the interconnections among theory, computation and experiments. The final activity of this TOY is a summer school with the intent of bringing new researchers into this field and giving them a multidisciplinary perspective.

The TOY-08 will be led by Keith Julien (Applied Mathematics, University of Colorado at Boulder) and Annick Pouquet (Geophysical Turbulence Program, NCAR) with workshops and schools being held in Boulder, CO.

The workshops are planned to accommodate 20-30 people and be a blend of research presentations along with ample time for discussions and more informal interaction. The summer school will draw on the material from the preceding workshop and will feature prominent researchers in turbulence. A registration fee is not required for the participants of the workshops. Some financial support will be available for graduate students and researchers, who would otherwise be unable to attend. Additional information can be found at www.image.ucar.edu/ThemeOfTheYear/2008/

Turbulent Theory and Modeling

27 - 28 February 2008, NCAR Mesa Laboratory

The extremely broad range of scales occurring in the atmosphere and oceans cannot be explicitly captured in general circulation models or large-scale numerical models, even on emerging petascale computers. Moreover, the mathematics and theory of multiscale interactions in turbulent flows are poorly understood, often relying on notions of spectral cascades and largely ignoring the crucial role of the coherent structures and forces that are ubiquitous in geophysical flows. Of special interest is the role played by rotation and stratification, as well as magnetic fields in the solar and space weather contexts. This workshop will address the theory and models for multiscale processes with a view towards integrating advances with state-of-the-art numerical experiments.

The participants are invited to register and submit an abstract on-line by December 12, 2007.

www.image.ucar.edu/Workshops/TOY2008/focus1/index.shtml

toy1@mail.ucar.edu

Petascale Computing for Geophysical Turbulence

5 - 7 May 2008, NCAR Mesa Laboratory

The geophysical community, and indeed, all of science, is progressing towards a petascale computing environment. Without doubt this is uncharted terrain. With respect to turbulence science, one key issue is the development of efficient numerical algorithms appropriate for multiscale problems and for large numbers of processors. Companion to petascale computation is the need for visualization and analysis of the output from large experiments. This workshop will be a broad survey of the opportunities and challenges for understanding turbulence as we move to petascale computational resources.

Observing the Turbulent Atmosphere: Sampling Strategies, Technology and Applications

28 - 30 May 2008, NCAR Mesa Laboratory

Measurements of turbulence in laboratory experiments and in observations of natural flows are crucial for elucidating the basic structure of fluid motions; the discovering of new characteristics of a fluid; guiding theoretical studies; providing empirical data to compare against modeling results. The measurement of turbulence along the enabling sensor technologies, span many areas in geophysical turbulence research. This workshop will bring together scientists and engineers and enable discussions on these cross-cutting aspects.

Summer School: Geophysical Turbulence

14 July - 1 August 2008, NCAR Mesa Laboratory

This school is structured and motivated by the three workshop themes and seeks to train graduate students in a multidisciplinary view of research in turbulence. The format will consist of lectures, discussions, tutorials, and hands-on use of codes. The students will have the opportunity of interacting with leaders in the field of geophysical turbulence and one goal of the school is to initiate collaborative connections among participants that will have a lasting impact on turbulence research.

The summer school is sponsored in part by the The National Science Foundation Collaboration in Mathematical Geosciences