

Abstract

Oberwolfach Workshop:

Multiscale Wave-Turbulence Dynamics in the Atmosphere and Ocean

Dates:

18 Sep - 24 Sep 2022 (Code: 2238)

Organizers:

Ulrich Achatz, Frankfurt
Oliver Bühler, New York
Chantal Staquet, Grenoble
William Young, La Jolla

The atmosphere and oceans present an ongoing first-rate challenge to science and mathematics because they operate on an extremely broad ranges of scales, from molecular to planetary in length and from below seconds to millennia in time. Because of this range climate simulations still suffer from leading-order uncertainties. Conceptual simplifications, such as scale-separation assumptions, and the neglect of many physical processes have enabled past progress in understanding the interactions of the basic dynamic constituents, i.e. large-scale mean flows, medium-scale waves and vortices, and small-scale turbulence.

But present-day research is stretching the validity of this framework. For example, it is recognized that intermediate-scale waves and vortices are key elements linking all relevant players, and are often characterized by nonlinear interactions on comparable scales and also by additional physical nonlinearities due to effects such as air moisture.

Motivated by recent advances in mathematical wave-vortex and wave-wave interaction theory, turbulence theory, and the study of internal wave dynamics as well as their numerical parametrization, the workshop will gather leading experts in these fields to foster a synthesis of new approaches and thereby a new level of understanding and numerical treatment of climate dynamics.