

Theoretical and Practical Perspectives in Geophysical Fluid Dynamics (TAPGFD)

Dates: 20 May 2024 – 31 May 2024

Format: International Scientific Meeting (Two Weeks)

The Earth's climate system is governed by complex **atmospheric and oceanic dynamics** operating across a wide range of temporal and spatial scales. Interactions across these scales lead to energy transfers that are fundamental to understanding the **ocean-atmosphere energy cycle**, yet remain poorly constrained.

Key physical processes—such as **turbulent mixing, instabilities, eddies, and wave-mean flow interactions**—are difficult to observe directly or resolve fully in numerical models and are therefore often parameterized. This presents ongoing challenges in achieving **energy-consistent closures** in ocean and climate models.

This two-week international meeting brings together experts to address these challenges through a combination of:

- Analytical theory
- Numerical modelling
- Observational and data-driven approaches

The programme covers **multi-scale and multi-physics topics** in geophysical fluid dynamics, including:

- Eddies, waves, turbulence, and instabilities
- Frontal dynamics
- Energy transfers and cascades
- Parameterizations in ocean and climate models
- Data science, data assimilation, and stochastic approaches

The event is hosted by the **International Centre for Theoretical Sciences (ICTS)**.