INSTITUT POLYTECHNIQUE DE PARIS

Mechanics Seminar series 2024 – 25

Impact of convective waves on large-scale atmospheric circulation and aviation safety

Speaker: Martina Bramberger

Date and time: November 21, 2024 (10 - 11 am)

Venue: Amphi 104 (Pole Meca)

Abstract

Atmospheric gravity waves (GWs) generated by convection play an important role in forcing large-scale atmospheric circulation that significantly impact seasonal and near-term climate predictions. Collectively these waves are known to drive long-term, slowly varying global circulation patterns as e.g. the quasi-biennial oscillation (QBO) in the tropical lower stratosphere. Furthermore, on smaller scales, these waves can cause clear-air-turbulence, a hazard to aviation that can cause severe aircraft damage and injuries of passengers. We present different case studies where we combine state-of-the-art balloon-borne and airborne observations with global circulation modeling forecasts. One study focuses on recent developments in predicting convectively induced clear-air-turbulence on the example of a Singapore airline turbulence incident in May 2024. Another study aims at quantifying the impact of convective waves on the QBO with Strateole-2 super-pressure balloon measurements and ultra-high-resolution forecasts from the European Center for Medium-Range Weather Forecasts integrated forecasting system (ECMWF IFS) and Japanese Atmospheric General circulation model for Upper Atmosphere Research (JAGUAR).

About the speaker

Dr. Bramberger is a research scientist at NorthWest Research Associates, a scientific research organization based in the U.S.A. Before this, she was awarded her PhD in Meteorology from the Ludwig-Maximilian University in Germany. Her research interests include atmospheric dynamics, gravity waves and clear air turbulence in aviation. She is especially interested in improving climate predictions by bringing together observations and modeling, and enjoys analyzing gravity waves with a diverse set of measurements including ground-based and airborne lidar, radar, balloon-borne, aircraft in situ, airglow and, space-born COSMIC 2 and AIRS observations.