

PhD Project: Cirrus cloud studies

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Overview: Cirrus cloud covers approximately 30% of the globe at a given time, and understanding its properties is vital for atmospheric models. This PhD exploits unique flight campaign atmospheric datasets to test state-of-the-art cirrus models, to improve cirrus modelling in climate models and numerical weather prediction.

Background: The influences of atmospheric humidity and clouds on the Earth's climate system are two of the most important uncertainties in our present understanding of how the climate system works. To improve this situation, and increase the accuracy of the parameterisation with which cloud-radiation and humidity-radiation processes are described in General Circulation Models (GCM) we require accurate observations of how water vapour and clouds interact with the radiation field. In addition, we now know that emission in the far-IR (FIR), from the pure rotation band of water vapour, and from high cold clouds (cirrus), is very important. However, due to the technical challenges, the FIR is relatively under-explored. At Imperial College we developed the Tropospheric Airborne Fourier Transform Spectrometer (TAFTS), the first FIR high resolution radiometer capable of observing up and down-welling radiation from an aircraft. TAFTS can be used to look at the radiative balance of the climate system and study cloud-radiation feedback.

PhD Project details: This project will investigate the link between ice cloud microphysical properties and the radiative signatures of cirrus at the macrophysical scale, such as would be seen from space. Our NERC funded project CIRCCREX (Cirrus Coupled Cloud-Radiation Experiment) involves flight campaigns with TAFTS on the Met Office FAAM (Facility for Airborne Measurements) aircraft, with instrumentation including radiometers (unique range 0.3–125 μm) and new ice microphysics probes. The resulting datasets give a unique opportunity for cirrus studies, including the first broad-band (microwave, far-IR to visible) testing of the world leading models of cirrus-radiation effects by comparison with the in-situ field campaign measurements. The student will benefit from collaboration with our Met Office project partner, and Manchester and Hertfordshire University partners specialising in measurements of ice particle properties. The student can expect to have an opportunity to participate in campaign flights. The project is expected to have large impact, such as improved cirrus parameterisation in Global Climate Models and directly in the UK Met Office numerical weather prediction models. The student can work with the authors of these models through our established collaborations. **The Applicant:** You should have a first class degree in physics or atmospheric physics and enjoy computational, analytical and experimental work. Applications will be considered as they arrive, early application is strongly recommended. After applying, please send another copy of your application to j.pickering@imperial.ac.uk.

For more information and eligibility information please visit:

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