# Characteristic structures of precipitating clouds over tropical ocean

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The characteristic structures of precipitating clouds over land are widely studied due to the availability of high quality observations including weather radars. For oceanic convection, studies rely on satellite observations, which cannot observe the 3D evolving structure of clouds, or field campaigns which tend to target only a small region. In the atmospheric science community, there are moves towards running convection-permitting (CP) models, which can represent individual precipitating clouds, on the global scale both for weather forecasting and climate prediction. Biases in the representation of precipitation over tropical oceans in global models are known to have implications for the large-scale circulation and hence climate prediction, but CP model biases over ocean are hardly studied, let alone understood.

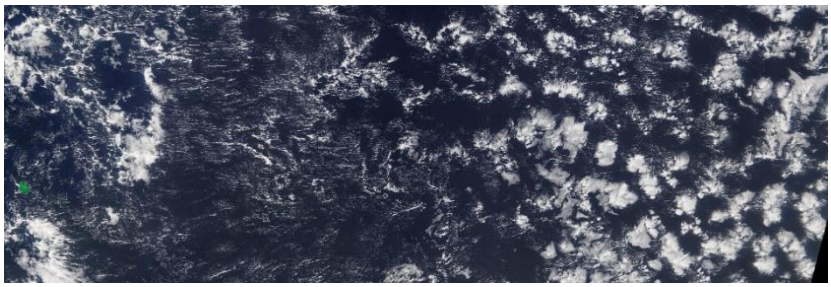

***Figure**: NASA GOES-16 satellite image of clouds over the tropical western Atlantic from 8 January 2020. The scene depicts a range of precipitating cloud modes. Using radar observations and high-resolution model simulations, the 3D morphology and evolution of these modes will be studied.*

In this project, you will use radar observations from recent and upcoming field campaigns to characterize the 3D structures of precipitating clouds over tropical oceans and evaluate their representation in Met Office CP model simulations. You will run your own simulations with the Met Office CP model to investigate the prevalence of different precipitating cloud modes, such as shallow or deep convection and stratiform precipitation, to understand how this varies with model physics parameters and resolution. For specific periods of interest, you will study how these cloud modes – and the model performance – depend on the large-scale state of the atmosphere and ocean, including the position of the inter-tropical convergence zone.

**Training opportunities:**
You will frequently interact with Met Office scientists and you will have the opportunity to run versions of the Met Office model, testing different physical parameterization schemes. You will have the opportunity to spend a period of time at the Met Office to work on your project and experience an operational forecasting environment and you will be encouraged (and supported) to participate in relevant field campaigns.

**Student profile:**
This project is suitable for students with a degree in an environmental or physical science. A strong affinity for developing skills in programming and handling of large and complex data sets is beneficial, although no prior experience is required. Knowledge of one of the three areas of research (radar meteorology, clouds and convection, and NWP) is desirable.

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https://research.reading.ac.uk/scenario/