Formation and Workshop: DREAM / CARDAPIO

Dynamical Research Empirical Atmospheric Model

16-17 July 2025
Salle Lyot, OMP, Toulouse

An introductory workshop to present the model DREAM. We will show you what it can do and how to use it.

DREAM is based on a global numerical model of the atmosphere that can easily run on a laptop. It has been used in numerous investigations from academic studies of dynamical processes to practical seasonal predictions of continental rainfall.

https://dream-gcm.github.io/

CARDAPIO is an international project based on a collaboration between France and several countries in the tropical band with the objective of reinforcing links between modellers and forecasters, concentrating on Sea Surface Temperatures, continental rainfall and hydrological applications.

https://irn-cardapio.github.io/

Most of the two days will be dedicated to presentation and training in the use of DREAM. Participants in the training sessions are also welcome to attend the half-day of CARDAPIO presentations on the first afternoon. All sessions will also include a zoom link for external participants and the hands-on sessions will be guided by three instructors.

Objectives of the training:

- *Run some simple experiments to simulate large scale atmospheric waves on a sphere, including equatorial Kelvin and Rossby waves and extratopical Rossby waves.*
- *Explore the large scale atmospheric response to imposed tropospheric heating anomalies and SST anomalies.*
- *Understand the way the general circulation is forced including the contribution of transient systems.*
- *Generate basic diagnostics for a number of dynamical and physical atmospheric variables.*
- *Hands-on experience with a simple GCM that is able to reproduce the global circulation with modest computing facilities.*
- *Learn how to simulate diverse phenomena including the large scale response to climate anomalies and the global distribution of rainfall.*

Prerequisites:

Experience with unix required. Fortran, bash scripts and python will be used. Basic understanding of atmospheric dynamics and physics.

Instructors:

Nick Hall - model code and experimental design: dynamical model and simple GCM.
Stephanie Leroux - installation and execution, dynamical model and diagnostics.
Hong Hanh Le - dynamical model, diagnostics and visualisation.

Program

Wednesday 16th July:

9:00 Welcome / Introduction to DREAM - Nick Hall

10:00 Github and Docker - code installation - Stephanie Leroux

10:30 Hand-on session - basic installation and first steps

- exercises on the general circulation and large scale waves

Wednesday Afternoon CARDAPIO Workshop
(alternatively continue with personal work on DREAM exercises)

14:00 Junior Francisco Vasconcelos, *FUNCEME, Fortaleza, Brasil* - Forecasting at FUNCEME

14:30 Aubains Hounsou Gbo, *LABOMAR/UFC-Fortaleza, Brasil* - Atlantic SSTAs and the abnormally warm condions in 2023

15:00 Flora Deffon *CIMPA, UAC, Cotonou, Benin*- Seasonal prediction of SSTAs and rainfall with AI

15:20 Pause

15:50 Rondrotiana Barimalala, *NORCE, Bergen, Norway* - The Atlantic forced component of the East African long rain

16:20 Hong Hanh Le, *Meteo France / IRD* - Regional modelling in Southeast Asia / West Pacific

16:50 Nick *LEGOS/Univ. Toulouse* - Ergodicity and stationarity in the extratropical response to an equatorial heating

Thursday 17th July

9:00 Continue hands on instruction

- *synoptic waves, heating anomalies and rainfall*.

10:30 What else can you do with DREAM ?

- *some more advanced topics - Nick Hall*

11:00 Interactive session to define student projects

14:00 Supervised work on individual projects