

First South African CROCO Summer School Basic Courses 17/10 – 21/10 2022

Motivation of the courses:

The course will be composed of a suite of lectures and hands-on sessions. It will follow all steps to prepare a CROCO configuration, making sure that each step will be explained in detail. Particular attention will be given to practicals and immediate application of the classes during hands-on sessions. The attendees will directly apply the morning class during the afternoon hands-on sessions on computers.

The class will take place in the CHPC (in Rosebank, close to UCT) and will make use of their server. The models will already be installed on the server. A maximum number of 20 in person participants and 20 virtual will be selected. At the end of the class, students are invited to copy their outputs and codes on their personal portable hard drives. Please note that lunch will not be provided during the class.

Target audience and prerequisites:

This course is designed for researchers, students, working professionals and/or interested in the use and features of numerical models of the ocean. A basic knowledge of physical oceanography (undergraduate level) and experience working with computer programming with Matlab/Octave, optionally Python, and knowledge of the Linux operating system is required.

For inscription, please fill the following form before July 15th:

<https://forms.gle/U7AN9dWUvrEmKAhL9>

Instructors (in-person):

Serena Illig, IRD, France
Jennifer Veitch, SAEON, South Africa
Rachid Benshila, CNRS, France
Guillaume Morvan, CNRS, France
Renaud Person, IRD, France
Christian Ethé, CNRS, France
Fabien Desbiolles, University of Milan, Italy
Lionel Renault, IRD, France

Instructors (remote):

Lionel Renault, IRD, France
Andres Sepulveda, University of Concepcion, Chile

The course lasts a week. Here is the schedule planned. It will be subject to changes before of the Summer School and according to the progression of the hands-on lab sessions.

Day 1 - October 17th - 9h30-12h30 - 14h-16h30:

Class "Introduction to regional ocean modeling", followed by a round-table discussion during which attendees will present their scientific objectives and their expectations for this class

Hands-on session:

- Presentation of CROCO and CROCO_tools environment.
- Quick Linux and NetCDF recaps.
- First preprocessing steps: design of the model grid and work on the vertical sigma parameters

Day 2 – October 18th - 9h30-12h30 - 14h-16h30:

Class: "Numerical aspects I "Finite differences: Spatial and temporal discretization Finite differences

Hands-on session: Solving a simple case, the 1-D Diffusion equation

Class: Forcing and Open Lateral Boundary conditions

Hands-on session:

- Creation of all CROCO
- Forcing inputs (climatological forcing)
- Launch of the model (climatological configuration)

Day 3 – October 19th - 9h30-12h30 - 14h-16h30:

Class: "Numerical aspects II "

- Consistency and stability of a numerical scheme
- Introduction to CFL condition
- Quick overview of Sigma coordinates and truncation error

Hands-on session:

- Model outputs analysis
- Introduction to the online nesting
- Creation of all CROCO Forcings inputs (climatological forcing) for a zoom
- Launch of the model (climatological configuration) with a zoom

Day 4 – October 20th - 9h30-12h30 - 14h-16h30:

Role game in order to give a complete understanding of the model input files, with an emphasis on how the model handles the time

Class "Running an inter-annual simulation"

Hands-on session:

- Preparation of an inter-annual simulation input files
- Launch of the inter-annual simulation.
- Notions of optimization of the I/O

Day 5 – October 21th - 9h30-16h30:

Morning:

- Class: How to take into account the river run-off?
- Hands-on session: Let's put river in your configuration
- Class: Notion of model validations. Example: Taylor diagram presentation

Afternoon:

- Class: Introduction to offline floats propagation
- Class: Introduction to LiveCROCO