



*ICEMASA is a scientific joint venture between South African and French institutions focusing on marine and atmospheric sciences through a multidisciplinary approach. Ideally located in Cape Town, at the crossroad of three interconnected oceans, this International Joint Laboratory is the IRD's flagship project in South Africa.*

## Research

- Ocean circulation, biogeochemistry and climate interactions
- Effects of global changes on marine ecosystems and fisheries
- Observational and modeling strategy

## OVERVIEW

ICEMASA was initiated in 2009 by the Institut de Recherche pour le Développement (IRD) partnering with 3 other French institutions : Centre National de la Recherche Scientifique (CNRS-Insu), Université de Bretagne Occidentale (UBO, Brest), Université de Montpellier (UM, Montpellier); and the University of Cape Town (UCT), the Department of Agriculture, Forestry and Fisheries (DAFF) and the Department of Environmental Affairs (DEA).

This forms a network of 60 researchers and technicians, across various disciplines: physical oceanography, marine biogeochemistry, ecosystem modeling, marine ecology and fisheries.

ICEMASA is made of two components : a research package developed according to a science plan, and a training and education program promoting mobility for Master's and Doctoral students between France and South Africa.

ICEMASA developed a 1<sup>st</sup> phase from 2009 to 2013, and was renewed for a 2<sup>nd</sup> and last phase (2014-2018).

## Education

- Co-supervise MSc and PhD students
- Co-badged degrees between UCT/UBO and UCT/UM
- Organize Summer Schools, seminars and workshops

## GOALS

- Facilitate exchanges of scientific teams between France and Southern Africa
- Supplement existing capacities on specific research themes
- Connect physical and ecological sciences in the marine environment
- Promote studies assessing climate change impacts on ocean, ecosystems & fisheries
- Strengthen capacity by developing education and training programs

## KEY FIGURES

### Staff :

- 611 months of expatriated staff from IRD, University of Brest and CNRS, 2009-2018
- An average of 70.5 months/year of expatriated French staff (8 to 11 researchers present at the same time for 2011-2015)
- 55 months of long-term mission (2-3 months) for French staff

### Publications (peer-reviewed journals):

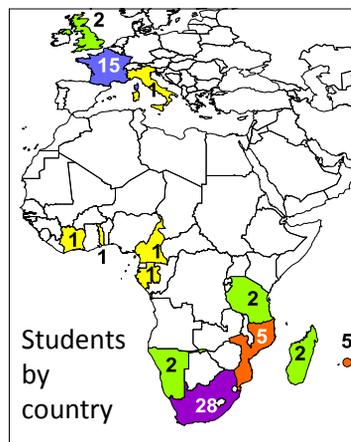
- 130 articles published during ICEMASA-1 (2009-2013), 32% co-authorship with southern African scientists
- 180 articles published during ICEMASA-2 (2014-2017), 34% co-authorship

### Funding by partners (average 2014-2017):

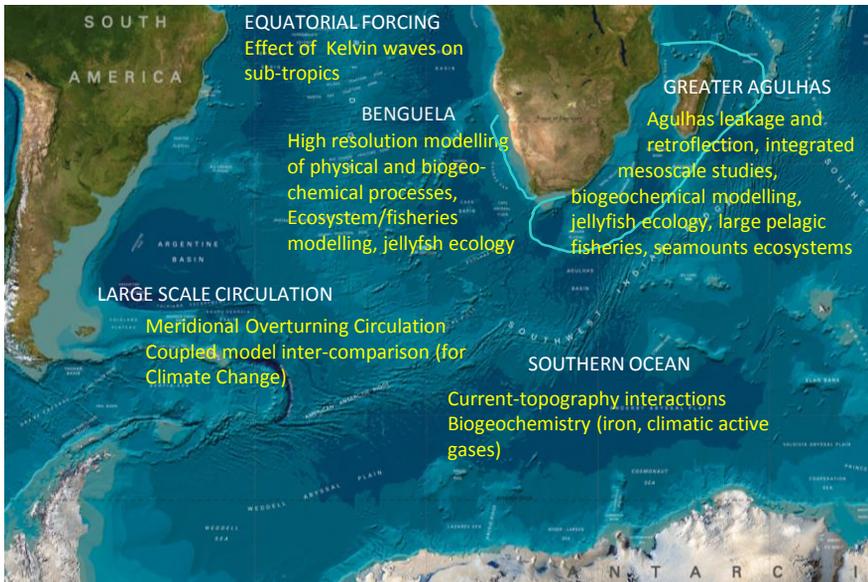
- Ship time = 620 000 €/year
- Running expenses = 127 000 €/year

### Education/Training program :

- Specialist lectures, tutorials (Honours , Master's), Summer schools, Workshops
- Establishment of co-badged Master's between UCT-UBO and UCT-UM
- Co-supervision of 26 PhD, 33 Master's and 8 Honours (67 students overall)
- 55% of students from Southern Africa, 61% from Africa, 72% from Africa + Indian Ocean islands (see map)
- Students male:female ratio = 55:45



## SCIENCE PLAN



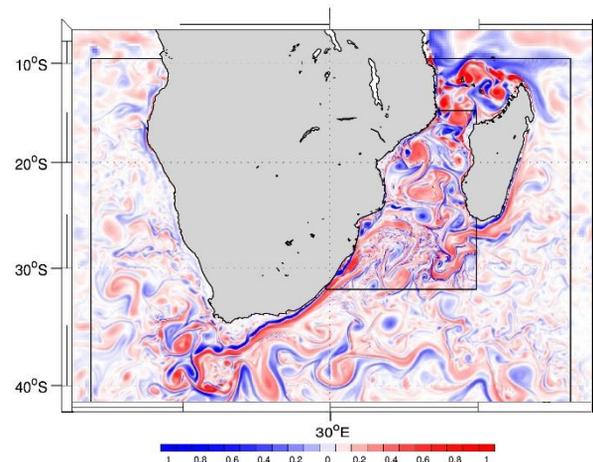
For the second phase, the ICEMASA Science Plan was updated to address the emerging scientific challenges in the region, and three main themes were designed: Climate and Oceans, Environmental impacts on ecosystems, Climate/Ecosystem/Fisheries interactions. The research activities are carried out in the waters around Southern Africa, including the Equatorial Atlantic to account for the forcing at the northern boundaries that impact coastal ecosystems.

## OCEAN CIRCULATION, BIOGEOCHEMISTRY AND CLIMATE

The main objective of coastal and large-scale oceanography over southern Africa is to reproduce, describe and understand the processes driving the circulation and the productivity of the ocean and their interactions with the lower troposphere.

The approach developed here combines observations and numerical simulations that will contribute to the regional monitoring of water masses and heat or biogeochemical fluxes.

The models, once validated by observations, are essential tools to perform predictions on the status of marine ecosystems along with climate change scenarios.



Eddies intensity (simulations CROCO/ICEMASA)

## ECOSYSTEMS AND FISHERIES



This research area investigates the effects of global change on marine ecosystems and fisheries. Scientists focus on describing the properties of ocean habitats affected by fishing, shedding light on the movements of pelagic fish and depicting a clear image of the marine food web in relation to its environment. Several researchers in various fields such as ecology, economy or law, are working together to achieve the ultimate goal: the creation of a reliable representation of the evolution of our ecosystem in the context of a changing environment.