Summer school "Ocean-atmosphere interactions"
12-20 of April 2022
San Ignacio de Huinay Foundation
in collaboration with the Institut de Recherche et de Développement and Ifremer, France

Context and Participants

The "Ocean-atmosphere interactions" summer school was held at the facilities of the San Ignacio de Huinay Foundation between the 12 and 20 of April 2022. To follow this intensive 56-hour course, 12 students (5 women, 7 men) received scholarships from the Foundation, including postgraduate students, doctoral students and young researchers, of 3 nationalities (Chilean, Ecuadorian and Cuban). The classes were given by Dr. Swen Jullien (Ifremer, France), Dr. Véra Oerder (Millennium Institute of Oceanography and Huinay Foundation) and Dr. Samuel Hormazabal (director of the Foundation). This school was carried out in collaboration with the Groupement de Recherche International CROCO (GDRI-CROCO, IRD, France) which covered Dr. Jullien's trip from France to the Foundation's facilities in Chile.

Content

For 7 days, the participants studied the different types of energy exchanges between the ocean and the atmosphere at scales ranging from the large scale (that of the ocean basins, with time scales from a few months to decades or hundreds of years) to the mesoscale, and its consequences for climate and ocean dynamics. They learned the role of the ocean in climate change, the mechanisms behind climatic phenomena such as El Niño events and tropical cyclones. They studied the coastal upwelling that occurs along the coasts of Chile and its impact on the climate. They also analyzed the consequences of mesoscale ocean-atmosphere interactions on ocean dynamics. In theoretical-practical activities, students also learned to process data from observations and numerical model outputs to show the interactions between the ocean and the atmosphere and their consequences. Finally, the participants conducted a short scientific investigation in 3 small groups with given topics, and presented the results through an oral presentation.

Programa de la Escuela

	M12/04	M13/04	J14/04	V15/04	S16/04	D17/04	L18/04	M19/04	M20/04
9h-10h		Introducción	Ciclones tropicales teoria	Interacción Océano-Atmósfera a mesoescala : Teoría 1	Interacción Océano-Atmósfera a mesoescala : Teoría 2	Interacción ola-viento : teoría	Interacción ola-viento : Actividad práctica	Sistemas de surgencia costera y acoplamiento Océano-Atmósfera	
10h-11h		Clima tropical ...							
11h-12h		Visita de los laborratorios	Salida al valle						
12h-14h	Salida de Hornopiren	Almuerzo	Almuerzo	Almuerzo	Almuerzo	Almuerzo	Almuerzo	Almuerzo	Llegada a Hornopiren
14h-15h		... y variabilidad ENSO	Ciclones teoria	Interacciones Océano-Atmósfera a mesoescala : Actividad práctica 1	Interacciones Océano-Atmósfera a mesoescala : Actividad práctica 2	Actividad grupal : Salida a las termas de Huinay	Proyectos de grupo	Proyectos de grupo	
15h-16h			Ciclones tropicales					Preparación de presentación de proyectos	
16h-17h		ENSO actividad practica	Actividad práctica						
17h-18h	Llegada a Huinay			Sesión de Poster	Proyectos de grupo			Presentación de proyectos	
18h-19h	Presentación centro de Huinay								
19h-20h	Cena	Cena	Cena	Cena	Cena	Cena	Cena	Cena	Cena

CROCO

The vast majority of the participants in the Summer School use models as part of their work/theses (80% of them are ROMS/CROCO users). The practical classes and group research projects were an opportunity to use outputs of forced and coupled simulations with ROMS/CROCO to show how these allow to represent given coupled phenomena related to tropical cyclones, coastal upwelling dynamics, and mesoscale ocean-atmosphere interactions. A part (~2h) of the theoretical course on mesoscale ocean-atmosphere interactions focused on the differences between coupled and forced models, and on the different strategies to force an ocean model, in particular on the new parameterization of the “current feedback (CFB)” implemented in CROCO.

Outcomes

The participation of the students in the course was very satisfactory, they were very interested and attentive to the classes, they fulfilled the work that was asked of them with great dedication. In a survey to which 7 of the 12 students responded, they were very satisfied with the course (one gave 9/10 and the other 6 gave 10/10). During the course, there was also an outreach talk on the subject of ocean-atmosphere interactions for the staff of the Foundation's Research Station (kitchen and cleaning/maintenance staff, ship captain, administrator).

Collaboration

The Summer School was followed by a 2-day stay in Castro for meetings with researchers from the Instituto de Fomento Pesquero (IFOP), the Instituto Milenio de Oceanografía (IMO), and the University of Conception. These researchers actively participate in the current modeling effort of the Chilean scientific community of the Patagonia region with CROCO. The meetings were an opportunity to make contact, present the modeling projects in development in the region (coupling with waves, operational oceanography, coupling with biogeochemistry, coupling with the atmosphere), and answer various technical questions and difficulties that arise on these different projects.