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## IFOP jointly with South Pacific Regional Fisheries Organization for Pelagic fisheries Scientific Observers and Coordinators carried out a training course for data collection and standards compliance

IN ORDER TO REINFORCE REGULATIONS AND STANDARDS DATA COLLECTION IN SOUTH PACIFIC REGIONAL FISHERIES ORGANIZATION MANAGEMENT AREA (ORP-PS OR SPRFMO FOR ITS ENGLISH ACRONYM), THIS ACTIVITY WAS HELD AS PART OF THE CHILEAN OBSERVER ACCREDITATION PROGRAM PROCESS TO ORP-PS.

"Currently there is a regional fisheries management organizations (RFOs) growing network operating in practically all the world's oceans, generally made up of coastal States of a region, as well as other countries with fishing interests in protected areas or protection of these Regional Organizations. These RFOs have



in many cases management responsibilities for fish stocks in various areas and provide forum for countries to agree on conservation and management decisions, often including fishing allocations, measures to combat illegal, unreported fishing and unregulated or species protection such as turtles, birds or marine mammals with measures aimed at reducing interactions or their incidental capture in fishing activities carried out there. In ORP-PS specific case, this issue is presented as relevant to our country, either because of the geographic location of its jurisdiction (off all of our coasts outside the exclusive economic zone in the Pacific Ocean) or because of the measures that are taken in it (for example, the horse mackerel quota is sanctioned within this organization).

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The ORP-PS is currently made up of 15 member states (Chi-





le, Australia, China, United States of America, European Union, Ecuador, New Zealand, Russian Federation, Peru, Cuba, Denmark, Taipei, Korea, Vanuatu and Cook Islands) and 3 non-contracting states but collaborators of the Convention (Panama, Liberia and Curaçao).

Within the 21 Conservation and Management measures currently in force in the South Pacific Regional Fisheries Organization, the Conservation and Management Measure for the PS-RFMO Observer Program (MCO 16-2019) indicates the obligation of the states that carry out fishing activity in these international waters to have accredited Observer Programs in the convention from 2024 to comply with different coverage requirements established for fisheries, which is why this type of activities is in the Chilean Observer Program accreditation process direct support currently underway”, explained Erick Gaete, in charge of the accreditation process.

Leonardo Caballero, Sampling Management Department Head, commented “among the topics covered in this training, there are specific SPRFMO aspects and regulations, types of fisheries carried out there, measures related to specific Scientific Observation that is executed and reported by Chile, Coordinators and Observers operation and security protocols, mandatory ORP-PS mitigation measures and good practices to avoid incidental birds, turtles and marine mammals capture, as well as protocols for safe handling and release of these species, in case of incidence of this type of situation”.

For the activity successful development, there was support and participation as rapporteurs from various IFOP and Fisheries and Aquaculture Undersecretariat specialists, among which are: Erick Gaete (In charge of the accreditation process), Leonardo Caballero ( Sampling

Management Department Head), Marco Troncoso (General Coordinator of the DGM), Patricia Zárate (Highly Migratory Resources Monitoring Program Head), Karin Mündnich (International Affairs Head at Subpesca), Luis Cocas (Bycatch Research and Reduction Program Head and in charge of Accreditation process before the ORP-PS by Subpesca), Marcelo García (in charge of Seabirds in Subpesca Issue) and Jorge Guerra (in charge of Marine Mammals in Subpesca issue)”.

## Increasing horse mackerel information

The “High seas’s horse mackerel biological condition” project began in 1998 with a methodological cruise that defined area, research period and design. From then until 2020 -although with some interruptions- the species has been studied from south-central Chile coast up to 1000 nm using industrial fleet vessels that operates in horse mackerel fishery. The main objective is to estimate relative abundance indexes of horse mackerel eggs and larvae and to characterize the resource aggregations during maximum reproductive activity period.

Project manager Carolina Lang stated: “This project represents three institutions IFOP-INPESCA-UNAB collaborative work . In addition, the use of fishing vessels as scientific platforms implies other challenges, such as acoustic equipment calibration and sampling protocols implementation, so collected information is comparable to any other research. In this sense, the industry willingness and captains is valuable and key on activities development on board, which in turn promotes stakeholders participation in its management process.

This project main results are currently used by ORP-PS (South Pacific Regional Fisheries Organization) to guide decision-making and stock assessment. But also, detailed information on reproductive, environmental and trophic condition has allowed us, on the one hand, to expand our knowledge about the species, which is a source of publications and information for other studies, and on the other hand to detect eggs, distribution changes. reproduction and spawning habitat, leading to new questions and the need to integrate new research to elucidate factors that affect these changes.

This year 2020, we were able to use a predictive model that considers environmental conditions to determine the probability of horse mackerel eggs in the oceanic re-



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gion, this effort seeks to efficiently distribute available resources, fishing vessels, and be more successful in meeting eggs. We will evaluate the success of this tool when we have results on the distribution of eggs and if it is effective, the model could be transferable to other species and spawning biomass evaluation studies ”.

According to Aquiles Sepúlveda INPESCA director, “today we are working on collected information processing and analysis, which will undoubtedly be important to meet the research’s setted objectives, and also an input for future fishery development. Our country maintains a robust research on horse mackerel and this study is another step in that direction ”.

Sebastian Klarian from UNAB adds: “This project provides the opportunity for joint research. On board, cooperation between institutions is mutual in samples taking, as well as in results discussion. Our role in the project is to investigate trophic dynamics and infer horse mackerel movement patterns. For this we use horse mackerel’s eye lens and combine stable isotope technique to know its life history. These results will have an impact on subsequent decision-making and progress towards ecosystem management ”.

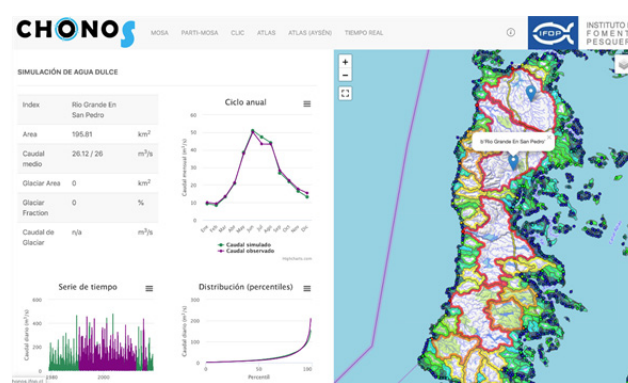
## What is the future vision of the project?

Carolina Lang added, “Chile and the world are experiencing changes and among them, resources availability and oceans health, which are also a matter of global concern. They are all related and difficult to address because there is a limited budget and multiple needs. But understanding the changes in the oceans is the first step in developing measures that allow better management and our seas continue to provide food security and well-being, today and in the future.

By gathering research studies information, researchers can learn more about species behavior and their response to environmental changes. But also, it better prepares us to share this knowledge with users. Therefore, collaboration helps to build a bridge between science and industry. In this project, the use of fishing vessels as scientific platforms is key to collecting information that supports evidence-based decision making ”.

## IFOP’s Chonos page launches new application

CHONOS (CHONOS.IFOP.CL), IFOP FISHING DEVELOPMENT INSTITUTE WEB PORTAL, SINCE 2018, HOUSES CHILEAN PATAGONIA OCEANOGRAPHIC INFORMATION SYSTEM, CONTINUES TO GROW WITH FLOW PUBLICATION (CHONOS.IFOP.CL/AGUADULCE/VISOR) NEW APPLICATION BASED ON NUMERICAL MODELING THAT ADDS TO THE ALREADY EXISTING MOSA (OCEANOGRAPHIC FORECAST), PARTIMOSA (PARTICLE DISPERSION MODEL), ATLAS (MARINE ENVIRONMENT ENVIRONMENTAL INFORMATION LIBRARY) AND CLIC (MATRICES CONNECTIVITY).



FLOW is jointly developed by IFOP and Meteodata (www.meteodata.cl) allows the user to view, through an interactive map, rivers and glaciers average daily flow rates in Los lagos, Aysén and General Carlos Ibáñez del Campo, Magallanes and Chilean Antarctica regions; obtained from VIC hydrological model (“Variable Infiltration Capacity Model”).

VIC (Liang et al., 1994) is a hydrological model that solves energy and water balance equations to calculate flows (surface runoff + subsurface base flow) from the input of meteorological data from the CR2MET model of 5 km resolution on a hydrographic network generated by TauDEM software and the SRTM topographic elevation database of 30 meters resolution. The spatial resolution of VIC is 5 kilometers, which yields a total of 31120 hydrographic basins that discharge fresh water to the marine system of Chilean Patagonia.

FLOW presents these flows in daily averages in time series that currently go from 1980 to 2018, allowing, thanks to its scalability, to update the results



of the model. VIC is calibrated and evaluated in its performance with 62 fluviometric stations of the General Water Directorate.

In Putemún IFOP researcher Pablo Reche words, “FLOW expands knowledge of freshwater flow discharges in Chilean Patagonia marine system, which due to the enormous extension and operational remote accessibility is not possible at the moment through direct measurements. In this way, FLOW serves to feed the other Chonos numerical models and thus solve the processes that generate low-density flows at the head of estuaries and fjords.”

## Researchers from Ecuador, Colombia, Peru and Chile participated in a Workshop about Optimal Multiparametric Analysis method Implementation and application

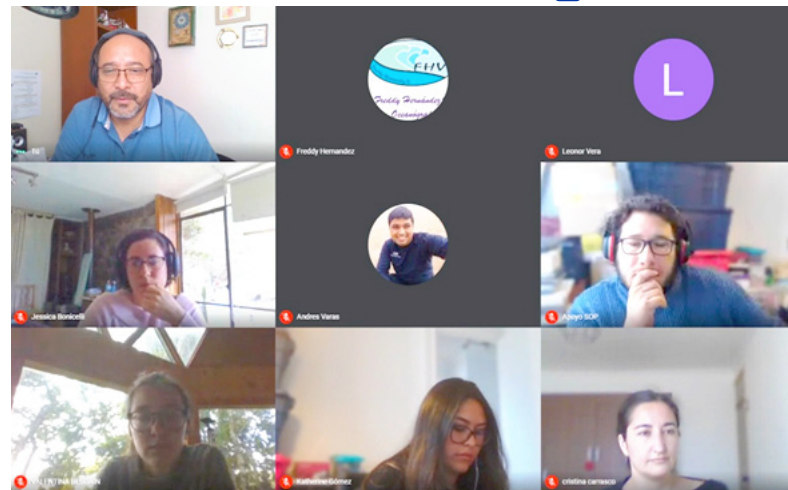
IT WILL MAKE IT POSSIBLE TO ACCURATELY IDENTIFY WATER MASSES PRESENT OFF SOUTH AMERICAN COAST.

Between December 21st and 22nd the virtual course “Optimal Multiparametric Analysis Implementation and application(OMP) method within the framework of the Researchers Exchange program” was held.

It was organized by Oceanography and Plankton Section from IFOP Oceanography and Environment Department and financed by a Performance Agreement between IFOP and CORFO in 2020. It was developed within the framework of researchers of the Coordinating Committee of Regional Cruises exchange program ( CC CR ERFEN) of South Pacific Permanent Commission (CPPS).

Researchers and Technicians from Ecuador, Colombia, Peru and Chile participated from:

- Valparaíso Oceanography and Environment Department
- Puerto Montt Environment Department
- Ecuador Oceanographic and Antarctic Navy Institute (INOCAR)
- Colombia General Maritime Directorate (DIMAR)



- Peru Sea Institute (IMARPE)
- Cristina Carrasco, professor, Oceanographer, Master of science and Universidad de Concepción PhD eligible.

The workshop was aimed at researchers and technicians working on the description of bodies of water in the Eastern South Pacific. The method of calculating water masses, which applies the optimal multiparametric analysis (OMP), is a tool that allows to better determine the participation percentages of water masses using chemical variables, such as oxygen and nutrients, together with those already traditional variables temperature and salinity, which are used in the traditional calculation method through the mixing triangle.

In the course’s two days the following topics and / or activities were developed:

- Optimal multiparametric analysis method (OMP) rationale and authors of
- OMP use Considerations, criteria and information
- OMP script delivery to the participants and a PDF course presentation.
- Matlab format script description that allows OMP calculation
- Program operation example
- Program Application Exercise with own data by country

This tool implementation will allow incorporating the analysis of water masses obtained with OMP method in reports or publications made by different working groups that participated in the course, as well as in reports of the annual regional cruises within the framework of the South Pacific Permanent Commission.

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## IFOP signs an agreement with Universidad Austral de Chile

On December 21st, Fisheries Development Institute (IFOP) signed a Postgraduate studies Cooperation Agreement with Universidad Austral de Chile (UACH), its aim is strengthening both institutions interaction, granting IFOP researchers facilities for postgraduate studies in programs offered by UACH Puerto Montt Headquarters .

The agreement will last 5 years from its subscription date.

Leonardo Guzmán, IFOP's Aquaculture Research Division Head referred to the agreement

Some of this agreement commitments are:

- Annually, Postgraduate Programs will reserve a total of 3 places for IFOP professionals, which will have a special fee value.
- IFOP undertakes to support the Program with experts by giving talks, in addition to participating in other mutually agreed activities, including conferences, seminars, among others, or as evaluating professors of master's degree or doctoral thesis.
- IFOP will financially support development, partially or totally, of thesis carried out by a student of postgraduate programs, whether this is a professional who works at IFOP or is a student carrying out IFOP interest research development and that is implicit in its work lines and strategic institutional development program.

IFOP in recent years has privileged this kind of relationships, not only because they strengthen joint work between UACH and IFOP, but also because they show the joint way in which joint work should be approached, in knowledge generation and advanced human capital formation, aspects that are not only of Los Lagos region interest, but also have national relevance.



## Abate Molina Scientific vessel begins 2021 with a cruise that will investigate anchovy and common sardines

THE SHIP HAS 5,510 DAYS OF OPERATION AND 234 CRUISES SINCE 1991, WHICH ARRIVED IN CHILE, DONATED BY JAPAN GOVERNMENT TO CHILEAN GOVERNMENT.

On January 5th, scientific vessel Abate Molina, from Fisheries Development Institute (IFOP) set sail with 27 professionals and technicians from Valparaíso's port ; to characterize and evaluate anchovy and common sardine stock resources present between Valparaíso to Los Lagos Regions, based on the hydroacoustic method, during the period of maximum recruitment and during immediate fall.

Research area is between Pichidangui and north of Caleta Mansa (Los Lagos region). The cruise will last 31 days, the head of the Cruise is Álvaro Saavedra fishing engineer and the ship captain is Takashi Abe.

Luis Parot IFOP Executive Director explained "this is the first cruise of the year and it will allow us to obtain data and background information to find out how the anchovy and sardine resources are. The Abate is a ship that fulfills a busy research schedule every year, with a very important effort from its crew, researchers and scientific observers. Due to the pandemic, they comply with very strict sanitary shipping measures, for example, they cannot get off at the intermediate landfall ports, they are kept in a closed gate in order to avoid contagion. During all of 2020 the ship carried out her work impeccably without having any infected workers".

Gersón Lizama IFOP Marine Operations Head commented "the ship had a successful operation year in 2020 given that it carried out the 7 scheduled cruises, from Arica to Canal Chacao, with 232 operation, days all of the above in a year with a pandemic. The success was due to established safety protocols, the result of which was that no member of the crew and researchers on board presented COVID contagion and therefore the ship was not affected in its operation".

