



Captain Carlos Zúñiga Araya

Director of the Chilean Navy Hydrographic and Oceanographic Service (SHOA)

Age: 44

Nationality: Chilean

Hydrographic Naval Engineer, APOLINAV – Chile.

Hydrographer Category “A”, OHI - ICA - FIG

MSc in Physical Oceanography, NPS – USA

Master in Naval and Maritime Sciences, ACANAV – Chile.

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Professional Profile

Graduated as a Navy Officer in December 1999.

Followed a Category "A" Hydrographic Program becoming a hydrographer and ocean science professional with proven leadership, exceptional teamwork skills for complex problem-solving in high-pressure environments, adaptability, and strong ecological and social awareness. Highly proficient in English (reading, written and spoken).

Professional Experience

2001-2003 Landing craft Elicura, Punta Arenas-Chile

This Chilean Navy ship, assigned to the Fourth Naval Zone and commanded by its Commander-in-Chief, plays a crucial role in supporting isolated communities in the Aysén and Magallanes regions by transporting vital materials, supplies, and food. It is crewed by 32 seamen.

Position: In charge of activities on deck, telecommunications, navigation, among others.

Function: Responsible for deck operations security, leading a team of 20 seamen during critical situations, including adverse weather, explosives handling, and heavy lifting. Additionally, responsible for ship navigation, including safe route planning and maintenance of all essential maritime safety equipment, such as communication systems and navigation radars.

2004-2011 SHOA, Valparaíso

and

2013-2015

Chilean Navy, Hydrographic and Oceanographic Service.

Position: Officer on Duty (OOD)

Function: 24 hours, approximately every 5 days, in charge of the security of SHOA's facilities, leading a team of 20 people. The most important technical tasks during the watch were related to the operation of the national tsunami warning center (SNAM) and the broadcasting of notice to mariners according IMO/IHO/WMO Manual on Maritime Safety Information, within the area of responsibility of NAVAREA XV.

2004 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: Secretary Officer

Function: Responsible for the processing of both internal and external documentation of the entire Service. In this function, the preparation of executive summaries for the documents is established as an added value to the work, as achieving greater fluidity in the associated processes. In charge of the administrative coordination of all the secretariats of the organization.

2007-2008 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: Head of Operations Planning Division

Function: In charge of planning hydrographic activities carried out by SHOA along the national coast determining the technical requirements of each activity in the field, having to combine the operational availability of internal teams and ships from different Commands of the Navy. This task requested a correct designation of the personnel, who fulfills other functions within the SHOA. The foregoing, in order to carry out the national cartographic planning.

2007-2011 and 2013-2014 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: Head of Survey Teams

Function: To accomplish hydrographic and oceanographic surveys along the Chilean coasts and Antarctica. After obtained the Cat "A", several surveys were conducted in order to obtain bathymetric (multi and single beams systems), positioning, tidal and current data used for SHOA's cartographic products, according the standards given by IHO and the Antarctic Treaty System.

2008-2009 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: Head of the Publications and Processes Division

Function: The publications division is responsible for the preparation of written or didactic elements useful for the safety of navigation according international standards ruled by IHO, IMO and WMO, for which it has a multidisciplinary teamwork, including editors, diagrammers, graphic designers, sailors and proofreaders. During the term, the periodicity in the updating of nautical publications was established, which is in force to date. In the processes division, a work group of 10 people including a photogrammetric interpreter, processors and geodesists whose mission is to deliver all the inputs for the preparation of nautical charts with all the planning that this task entails. As part of a processing line, the layer provided for this division were requested to fulfill CARIS' software standards. During this period, the migration from analogue to digital restores was carried out, constituting a technological leap for the aero restitution process, generating a positive impact on productivity, which was accompanied by a successful period of training and adaptation to the new technology.

2010-2011 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: Head of Customer Service Department

Function: According to current Chilean laws, all hydrographic and oceanographic studies carried out in any body of water within national jurisdiction must be inspected, controlled and/or approved by the SHOA. Within this context, this Department

has a group of 12 multi-disciplinary professionals dedicated to both office and field tasks, and must also manage permanently with private companies, so that established regulations are complied with. As private sector use different kind of sensors and software, the whole team was provided of a strong background of a wide range of post processing software for either bathymetric (multi and single beam) and met-ocean data analyze.

2013- 2021 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: *Head of the Oceanography Department*

Function: A team of more than 40 professionals executed a wide range of field and office operations, encompassing comprehensive coastal monitoring, the provision of critical information for maritime safety, and in-depth studies on ocean currents, wave patterns, tidal fluctuations, and climate change. These activities were conducted within the framework of various IOC-UNESCO monitoring initiatives, notably GLOSS and GOOS. The department publishes two annual resources, Tide Tables and Tide-Driven Current Forecasts, to disseminate these findings. A key responsibility is the operational oversight of the National Tsunami Warning System (SNAM), a multi-agency collaboration involving both civilian and military entities. SNAM's core mission is to deliver timely and accurate tsunami threat assessments. Recent advancements include the modernization of SNAM's decision-making protocols, achieved through collaborative updates with the National Disaster Management Office, and the development of a sophisticated decision support system. Addressing resource limitations, the department has successfully secured funding from a diverse array of international and national partners, including UNESCO, APEC, IHO, CPPS, NOAA, USAID, JICA, and DLR. These grants have enabled the delivery of specialized workshops, diploma programs, and seminars, with a focus on enhancing tsunami monitoring and preparedness. A notable milestone in international cooperation was the leadership of a Memorandum of Understanding (MoU) between SHOA and NOAA, which resulted in the deployment of three supplementary DART 4G prototype systems off the Chilean coastline.

2013- 2023 International Tsunami Information Center, Hawaii-USA

Position: *Associate Director*

Function: Spearheaded efforts to educate and mitigate the impacts of tsunamigenic events in nations throughout the Pacific Ocean basin. This involved the creation, implementation, and distribution of critical operational procedures for tsunami early warning centers. Facilitated sustained coordination with parallel initiatives in the Caribbean, Mediterranean, and Indian Ocean, within the IOC-UNESCO structure.

2022- 2023 SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: *Deputy Director*

Function: Among others, in charge of advising the Director of SHOA on all technical and scientific aspects of the Services work, such as cartographic production (training, planning, data collection, processing, quality control and delivery) according

international standards given by the International Hydrographic Office (IHO), the IOC – UNESCO and the World Maritime Organization (OMI). In the mid-term, the most challenging endeavor on going is the migration of our production line to the S-1XX standards.

2022- 2023 Pacific Tsunami Warning and Mitigations System, COI-UNESCO

Position: *Co-chair, Task team tsunamis UN Decade program*

Function: Along with the representatives of New Zealand and French Polynesia, deliver the background information on the Pacific basin to be considered in the global plan for the UN Decade of Ocean Sciences, on the particular issue of tsunamis, having to establish a program for a duration of 10 years, with a focus on training, mitigation and development of new technologies for the detection and monitoring of Tsunamis.

2025- SHOA, Valparaíso

Chilean Navy, Hydrographic and Oceanographic Service.

Position: *Director*

Function: Responsible for the Management of SHOA, being in charge of the accomplishment of the work program according to the human resources assigned and the allocation of the budget provided by law.

Captain Zuñiga is also the President of the National Oceanographic Committee (CONA) and Head of the Training Centre of the Hydrographic and Oceanographic Service of the Chilean Navy. At the international level, he is the Chilean representative to the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC), among others. As President of the National Oceanographic Committee, has the mandate of advising and coordinating the institutions that carry out ocean research in their different aspects in the field of oceanography in Chile, advising and coordinating national agencies and entities engaged in ocean and natural resource research. Also to develop, promote and maintain, in a coordinated, systematic and short, medium and long-range, programs for national institutions in the field of marine sciences, to enable them to acquire, among others, scientific knowledge of the ocean, its natural resources , its energy sources, its soil and subsoil, its interaction with the atmosphere, health and property protection, and a greater and better use of these resources and possibilities. Also to give scientific and technical advice in all disciplines that comprise the marine Sciences, to study and evaluate the various matters addressed by international organizations and to formulate proposals and suggestions for the national and science interest.

Academic background

1996-1999 Naval Academy

Escuela Naval Arturo Prat, Valparaíso-Chile
Four years of academic–military training.

2000 Training Cruise

Training Ship Esmeralda, by the seas of the world. First tools as a seaman, allowing a young sailor in training to lead personnel in different tasks.

- 2004-2006 Naval Engineering Course in Hydrography**
 Naval Polytechnic Academy, Viña del Mar-Chile
 Course delivered by the Navy and recognized by the College of Engineers of Chile. It was obtained the title of hydrographer category "A" internationally accredited by the International Hydrographic Organization (IHO), the International Federation of Surveyors (FIG) and the International Cartographic Association (ICA).
- 2011-2013 Master on Sciences in Physical Oceanography**
 Naval Postgraduate School, Monterey, California-USA
 Thesis developed in conjunction with the Department of Meteorology, focused on the development of an easily deployable drift buoy with sufficient capacity to measure momentum and heat fluxes between the surface layer of the ocean and the first 3 meters of the atmosphere (Small Flux Buoy for Characterizing Marine Surface Layers).
- 2016 Diploma in Tsunamis**
 Pontificia Universidad Católica de Valparaíso - Chile
 Program that provides knowledge related to the generation of tsunamis, monitoring of seismic networks and methodologies for the evaluation of the threat. It has an approach to the Chilean Situation.
- 2022 Diploma in Ethics and Philosophical Anthropology**
 Universidad del Desarrollo - Chile
 Tailored made for personnel of the Chilean Navy, focusing on the institution with a look at classical philosophy applied to the current times of the society.
- 2025 Master in Naval and Maritime Sciences**
 Naval War College, Viña del Mar-Chile
 Master focused on developing competencies to perform command, leadership, and advisory functions as members of high-level institutional bodies, operational forces, and in national and international joint staffs.

International meetings / conference attended

- 2005 Exchange on Argentinean Navy ship "Puerto Deseado". Antarctic**
 Participated in a two-month professional exchange aboard the Oceanographic Vessel ARA 'Puerto Deseado', conducting bathymetric surveys in Antarctica
- 2016 Meeting with authorities of the National Oceanic and Atmospheric Administration (NOAA) for MoU official launch. Washington DC - USA.**
 Through leading the Chilean negotiation team, he facilitated the installation of three DART 4G prototypes by allocating all necessary ship-time for their maintenance.
- 2014 - 2017 Meetings of the Southeast Pacific Regional Tsunami Warning System**
2018 - 2023
- 2019 OceanObs19. Hawaii - USA**

2022	Fourteenth Meeting of the Sub-Committee on World Wide Navigational Warning Service (WWNWS-SC14). Geneva, Switzerland.
2022	Annual Meeting of the Scientific Committee on Oceanic Research (SCOR). Busan – Republic of South Korea
2023	21st Meeting of the Capacity Building Sub-Committee (CBSC21) and 15th Meeting of the Inter-Regional Coordination Committee (IRCC15). Tokyo – Japan.
2018 – 2020 2020 – 2023 2025	Meetings of the Working Group on Tsunamis and other hazards related to sea level warning and mitigation systems (TOWS-WG). Paris, France.

Courses/ Seminars

2007	Workshop on bathymetric and oceanographic operations in navigable rivers. Iquitos – Peru.
2008	Digital Aero Photogrammetry Course taught by the Agustín Codazzi Institute, Bogota-Colombia
2008	Advanced course of Microsoft Project
2013	Ocean Leaders Practicum, taught by Stanford University, California-USA
2014	Training of the enhanced products of the Pacific Tsunami Warning Center (PTWC).
2017	APEC Workshop “Tsunami Threat Assessment for Tsunami Warning Centers of APEC Economies”

Languages

English :	Advanced.
Spanish :	Mother language

Computing

Word:	Medium
Power Point:	Advanced
Excel:	Medium
Matlab:	Medium
ERDAS:	Medium
HYPACK:	Medium
PDS2000:	Medium
CARIS HIPS:	Medium

Publications / Articles

2015. Análisis multisectorial eventos 2015 “Evento Hidrometeorológico Marzo – Terremoto/Tsunami Septiembre”. Comité Científico Técnico ONEMI.

<file:///C:/Users/Director/Downloads/Analisis%20Multisectorial%20Eventos%202015.pdf>

Catalan, P. A., Gubler, A., Cañas, J., **Zuñiga, Carlos**, Zelaya, C., Pizarro, L., Cienfuegos, R. (2020). Design and operational implementation of the integrated tsunami forecast and warning system in Chile (SIPAT). Coastal Engineering Journal, 62(3), 373–388.
<https://doi.org/10.1080/21664250.2020.1727402>

Zuñiga, Carlos (2017). Red de monitoreo de tsunamis en Chile. Anuario Hidrográfico y Oceanográfico de la Armada de Chile, tomo 69, pp. 101-103.

Zuñiga, Carlos (2020). El Sistema Nacional de Alarma de Maremotos a una década del terremoto y tsunami del 27 de febrero de 2010. Anuario Hidrográfico y Oceanográfico de la Armada de Chile, tomo 72, pp. 110-121.

Zuñiga, Carlos (2024). Carlos Dittborn: Un liderazgo transformacional que gestó el mundial de 1962. Revista Eslabón ASOFAR, 10a edición, pp. 41-46.

Hobbies

Reading

Jogging

Cycling

Soccer