CHILEAN NAVY HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE

NATIONAL TSUNAMI WARNING SYSTEM

Commander Alfredo Teixidó Díaz

SHOA Desde 1874

SNAM Chile

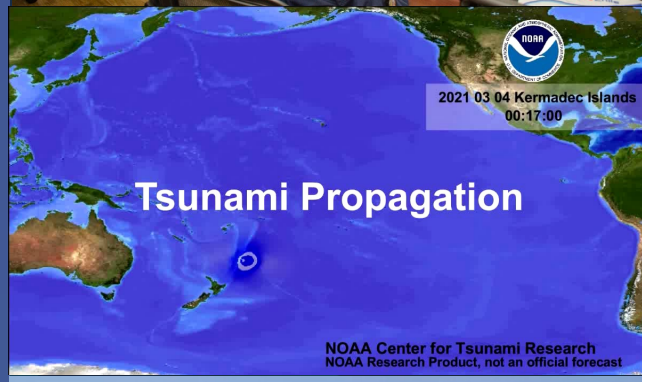
National Tsunami Warning System

National Tsunami Warning System

- Supreme Decret No 26, January 11, 1966.
- Mission: Tsunami hazard assessment within the national responsibility area.

SNAM Chile
Sistema Nacional de Alarma de Maremotos

- Advanced technology systems, with national scientific contribution.
- High level of professionalism and training.
- Redundancy in monitoring, command/control and communications systems.
- High cost of maintenance and renovation.
- Operation under national and international protocols.



System Activation/Timing

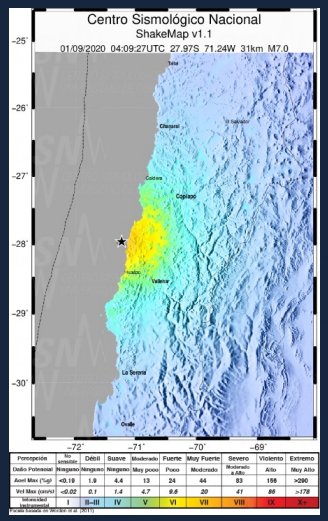
TRIPARTITE PROTOCOL

SENAPRED — NATIONAL DISASTER PREVENTION AND RESPONSE SYSTEM

CSN — NATIONAL SEISMOLOGICAL CENTER

SHOA — CHILEAN NAVY HYDROGRAPHIC AND OCEANOGRAPHIC SERVICE

Perception Report



2 Coastal intensities equal to or greater than VII or one equal to or greater than VIII

Preventive Evacuation

Intensity = Mercalli = Subjective

The population is evacuated while the event is being analyzed.

5 min

PRELIMINARY BULLETIN

Determination of earthquake parameters:
Epicenter - Depth - Magnitude

Magnitude = Objective

Analysts determine the characteristics of the earthquake.

It has 200 stations of its own, in addition to the stations in Peru, Bolivia, Brazil and Argentina.

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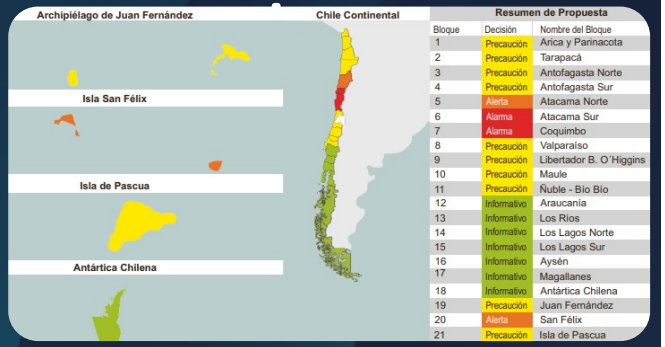


INFORMATIVE | **WATCH** | **ADVISORY** | **WARNING**

The preventive evacuation is maintained or cancelled according to the SHOA assessment.

SNAM

SHOA

NOAA

USGS science for a changing world

CSN

GFZ Helmholtz-Zentrum Potsdam

NOAA

International cooperation

unesco

Southeast Pacific Regional Cooperation

SNAM Chile

Sistema Nacional de Alarma de Maremotos

National Tidal Network

SENAPRED
Ministerio del Interior y Seguridad Pública
Gobierno de Chile

Interior Ministry

Maritime Field

Navy Field

SIPAT

Technology platform for Tsunami hazard forecast based on numerical modeling (pre-modeled scenarios).

Given a seismic event, it allows to obtain a quick and sectorized forecast (21 blocks) of the different threat levels for Chile.

CHILE DIVIDED IN

21 Blocks

According to Tsunami propagation and political division of Chile.

- ALARM
- ADVISORY
- WATCH
- INFORMATIVE

IMPLEMENTATION PHASE-W

THREAT ASSESSMENT

CONTINUOS UPDATE OF SEISMIC INFORMATION FOR NEAR-FIELD

Emergency Evacuation Actions

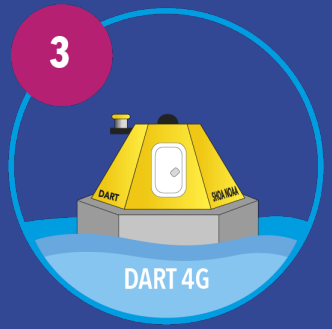
Type of tsunami	Threat Status	EVACUATION AREAS	Expected amplitude
Instrumental	INFORMATIVE	No action required	< 0.3m
Minor	WATCH	Evacuation of the population outside the Precautionary zone, which includes areas of beaches, rocky shores, wetlands, estuaries, river mouths, coastal walks (pedestrians), marinas, waterfronts (vehicular), coves, ports and docks.	0.3 to 1m
Intermediate	ADVISORY	Evacuation of the population towards the Security Area (or Safe Zone), established at a height greater than 30 meters or as provided by local authorities.	1 to 3m
Major	WARNING		≥ 3.0m

SNAM Chile
Sistema Nacional de Alarma de Maremotos

National Monitoring Network

DART BUOYS – SEA LEVEL STATIONS – METOCEAN BUOYS

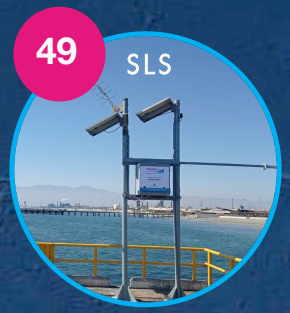
- Iquique
- Caldera



- Mejillones
- Pichidangui
- Constitución

- Iquique
- Antofagasta
- Concón
- Punta Arenas

- San Antonio
- Talcahuano
- Desertores



Isla de Pascua

Arica
Pisagua
Iquique
Patache
DART Iquique
Triaxys Iquique
Tocopilla
Mejillones
DART Mejillones
Antofagasta
Paposo
Taltal
Chañaral
San Félix
Caldera
DART Caldera
Huasco
Punta de Choros
Coquimbo
Puerto Aldea
Pichidangui
Quintero
DART Pichidangui
Watchkeeper Valparaíso
Valparaíso
Juan Fernández
San Antonio
Boyeruca
Constitución
DART Constitución
Watchkeeper Talcahuano
Coliumo
Isla Quiriquina
Talcahuano
Coronel
Lebu
Villarrica
Nehuentue
Queule
Corral
Bahía Mansa
Ancud
Puerto Montt
Castro
Puerto Melinka
Watchkeeper Melinka
Puerto Aguirre
Puerto Chacabuco
Puerto Edén
Caleta Meteoro
Triaxys Punta Arenas
Bahía Gregorio
Punta Arenas
Puerto Williams
Base Prat
Base O'Higgins

LEYENDA:

Red Nacional de Monitoreo de Nivel del Mar

- Estaciones de Nivel del Mar
- Estación de Monitoreo en Lagos
- Boya DART II
- Boya DART 4G
- Boya Triaxys
- Boya Watchkeeper
- Límites Administrativos

Escala: 1:27.000.000

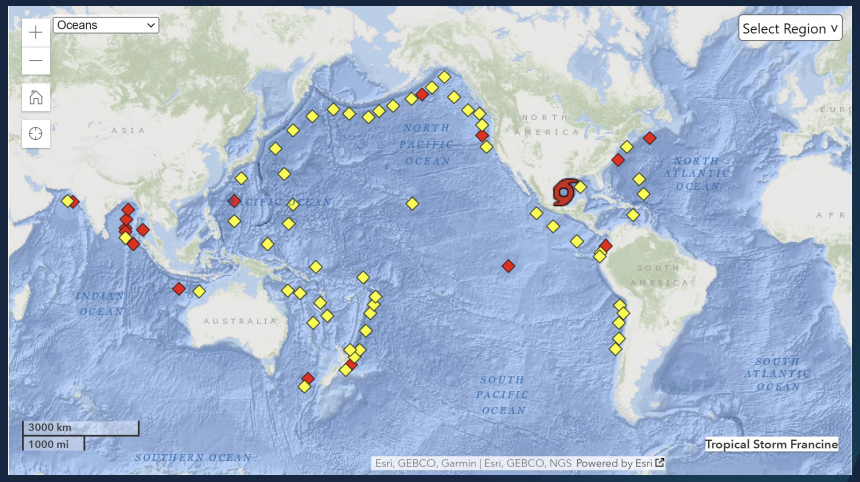
250 125 0 250 500

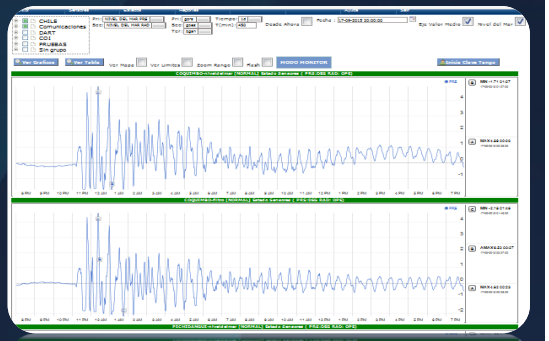
Millas Náuticas

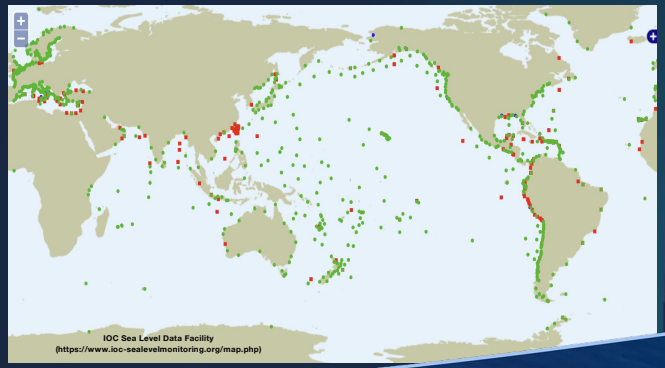
Sistema de Coordenadas:
GCS WGS 84

INTERNATIONAL MONITORING NETWORK

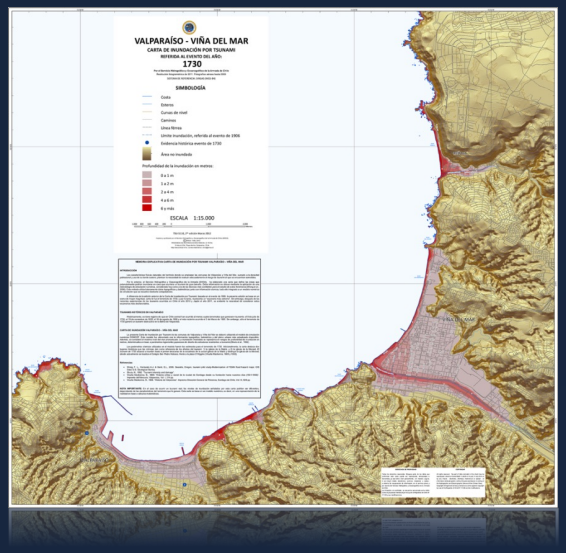
DART BUOYS - SEA LEVEL STATIONS







CITSU
Tsunami Flood Charts



Threat maps, which includes areas that could be flooded and their depth, in the event of a Tsunami.

The CITSUs are based on a probable extreme event, considering the scientific background and available technologies

With the new SINAPRED Law, the CITSUs become Disaster Risk Management Instruments, which are necessary for territorial planning.

CITSUS IN FORCE

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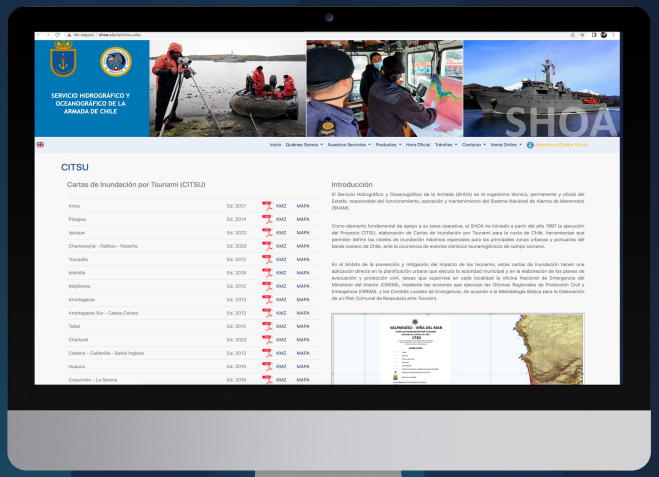
Between Arica and Puerto Williams
Available on Web Site

www.shoa.cl

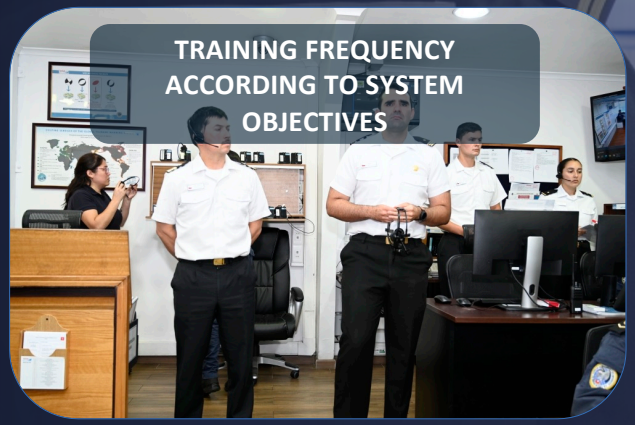


Training courses in Japan to improve capabilities

TRAINING AND PREPAREDNESS

Chile's NTWC has developed a training scheme based on four levels associated with the degree of involvement: on-duty personnel (daily), institutional (monthly), inter-institutional at the national level (triannual), and regional (biannual).

Each of these levels has a different focus and specific objectives. Also, the training team complements scripts with real-time simulators for seismic data and mareographs.



TRAINING AND PREPAREDNESS

SHOA

National Tsunami Warning System

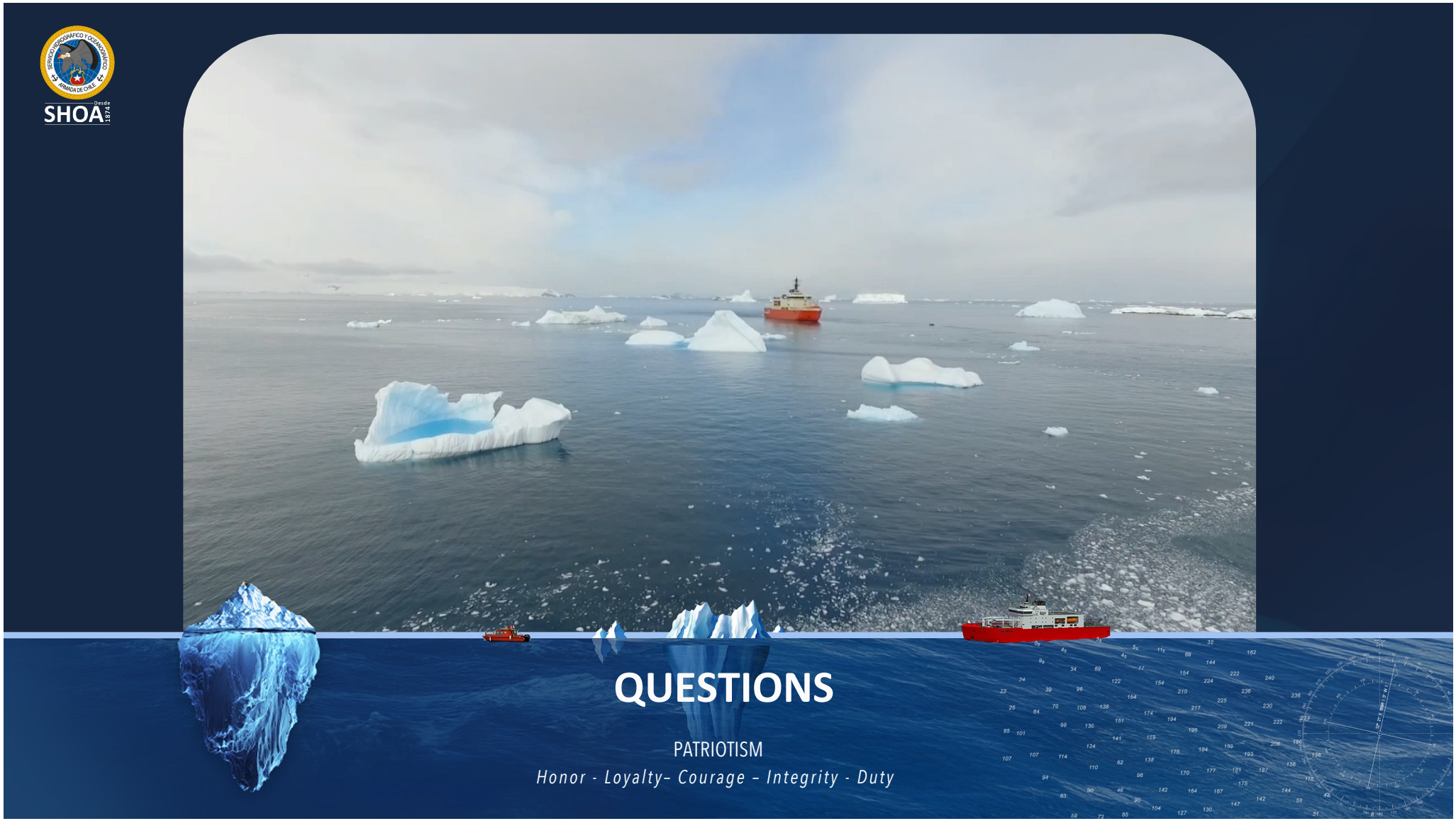
We cannot predict tsunamis, so we must be prepared to react under demanding scenarios, and for this reason, training and having modern and redundant systems are key to accomplishing the mission.

INFORMATIVE

WATCH

ADVISORY

WARNING


QUESTIONS
PATRIOTISM
Honor - Loyalty– Courage – Integrity - Duty