PERÚ Ministerio de la Producción

IMARPE
INSTITUTO DEL MAR DEL PERÚ

Lima, Peru | May 18 - 22, 2026

Jack Mackerel Benchmark Workshop (SCW16)

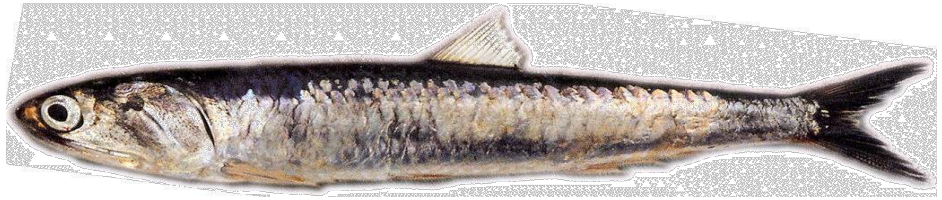
SPRFMO
South Pacific Regional Fisheries Management Organisation

Application of sonar systems in Peruvian anchoveta surveys and potential applicability for jack mackerel in Peru and Chile

Grados, D; et al

What do we know?

Goal: Quantify the **biomass and spatial distribution of anchovy**.



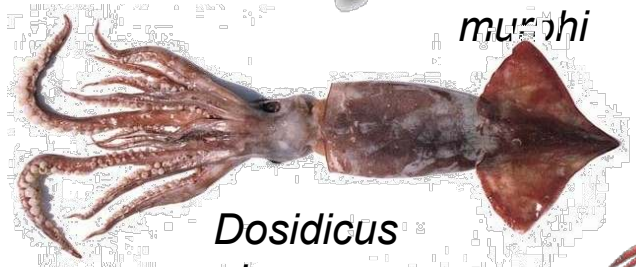
Engraulis ringens

Anchoa nasus

Scomber japonicus

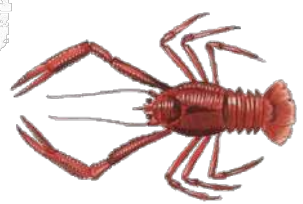
Trachurus murphi

Galeichthys peruvianus



Dosidicus gigas

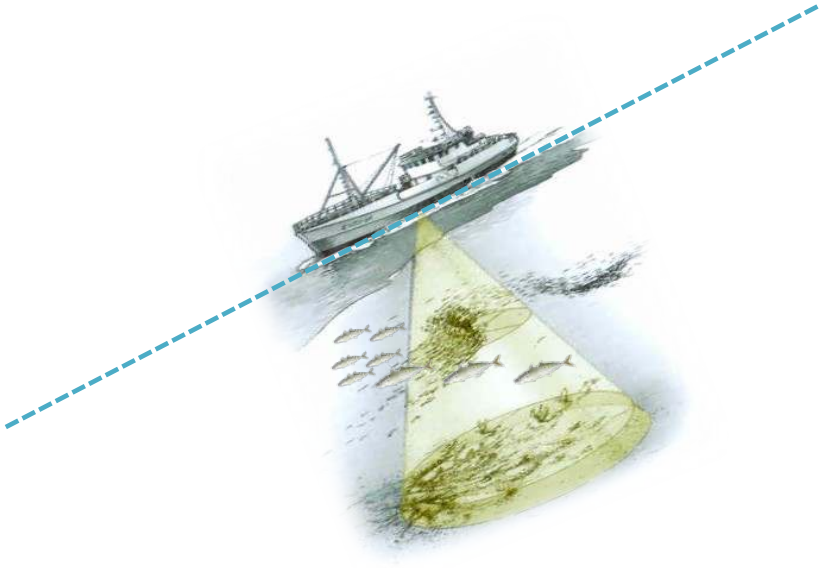
Vinciguerria lucetia

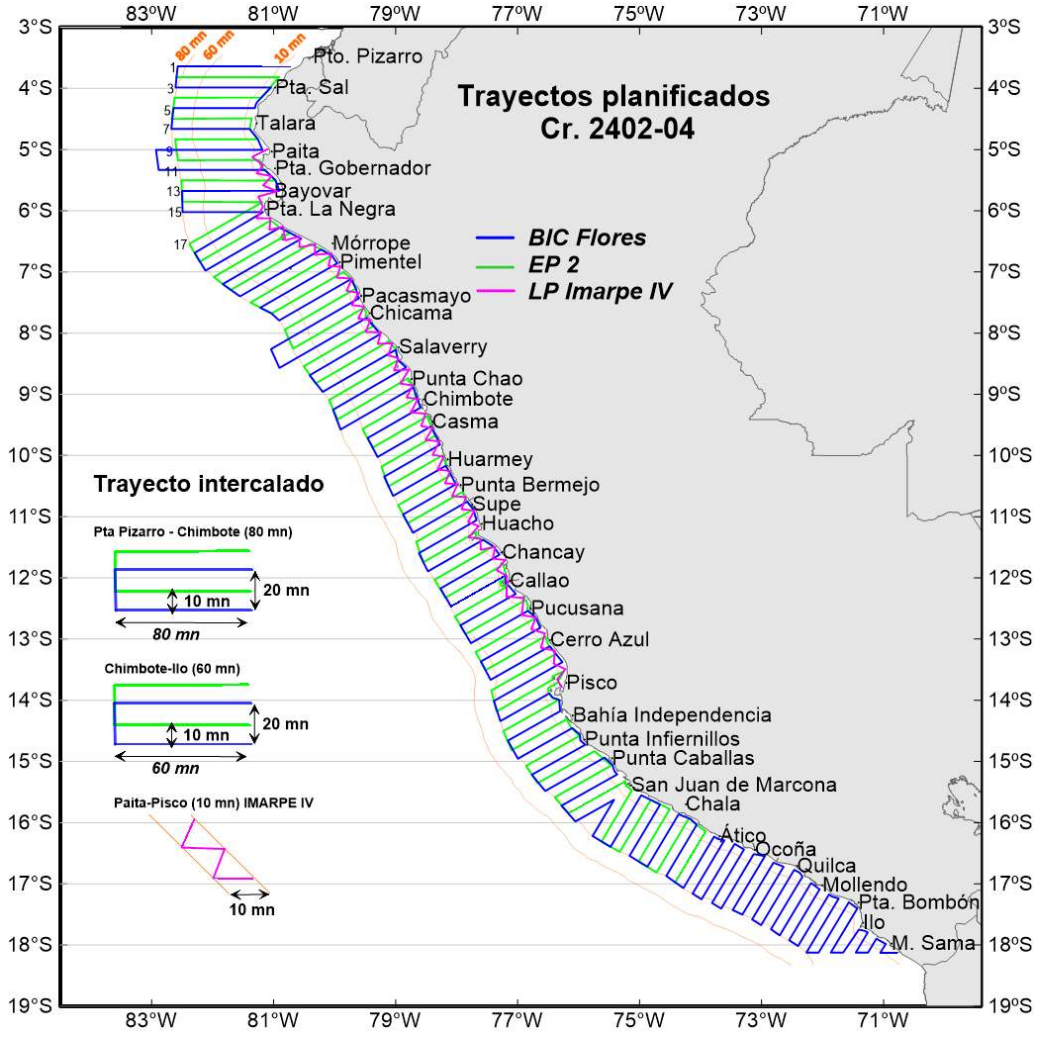


Pleuroncodes monodom

Macrozooplancton

What do we know?





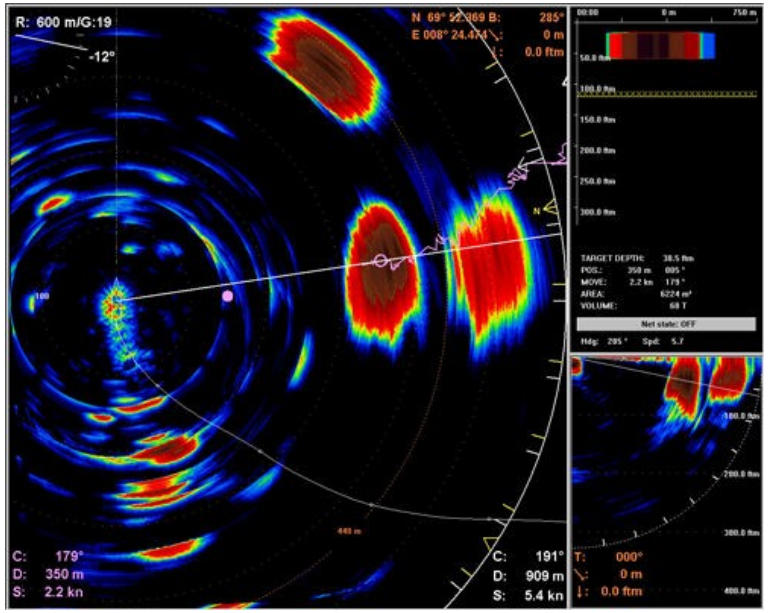
- 40 days
- 80/100 nm

What do we have?

ECOSOUNDER EK80

- 2 Scientifics ships
- Different operations → biological and oceanographic samplings
- Moderns acoustic systems → EK80
- SONAR SX90

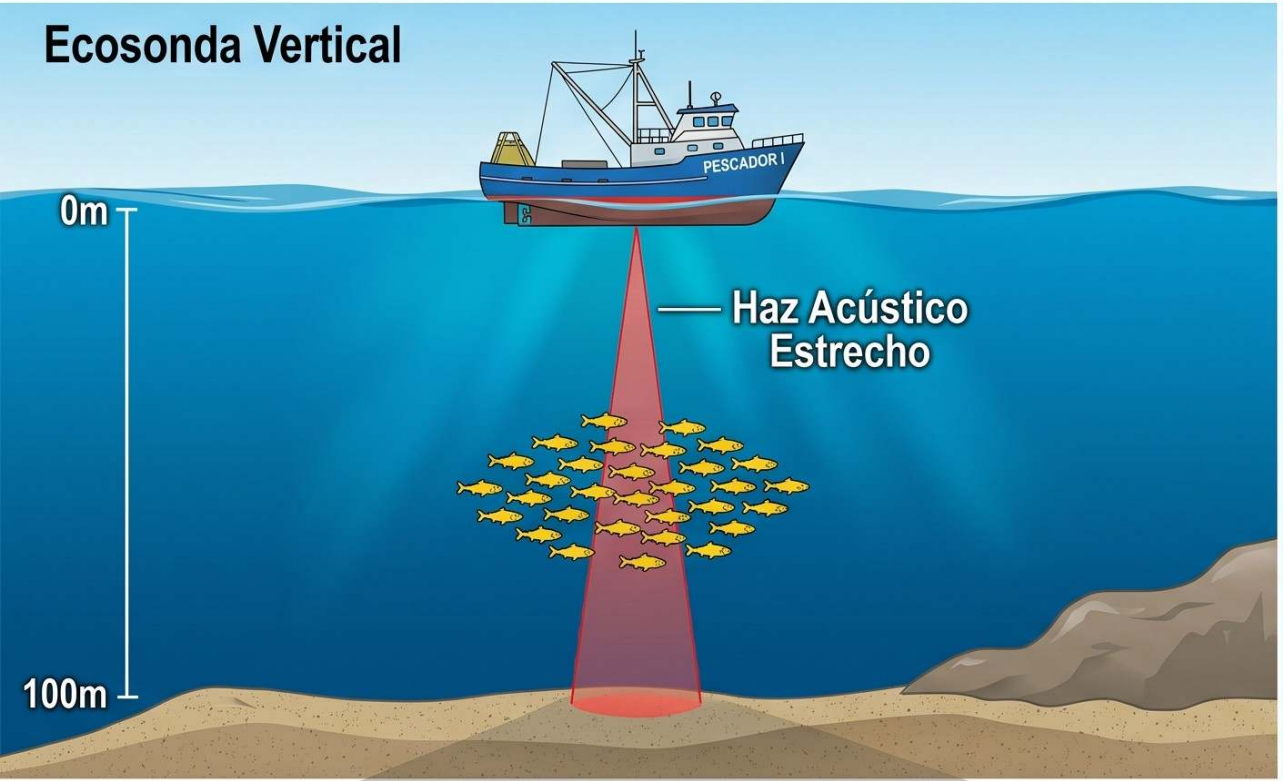
SONAR SX90

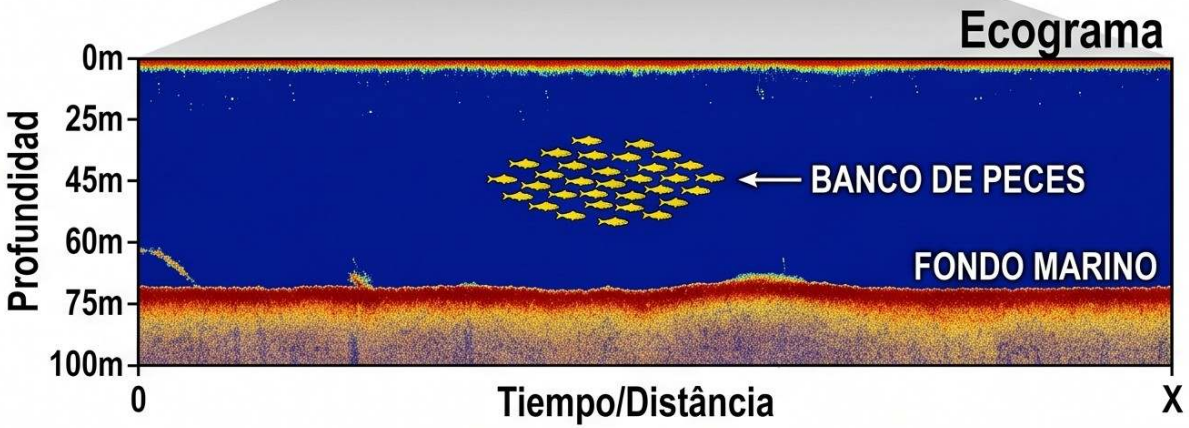


What we can study using sonar data?

- Anchovy Behaviour
- Biomass estimation?

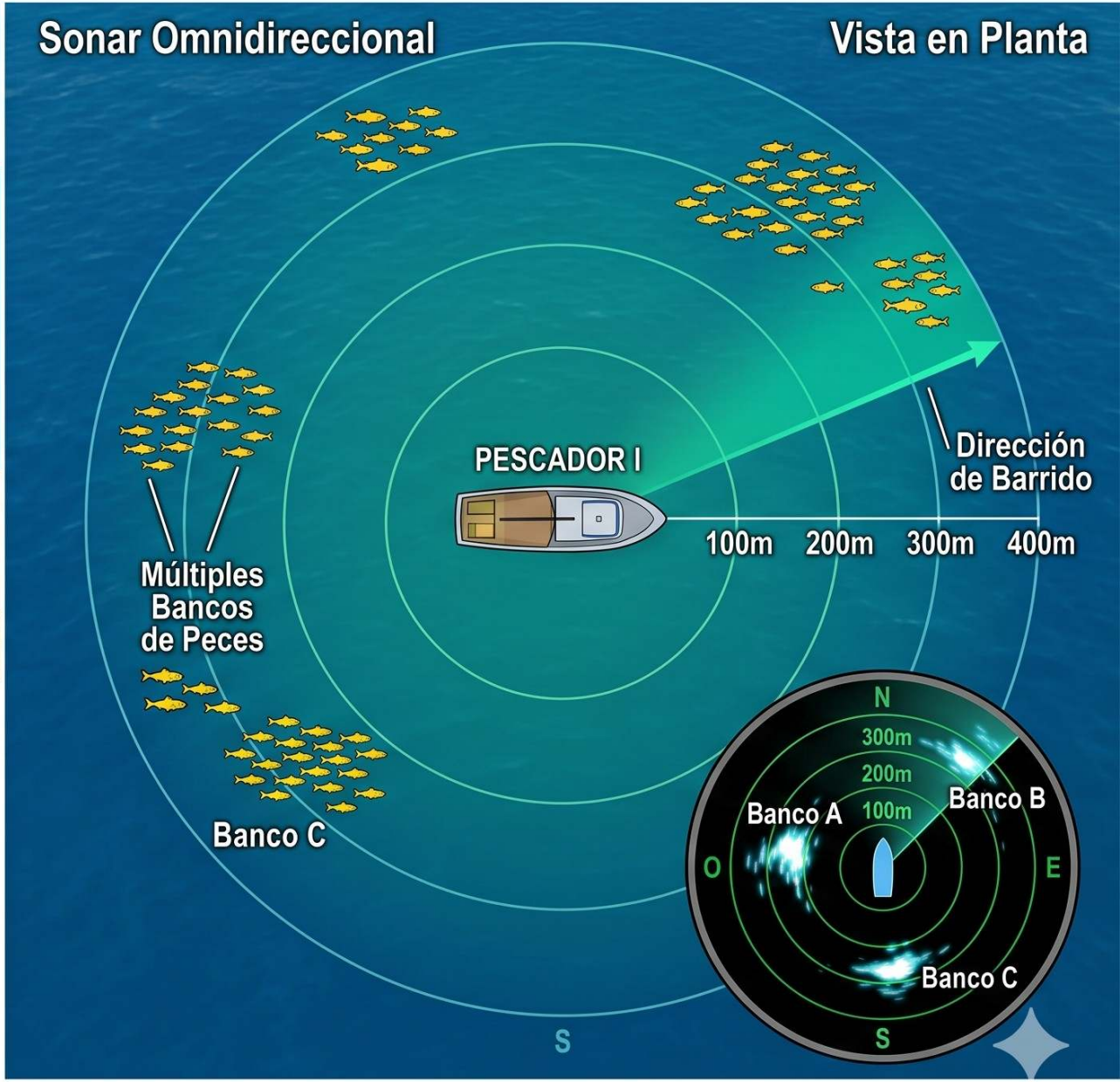
PANEL IZQUIERDO: ECOSONDA VERTICAL





ECOGRAMA (Vertical)

PANEL DERECHO: SONAR OMNIDIRECCIONAL

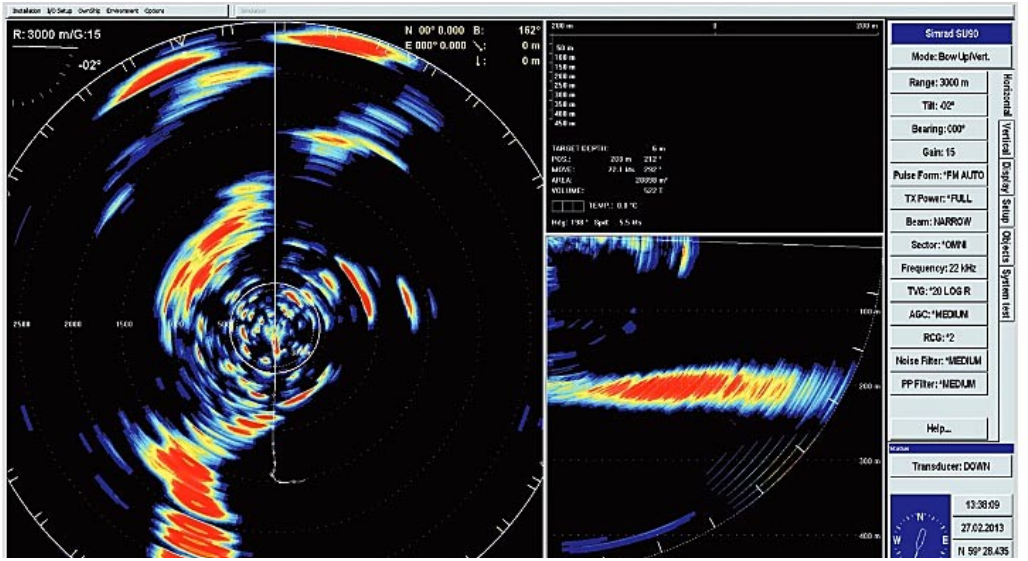


VISUALIZACIÓN DE SONAR (Omnidireccional)

Synchronization

SX90 EK80

SX90 Configuration

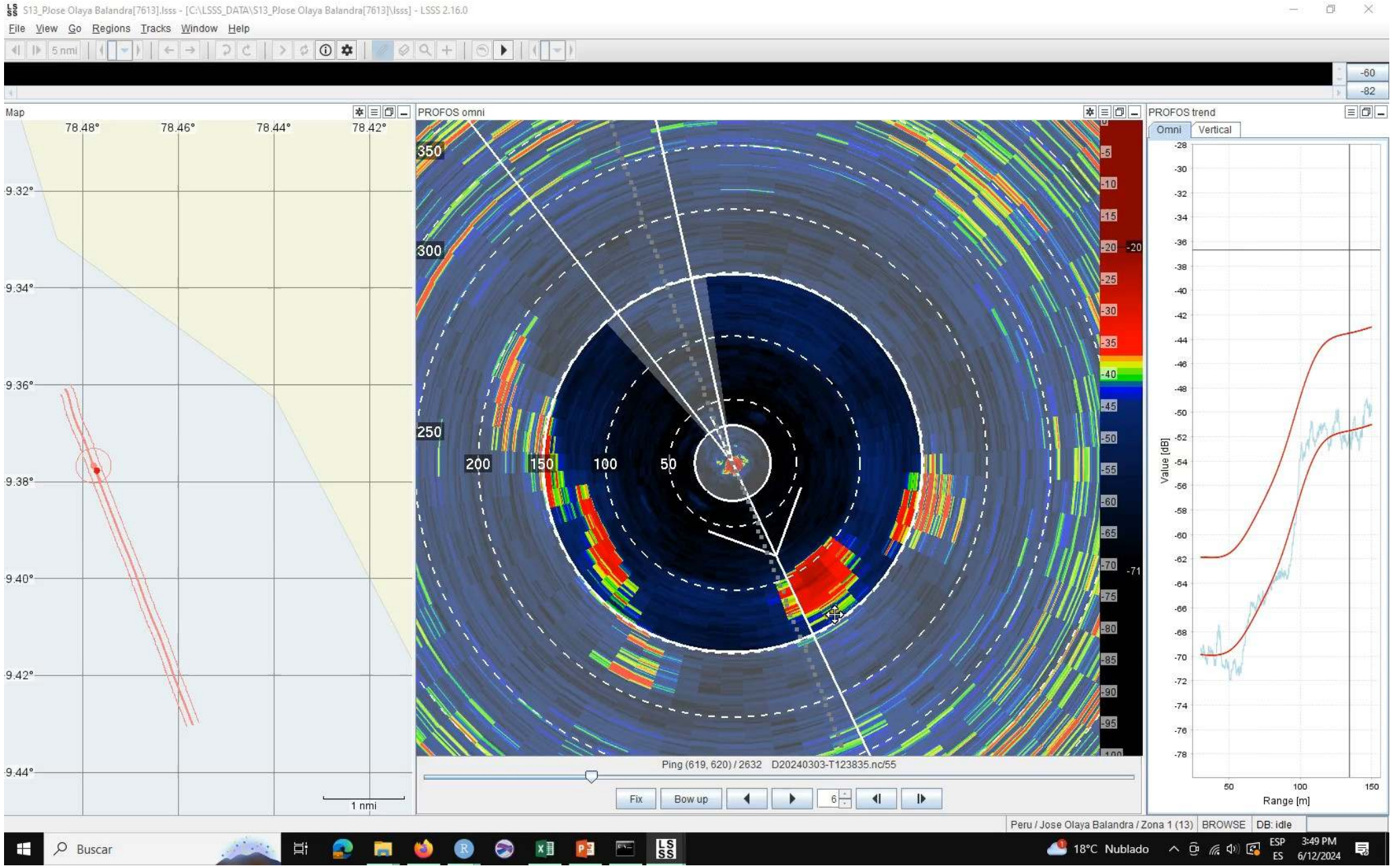


- Range: 500 m
- Tilt : 7°
- Noise filter: off

LSSS

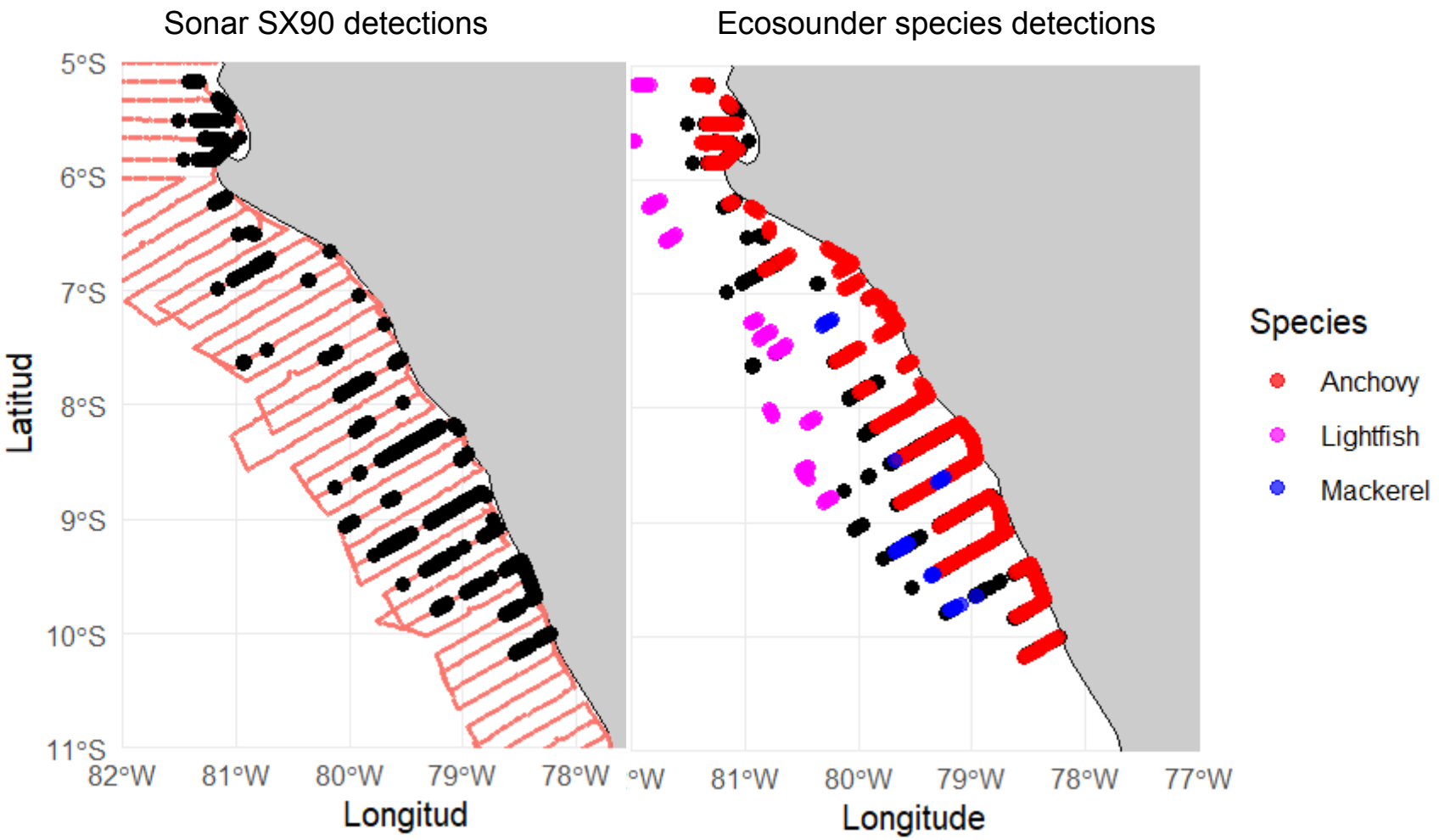
INSTRUCTIVO PARA EL PROCESAMIENTO DE LOS DATOS ACÚSTICOS RECOPILADO ATRAVEZ DE SONARES OMNIDIRECCIONALES (SX 90)

Results


S13_PJose Olaya Balandra[7613].lsss - [C:\LSSS_DATA\S13_PJose Olaya Balandra[7613]\lsss] - LSSS 2.16.0
File View Go Regions Tracks Window Help
Map
78.48°
78.46°
78.44°
78.42°
9.32°
9.34°
9.36°
9.38°
9.40°
9.42°
9.44°
1 nmi
PROFOS omni
350
300
250
200
150
100
50
Ping (619, 620) / 2632 D20240303-T123835.nc/55
Fix
Bow up
PROFOS trend
Omni
Vertical
Value [dB]
Range [m]
Peru / Jose Olaya Balandra / Zona 1 (13)
BROWSE
DB: idle
Buscar
18°C Nublado
ESP
ES
3:49 PM
6/12/2024

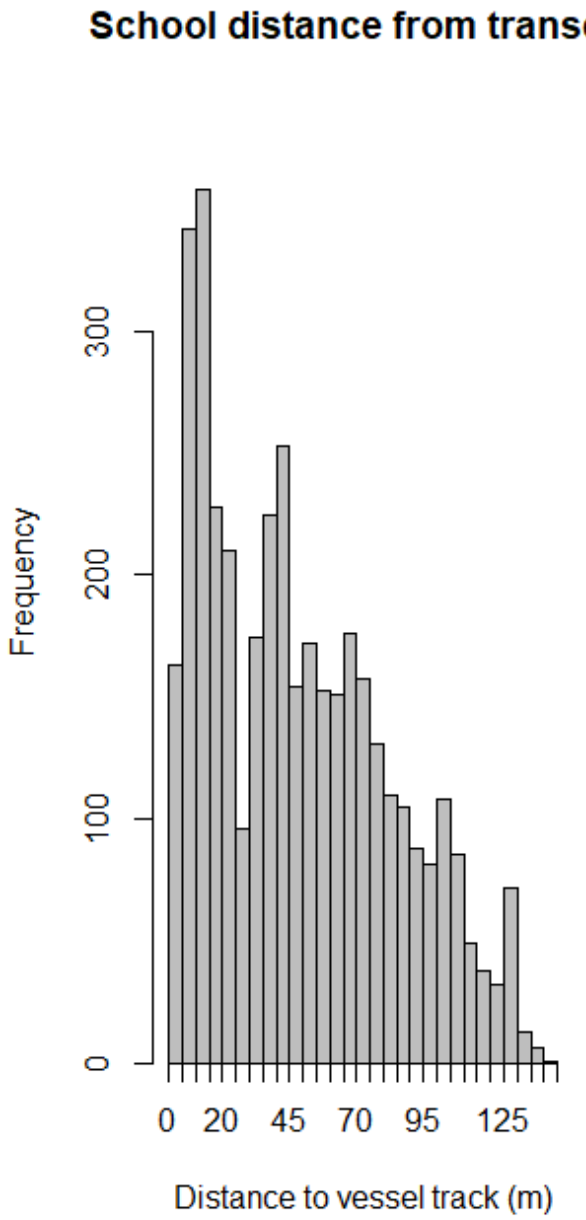
RESULTS

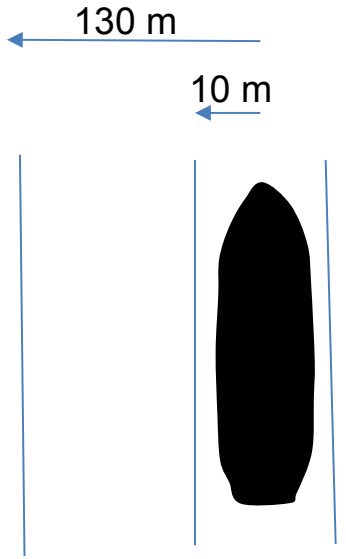
Results: Detection schools



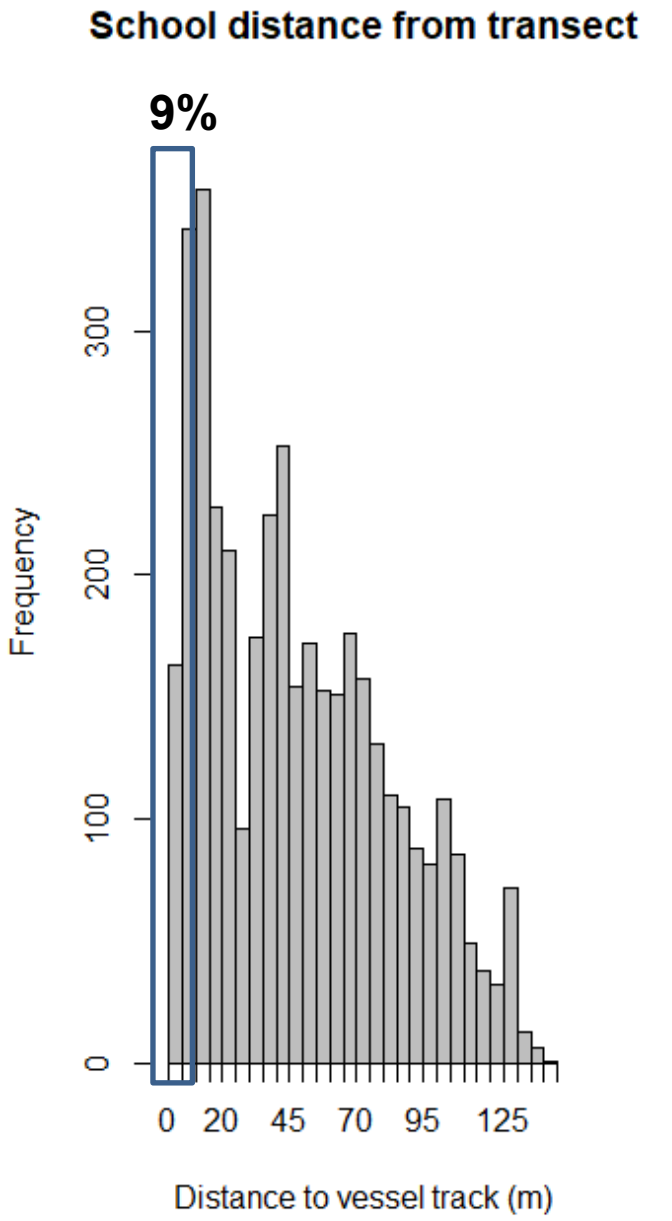
- Day detections
- Validation using different anchovy schools
- Similar patterns in school detection → ecosounder and sonar
- Automatic and visualization detection
- Strong school → 2200 schools

Results

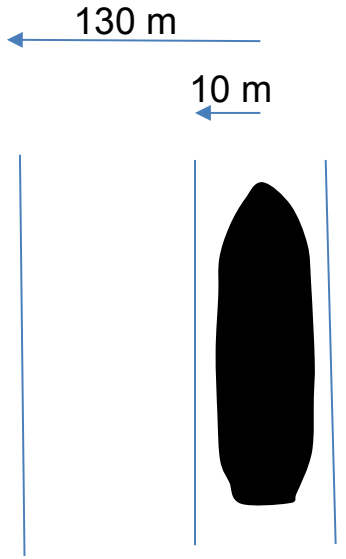

School distance from transect
Frequency
0
100
200
300
0 20 45 70 95 125
Distance to vessel track (m)


130 m
10 m

Results



- Detection around 130 meters of radio
- Day detection of schools
- 10 first meters → 10% of total school

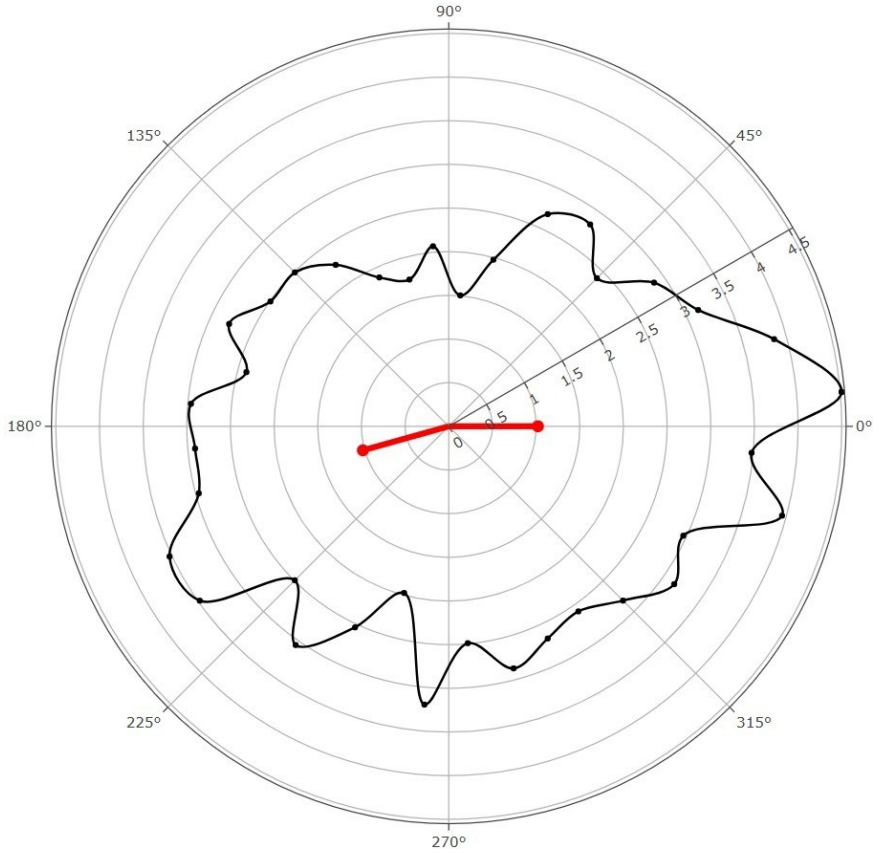


Results

Reference	Scale	Platform	Area	Avg. Total length	Total Avg. Speed	Horizontal Avg. Speed	Vertical Avg. Speed
Gerlotto et al., 2006	School	RESON Multibeam sonar	Peruvian Sea (NC)	--	--	0.48 m/s (u.p.), 0.28 m/s (w.p.)	--
Peraltilla & Bertrand, 2014	School	SX90 Multibeam sonar	Peruvian Sea (NC)	--	--	0.6 m/s	--
Santivañez (in prep.)	Individual	ES60 echosounder	Peruvian Sea (NC)	13.66 cm	0.63 m/s; 4.63 BL/s (u)	0.56 m/s; 4.07 BL/s (u)	0.21 m/s; 1.55 BL/s (u)
					0.68 m/s; 4.65 BL/s (d)	0.59 m/s; 4.32 BL/s (d)	0.25 m/s; 1.8 BL/s (d)
IFOP (2022)	Individual	EK60 echosounder	Chilean Sea (N)	10.5 cm	1.3 m/s; 10.48 BL/s	--	--
IFOP (2022)	Individual	EK60 echosounder	Chilean Sea (NC)	12.4 cm	1.4 m/s; 13.33 BL/s	--	--
IFOP (2022)	Individual	EK60 echosounder	Chilean Sea (SC)	12.6 cm	1.7 m/s; 13.49 BL/s	--	--

u.p./w.p.: under/without predation. u/d: Upwards/Downwards.

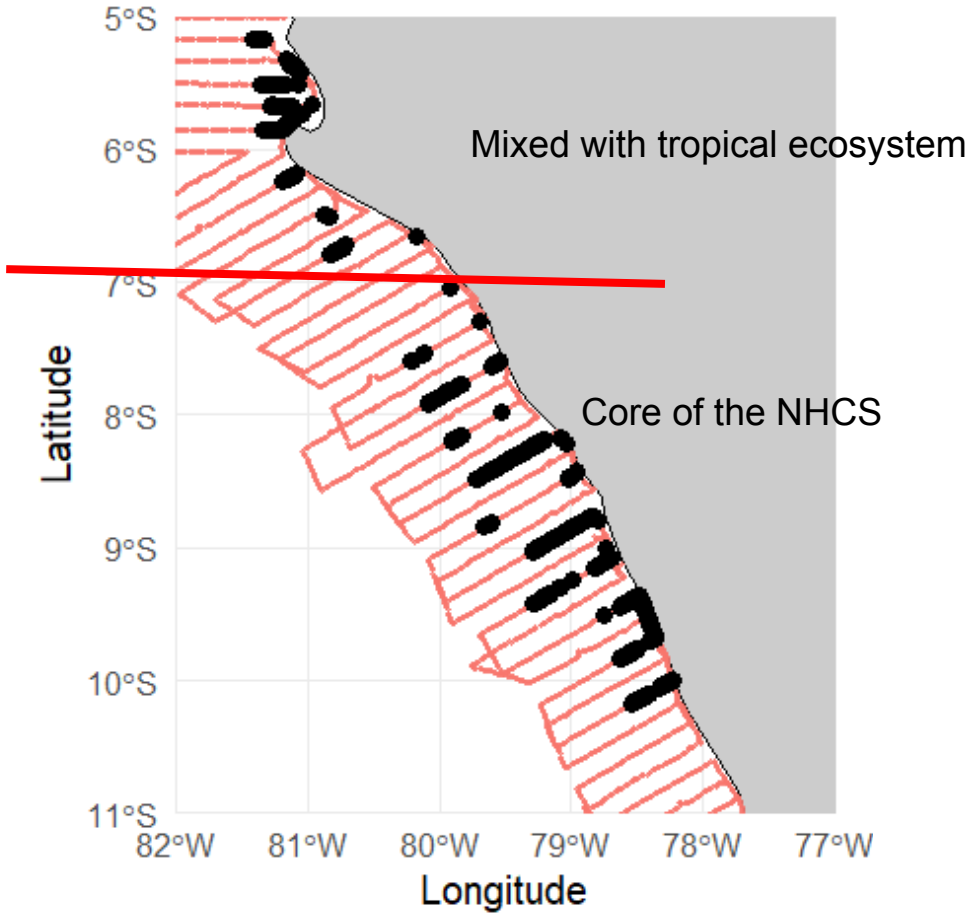
N/NC/SC: North/North-Center/South-Center. BL: Body length.

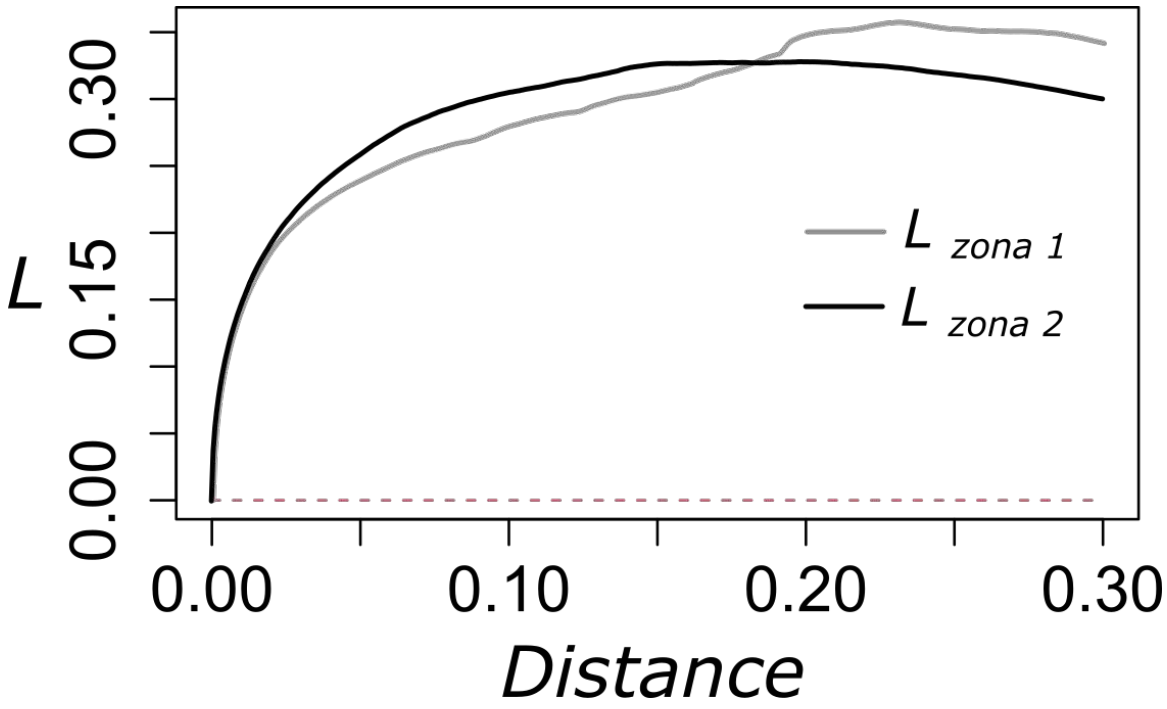


mean = 0.683 m/s,
sd = 0.44 m/s

Similar results with others studies

Results: Spatial diferrences?

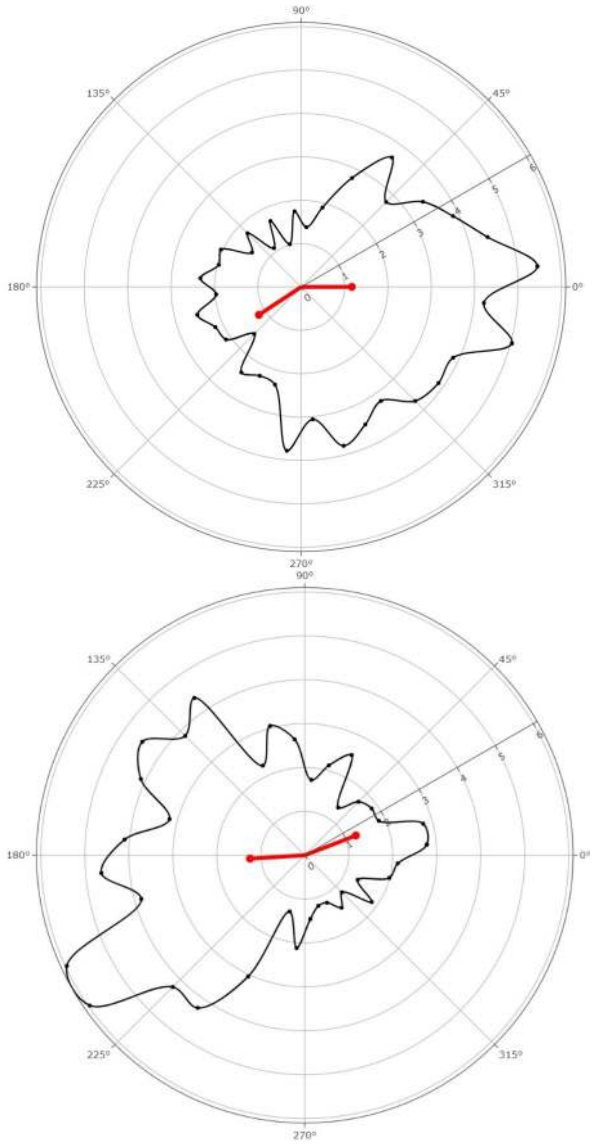


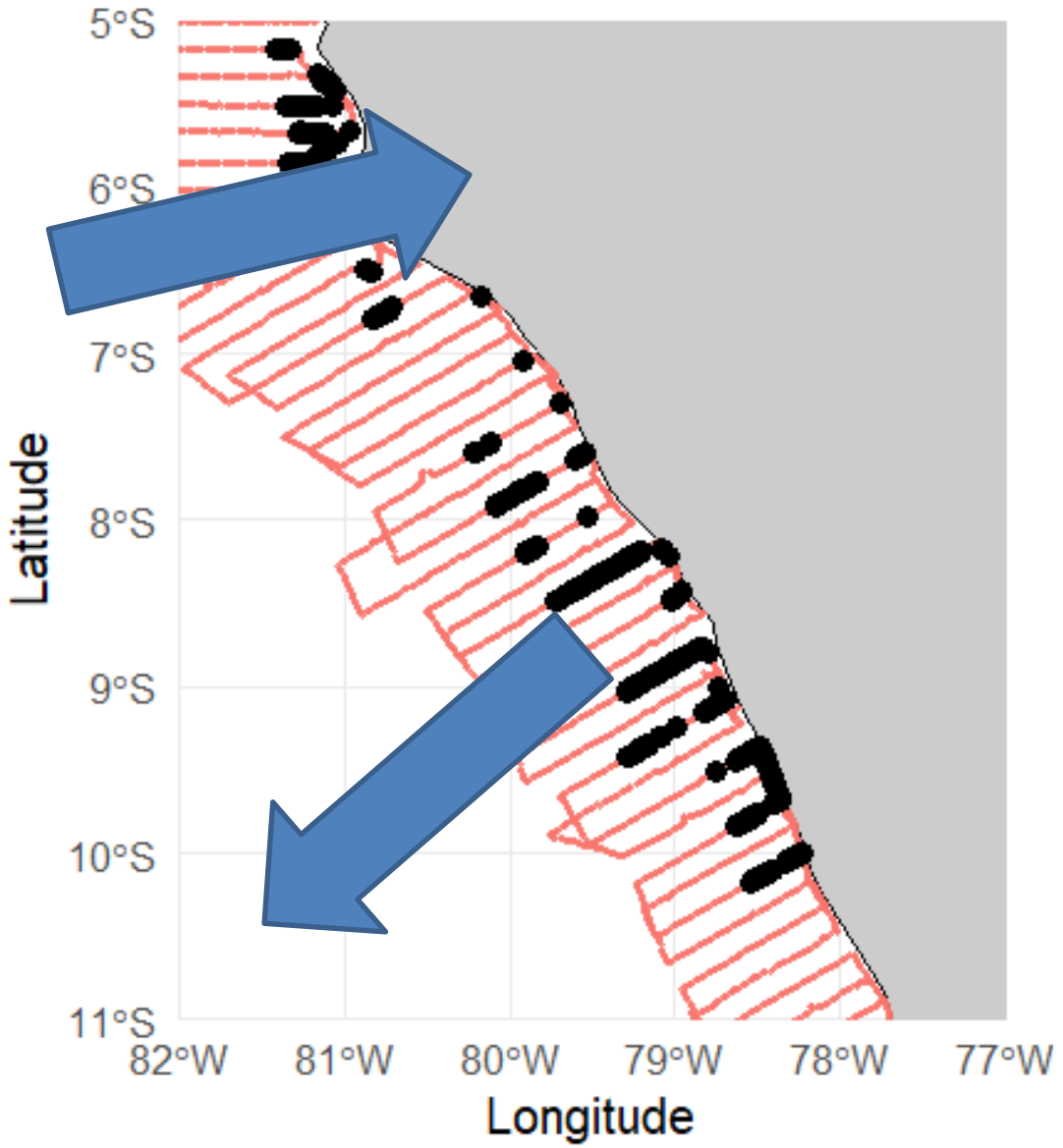


AUC L1	AUC L2
0.087	0.086

Aggregation: Not diferrences at small scale

Results





Two directions → depending the región

Food offerts differences?

Efforts in Sonar calibration

Feb – 2024: ROV system

Unstable in the water

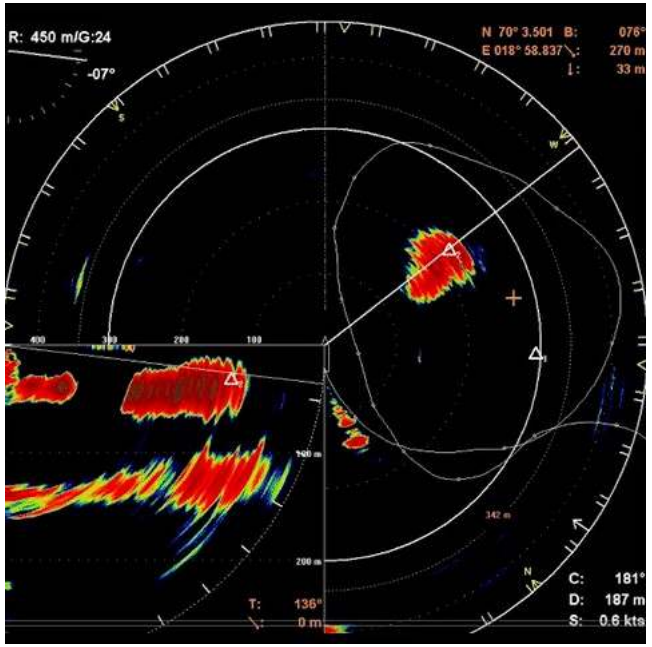
Feb – 2025: two poles system

Stable in the wáter

Easy to implement

Sonar in the industry – What we need?

- Collected sonar data using the industry fleets
- Desing parameters to identify jack mackerel
- Design a TS equation to use in the evaluation of
- Design an experiment to quantify school biomass
- Compare the results at the seasonal scale



Conclusions and perspectives

- Geographical comparison
- Test for others species (jack mackerel, others)
- Compare the results at the seasonal scale

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