SIZE STRUCTURE BASED ASSOCIATIONS BETWEEN ANCHOVETA AND OTHER PELAGIC RESOURCES IN PERU

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ICES CIEM

PICES

OUTLINE

- Goal & Data
- Presence of mixed schools
- Size structure A/S y A/M
- Distribution A/S y A/M
- Conceptual model for Interactions
- Position of oceanic front
- Proposal of a circuit
- Conclusion

GOAL

To describe interactions between anchovy and other pelagics, with emphasis on their distribution and size structure during warm periods.

DATA

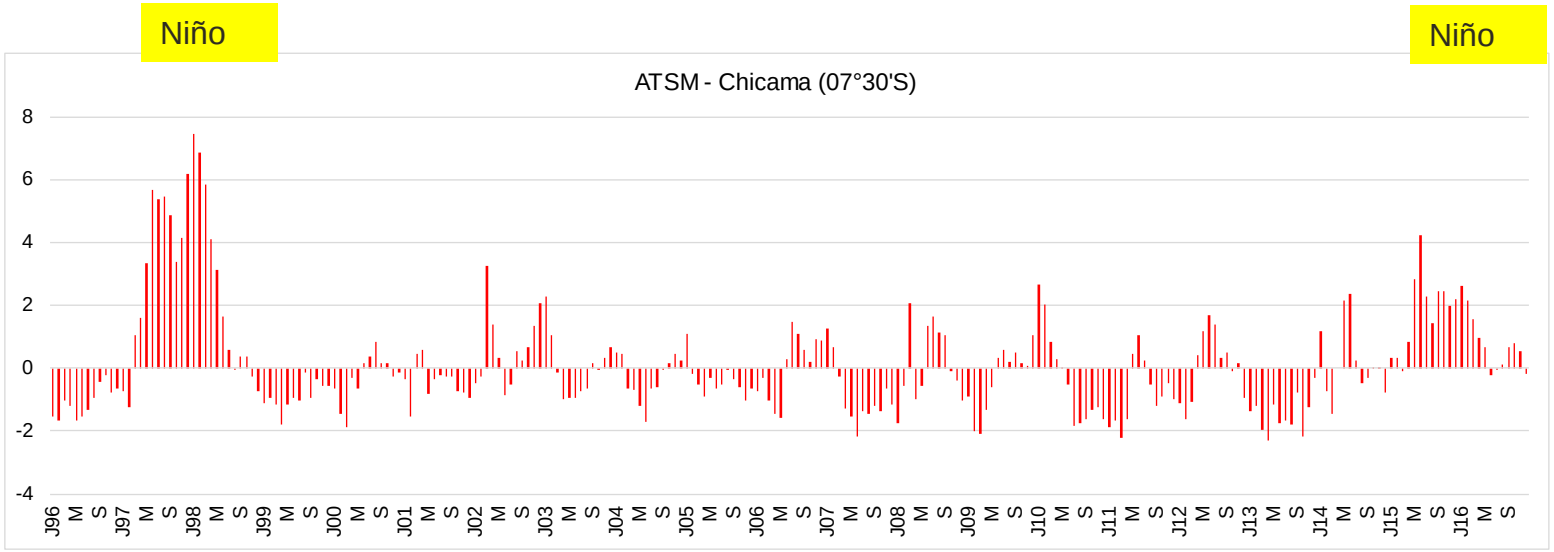
On board observations, in Purse seine fleet. between 1996 to 2016

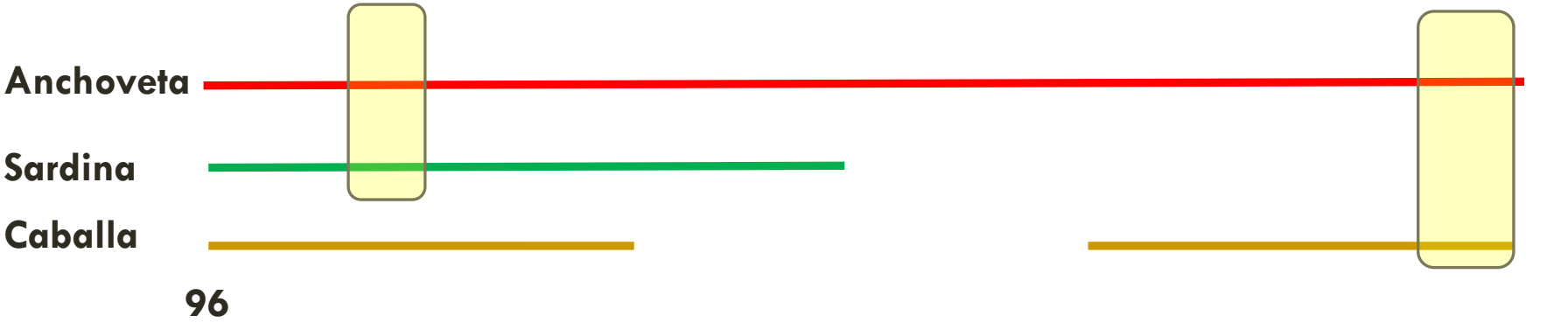
Species composition and size structure by set.

Pelagic resources monitoring on landings port.

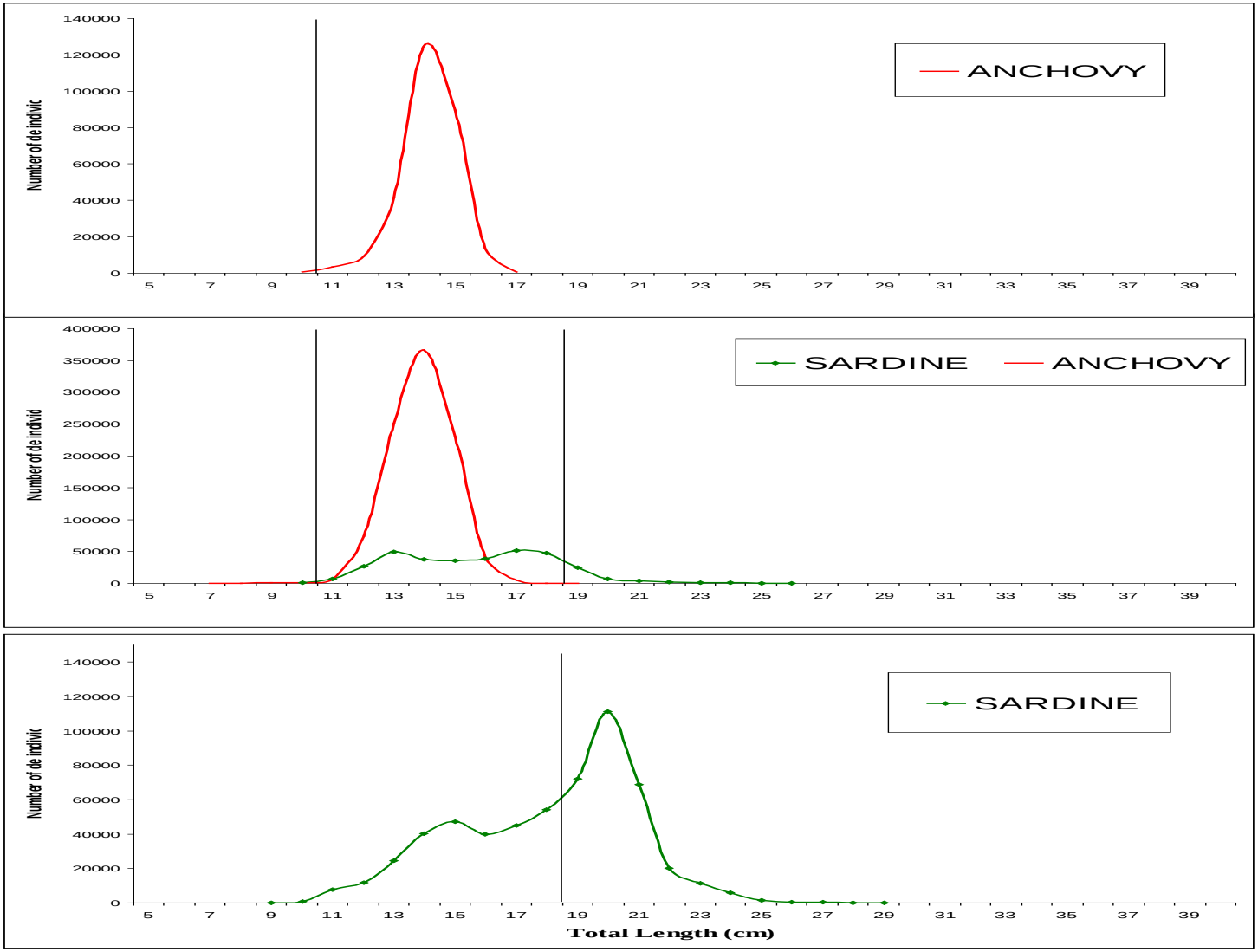
Sea surface temperature anomalies in Chicama (07°30´S) from 1996 - 2016

Presence of mixed schools



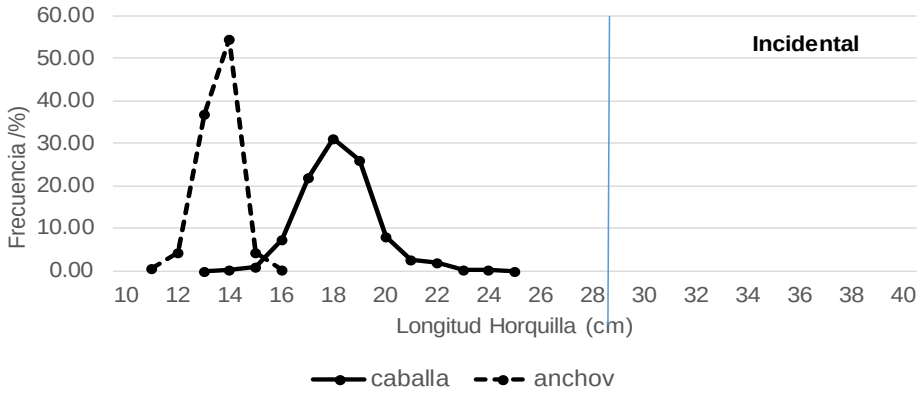


About size composition in 3 cases
Anchovy and sardine

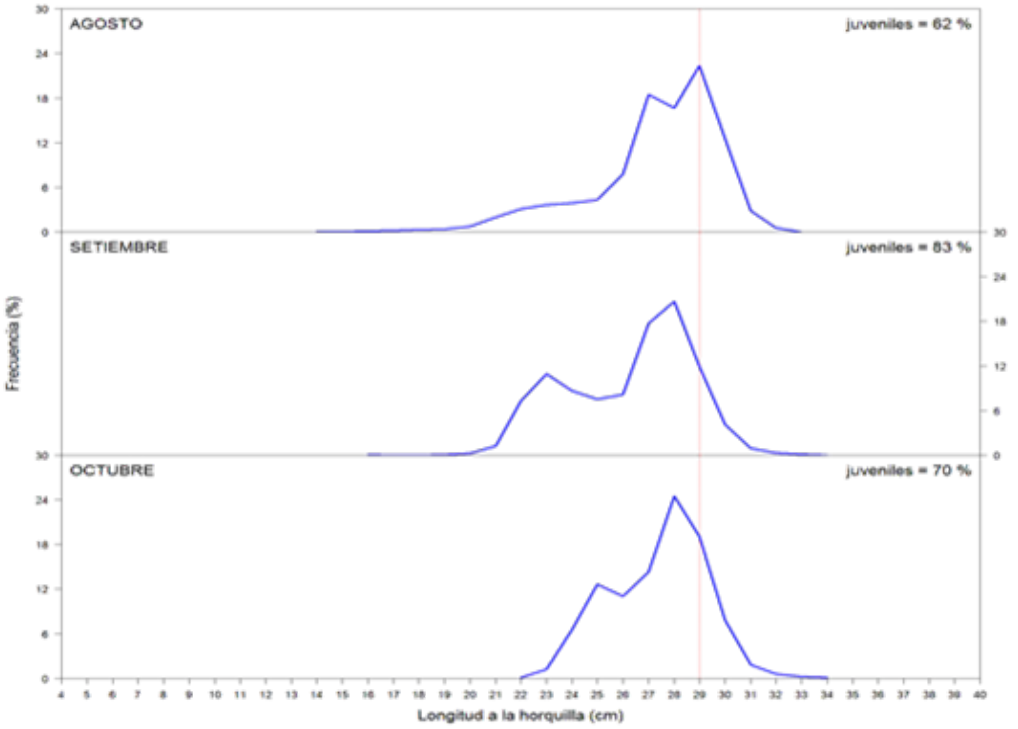


About size composition in 2 cases
Anchovy and pacific mackerel

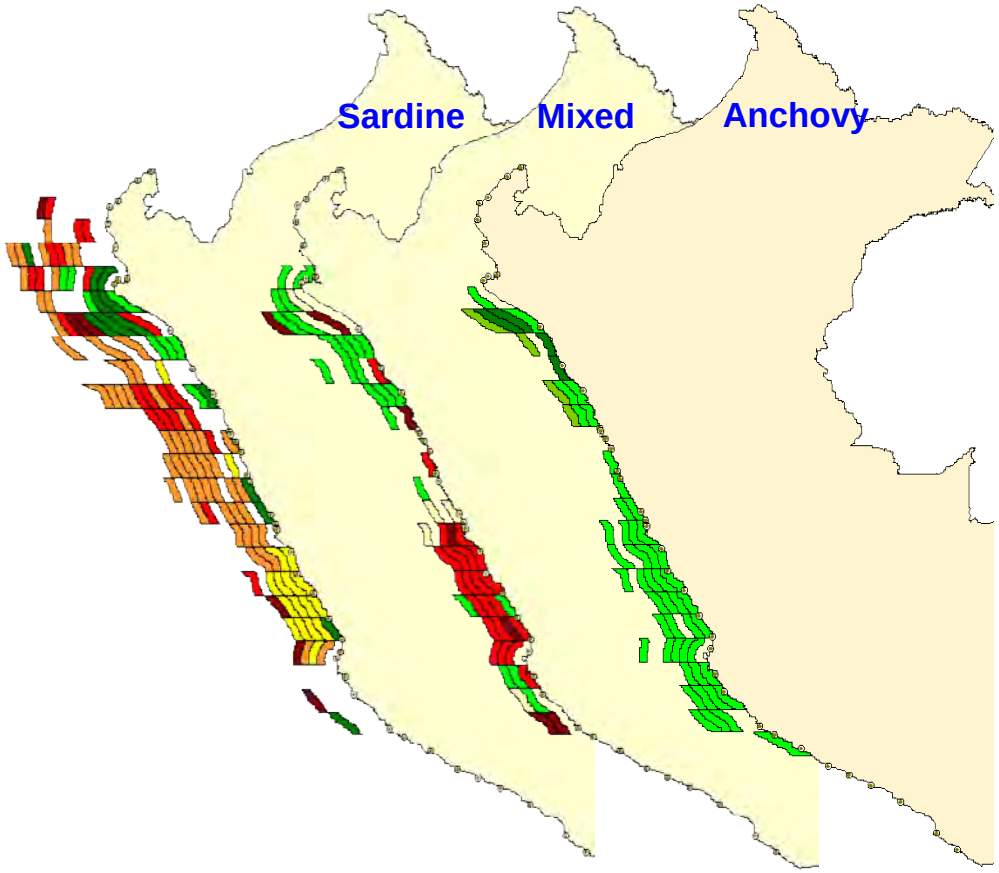
Anchovy & Mackerel
Coastal zone



Only Mackerel
Not anchovy
Oceanic zone



About distribution by zones
Anchovy and sardine



Sizes modal of anchovy and sardine (cm)

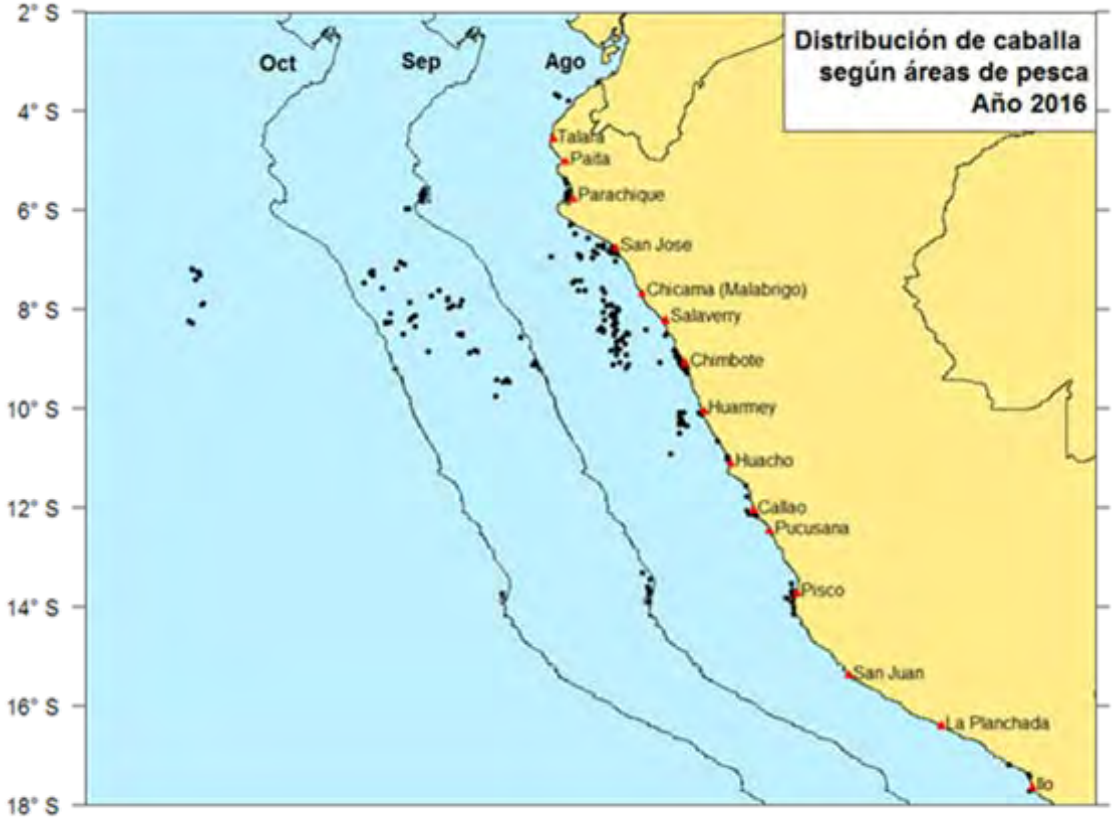
- 23 a 25 (6)
- 21 a 23 (21)
- 19 a 21 (53)
- 17 a 19 (17)
- 15 a 17 (13)
- 13 a 15 (8)
- 11 a 13 (4)

Diferences in sizes modal (cm) between anchovy and sardine in mixed hauls

- 5 a 10 (7)
- 3 a 5 (22)
- 1 a 3 (23)

About distribution by zones
Anchovy and pacific mackerel

Only Mackerel
Not anchovy
Oceanic zone



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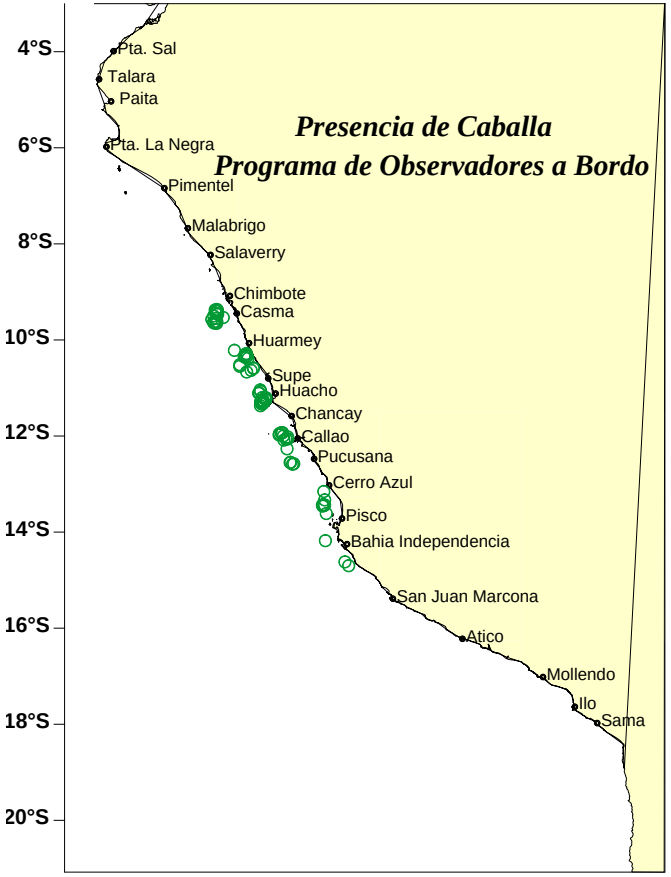
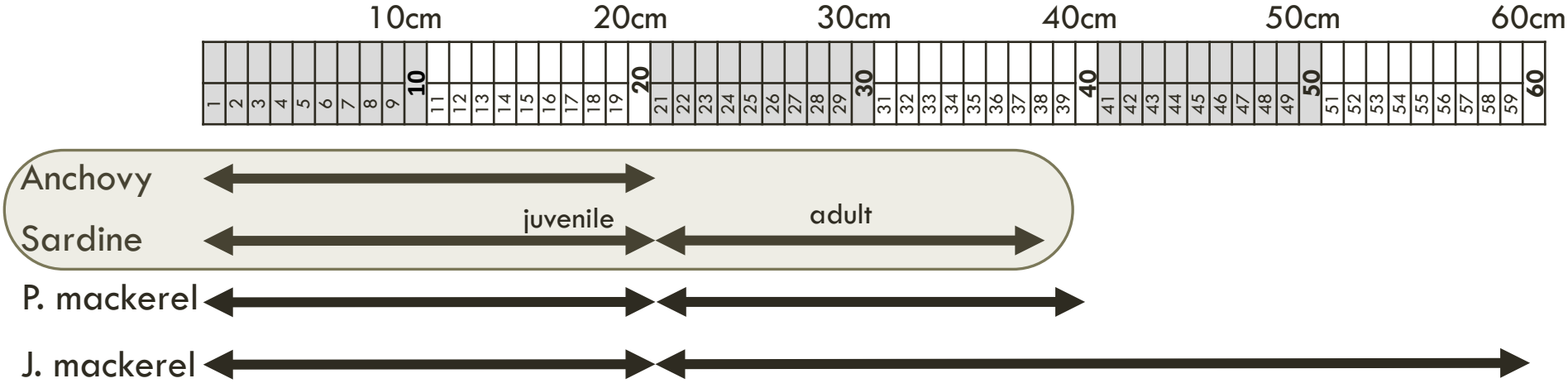


Conceptual Model for interaction Anchovy / Sardine (other pelagics)

Evidence indicates that the interaction is related to **adult anchovy** with **juvenile sardine** and it develops in two different spatially and oceanographically zones.



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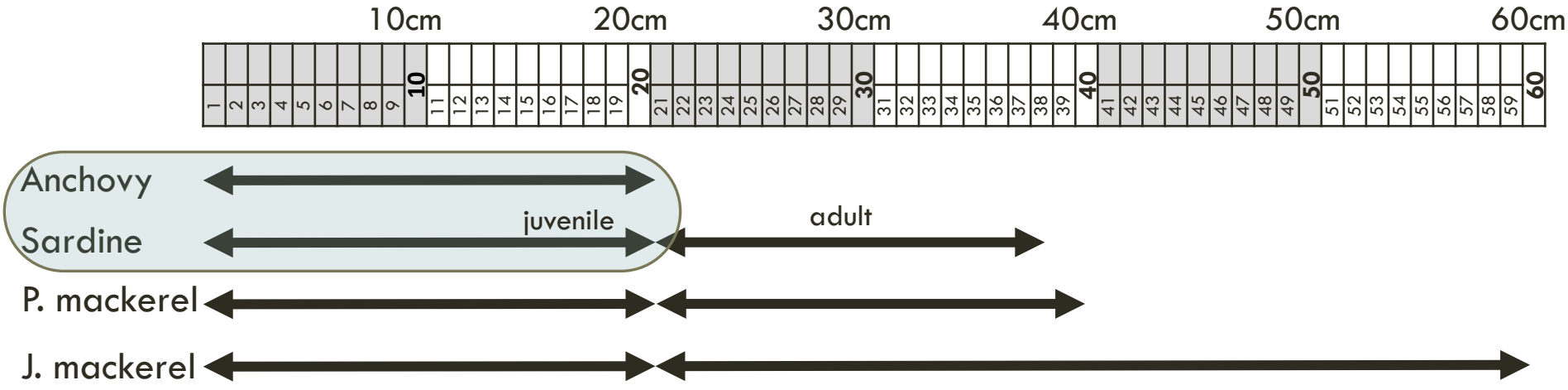

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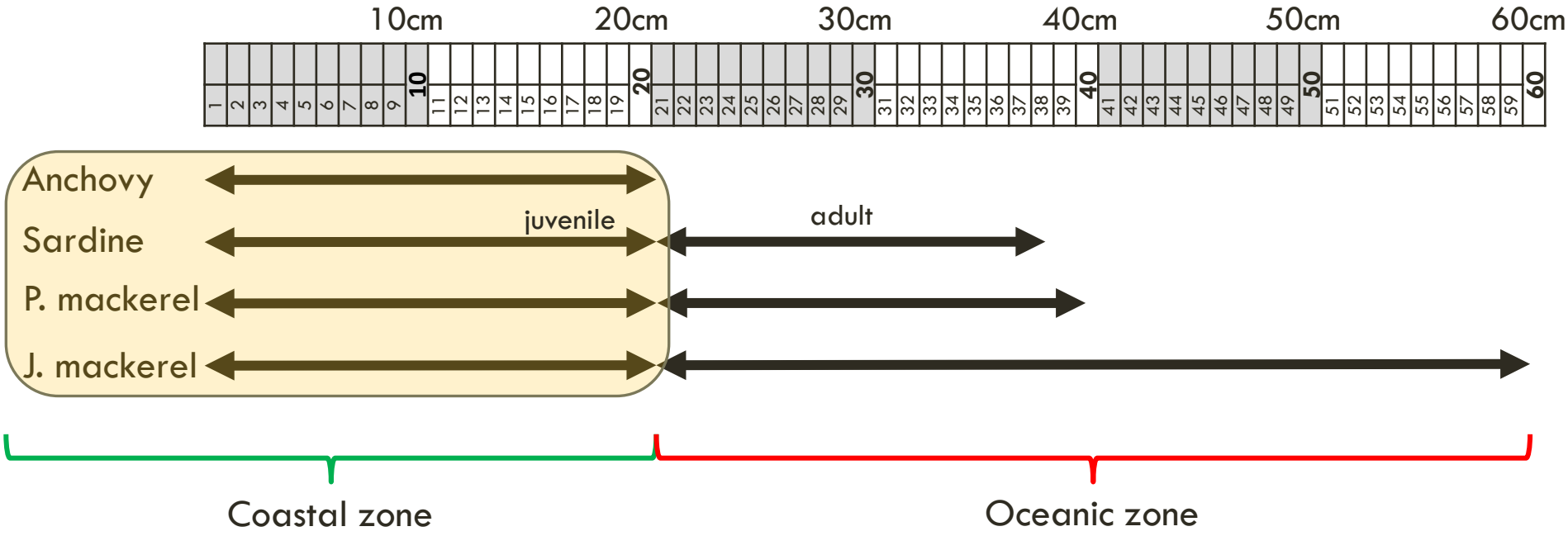
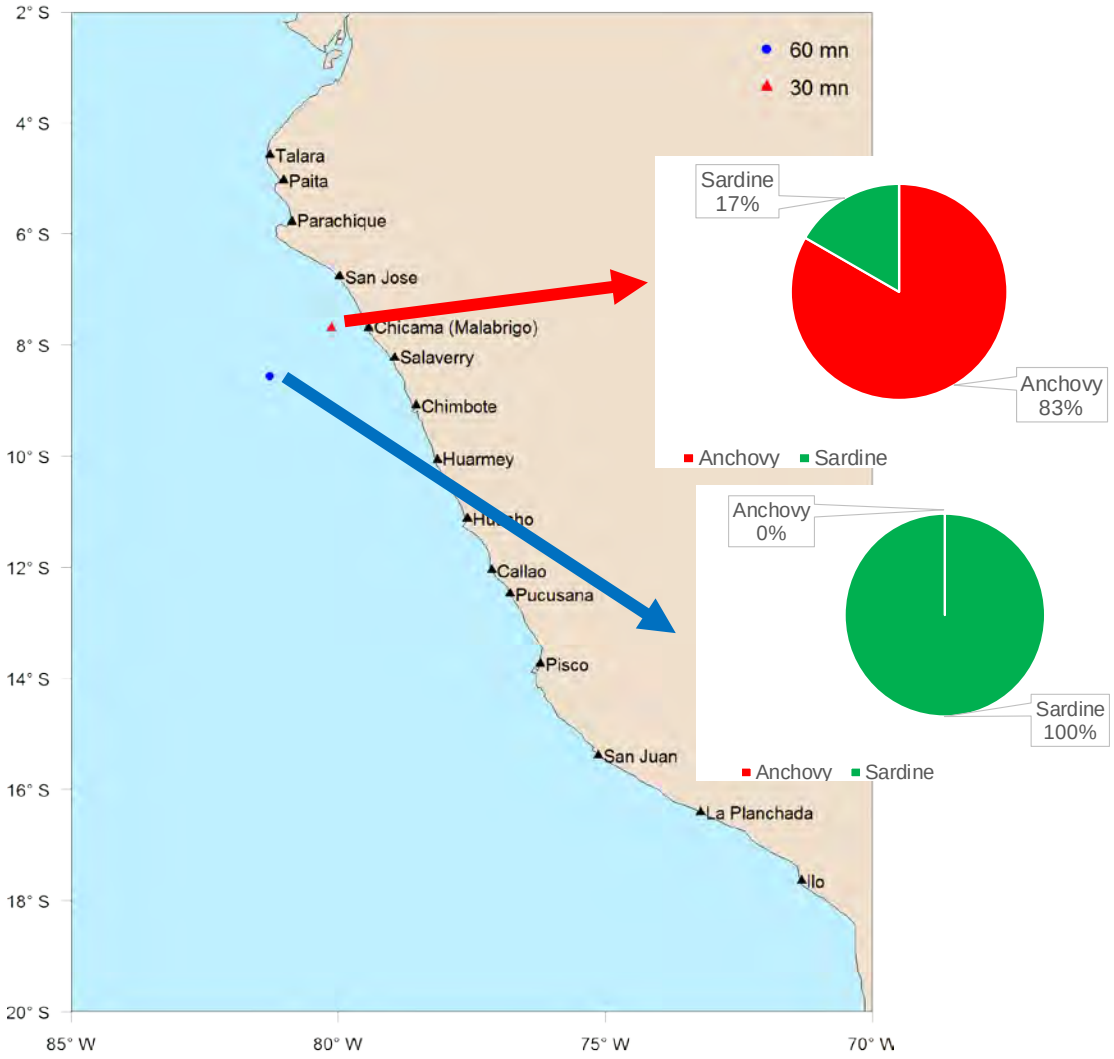
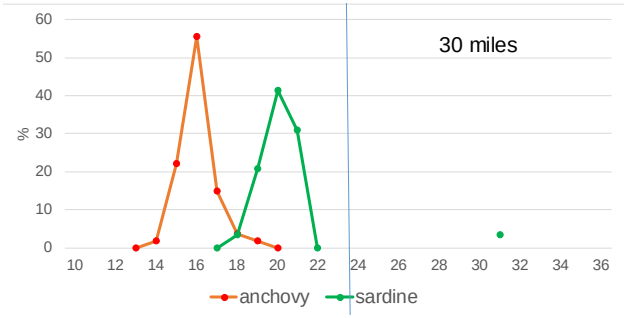
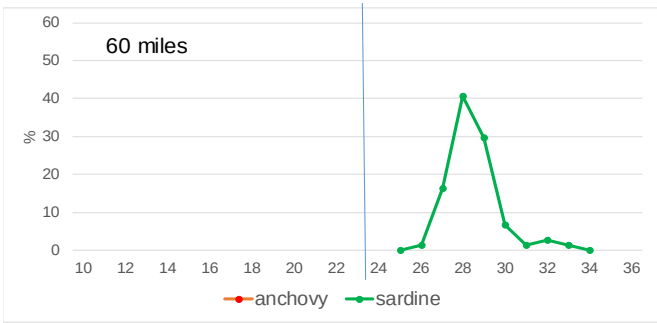


Come back to the data…….

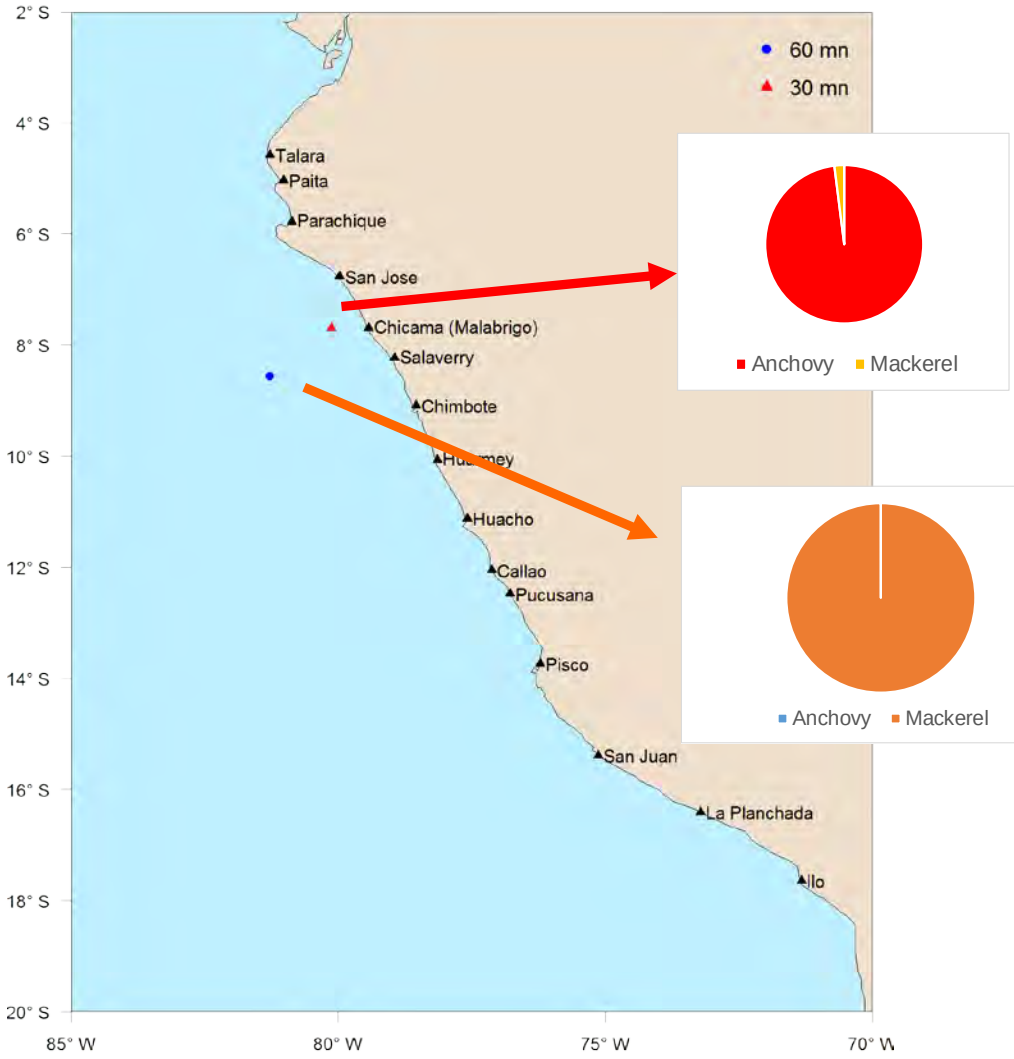
Interactions anchovy-sardine, 1998

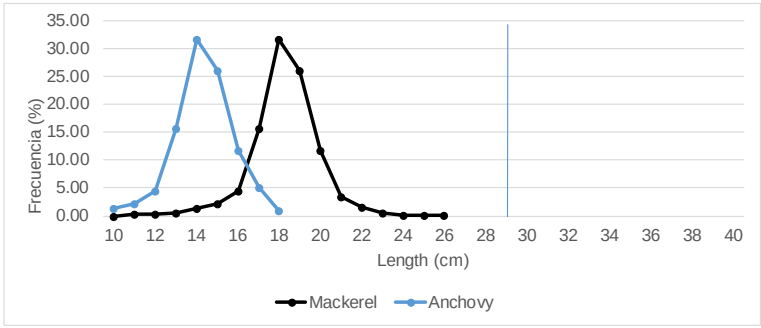


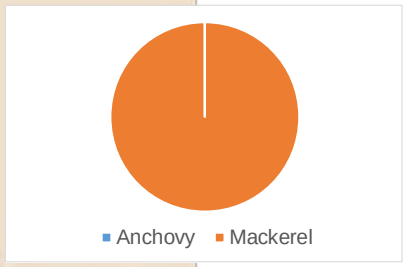


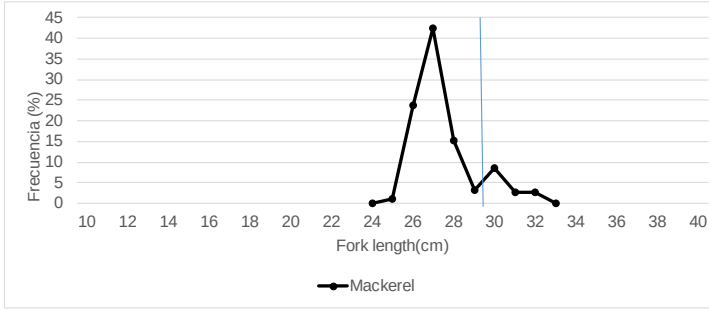


Interactions anchovy-pacific mackerel, 2016



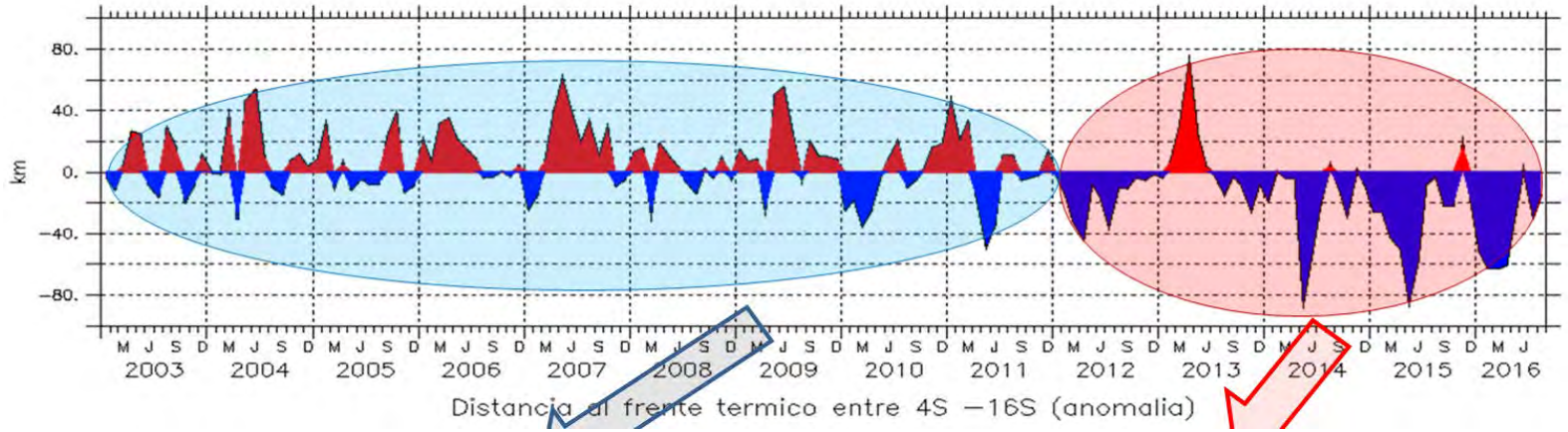




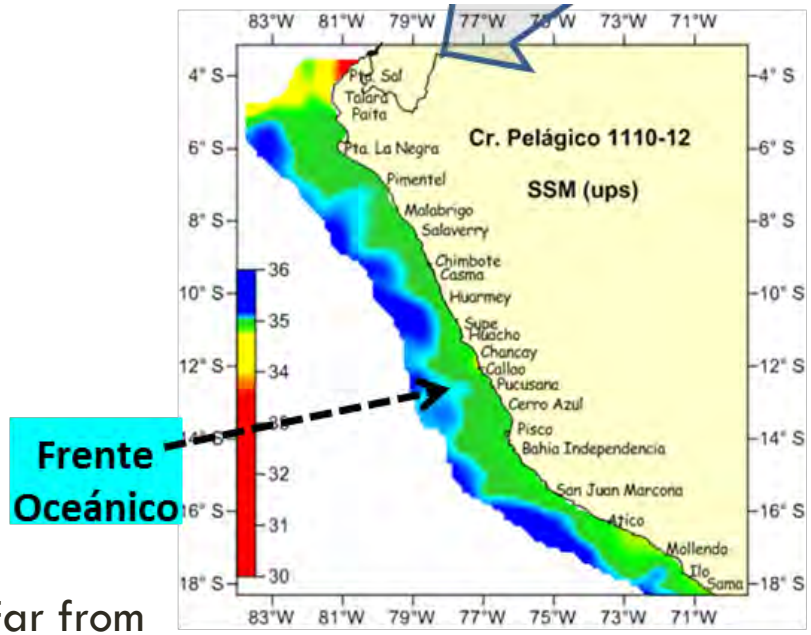


Changes of the position of oceanic front

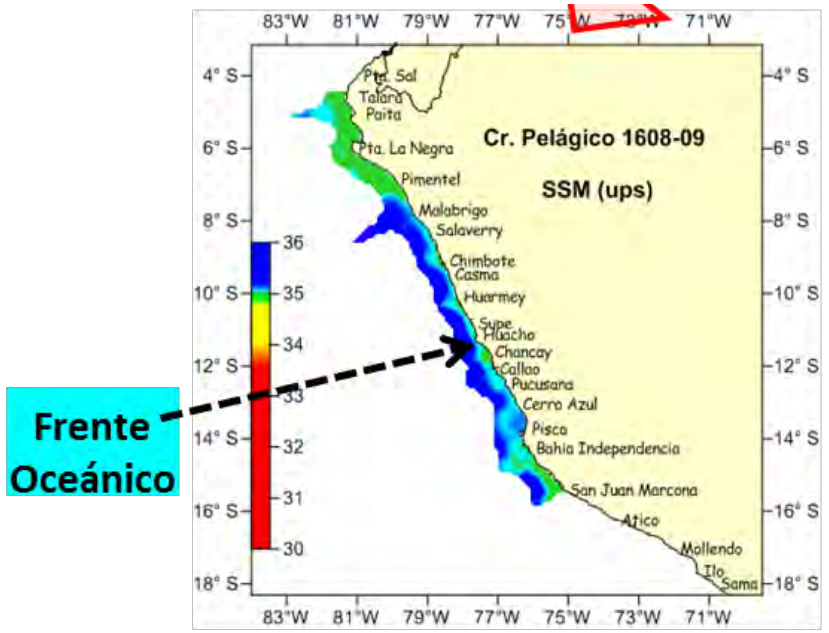
Temporally



Spatialy



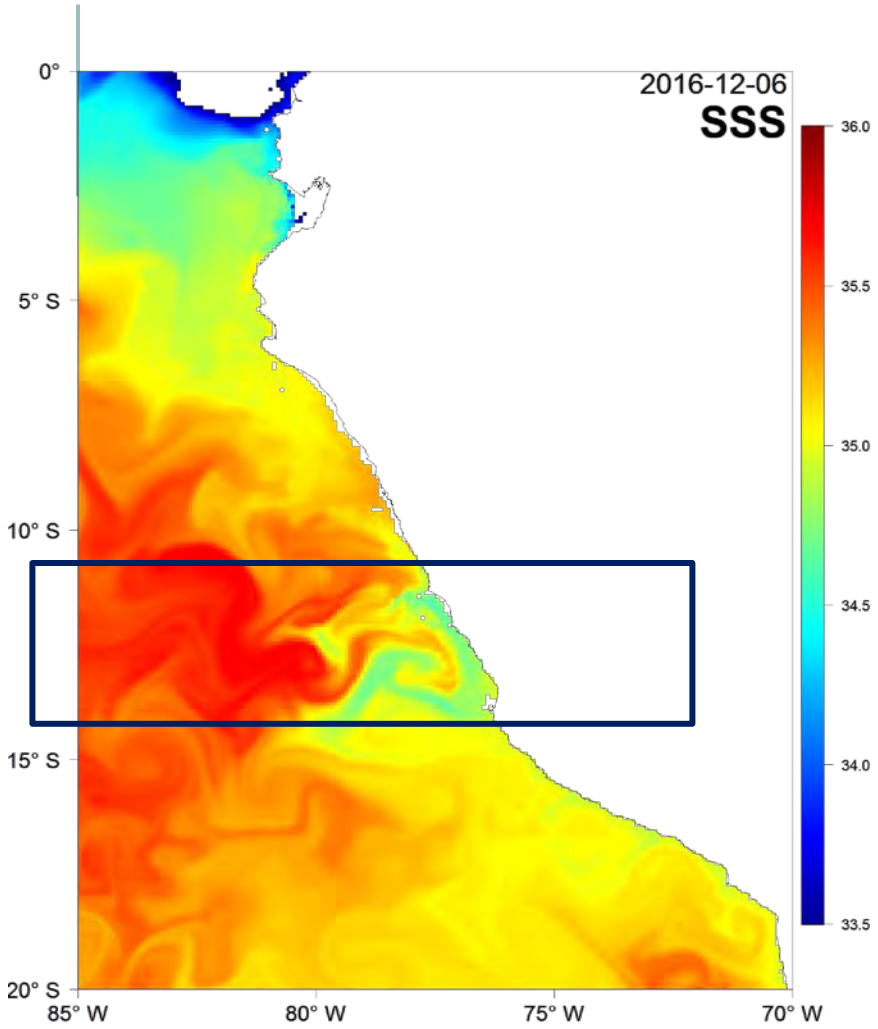
Far from the coast

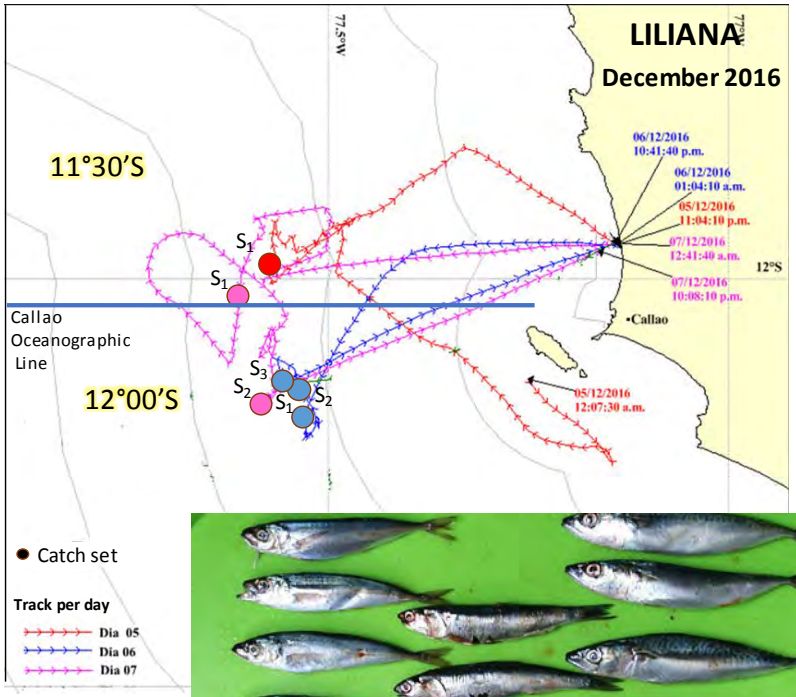


Near to the coast

More data…….

Horizontal View





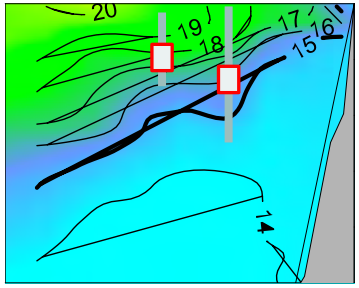
Vertical View

OCEANOGRAPHIC LINE: CALLAO 1612 - R/V LUIS FLORES PORTUGAL

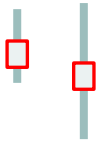
06th - 07th December 2016)

Mixed school vertical distribution

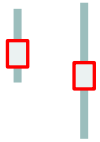
Temperature (°C) CTD



Salinity (ups) CTD



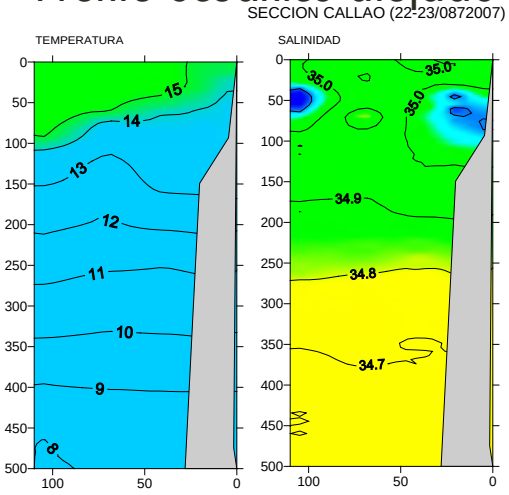
Oxigen (mL/L) CTD



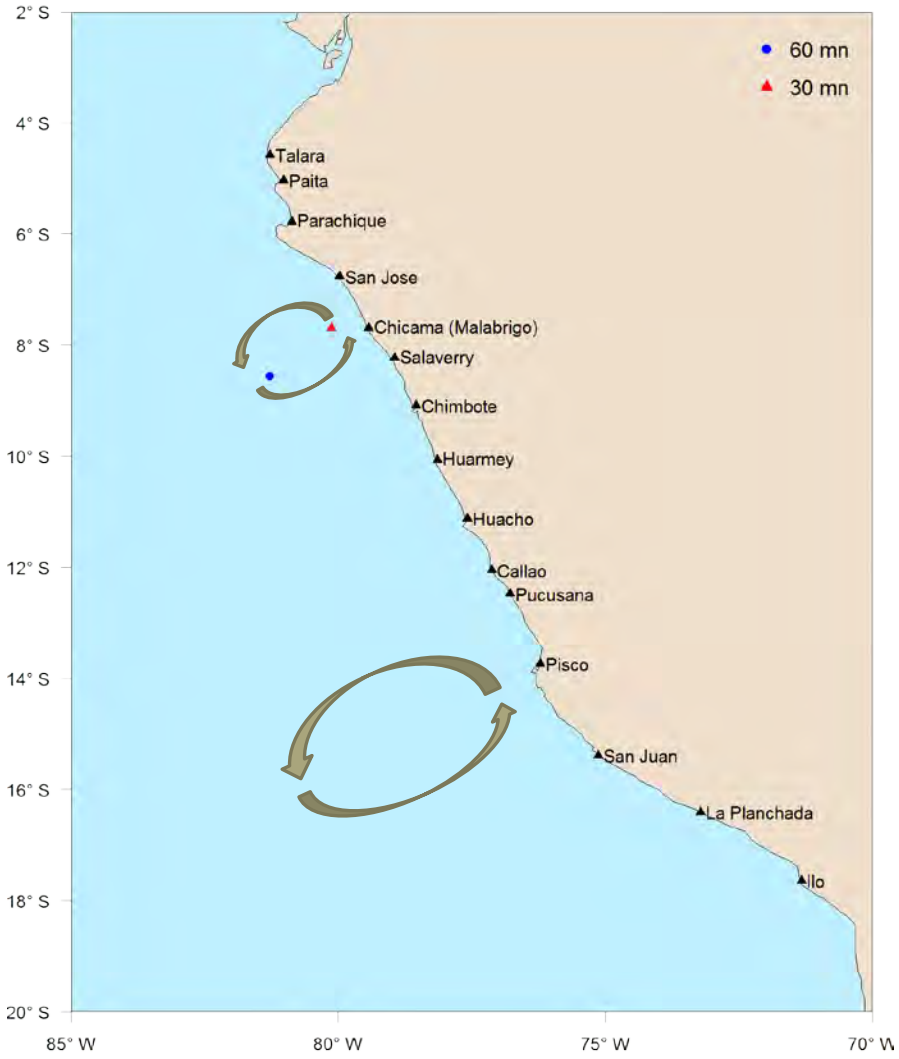
CTD : conductivity, temperature and depth)

2007

Frente oceánico alejado



Proposal of a circuit

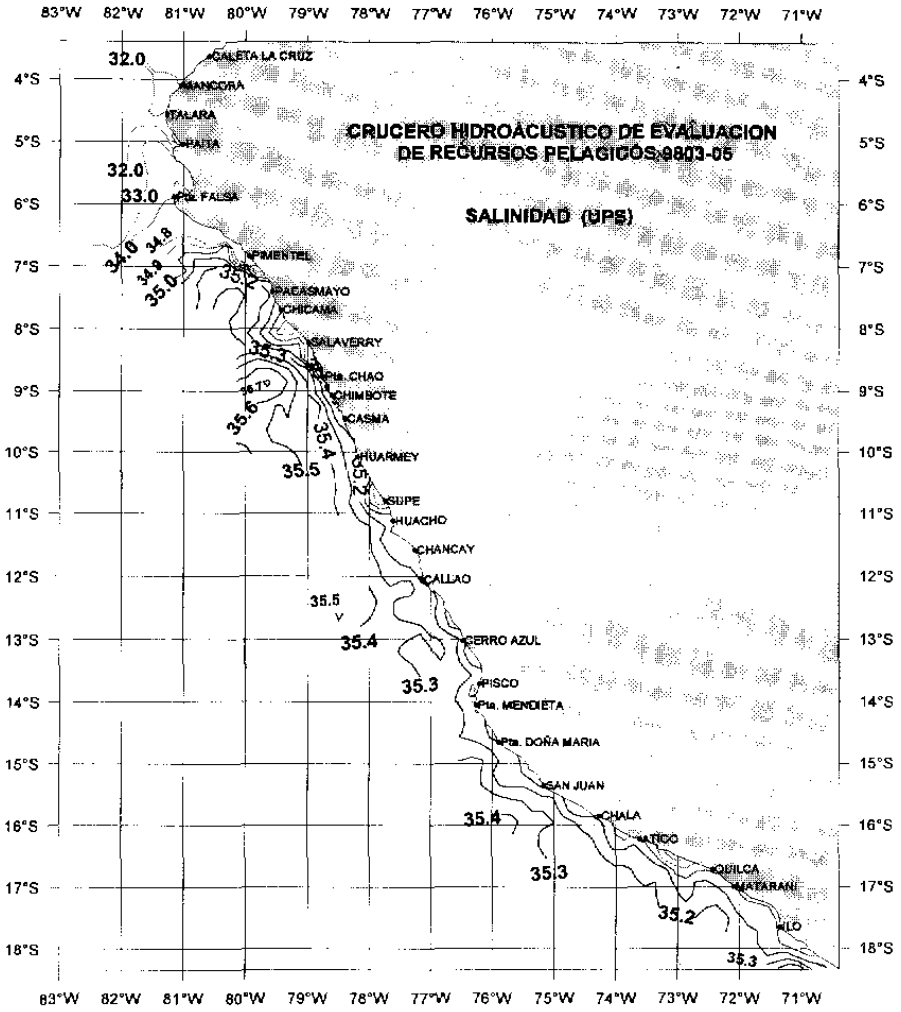


When the oceanic front is near to the coast, then the circuit repeats quickly;
While when it is far away, then the circuit is difficult to meet.

“The circuit is closer in warm periods”

Looking for historical data…….

Proposal of a circuit



Salinidad superficial del mar durante el Crucero de marzo de 1998.

What happens at that moment ???

IN 1998
The oceanic front was very near to the coast.
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CONCLUSION

1

- There is interaction between adult anchovy and juvenile sardine, jack mackerel and pacific mackerel in coastal areas, whereas in oceanic areas there is only interaction between adult specimens of these species, without anchovy participation.

2

- These evidence suposse the generation of a circuit in the life cycle of the sardine, jack mackerel, mackerel, that goes from juvenile coastal zone to adult oceanic zone and vice versa, according far away or closing of the oceanic front.

3

- The direct interaction between anchoveta and sardine occur only in a given size range interval. We suppose that at this stage the competition between the two species is a key factor for the abundance of the species during the following years.
- The knowledge of the interactions between these pelagic resources, identified with the upwelling areas, are the basis for understanding possible mechanisms of regime shift.