Monitoring skipjack migratory movements with 6 pole and line vessels and daily interpretation of oceanographic processes: towards a better understanding of skipjack life cycle in the interest of sustainable fisheries in Brasil

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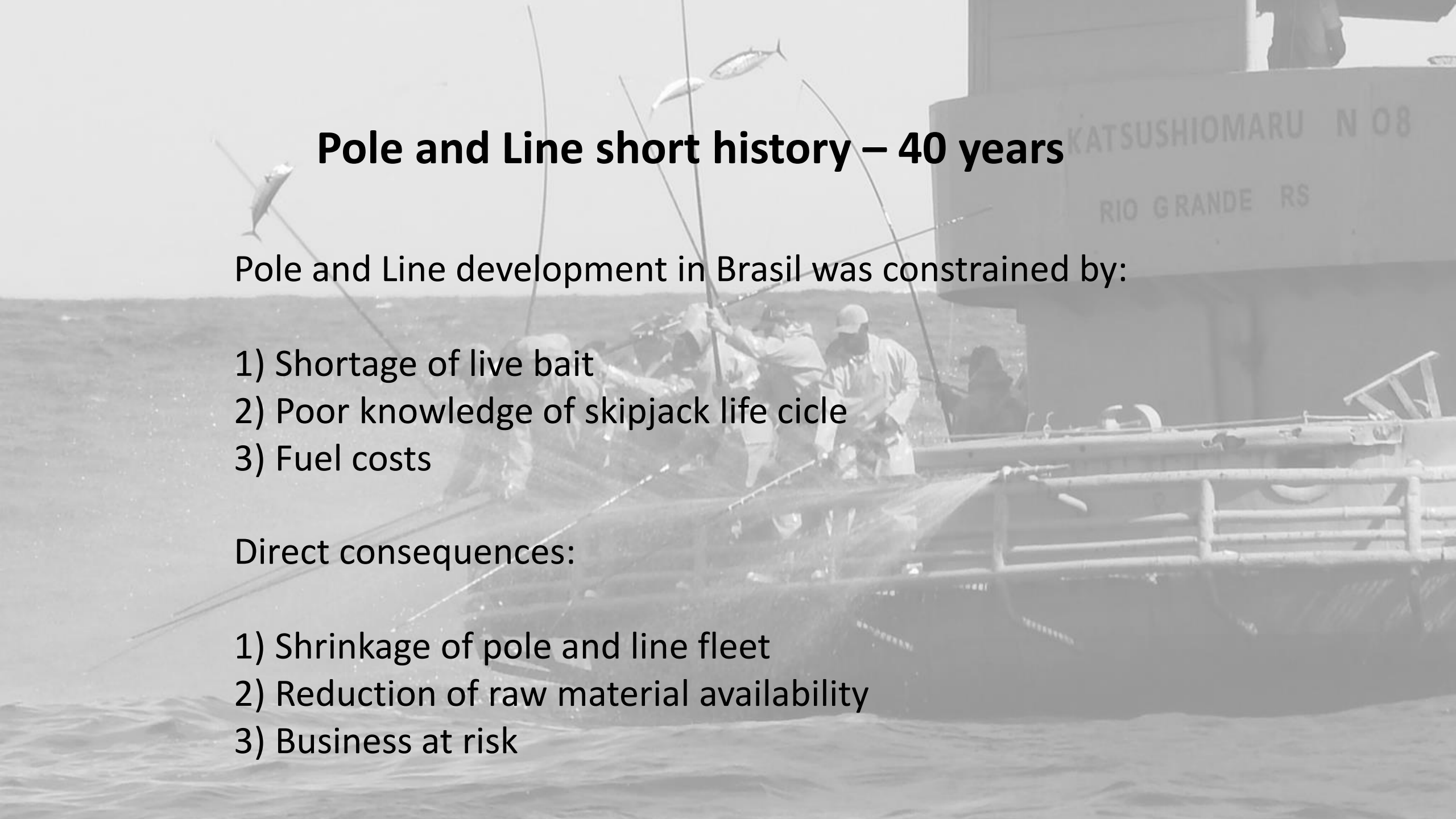
III FORO REGIONAL DE SOSTENIBILIDAD DEL ATÚN
6 y 7, Julio 2017
ceipa
ORGANIZADOR

FURG
INSTITUTO DE OCEANOGRAFIA
Universidade Federal do Rio Grande



Pole and Line short history – 40 years

Pole and Line development in Brasil was constrained by:

1) Shortage of live bait
2) Poor knowledge of skipjack life cicle
3) Fuel costs

Direct consequences:

1) Shrinkage of pole and line fleet
2) Reduction of raw material availability
3) Business at risk

Fishery Improvement Project (FIP)

Actors

- Private Sector – Industrias Alimentícias Leal Santos Ltda – Actemsa Group
- Government Sector – Instituto de Oceanografia – Universidade Federal do Rio Grande

Aims

Development of research to reduce bottlenose constrains

Summary

1st action – select 6 pole and line vessels to be used as “experimental labs”
2nd action – reduce the importance of sardine as live bait
3rd action – skipjack habitat monitoring to reduce searching time for fishing areas
4th action – reduce dependence on wild bait

1st action – select 6 pole and line vessels to be used as "experimental labs"

Vessels were monitored daily via Onixsat and production reports

Results:

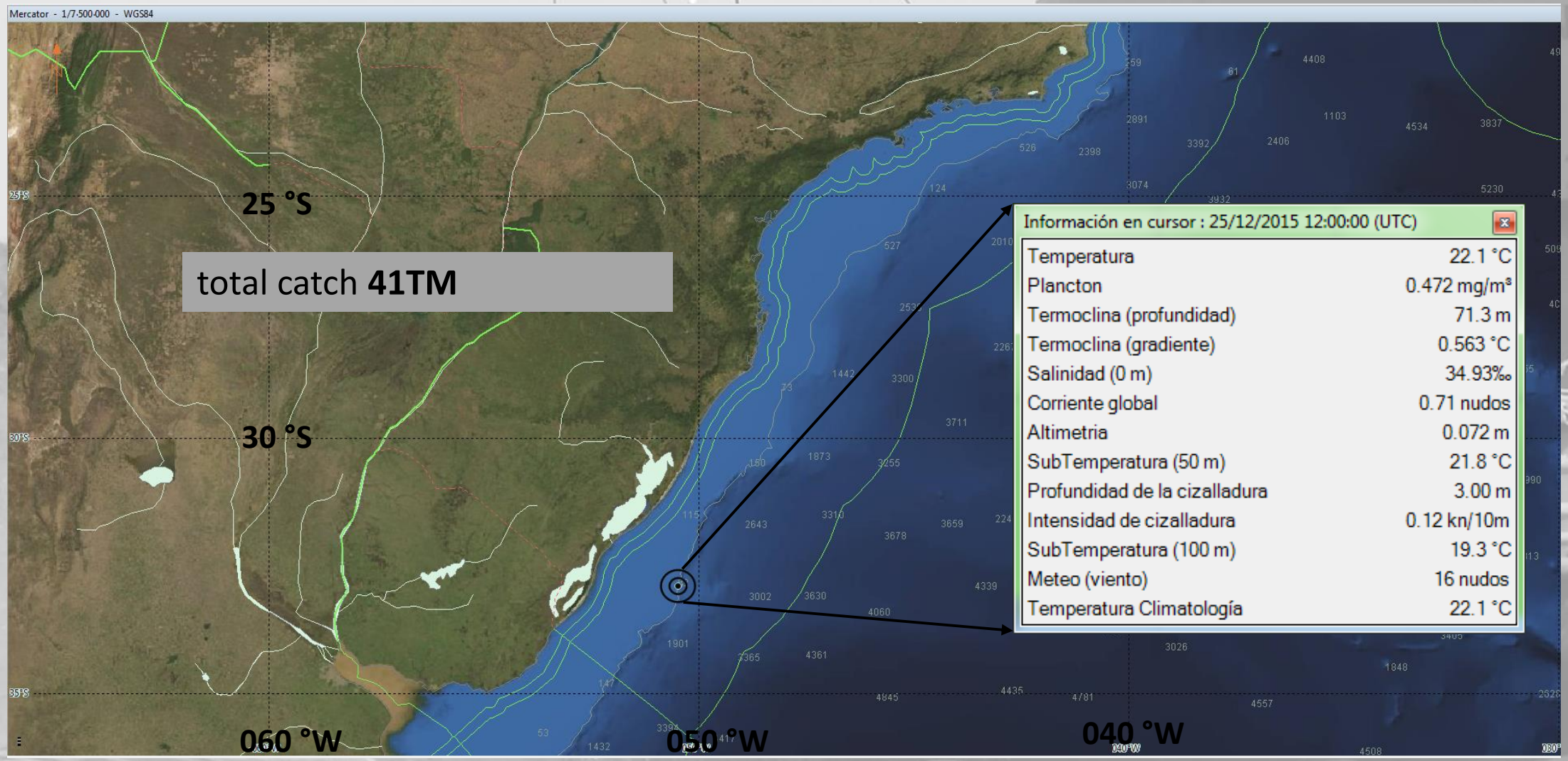
1) Gradually we learned about the main currents flowing north and south, their meanders, cooling and warming processes and plankton growth

2) Gradually fishing masters learned about Catsat tools and improved their catches

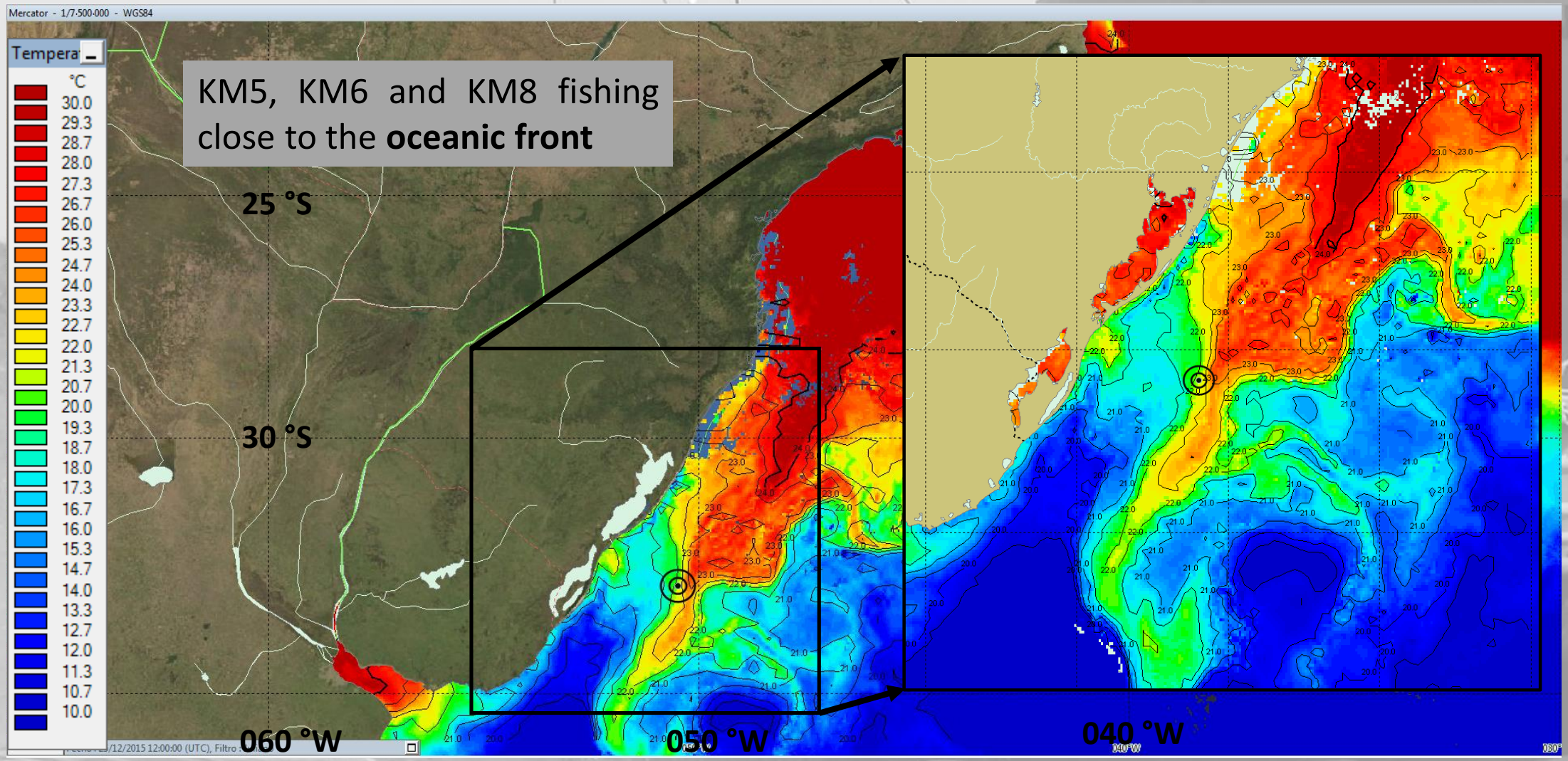
3) Gradually we learned that every year is a unique year

Summer fishing season: Christmas Day
An example

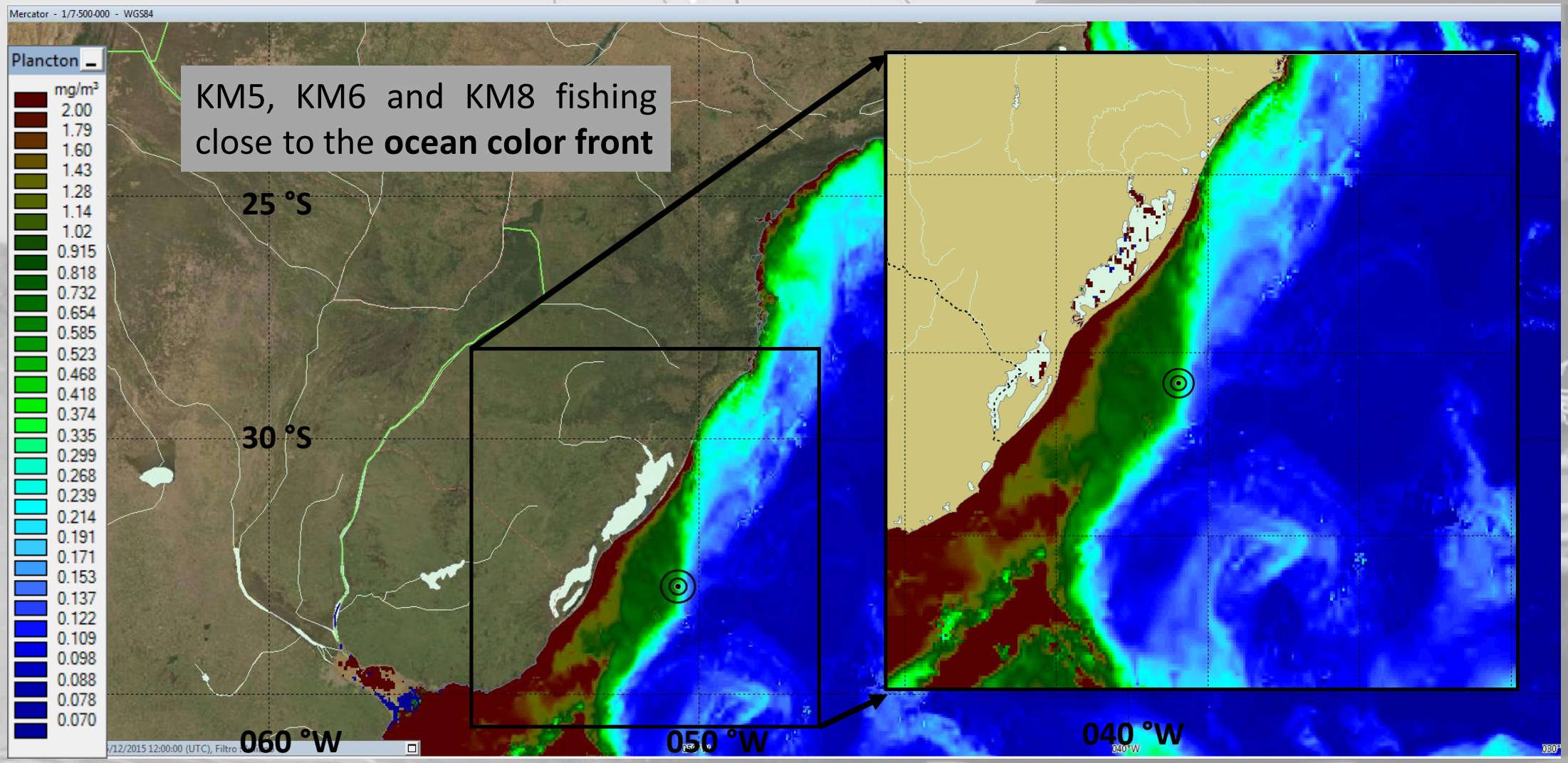
Vessels No. 5, 6 and 8 positions – Shelf break



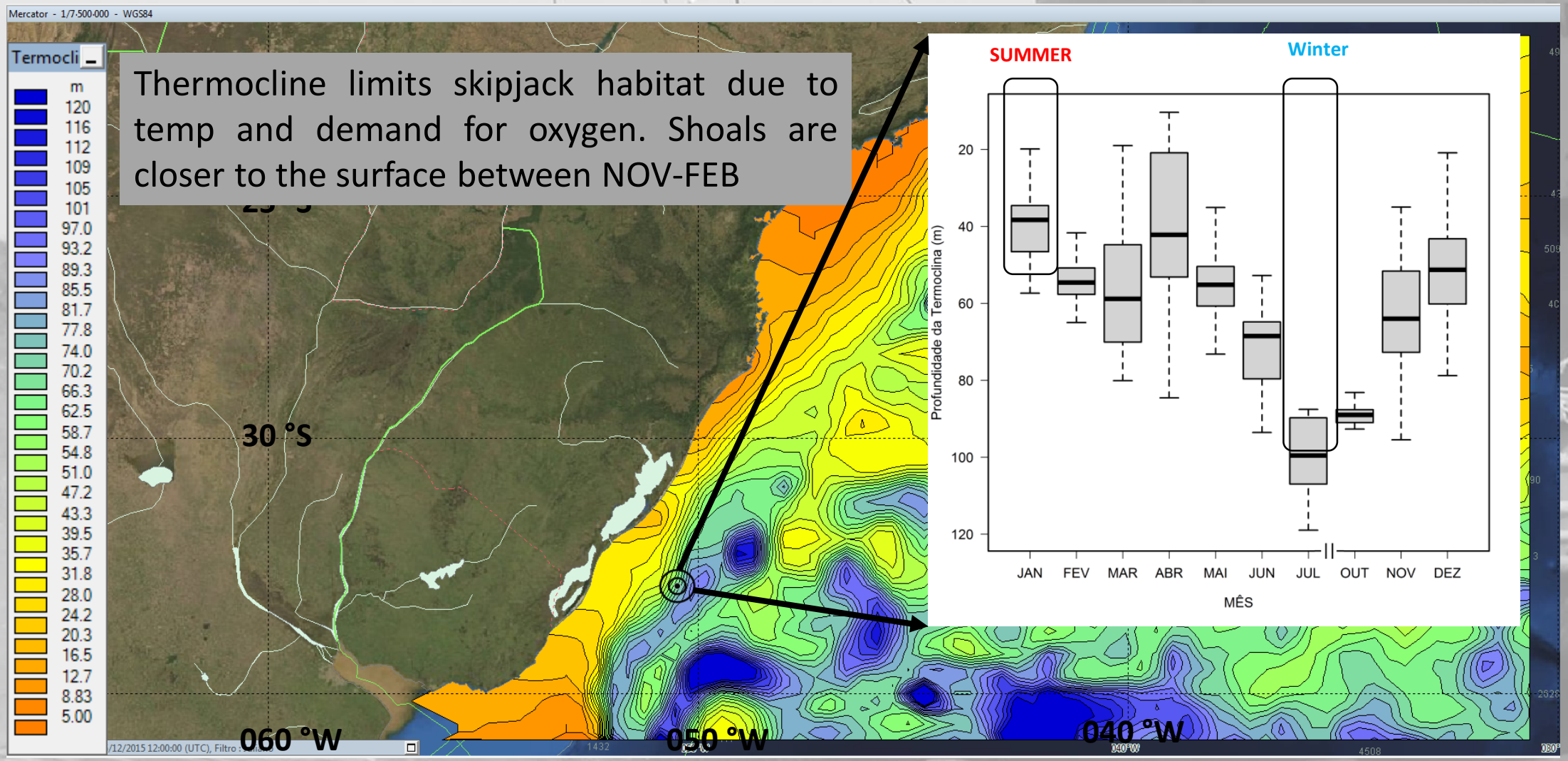
Vessels 5, 6 and 8 positions - SST



KM5, 6 and 8 positions – Plankton



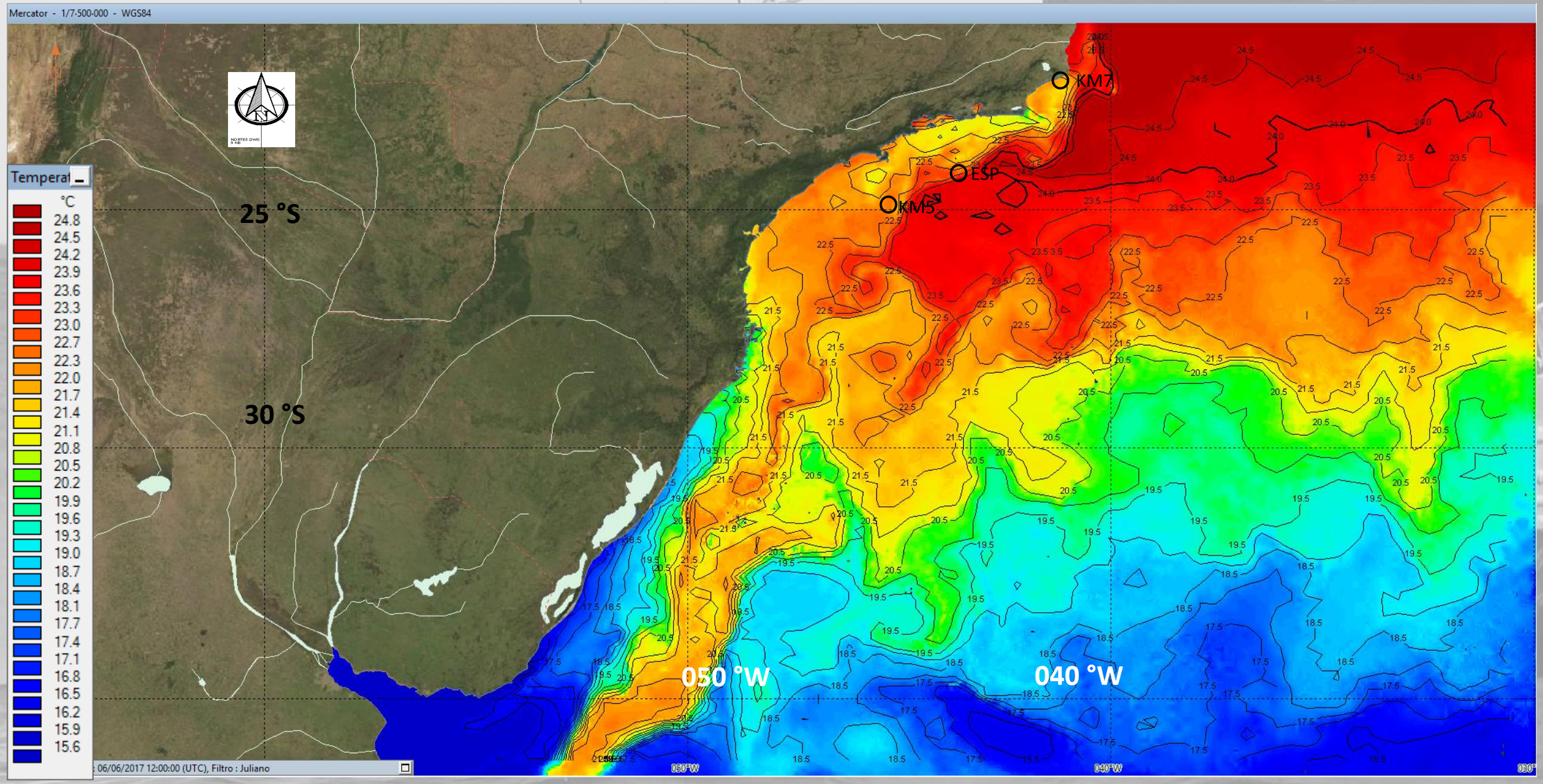
Vessels 5, 6, 8 positions – Thermocline Depth



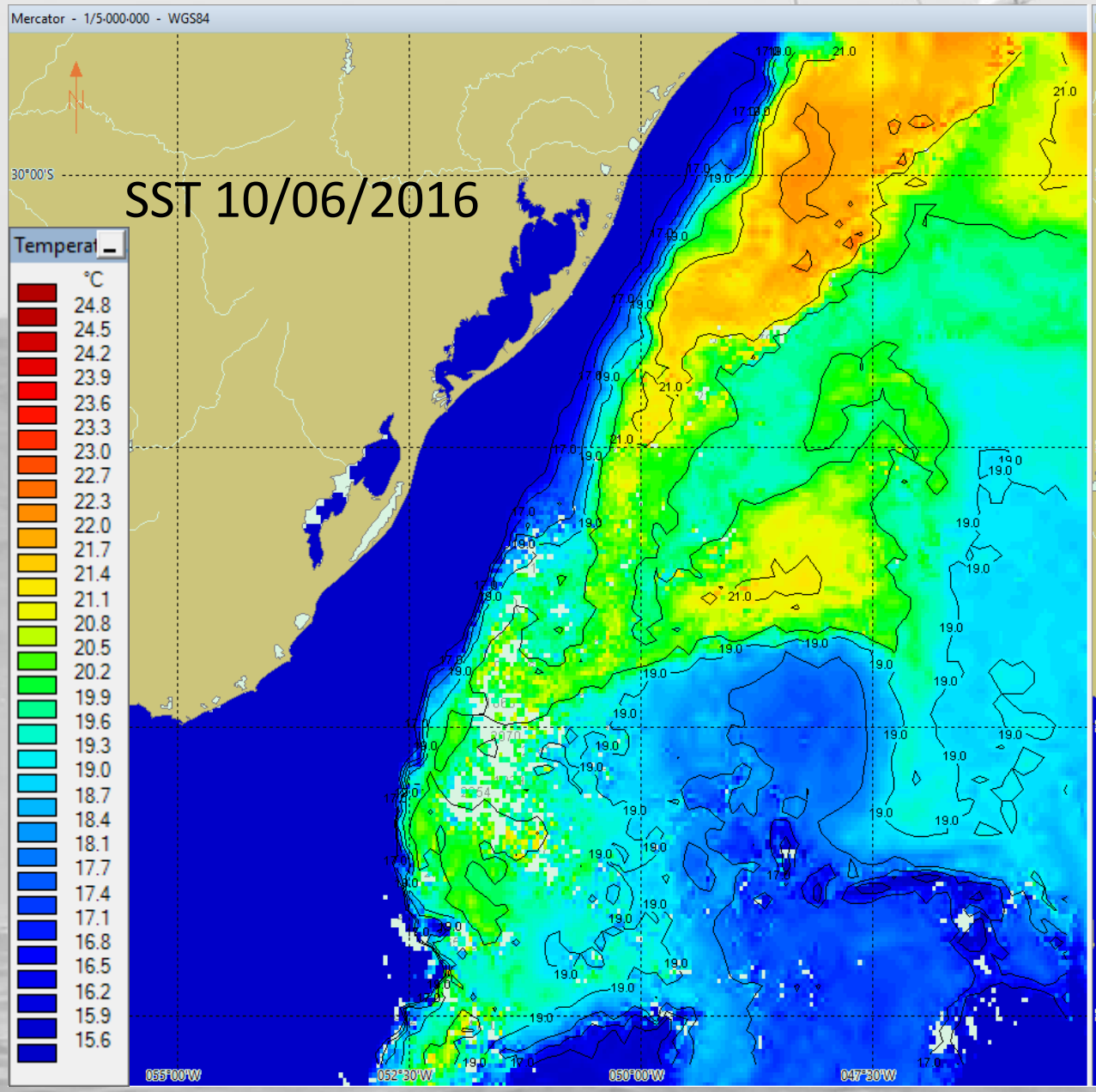
Thermocline limits skipjack habitat due to temp and demand for oxygen. Shoals are closer to the surface between NOV-FEB

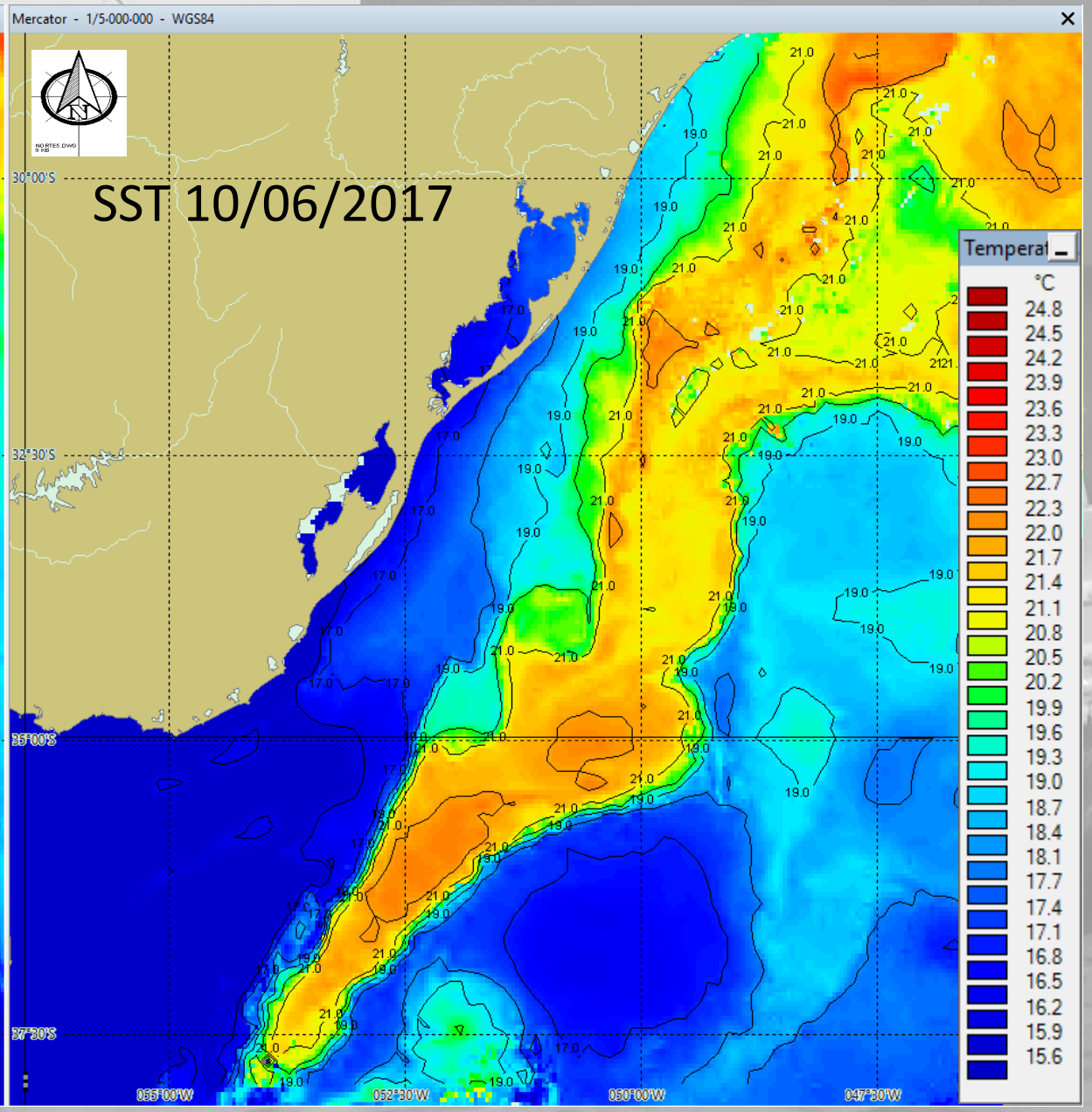
Winter fishing season
An example

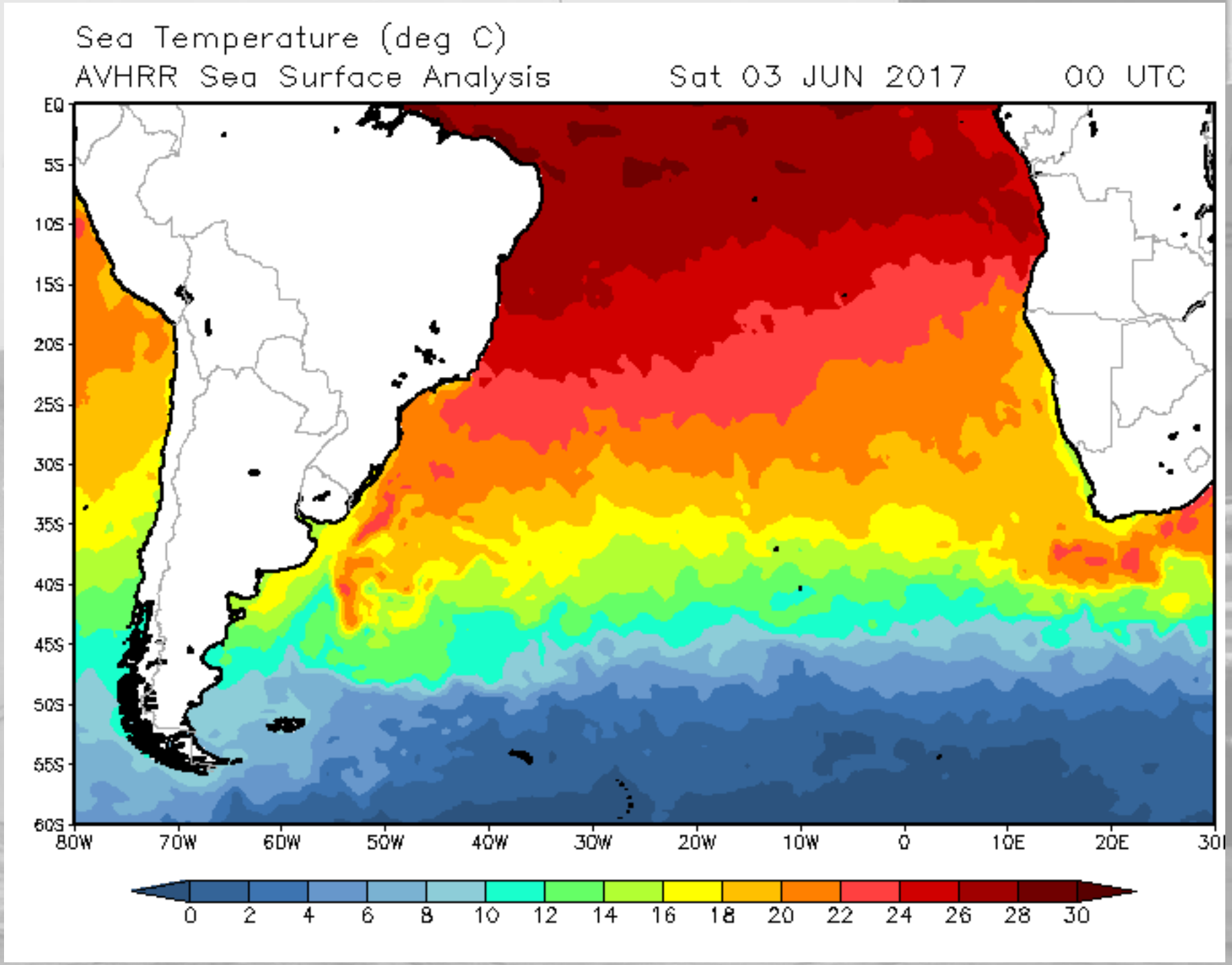
Sea Surface Temperature



Sea Surface Temperature






Sea Temperature (deg C)
AVHRR Sea Surface Analysis
Sat 03 JUN 2017
00 UTC
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10S
15S
20S
25S
30S
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40S
45S
50S
55S
60S
80W
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50W
40W
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0
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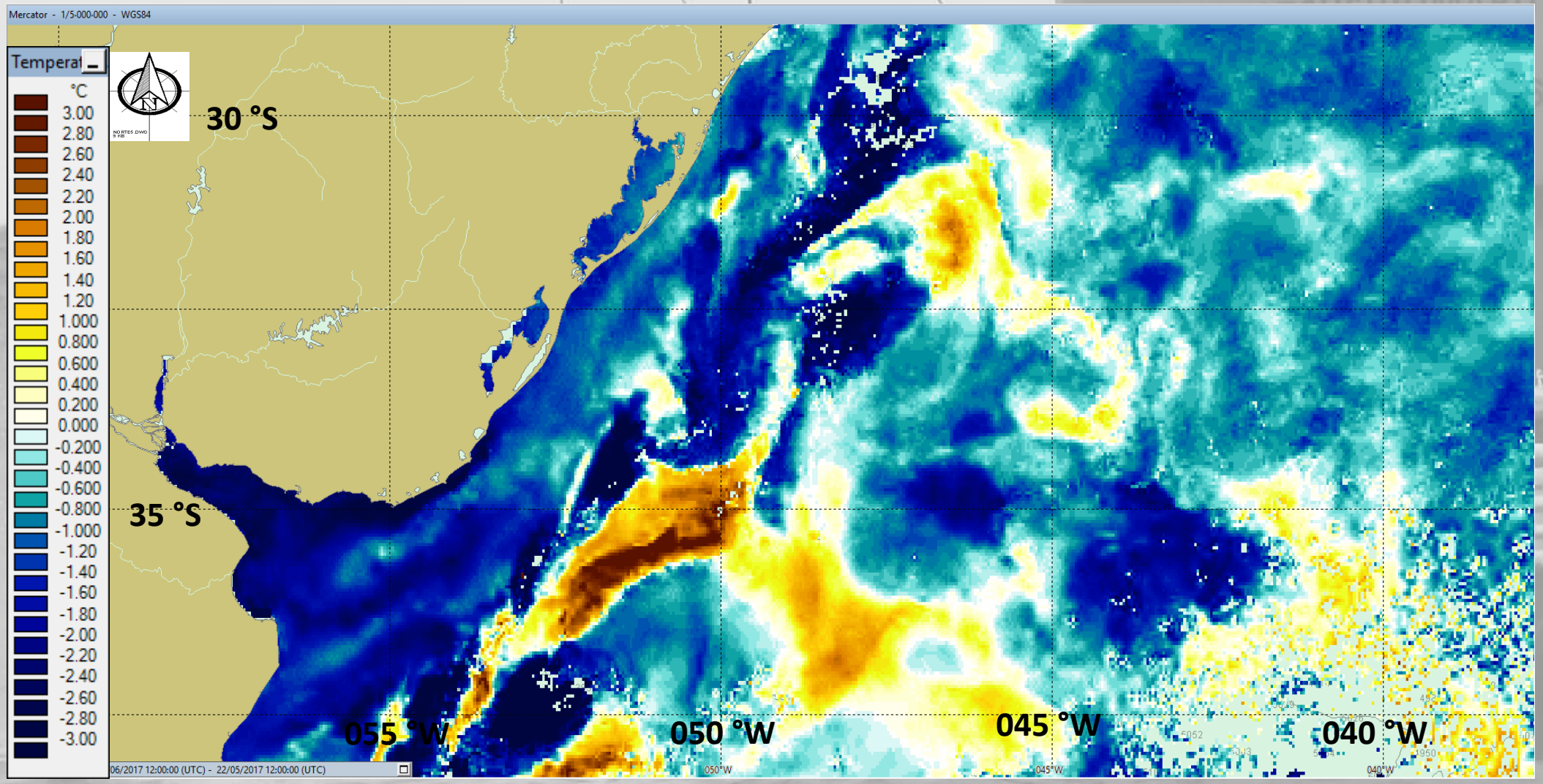
Gradient SST 15Days



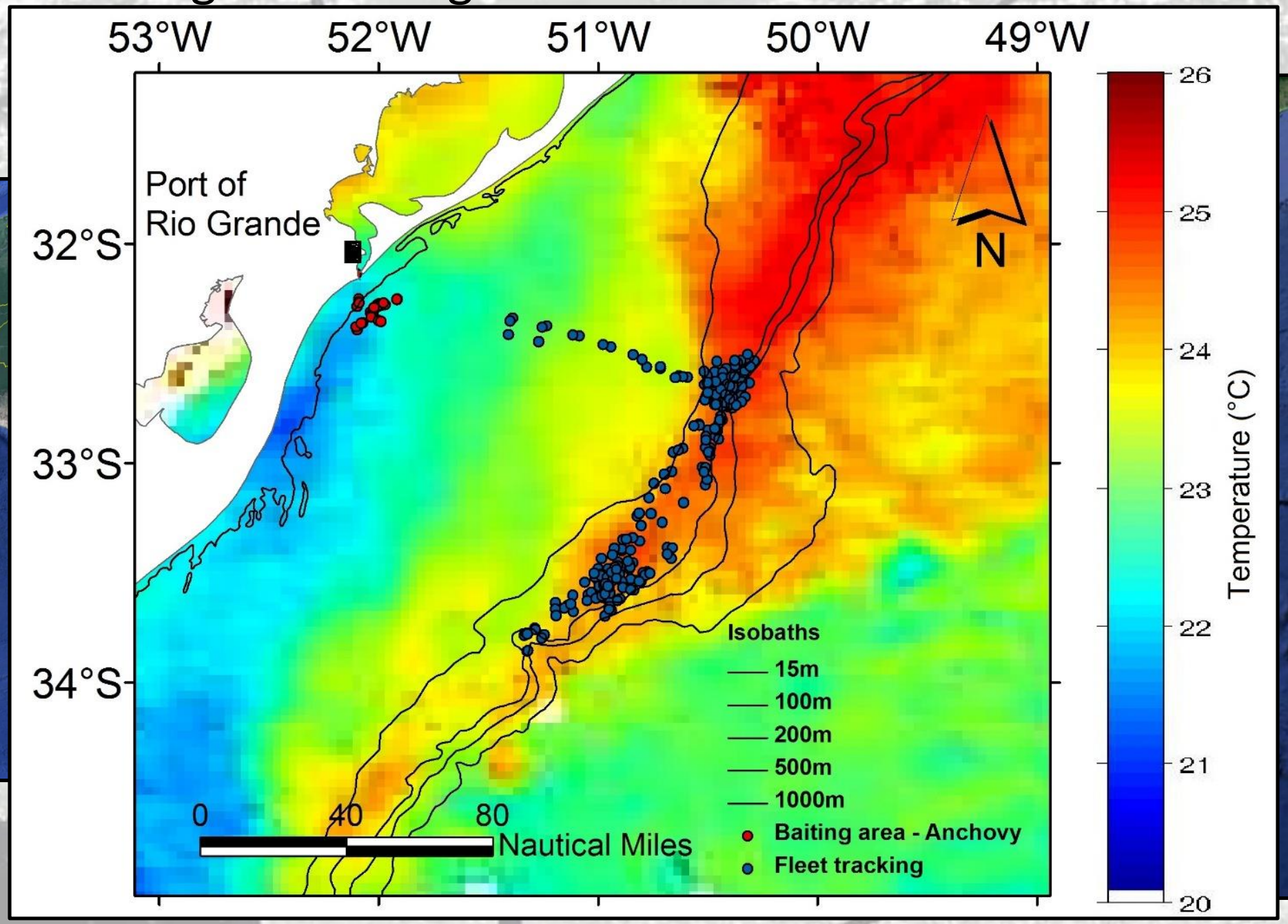
2nd action – reduce the importance of sardine as live bait

First test with anchovy in 2010
Before 2010 – sardine ~ 100%

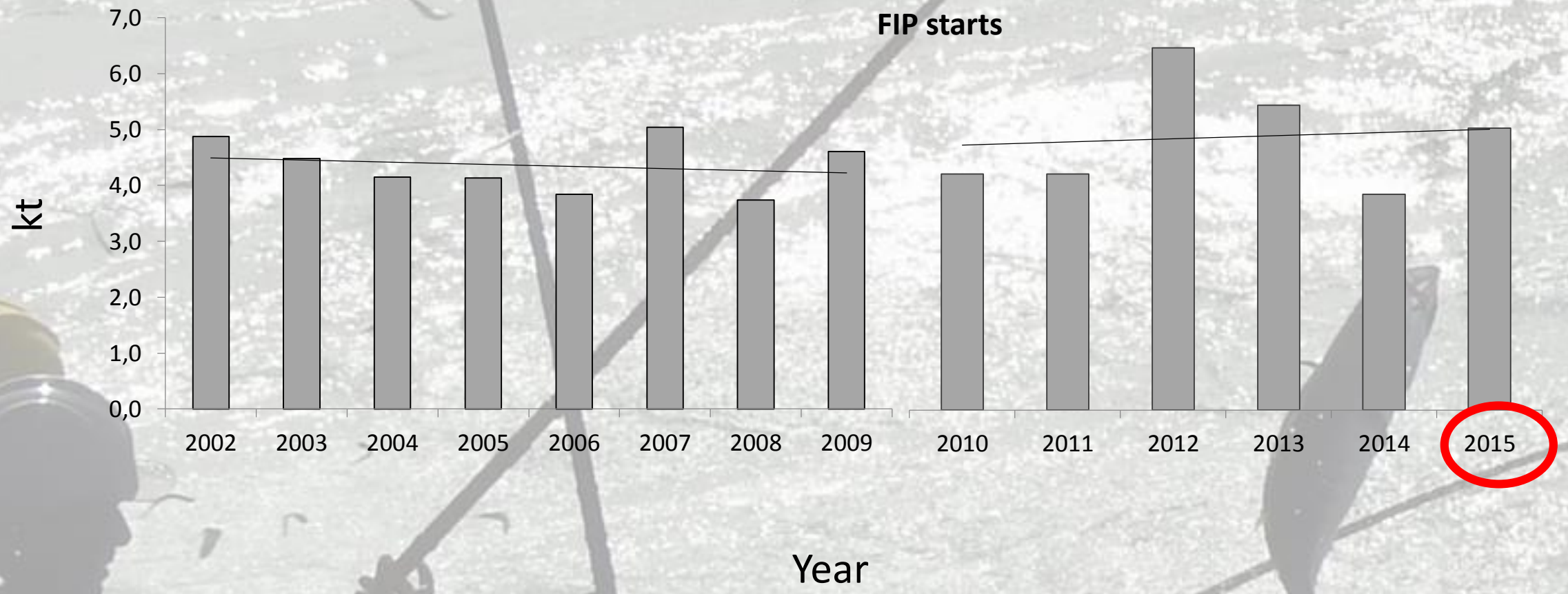
Actual fishing season ended 20th of June

Sardine – 20%
Anchovy – 80%

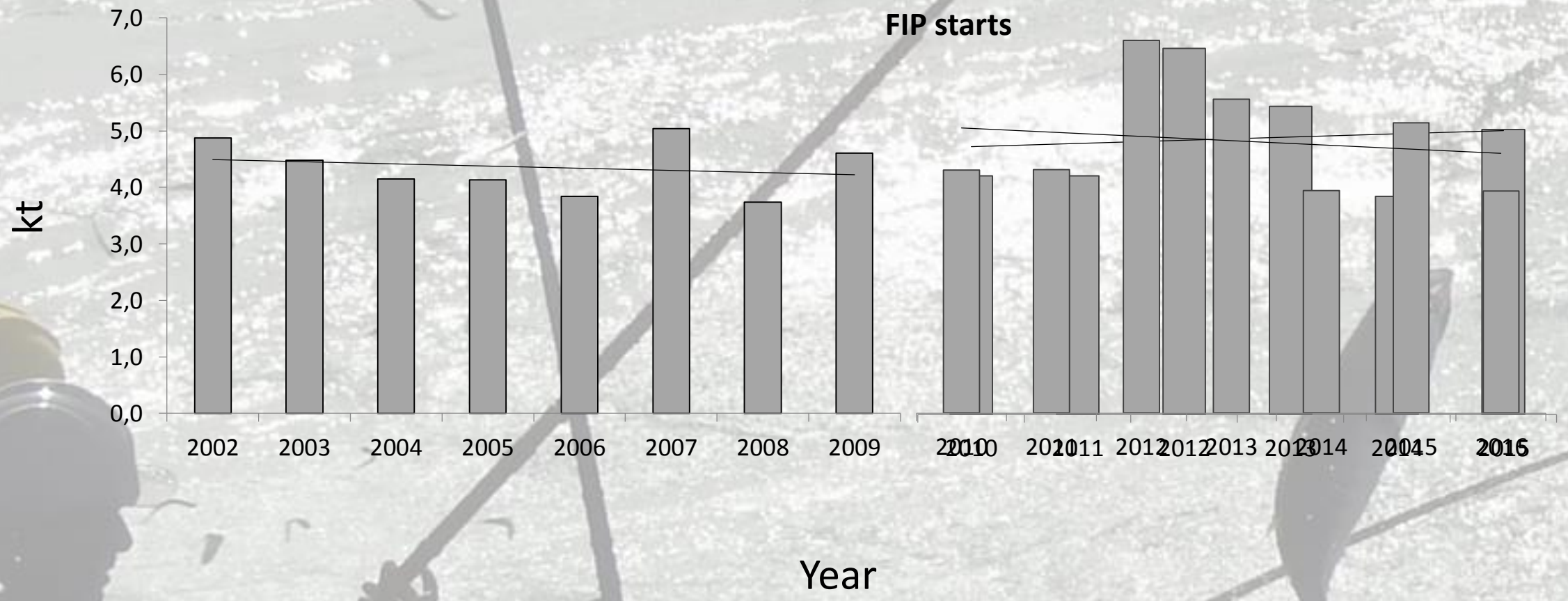
Baiting and fishing areas after FIP – summer months



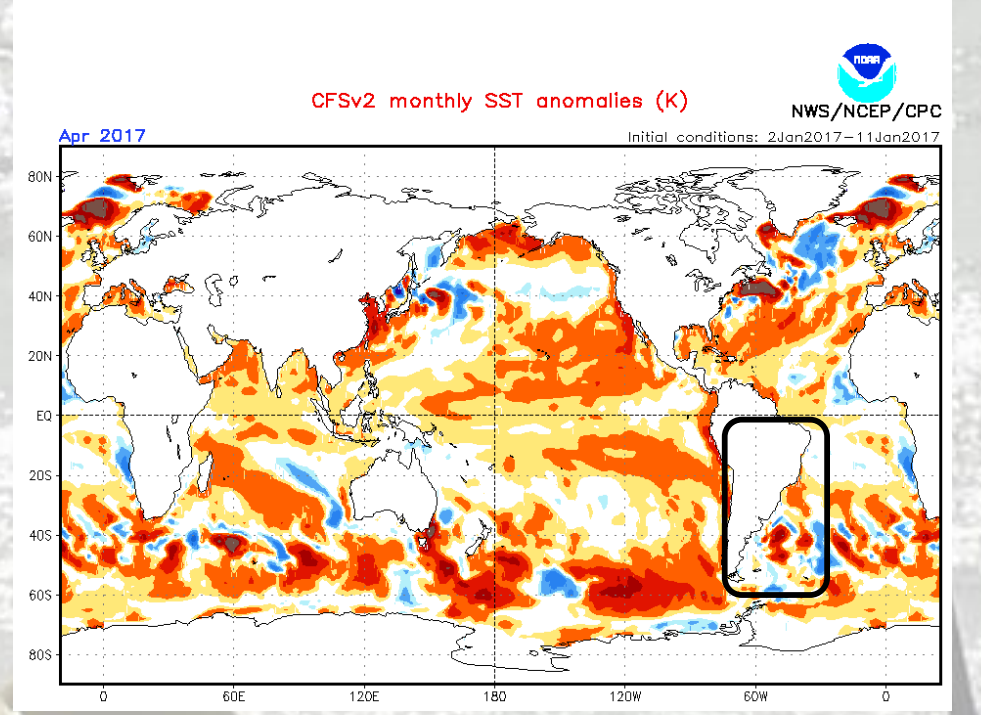
Skipjack catches by Leal Santos

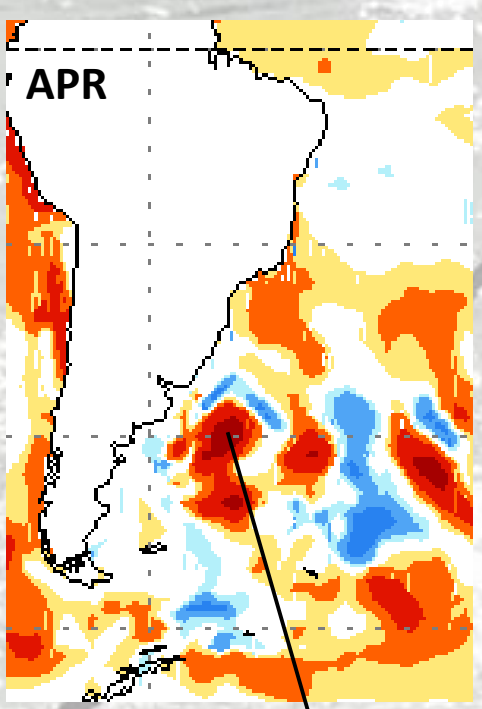


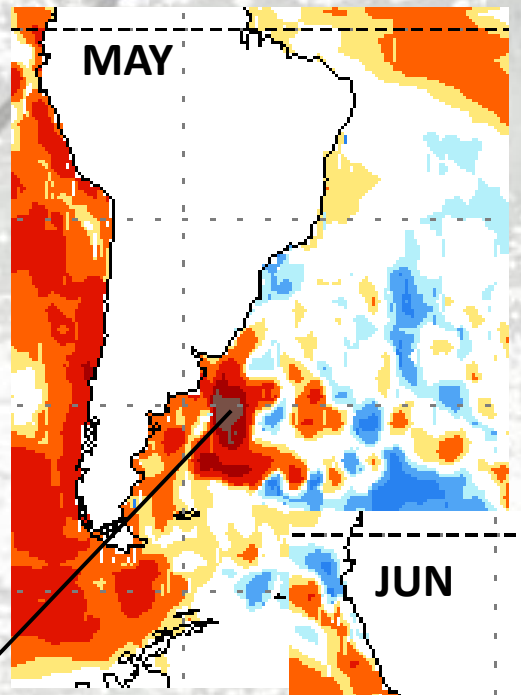
Skipjack catches by Leal Santos

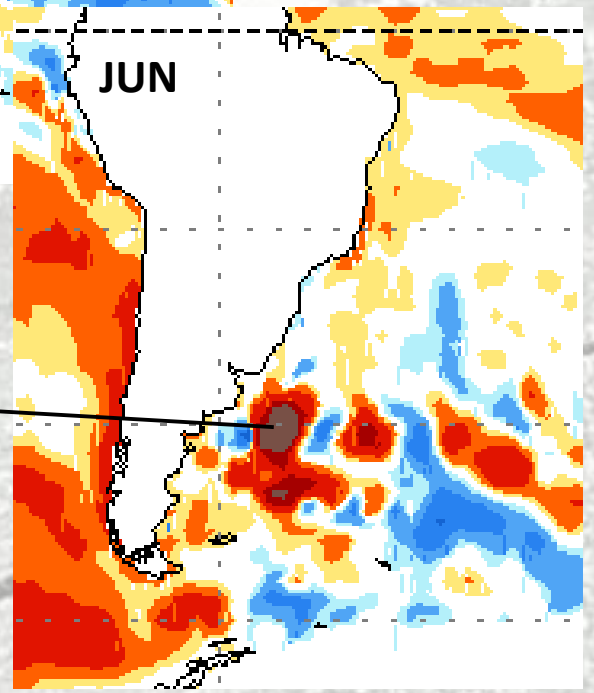


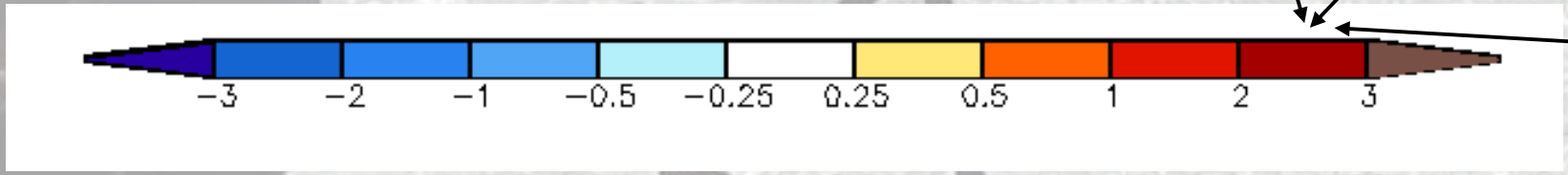
SST Anomalies (from NOAA)



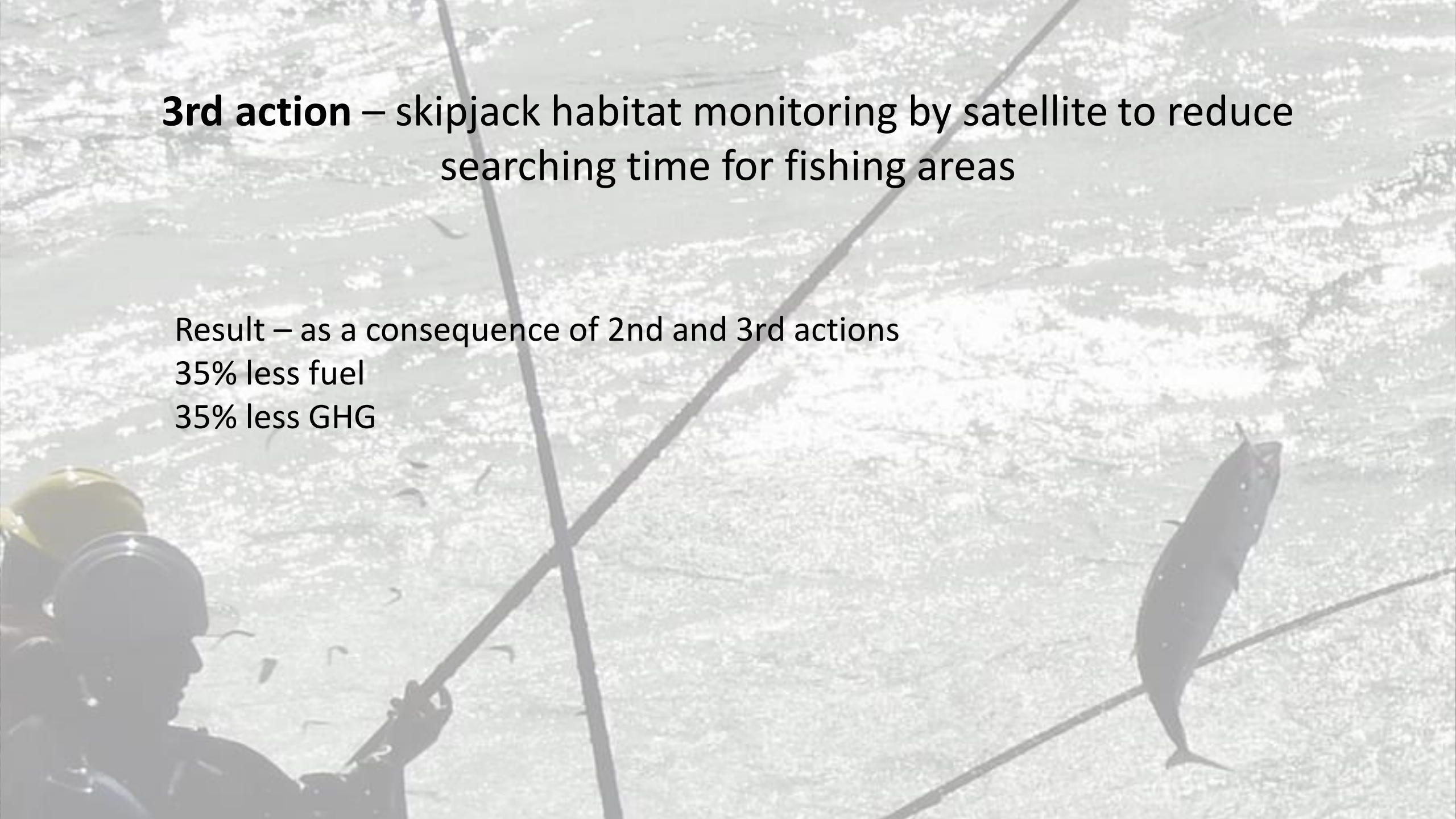








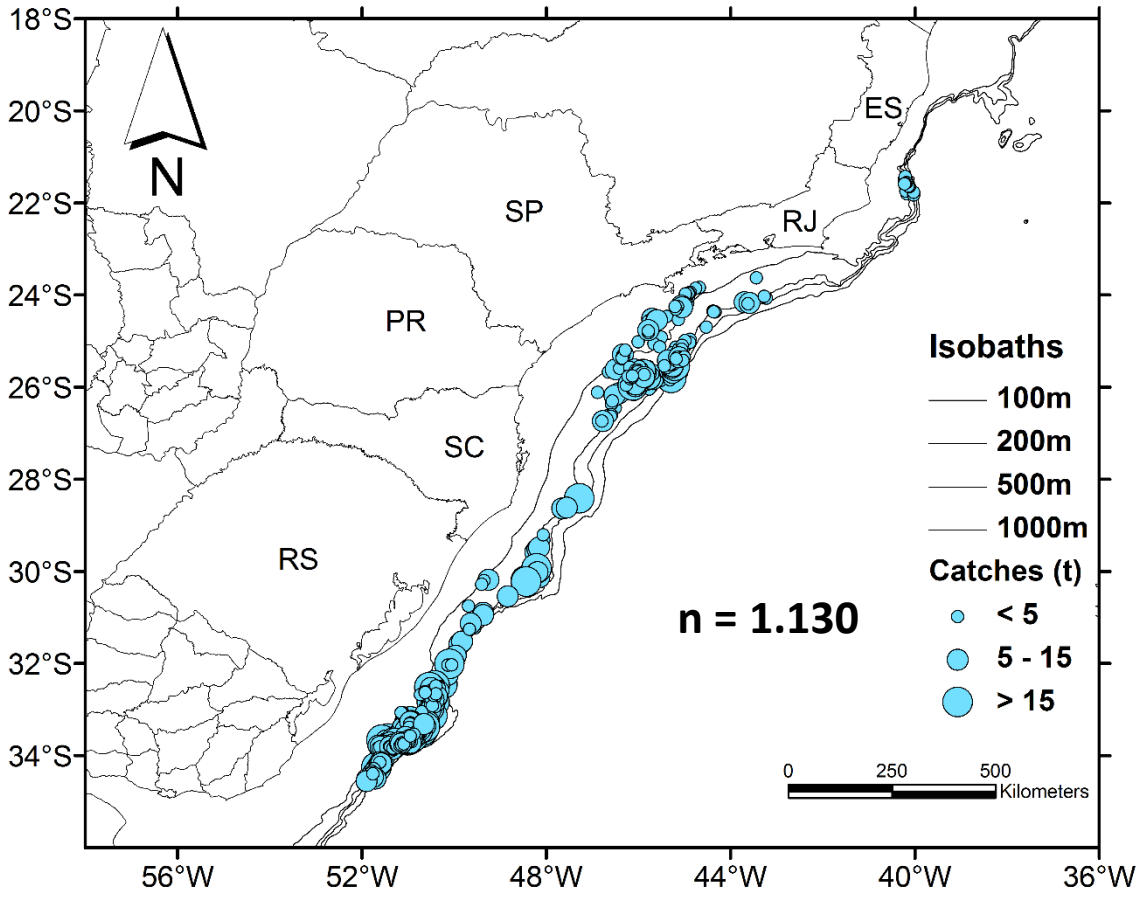
Important effect of higher SST and air temperature
Stronger winds – reduced number of fishing days

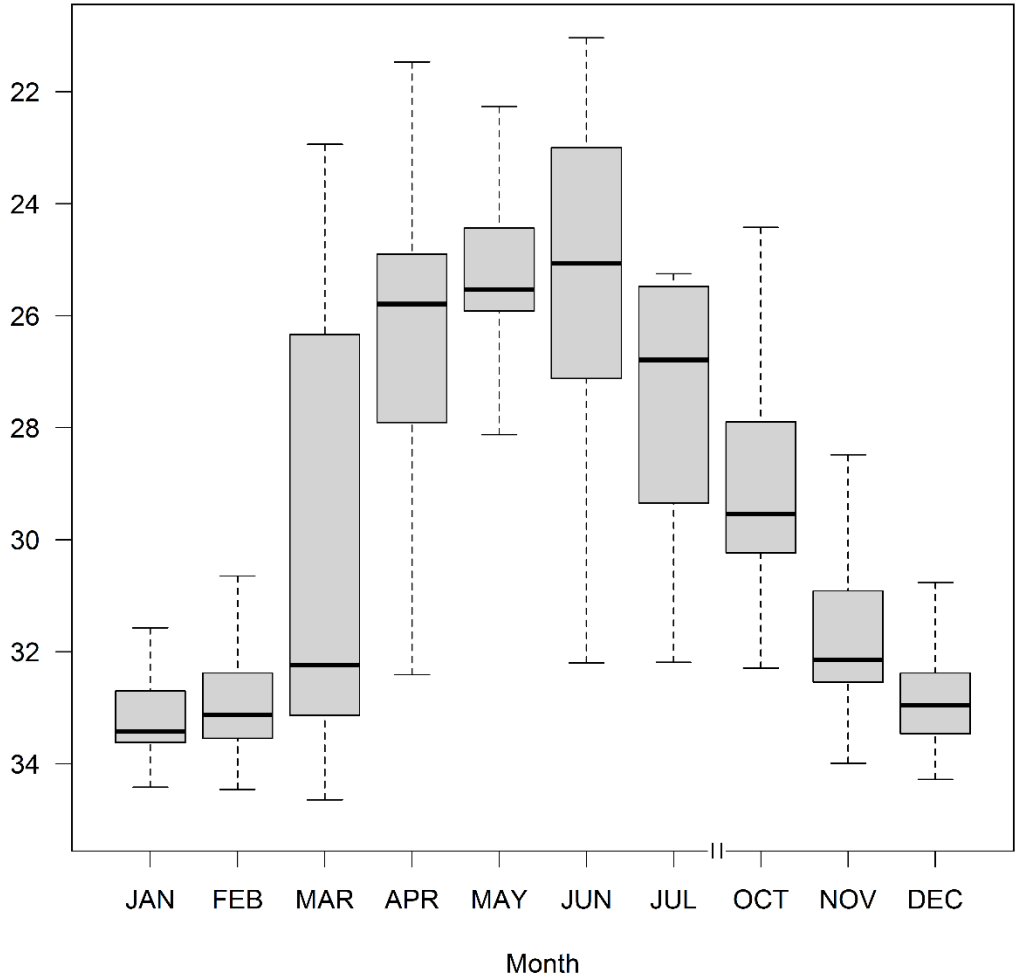


3rd action – skipjack habitat monitoring by satellite to reduce searching time for fishing areas

Result – as a consequence of 2nd and 3rd actions
35% less fuel
35% less GHG

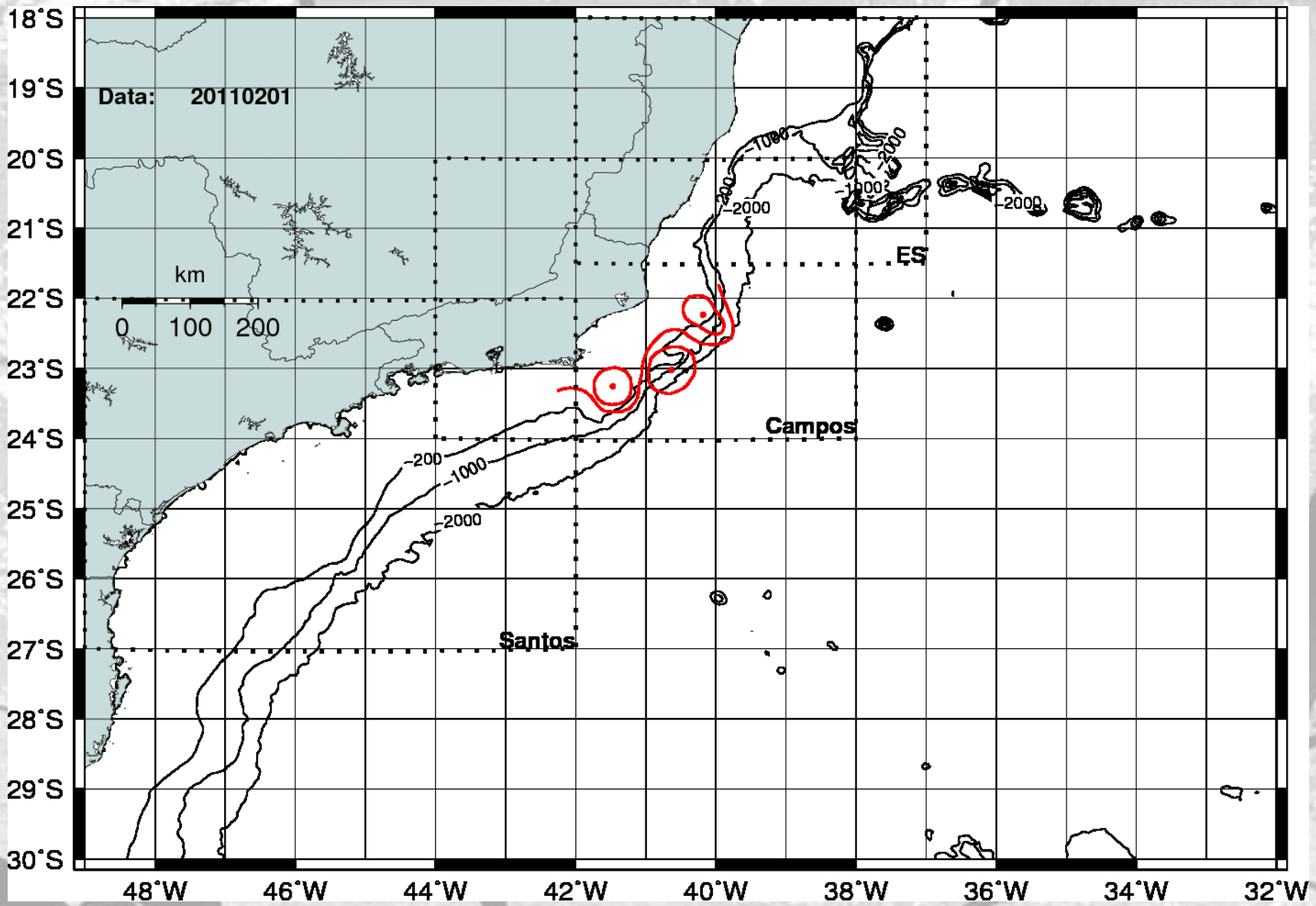
Spatio-temporal fleet displacement 2014-2016





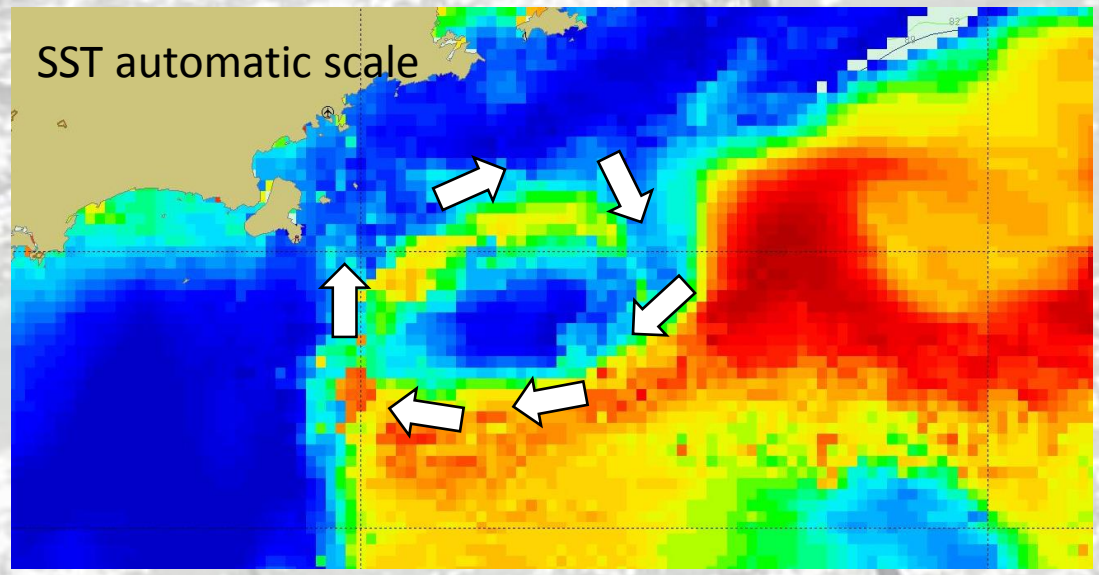
Coletto, 2016

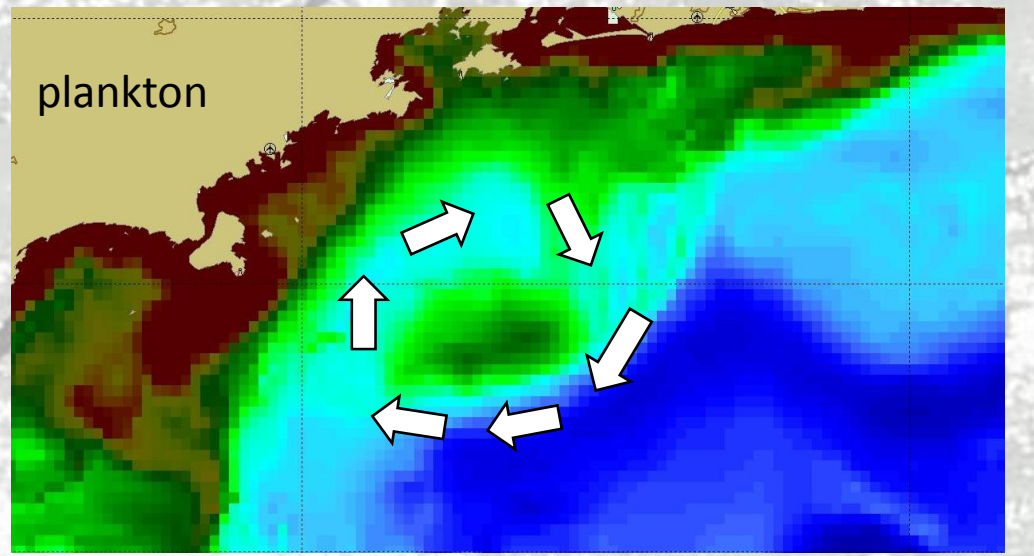
We search for eddies

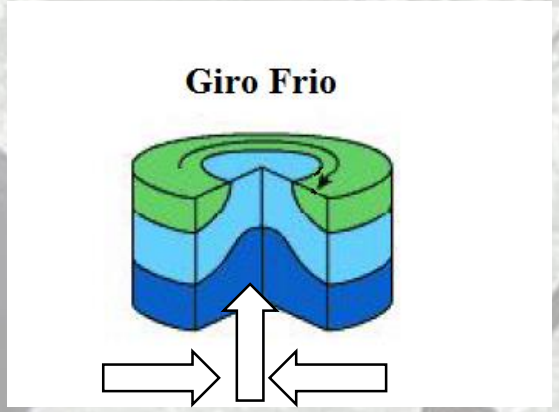


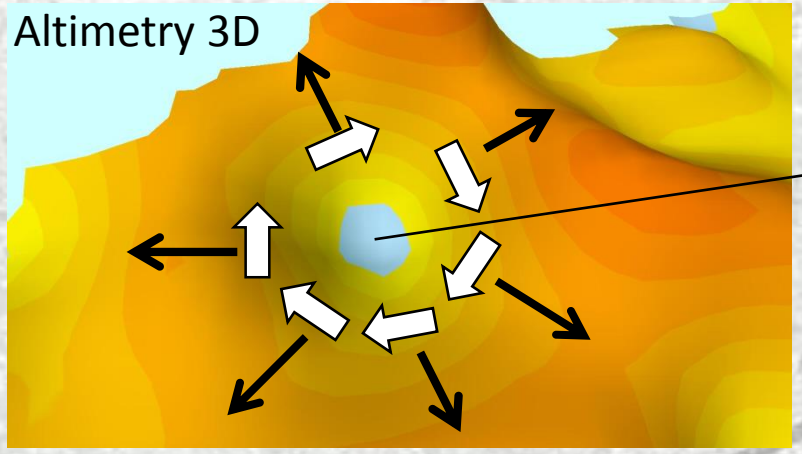
Cedido por Milton Kampel - INPE

Enrichment processes - Integrated environmental data



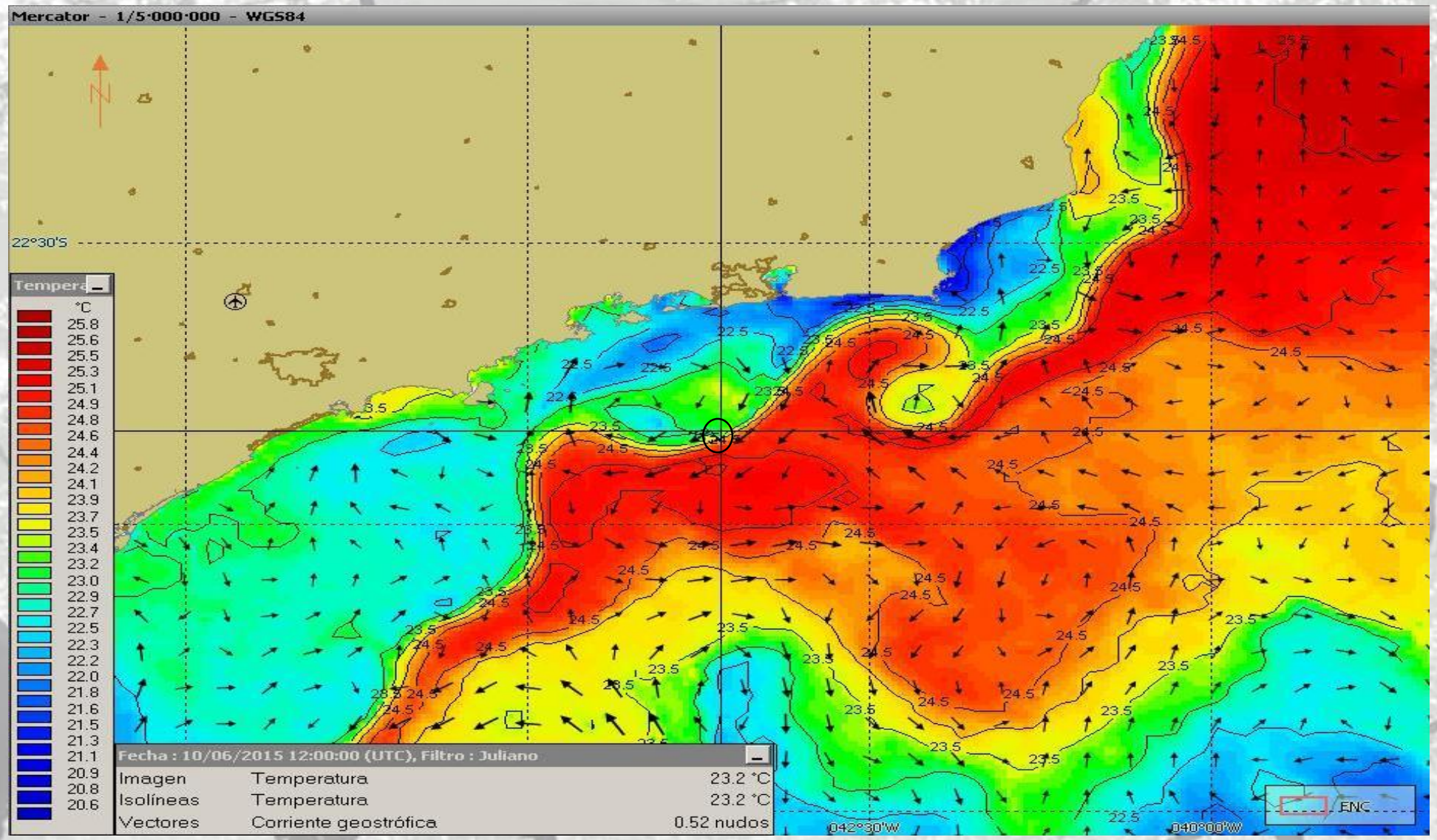






12 cm difference on sea level

South hemisphere gire – vertical structure – cold core (cyclonic)
Blue layer – indicates termocline position.


Mercator - 1/5·000·000 - WGS84
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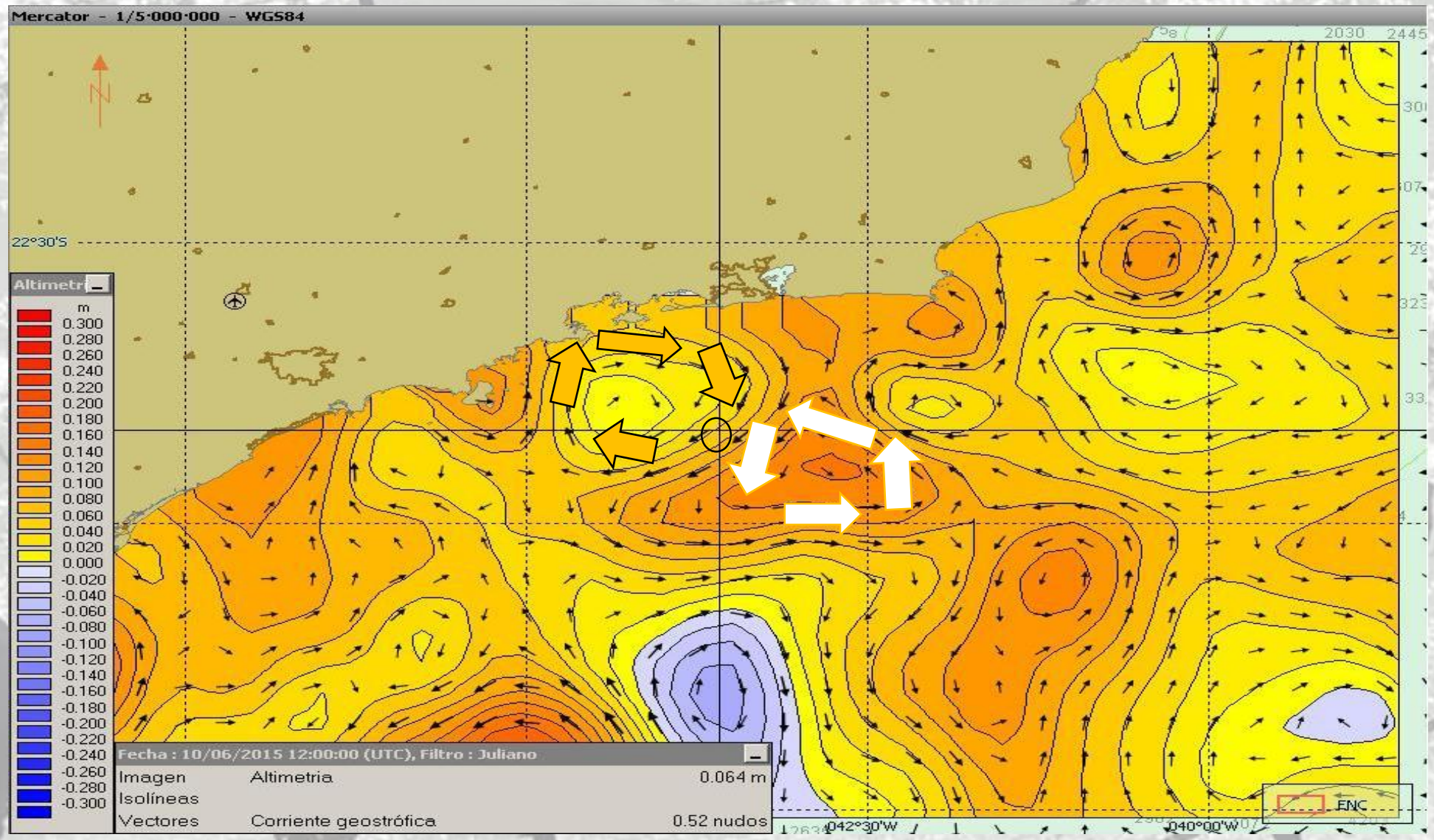
Fecha : 10/06/2015 12:00:00 (UTC), Filtro : Juliano
Imagen Temperatura 23.2 °C
Isolíneas Temperatura 23.2 °C
Vectores Corriente geostrófica 0.52 nudos
042°30'W
040°00'W
ENC


Mercator - 1/5·000·000 - WGS84
22°30'S
Altimetria
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-0.300
Fecha : 10/06/2015 12:00:00 (UTC), Filtro : Juliano
Imagen Altimetria 0.064 m
Isolíneas
Vectores Corriente geostrófica 0.52 nudos
042°30'W
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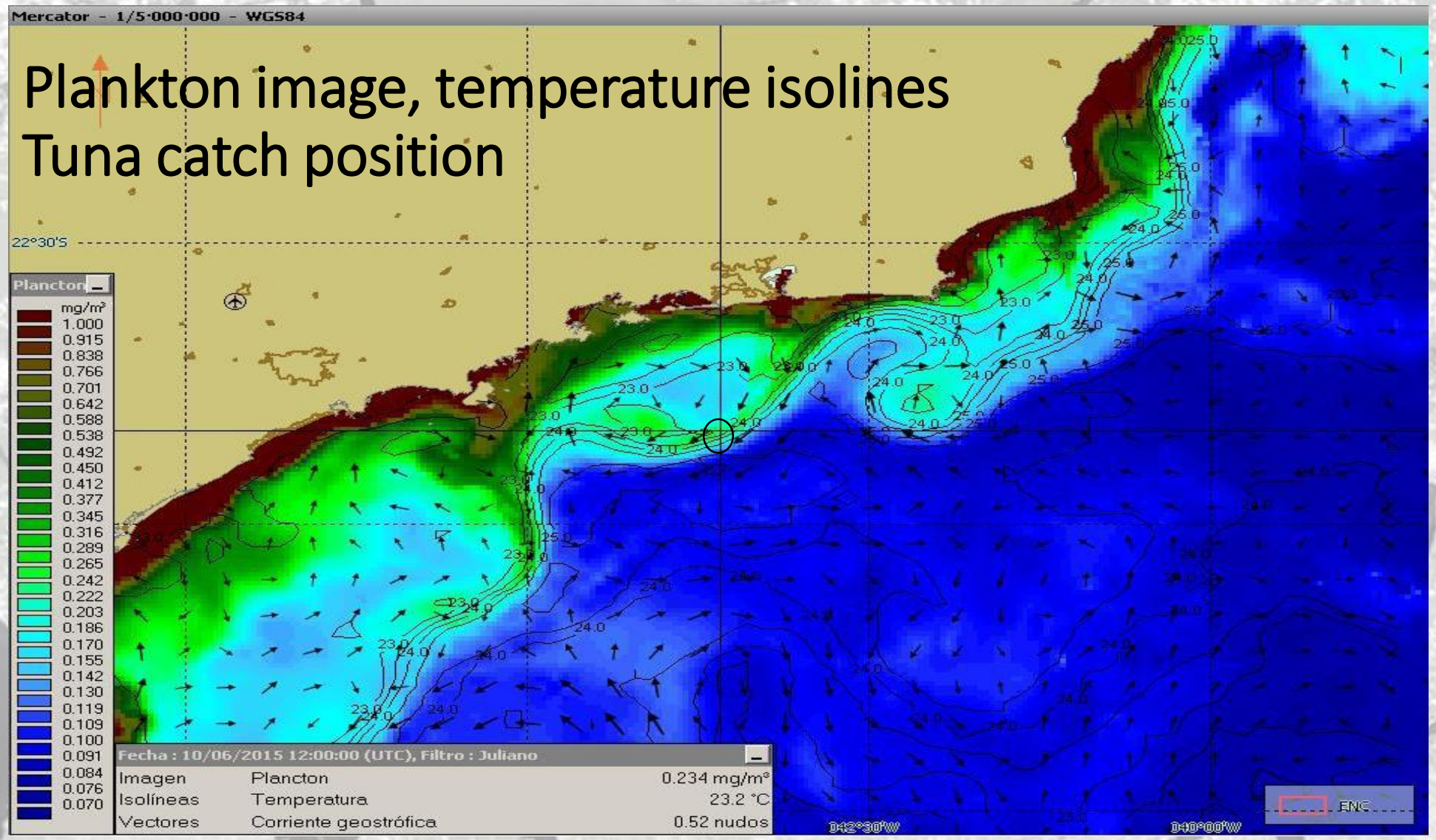
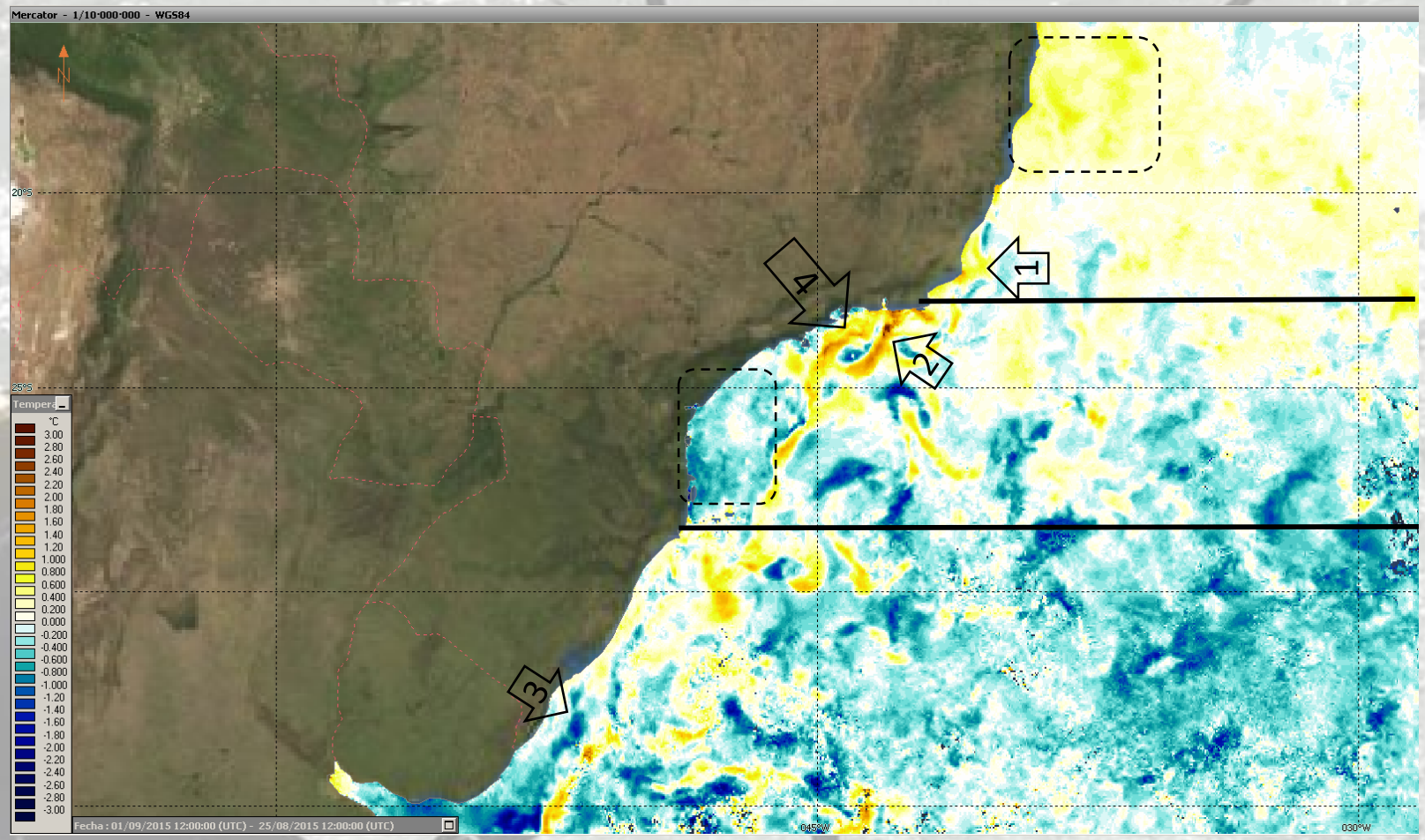
Plankton image, temperature isolines
Tuna catch position



Dinamics



GRADIENT SST (7 days)

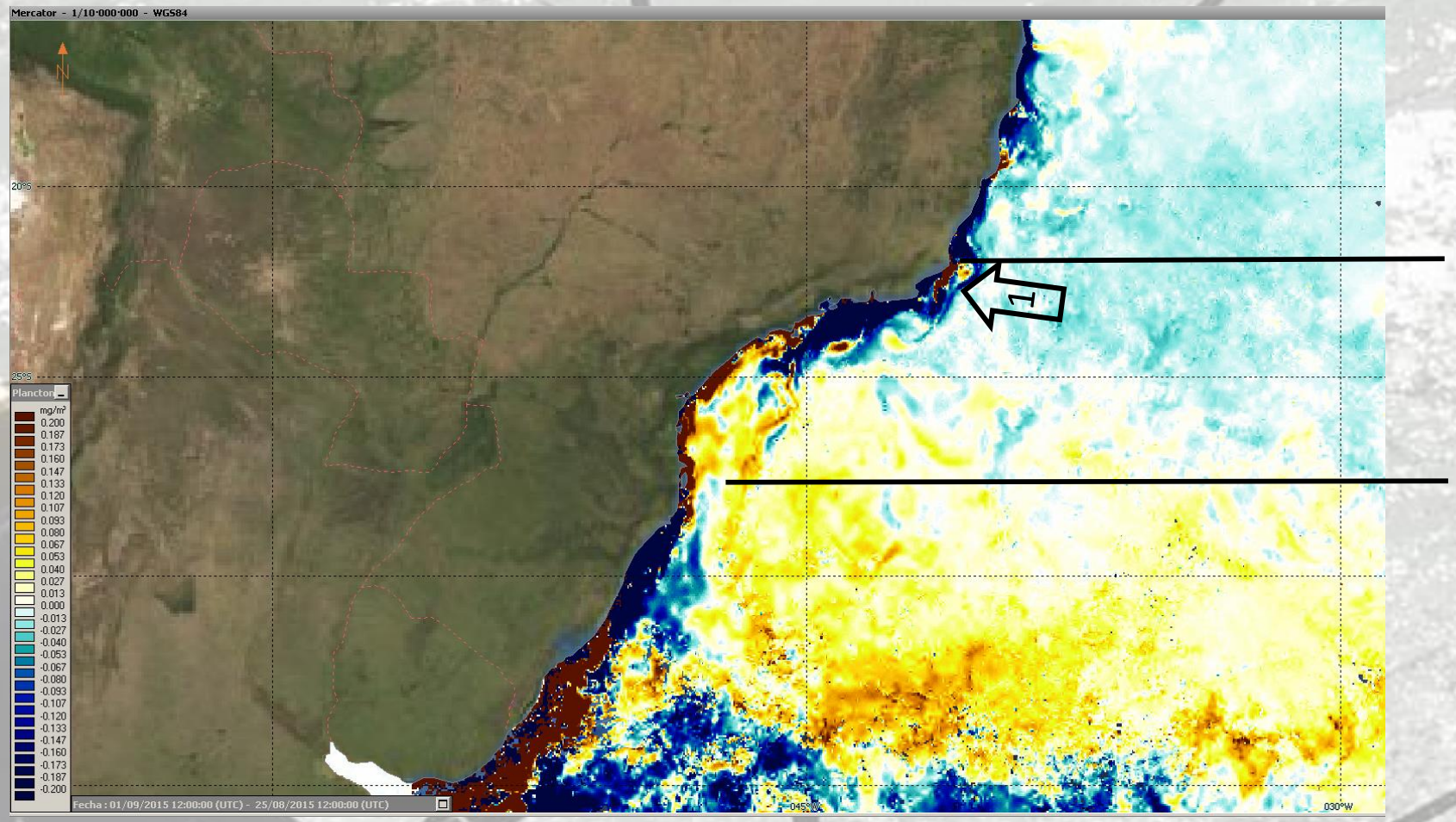
North Sector : warming 1,4°C Cabo São Tomé (1) and 0,4°C north of Abrolhos;

Central Sector :

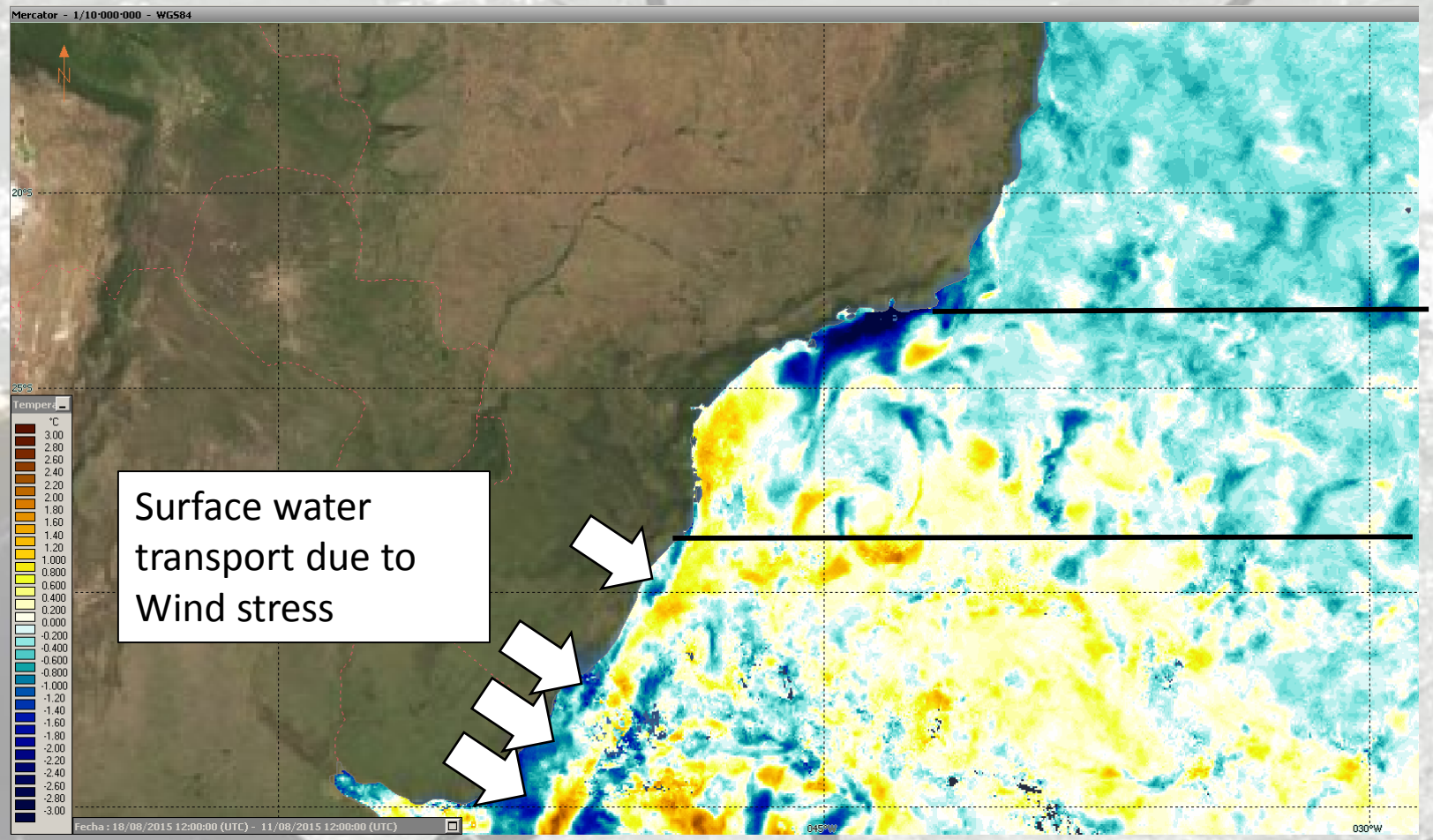
Cooling over the shelf (Ilha Bela) warming South of Cabo Frio (2);

South Sector: warming Sta Marta to Rio Grande, cooling to the South (3).

Plankton gradient (7 days)

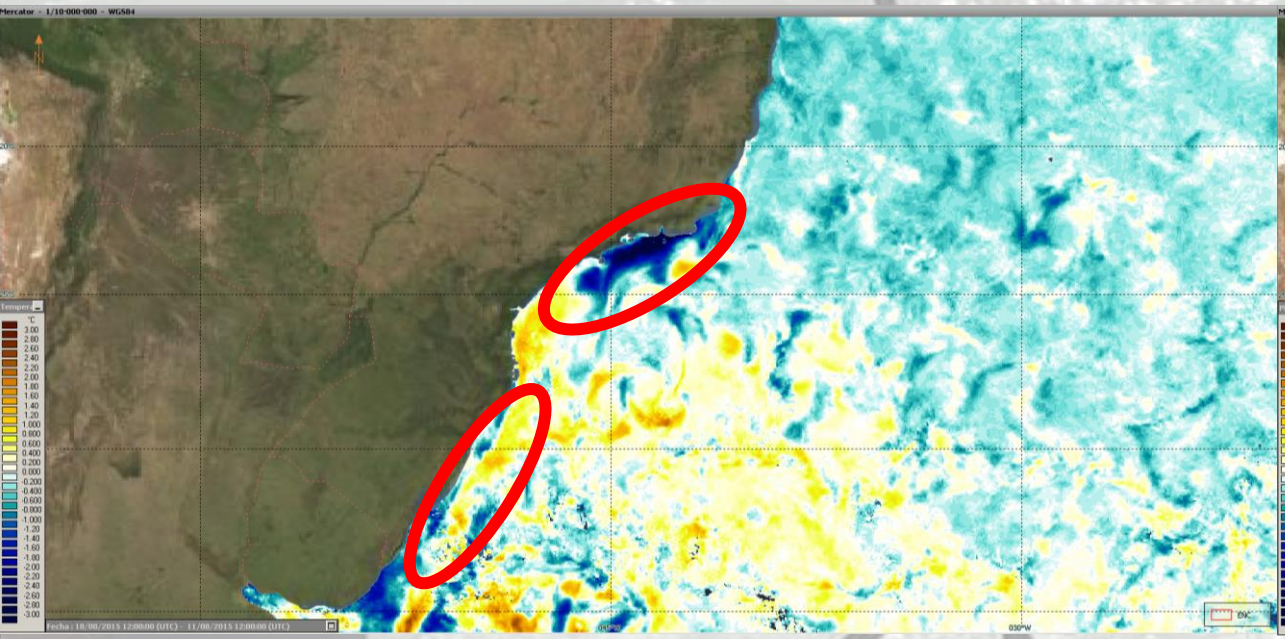


We search for cooling áreas- Gradient SST (7 days)

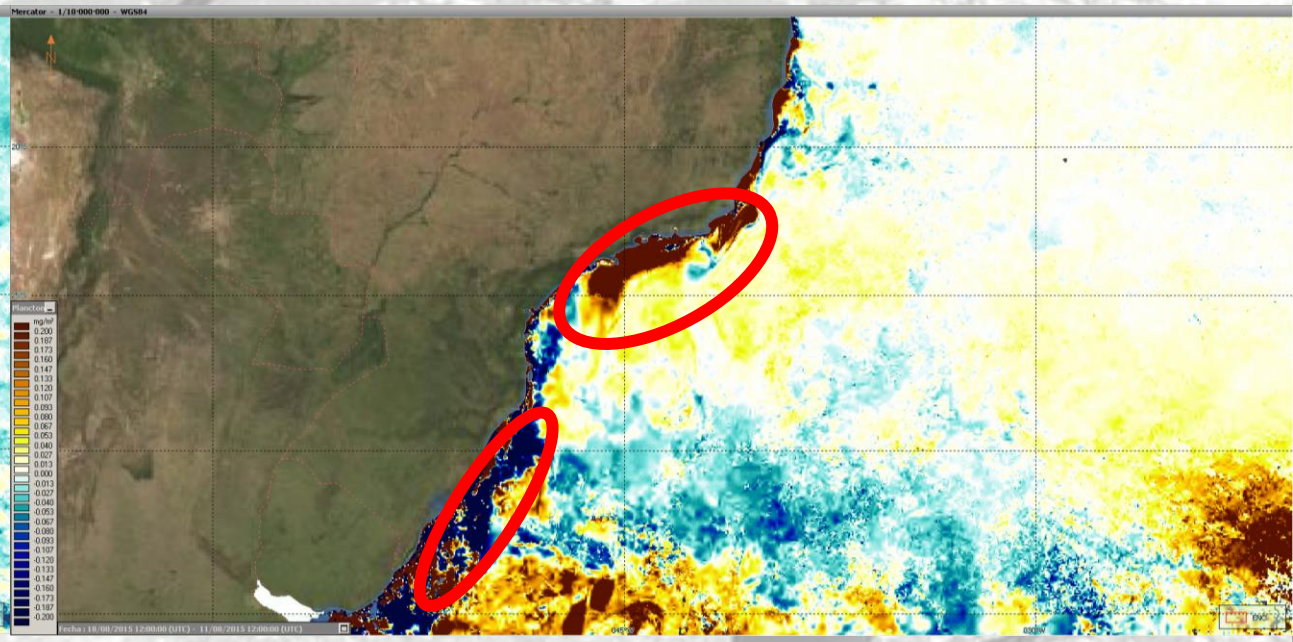


Surface water transport due to Wind stress

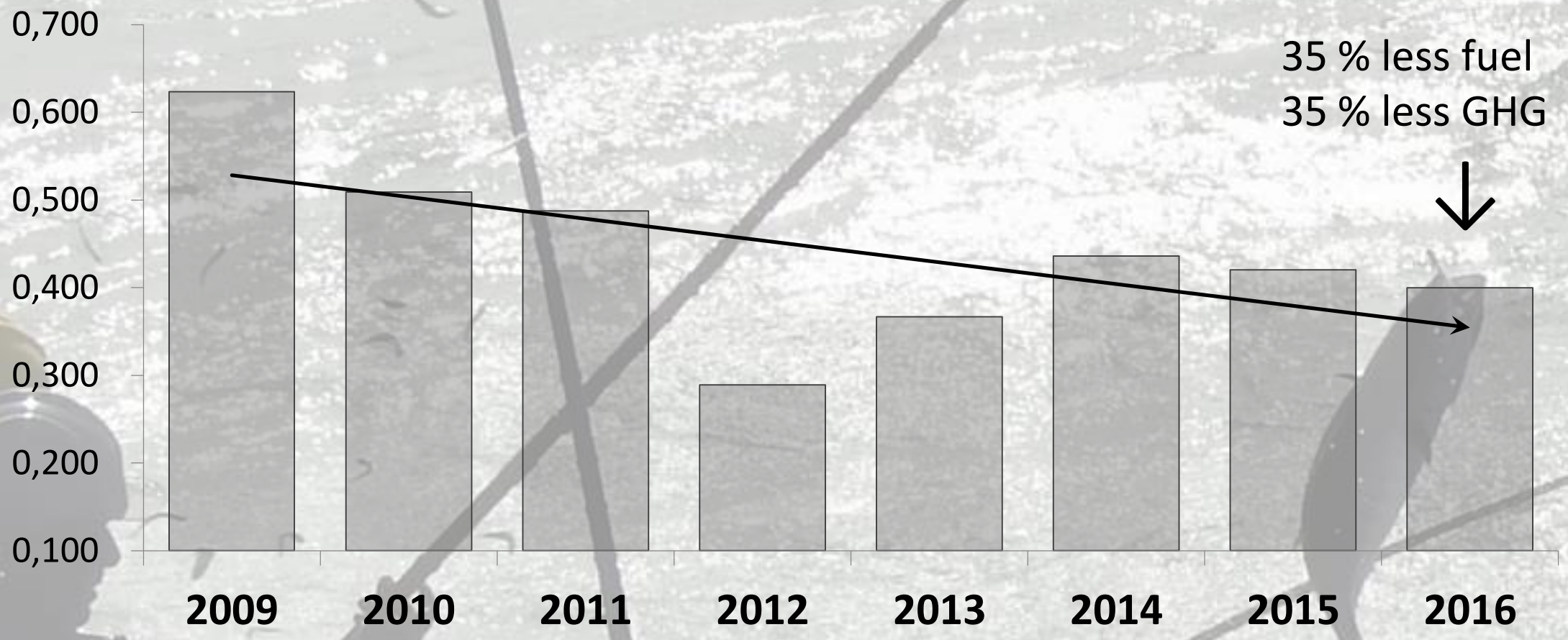
SST



Plankton



Diesel / skipjack metric ton



4th action – reduce dependence on wild bait

Why????

Anchovy is abundant. Perhaps we have been operating in one of the largest bait banks available worlwide.

However, many times we have been exposed to situations like:

1) Skipjack patches were concentrated in areas we had been monitoring
2) Anchovy was available but we could not catch them due to bad weather
3) If we waited for better weather we might loose contact with skipjack patches

Conclusion - we need an aquacultured bait to have it available at any time/weather

Result – succesful tests with aquacultured fish

Action

Choice of a hybrid freshwater species (Lambari) unable to survive in oceanic waters – mandatory decision from Environmental Agency

Perspectives

Lambari will be available at the main fishing ports

1) Reduce wild bait dependence
2) Aquacultured bait will be used when wild bait like anchovy is not accessible
3) Fleet will have the chance to do their logistics when bad wheater does not allow fishing skipjack – no risk to go to the port and have no bait
4) After “front passage” fleet can return to the fishing grounds
5) Fishing effort will increase

Fishery Improvement Project (FIP)

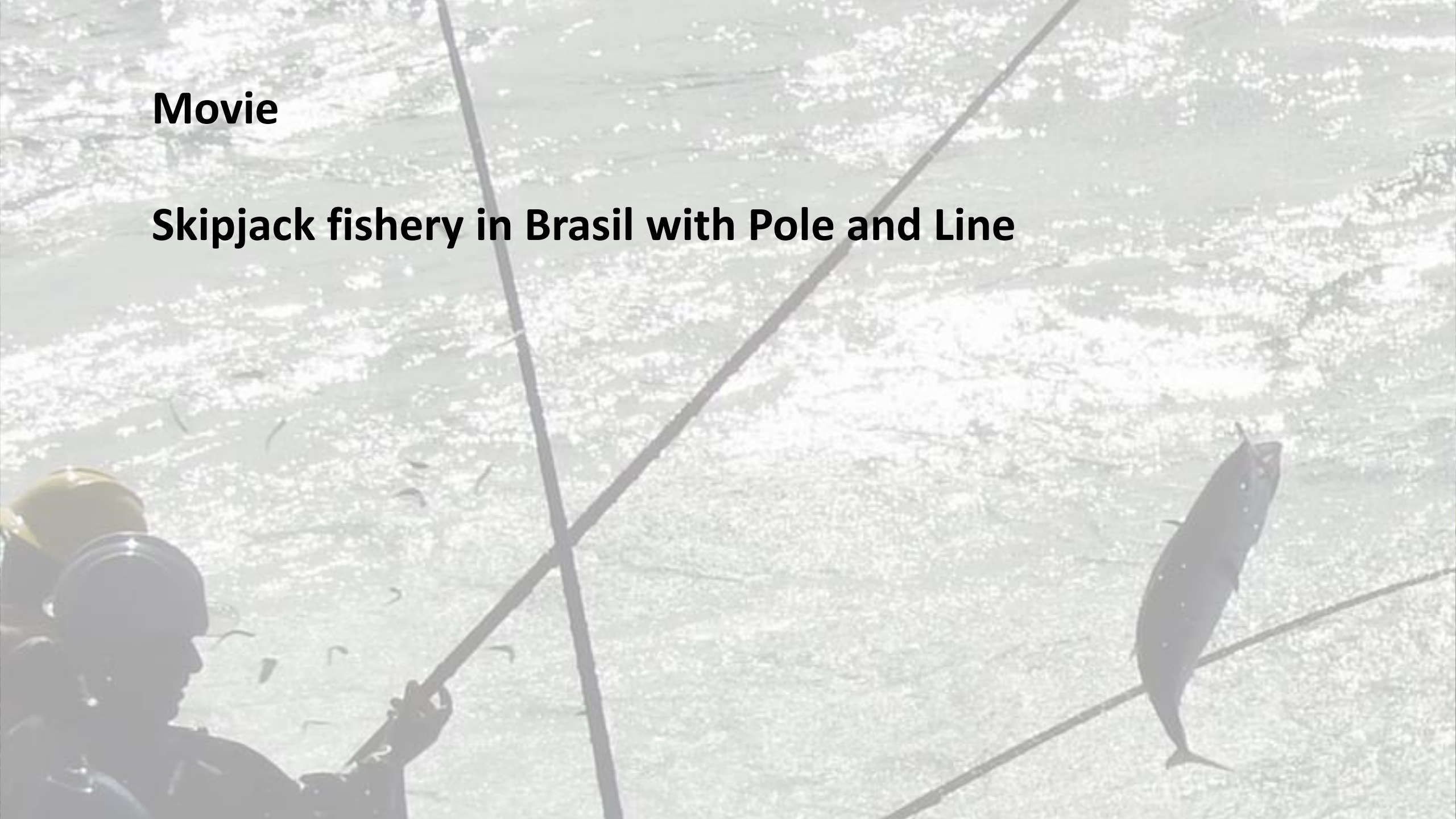
Actors

Private Sector – Industrias Alimentícias Leal Santos Ltda – Actemsa Group
Government Sector – Instituto de Oceanografia – Universidade Federal do Rio Grande

Aims

Development of research to reduce bottlenose constraints
Summary -

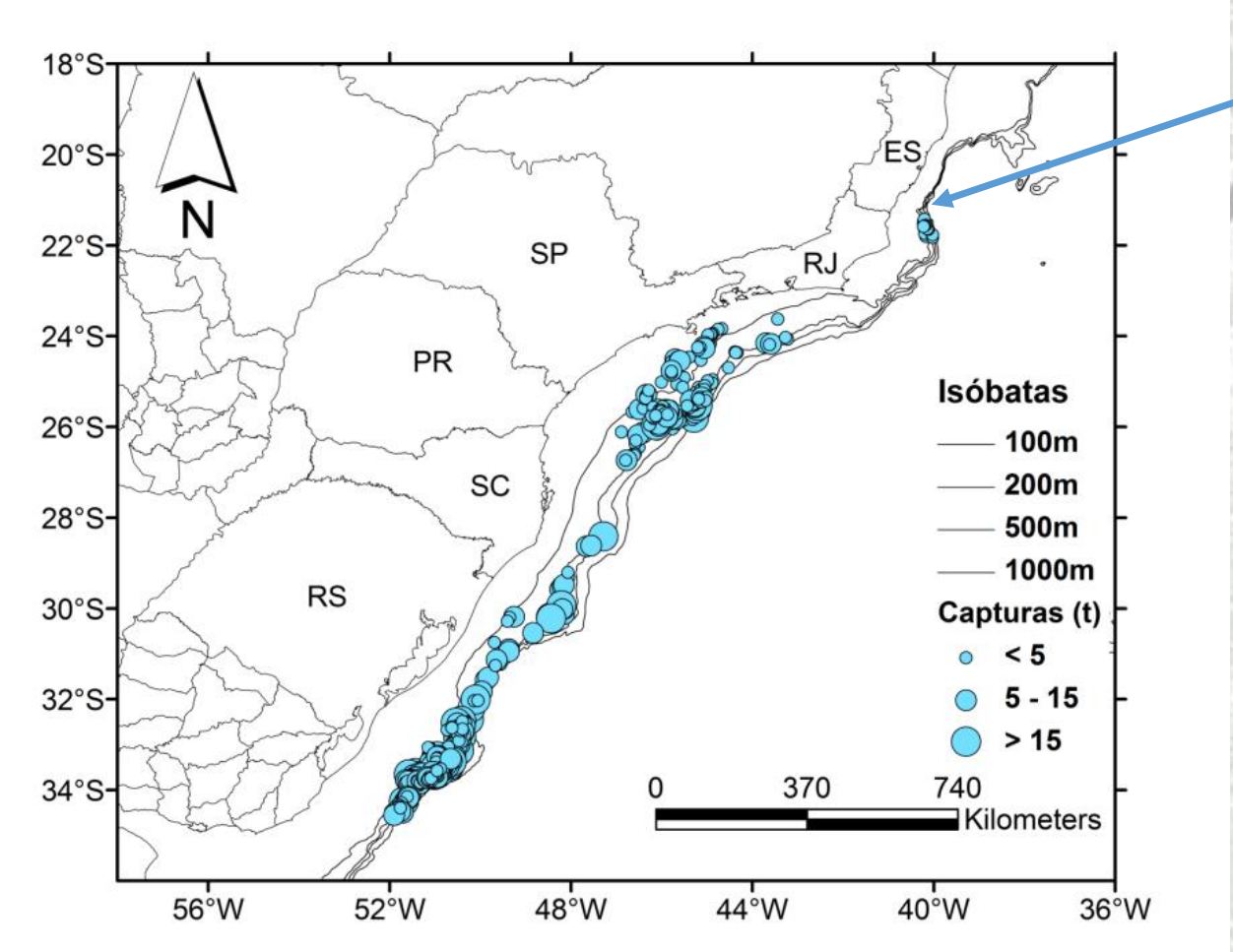
- ✓ **1st action**
- ✓ **2nd action**
- ✓ **3rd action**
- ✓ **4th action**



Movie

Skipjack fishery in Brasil with Pole and Line

Next 3 years - Project started 2017 – Brazilian Fund for Biodiversity



A) 12 MiniPAT satellite tags (Wildlife Computers)

B) Skipjack diet studies using tissue samples to investigate "prey history", trophic links and biomass flows via stable isotope ratios and amino acids

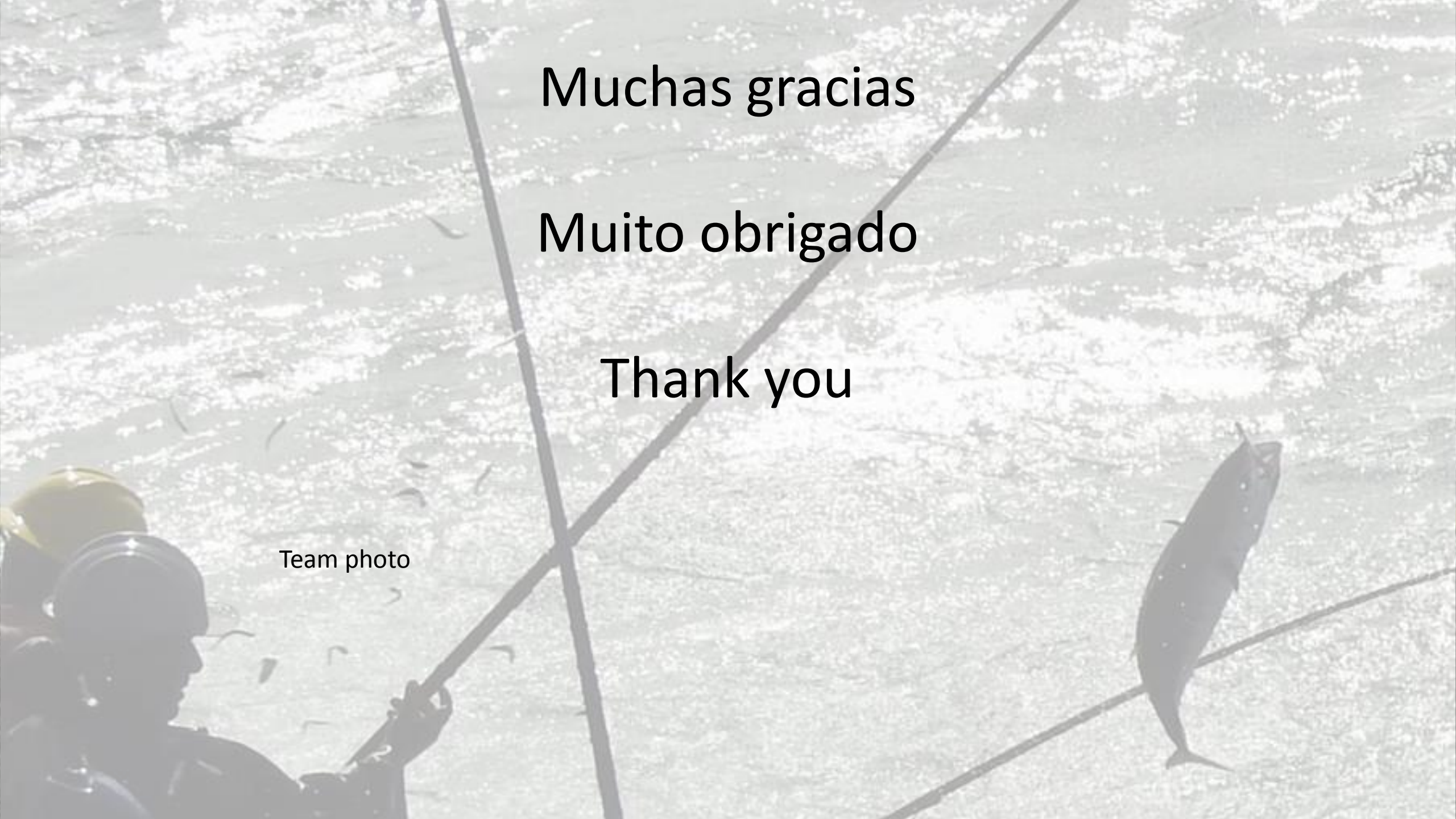
C) A+B will be used to investigate skipjack migration on the East South Atlantic Ocean

Results – improvement of our knowledge about skipjack life cicle and stock structure

We understood the need for more raw material for the tuna canning industry and we started working at a critical moment.

We are sure we can achieve this objetive with a re-engineered Pole and Line fishery for skipjack in Brazil

We are working towards the sustainabilty of a sustainable fishing activity



Muchas gracias

Muito obrigado

Thank you

Team photo