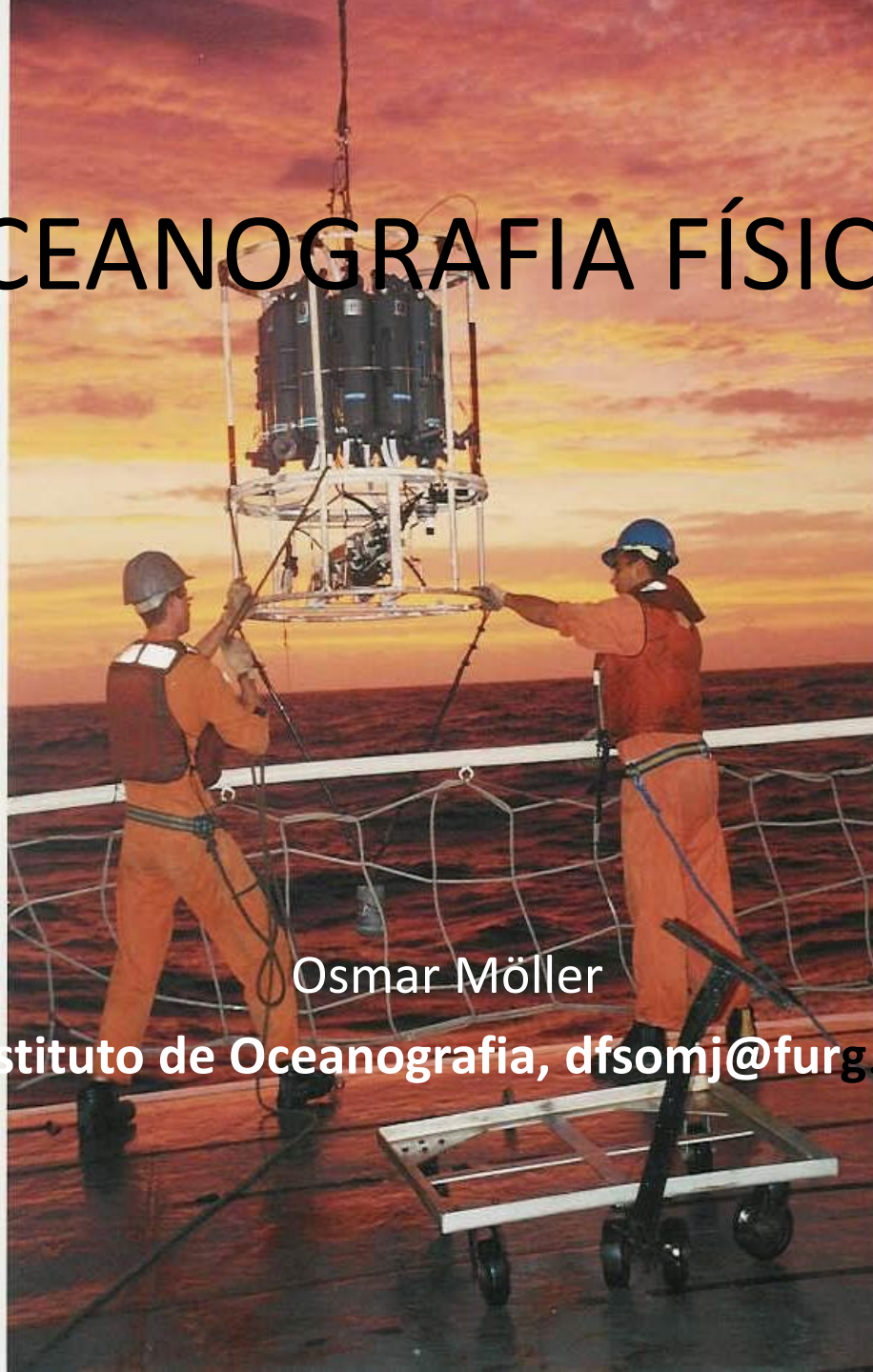


OCEANOGRAFIA FÍSICA



Osmar Möller

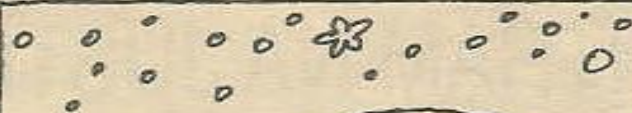
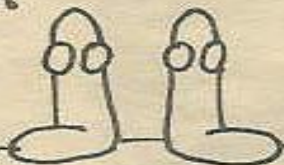
LOCOSTE, Instituto de Oceanografia, dfsomj@furg.br, 32336884

Perguntem, leiam, perguntem de novo

AS COBRAS

L.F. Verissimo

SERÁ QUE ALGUM DIA OS
CIENTISTAS CONSEGUIRÃO
EXPLICAR O UNIVERSO?



ACHO QUE
SIM



MAS SÓ PARA OUTROS
CIENTISTAS



Tópicos a serem abordados

- Definições, Divisões, Relações com outras ciências
- Metodologias empregadas: coleta de dados: cruzeiros, fundeios, bóias de deriva e similares (gliders, ROV), sensoriamento remotos, modelagem numérica.
- Equipamentos e técnicas
- Propriedades Física da Água do Mar: temperatura, salinidade, densidade, volume específico, anomalias
- Diagrama T/S
- Massas de Água: processos de formação e análise de massas de água
- Processos de propagação de luz na água do mar
- Processos de propagação do som na água do mar
- Aulas práticas em todos os itens: faz parte da avaliação.
- Circulação Oceânica - MMM

LINKS:

<http://www.jason.oceanobs.com/>

AVISO/CNES

<http://topex-www.jpl.nasa.gov/>

TOPEX/NOAA

<http://oceanworld.tamu.edu/>

TEXAS A&M

<http://www.woce.org>

WOCE

<http://www.clivar.org>

CLIVAR

<http://www.lei.furg.br/ocfis/mattom/> Tomczak's Page

<http://podaac.jpl.nasa.gov>

NASA/PODAAC

Referências

1. Tchernia P (1980) Descriptive Regional Oceanography. Pergamon Press, Oxford.
2. Tomczak M, Godfrey JS (1994). Regional oceanography: An Introduction. Pergamon Press, Oxford, 422pp. Disponível página lei
3. Steward, R. (2002). Introduction to Physical Oceanography. Disponível página TAMU.
4. Talley, L.D., Pickard G. L., Emery, W.J., Swift, J.H. (2011) Descriptive Physical Oceanography: an Introduction. Pergamon Press, Oxford. – recomendo comprar
5. Garrison, T. (2010). Fundamentos de Oceanografia. Cengage. Recomendo comprar
6. Open University. (Evelyn Brown, Angela Colling, Dave Park, John Phillips, Dave Rothery and John Wright). Ocean Circulation.

Oceanografia Física

- Área da Oceanografia cujo objetivo é o estudo dos movimentos das águas oceânicas, das forças que os causaram e das conseqüências que estes acarretam
- **Movimentos**
- Escalas temporais –segundos – interanuais, decadais
- Correntes
 - De maré
 - Geradas pelo vento
 - Termohalinas
- Ondas
 - Longo período
 - Marés
 - Ondas geradas por ventos
 - Ondas Internas

Oceanografia Física

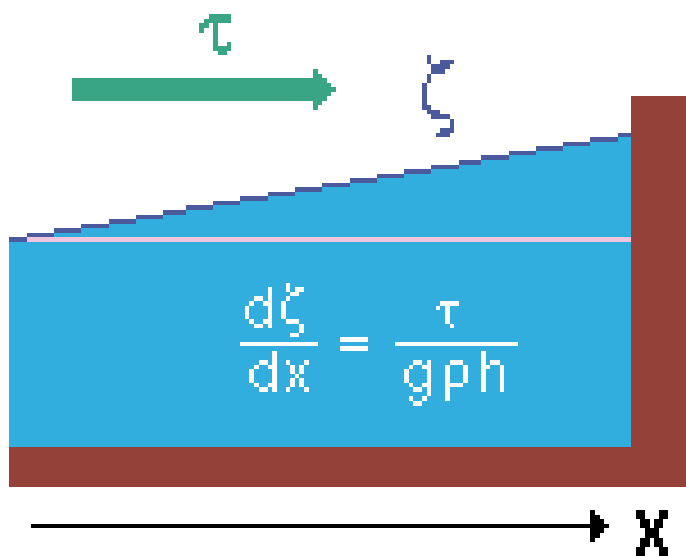
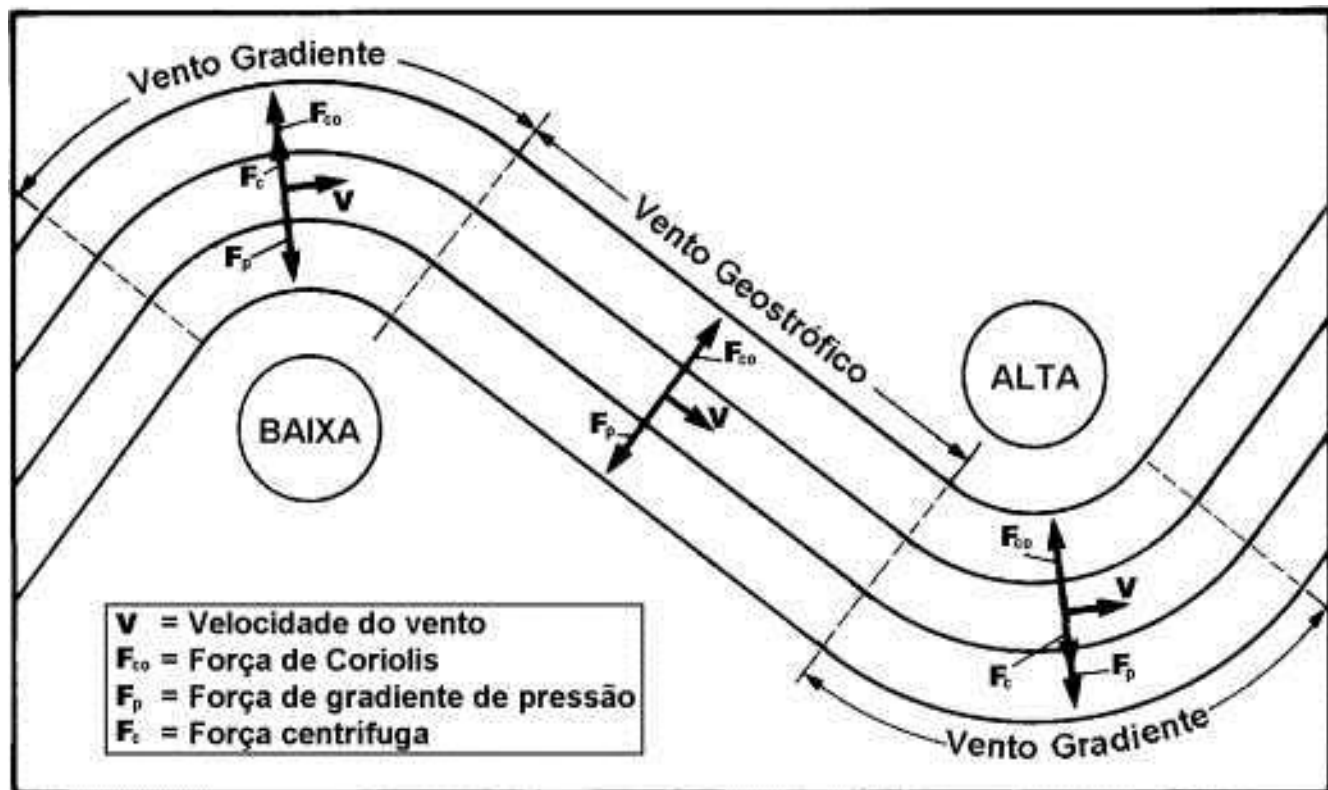
- **Forças**

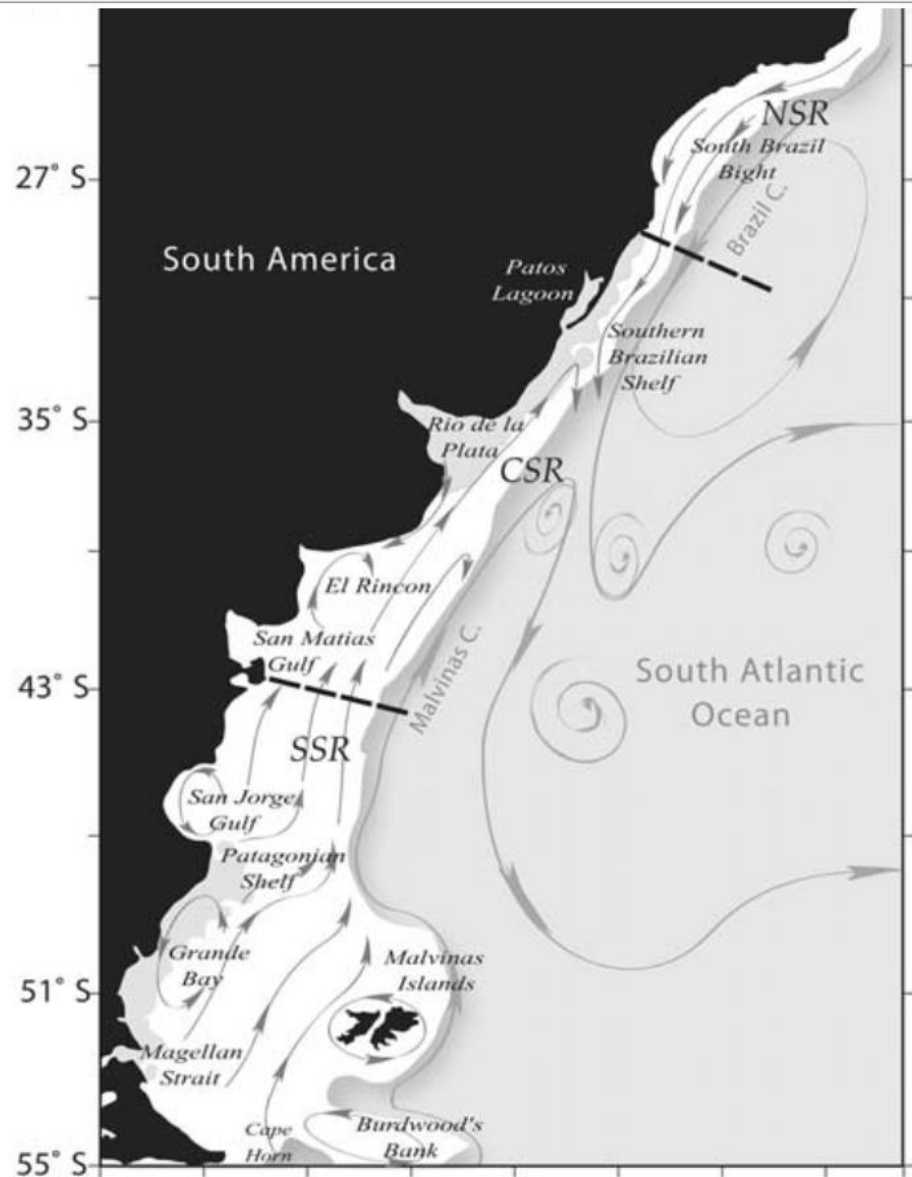
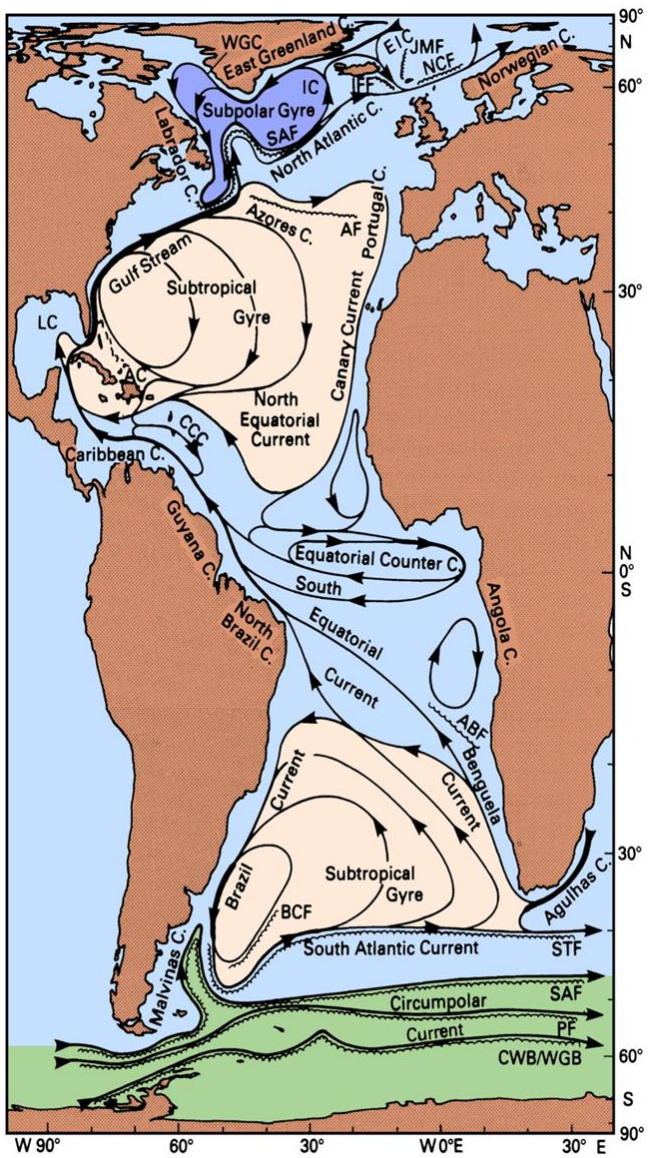
- Escalas temporais – segundos – interanuais, decadais
- Gravidade g – inclui a força centrífuga
- Fricção – vento, fricção interna, fricção com o fundo
- Gradiente de Pressão – plano inclinado
- Coriolis – força não inercial $f = 2\Omega \sin \phi$ – onde:
- Ω – velocidade angular da terra: $7,29 \times 10^{-5}$ rd/s
- Φ – latitude do local - + hemisfério norte
- Centrífuga – V^2/R – onde R é o raio do movimento

- **Equações**

- **Movimento**
- $du/dt = -1/\rho (\partial P/\partial x) + 2\Omega \sin\phi v - 2\Omega \cos\phi w + F_x$ (outras forças- fricção tangencial, interna)
- $dv/dt = -1/\rho (\partial P/\partial y) - 2\Omega \sin\phi u + F_y$
- $dw/dt = -g - 1/\rho (\partial P/\partial z) + 2\Omega \cos\phi u + F_z$

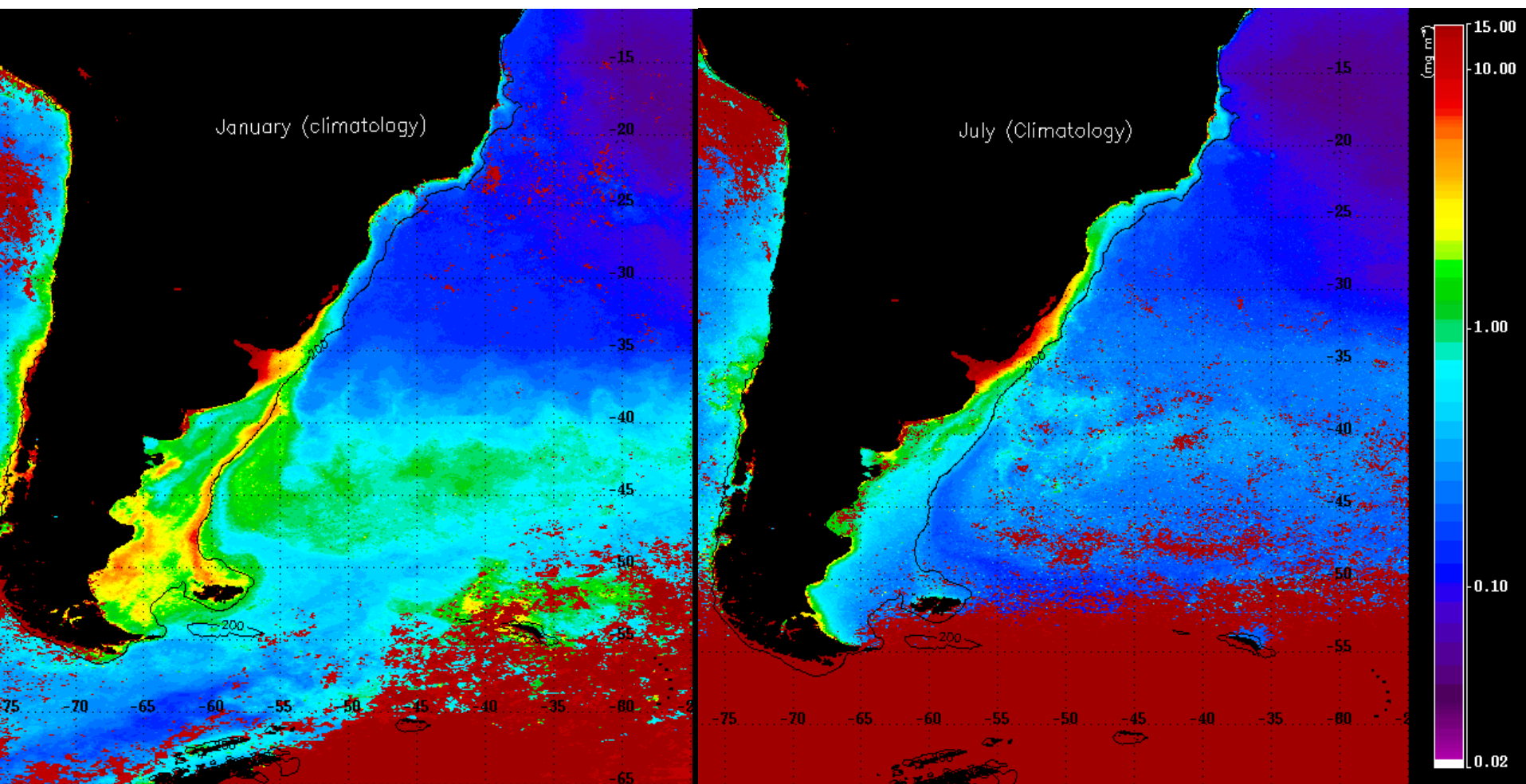
- Equilíbrio hidrostático $dP = \rho g dz$
- Continuidade
- Advecção-difusão
- <http://www.lei.furg.br/ocfis/mattom/IntroOc/por/lecture06.html>





CSAT

Romero (2008)



Frente de Talude - Argentina

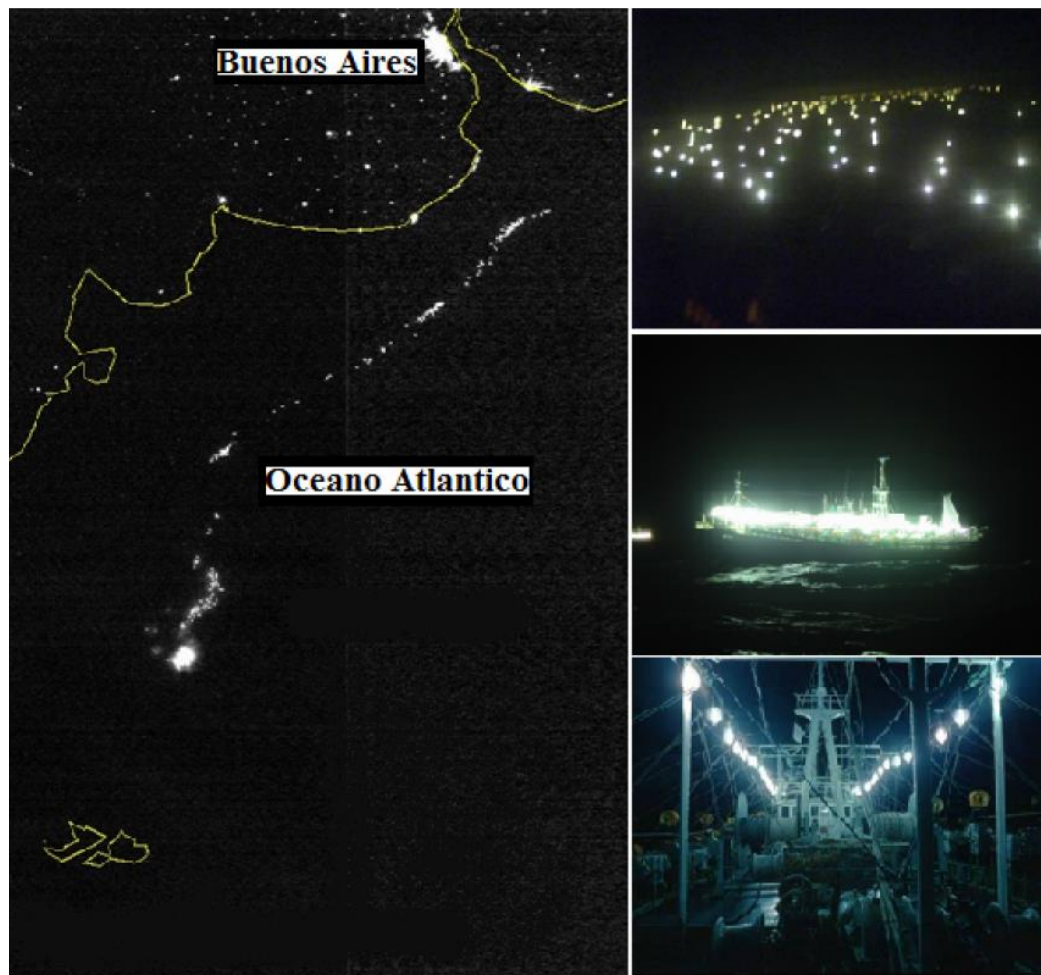


Figura 2-25 Imagen satelital nocturna de poteros en el TC

Modelo de Ekman

- Equilíbrio entre F_{Coriolis} e tensão do vento
- Oceano sem bordas e profundidade ilimitada
- Gradiente de pressão nulo
- Vento constante
- Termo de turbulência constante

f – termo de Coriolis

K_z Coef. de difusão
turbulenta

$$- 1.3 - 1.5 \times 10^{-3} \text{ m}^2 \text{ s}^{-1}$$

V_0 – velocidade na
superfície

D_e – espessura da camada
de Ekman

W – velocidade do vento

U, v – velocidades em x e
 y

$$fv = K_z \frac{\partial^2 u}{\partial z^2}$$

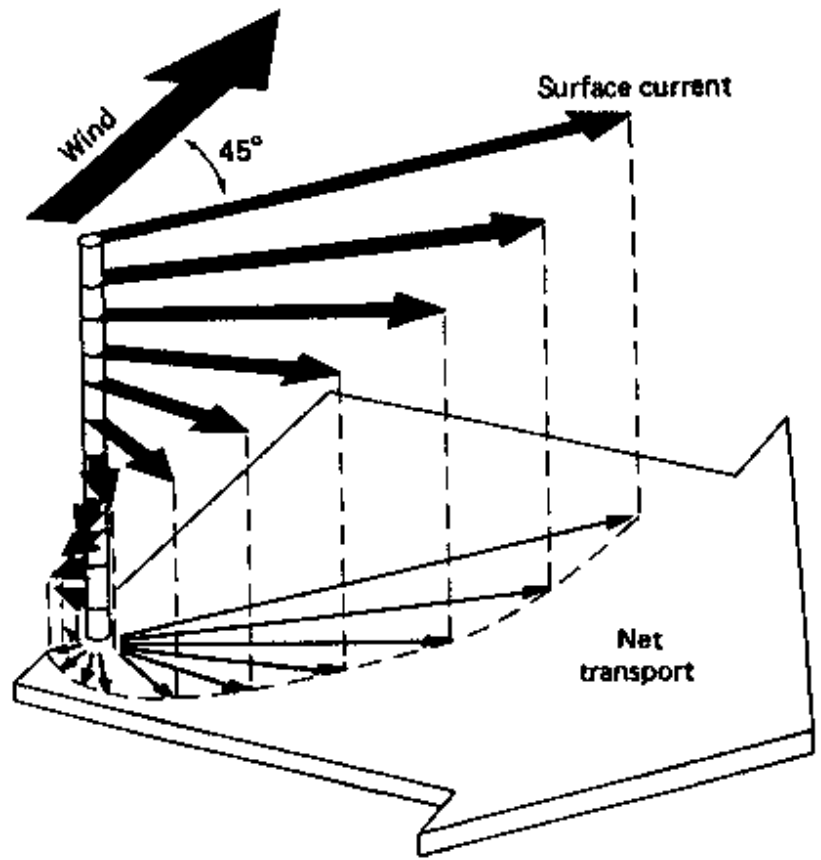
$$fu = -K_z \frac{\partial^2 v}{\partial z^2}$$

$$u = + / - V_0 \cos\left(\frac{\pi}{4} + \frac{\pi z}{D_e}\right) \exp\left(-\frac{\pi z}{D_e}\right)$$

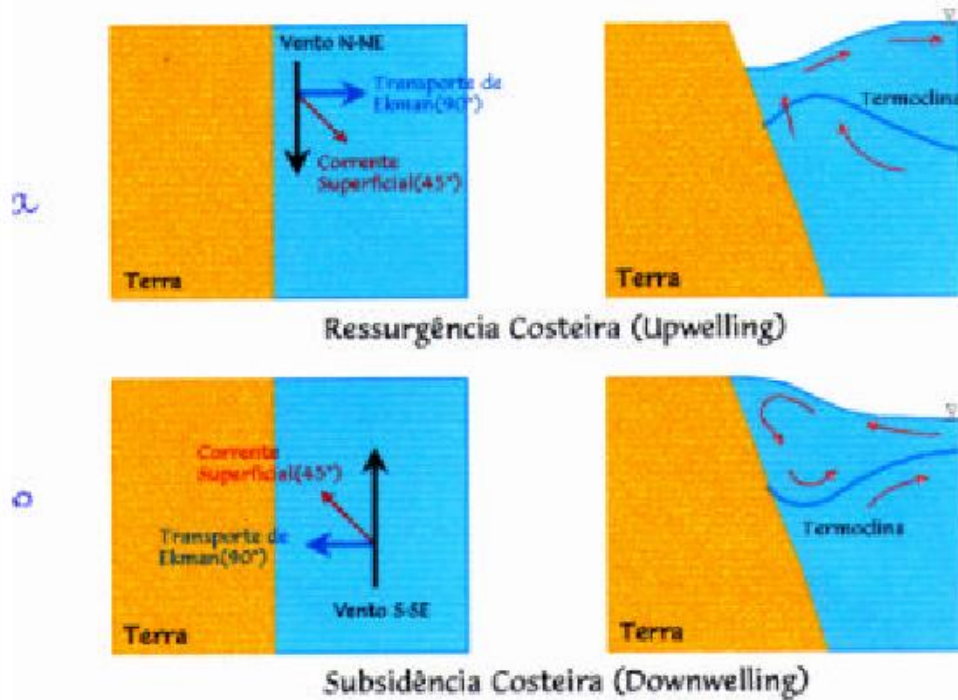
$$v = V_0 \text{sen}\left(\frac{\pi}{4} + \frac{\pi z}{D_e}\right) \exp\left(-\frac{\pi z}{D_e}\right)$$

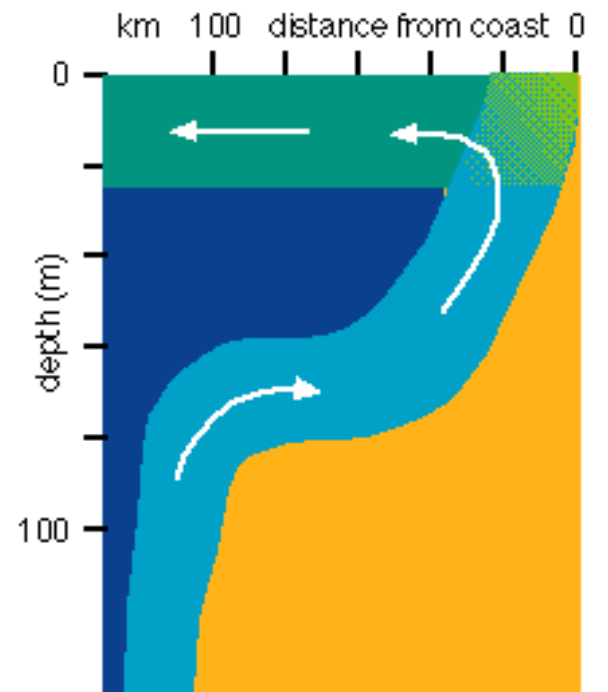
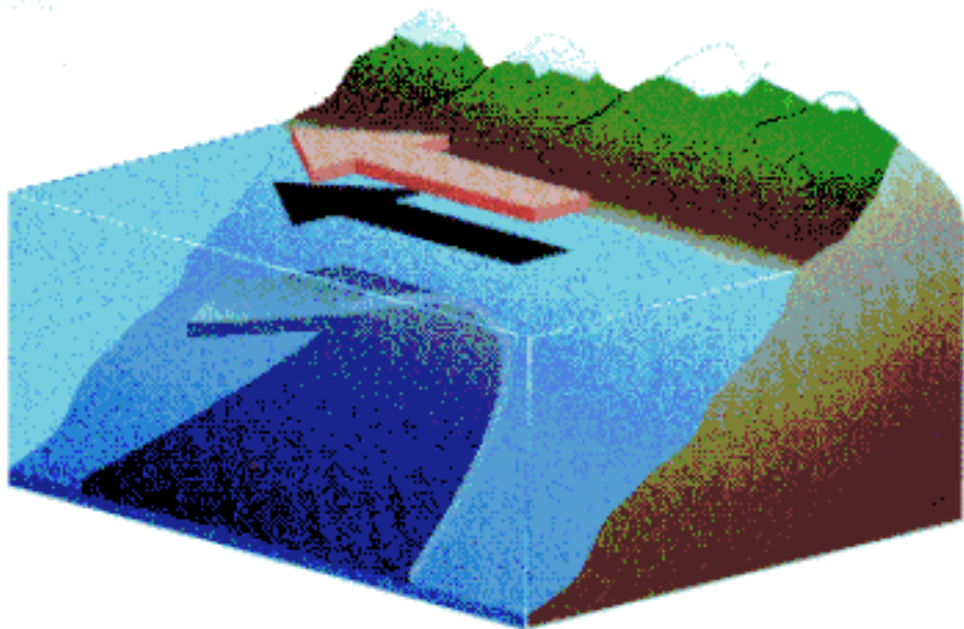
$$D_e = \frac{4.3W}{\sqrt{\text{sen}|\phi|}}$$

$$V_0 = \frac{0.013W}{\sqrt{\text{sen}|\phi|}}$$

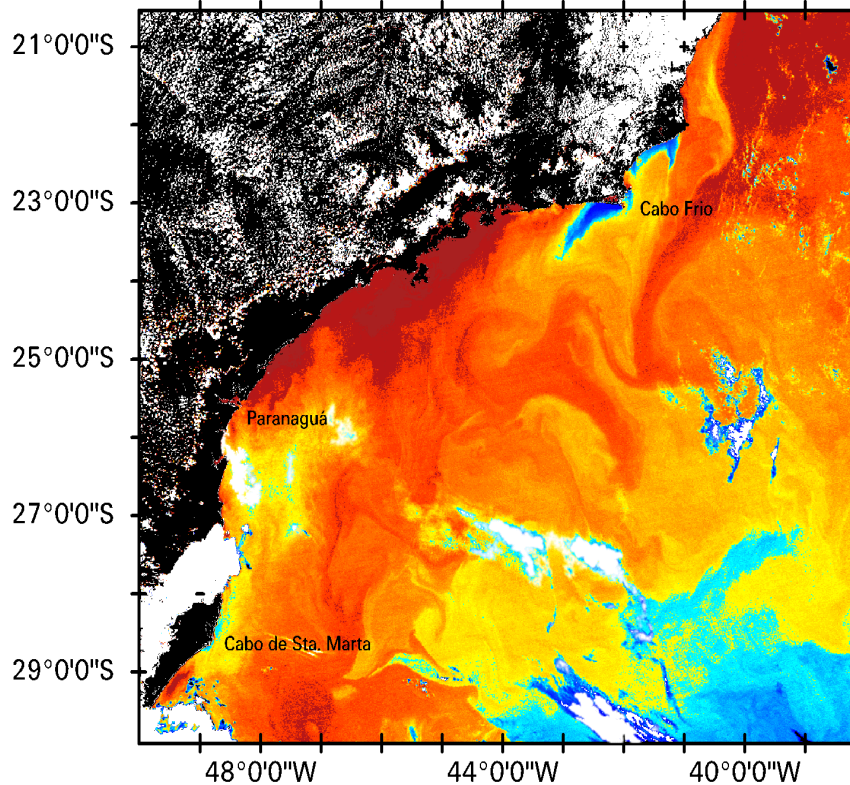


Hemisfério Sul - Divergência e Convergência Costeira

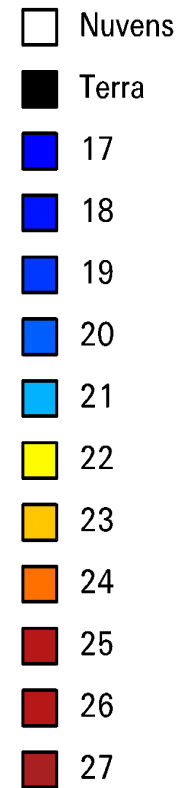




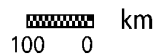
TEMPERATURA SUPERFICIAL DO MAR



TEMPERATURA (°C)



Escala



SENSOR/SATÉLITE: AVHRR/NOAA-14

ALGORITMO: DAYTIME NLSST

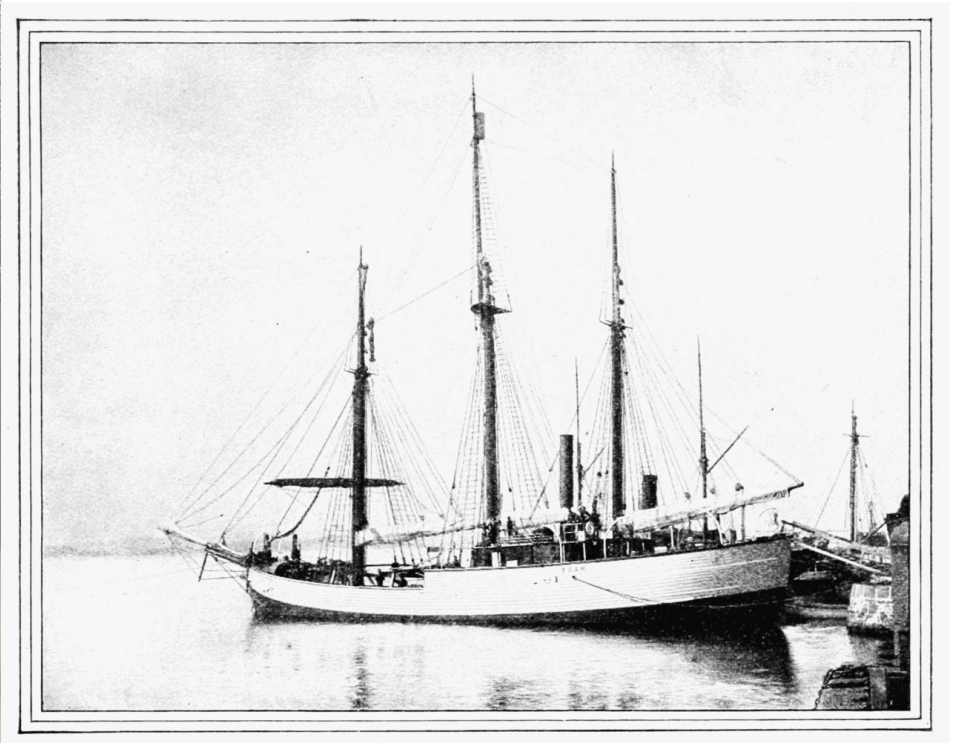
AQUISIÇÃO: 07/11/95 - 16:54 GMT

REGIÃO CENTRAL DA BACIA DE SANTOS

CONVÊNIO PETROBRÁS/FURG

Fram ("Forward") is a [ship](#) that was used in expeditions of the [Arctic](#) and [Antarctic](#) regions by the [Norwegian](#) explorers [Fridtjof Nansen](#), [Otto Sverdrup](#), [Oscar Wisting](#), and [Roald Amundsen](#) between 1893 and 1912. It was designed and built by the Scottish-Norwegian shipwright [Colin Archer](#) for Fridtjof Nansen's 1893 Arctic expedition in which the plan was to freeze *Fram* into the [Arctic ice](#) sheet and float with it over the [North Pole](#).

Fram is said to have sailed farther north (85°57'N) and farther south (78°41'S) than any other wooden ship. *Fram* is preserved at the [Fram Museum](#) in [Oslo](#), Norway.



Oceanografia Física

- Conseqüências
 - Transporte de propriedades – **salinidade, temperatura**
 - Variação e distribuição de propriedades
 - Propagação de som e luz no mar
 - Processos de mistura entre águas de origens diversas
 - Formação de massas de água
 - Interações Oceano-Atmosfera – clima e meteorologia
- Relações com outras ciências - serve de base para:
 - Transporte e dispersão de substâncias dissolvidas ou em suspensão;
 - Transporte e dispersão de ovos e larvas e de organismos adultos
 - Transporte e dispersão de sedimentos de fundo
 - Processos de erosão costeira
 - Instalação de obras
 - Previsões meteorológicas

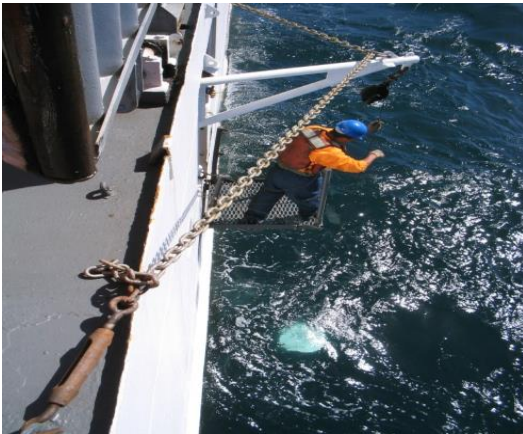
Oceanografia Física

Métodos

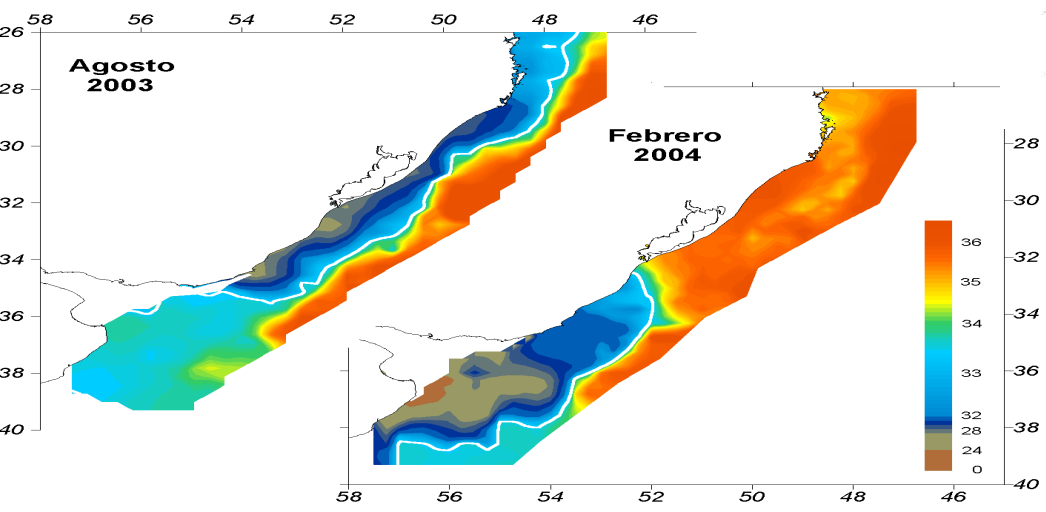
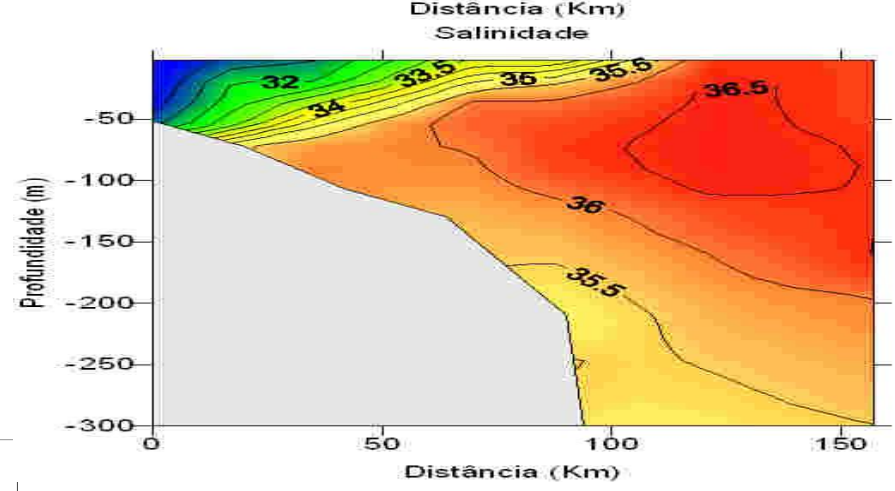
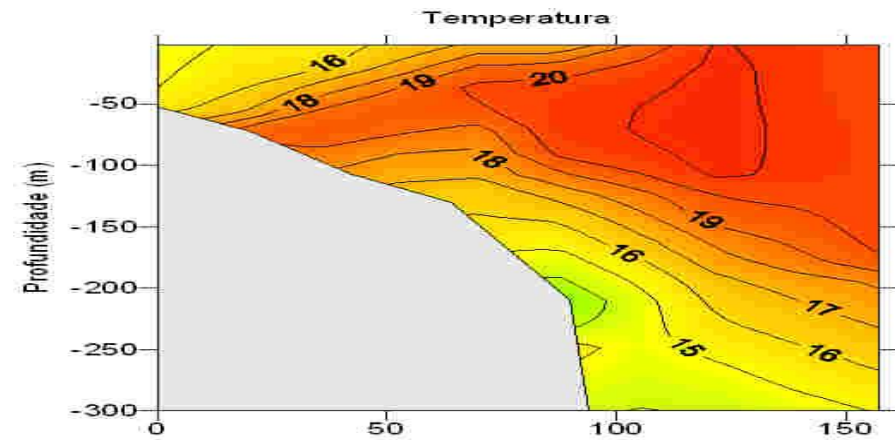
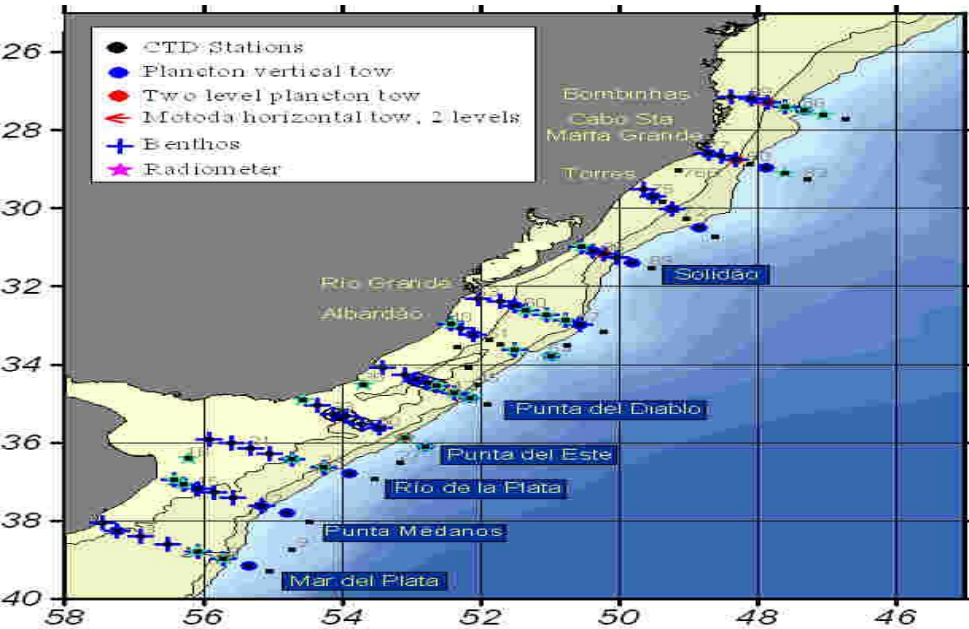
- Medições Diretas
 - Cruzeiros Oceanográficos – distribuição de propriedades
 - Fundeios de equipamentos – séries temporais
 - Derivadores
- Sensoriamento Remoto:
 - Imagens termais AVHRR
 - Imagens em bandas visíveis – Landsat, CZCS, Seawifs, Modis, etc.
- Modelagem Numérica
 - Modelos analíticos
 - Modelos numéricos
 - Elementos finitos
 - Diferenças finitas

Oceanografia Física

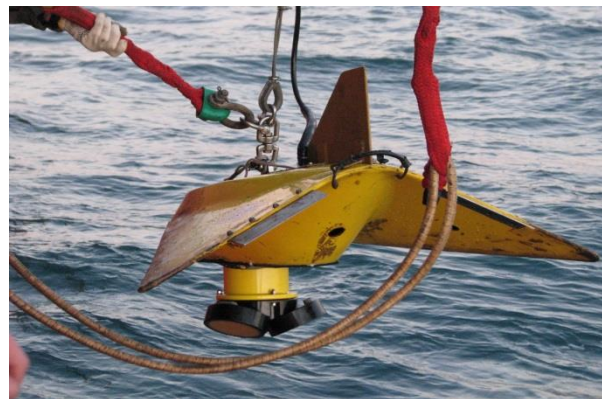
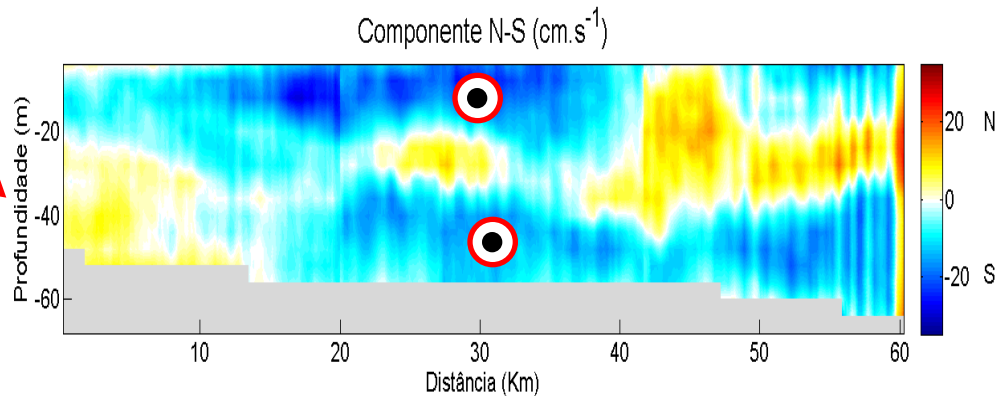
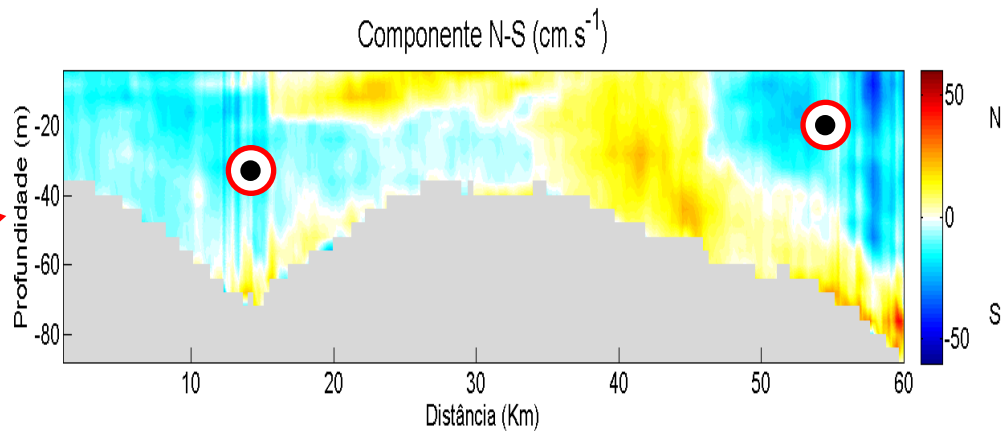
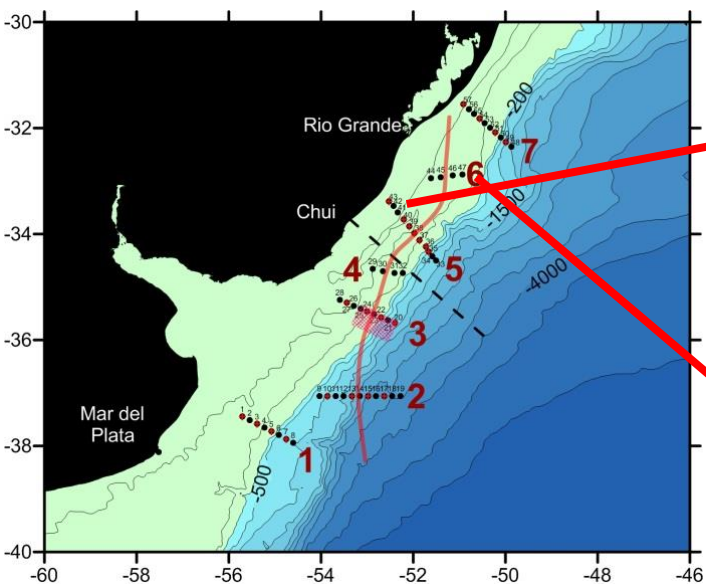
Cruzeiros Oceanográficos



Oceanografia Física

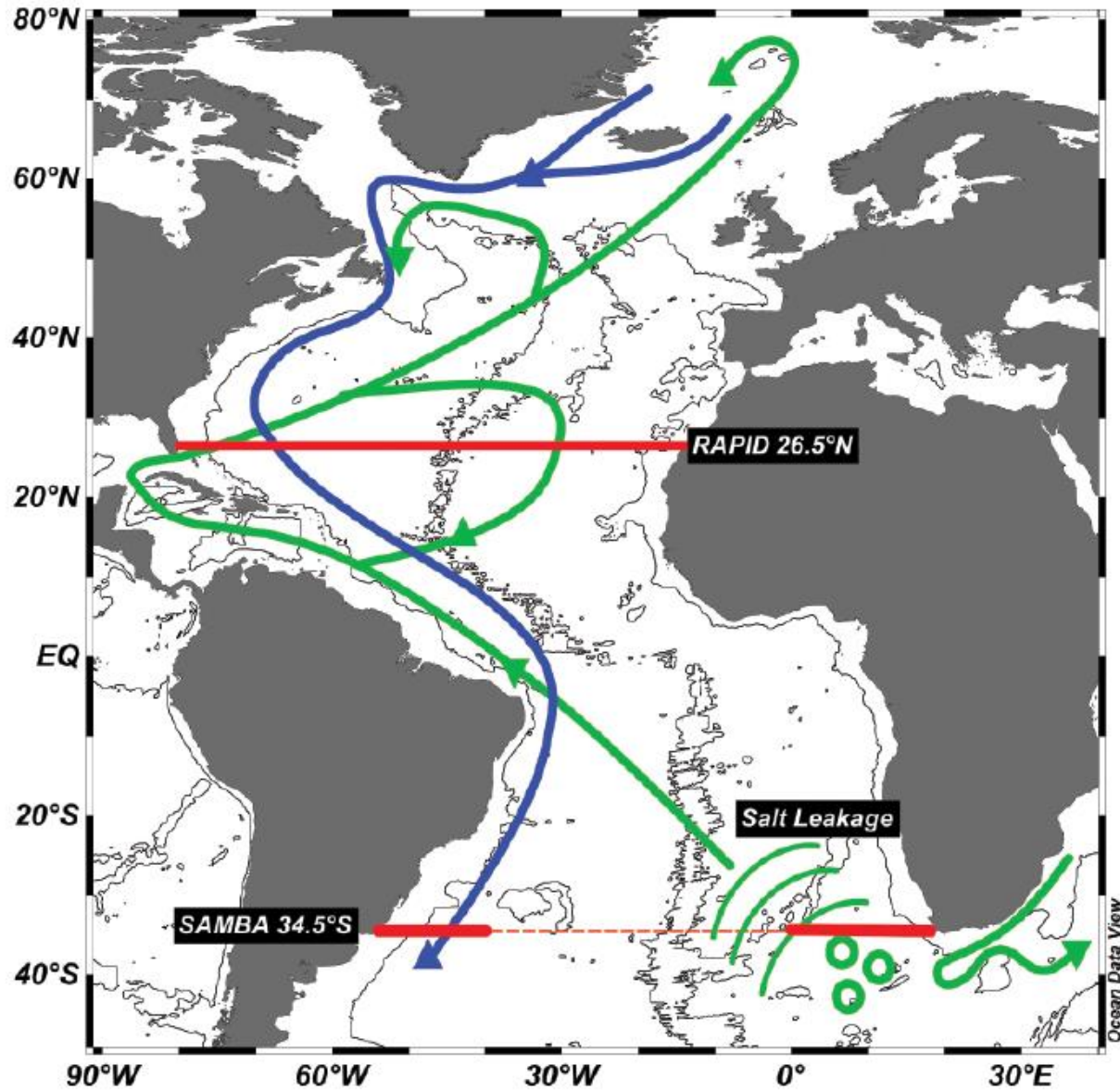


PERFIS DE VELOCIDADE DE CORRENTE MEDIDOS POR ADP 500 KHZ DURANTE O CRUZEIRO STSF - ONE WAY TICKET EM OUTUBRO DE 2013



CRUZEIRO MULTIDISCIPLINAR FOCADO NA FSTP ATRAVÉS DA COLETA DE DADOS (CTD, OD, CONC. CLOROFILA A, ADCP-BT, L-ADCP, DO, NUTRIENTES, PLANKTON). OUTUBRO 2013

South Atlantic Meridional Overturning Circulation



Cruzeiros SAMOC

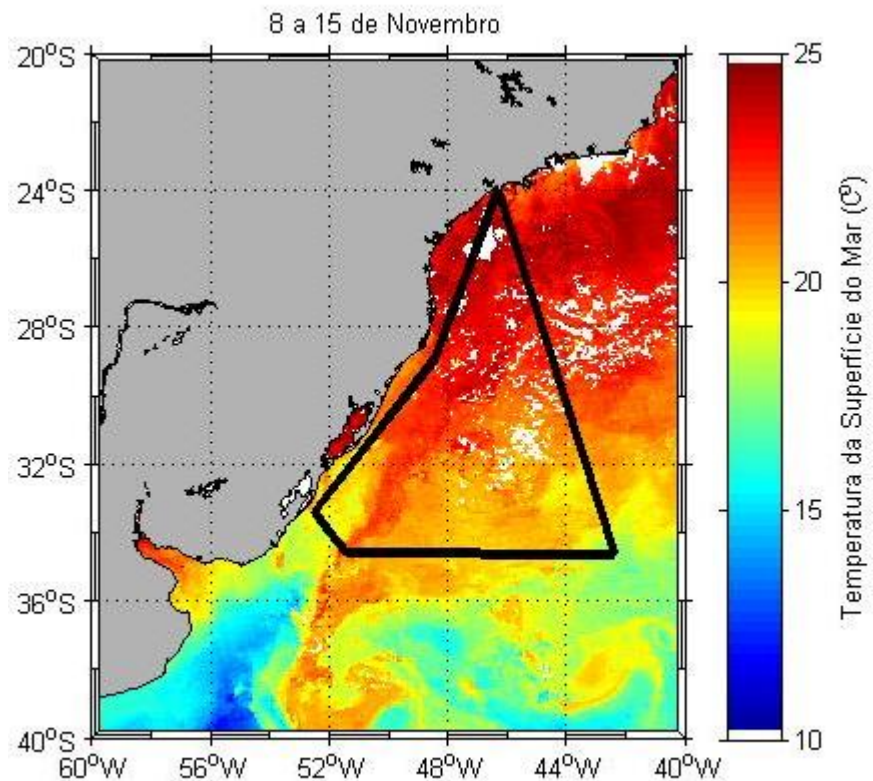
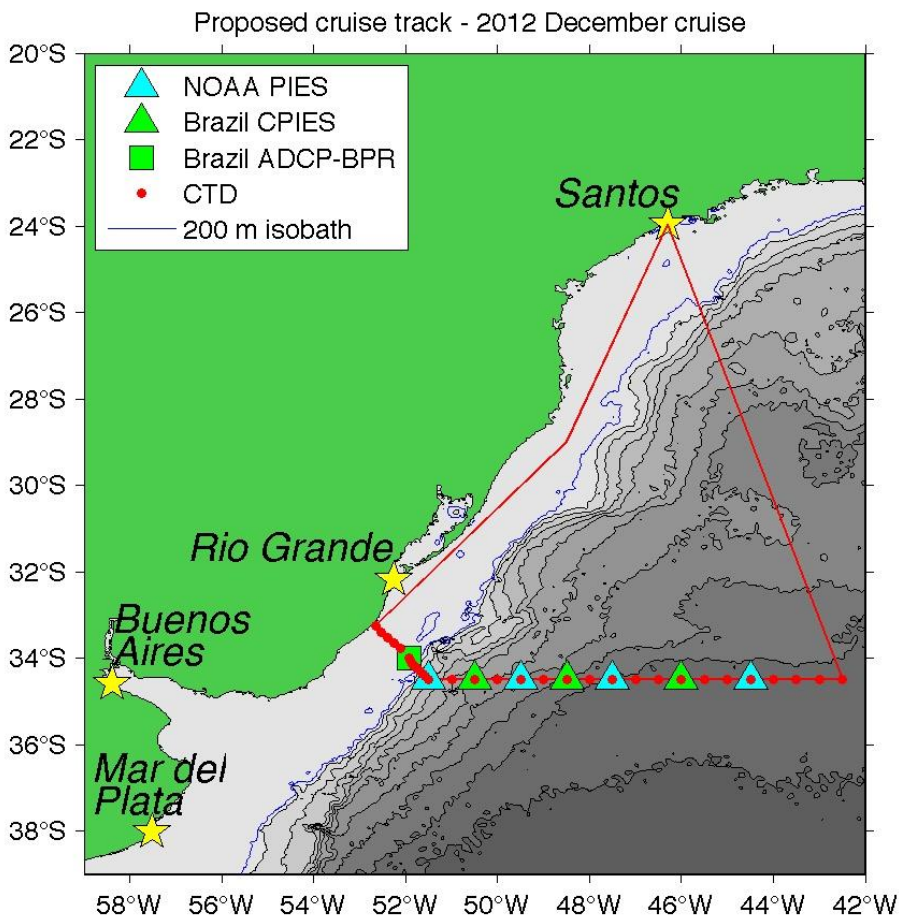
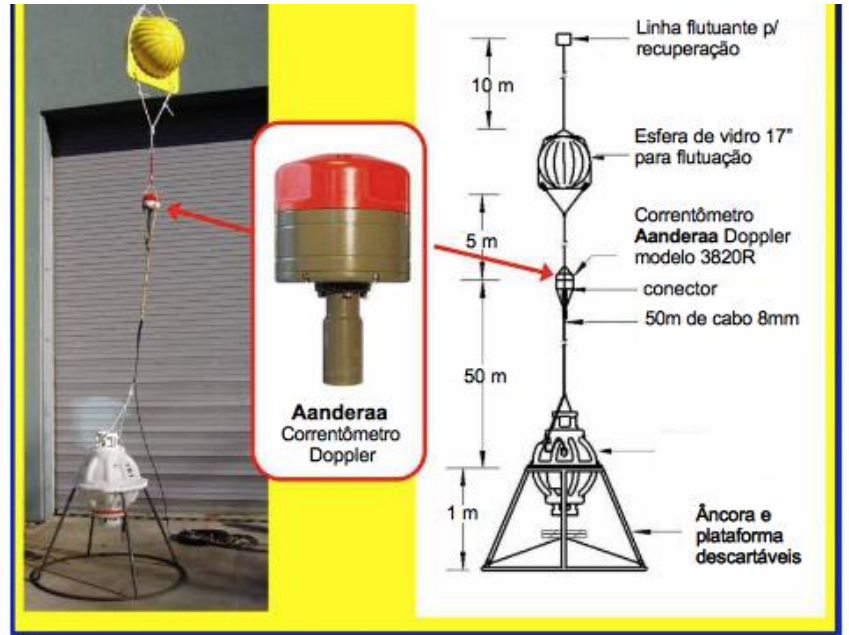




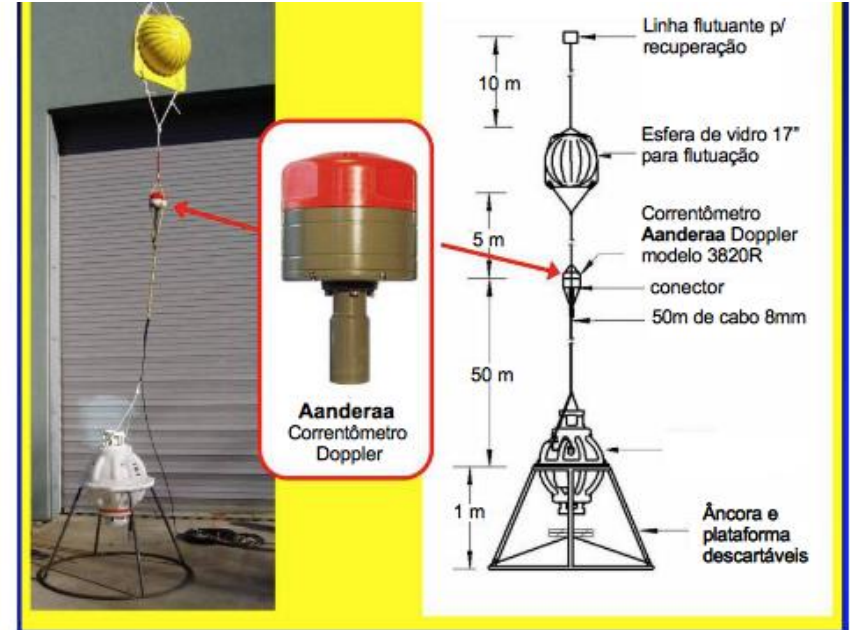
Foto: Chico Vicentini



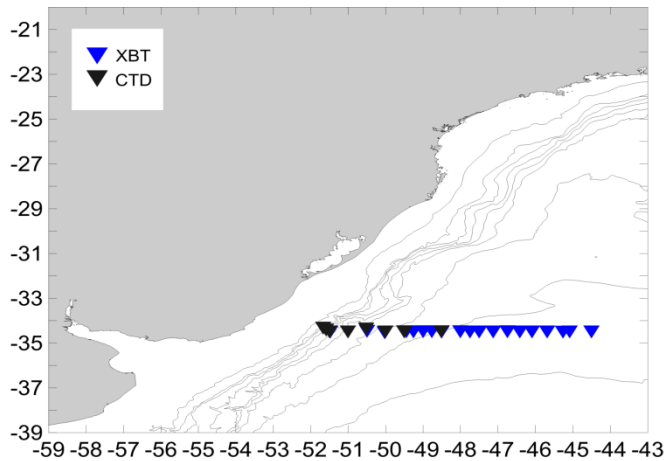
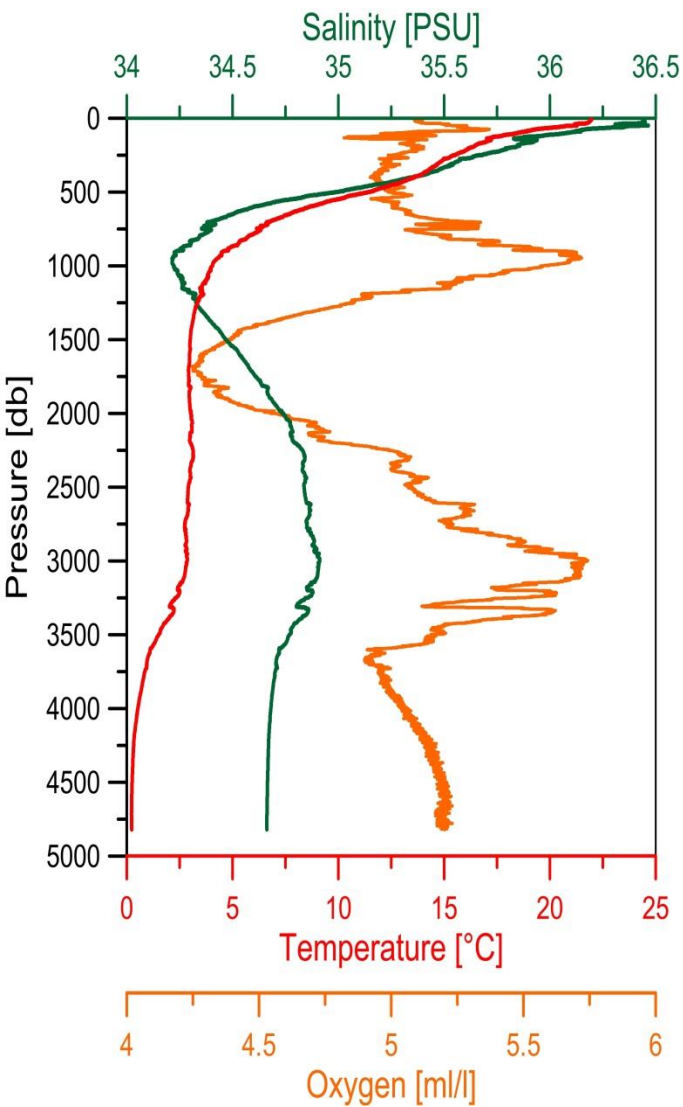
Foto: Chico Vicentini



C-PIES – Correntômetro – Pressure Inverted Echo-Sounders - Esses equipamentos utilizam a relação entre a velocidade do som e a densidade (temperatura) da água para estimar quantidade de calor armazenado e a altura dinâmica da termoclina, usadas no cálculo de velocidade geostrófica e fluxos de calor.

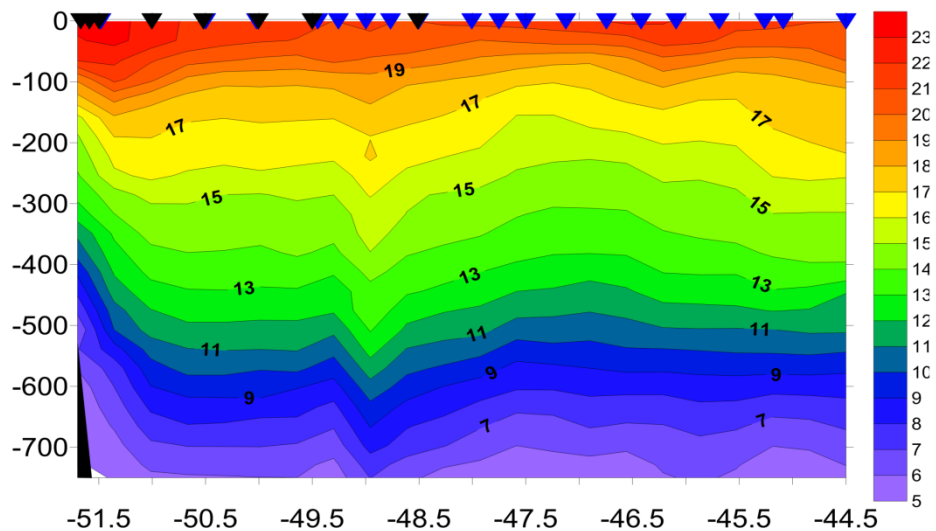


SAM08/SAMOC I - CTD #2



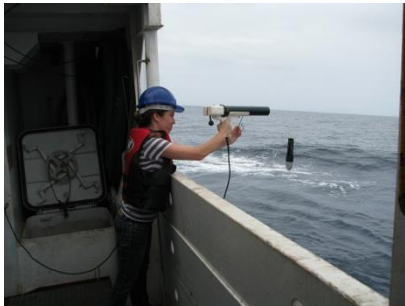
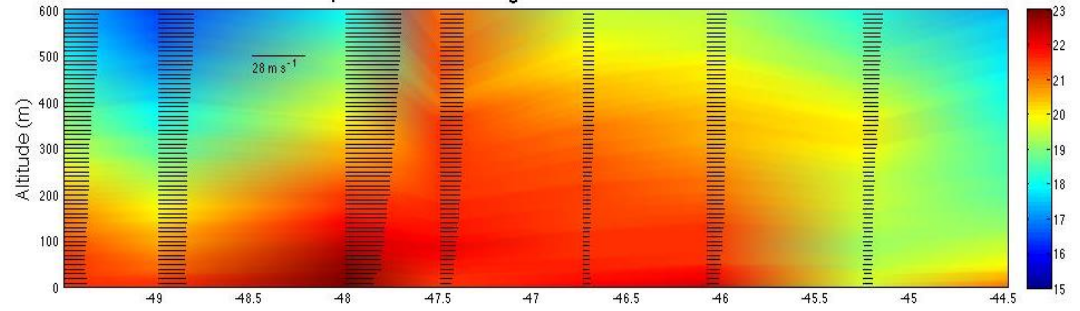
XBT
CTD

SAM08/SAMOC I - Transect XBT/CTD (34.5 S)

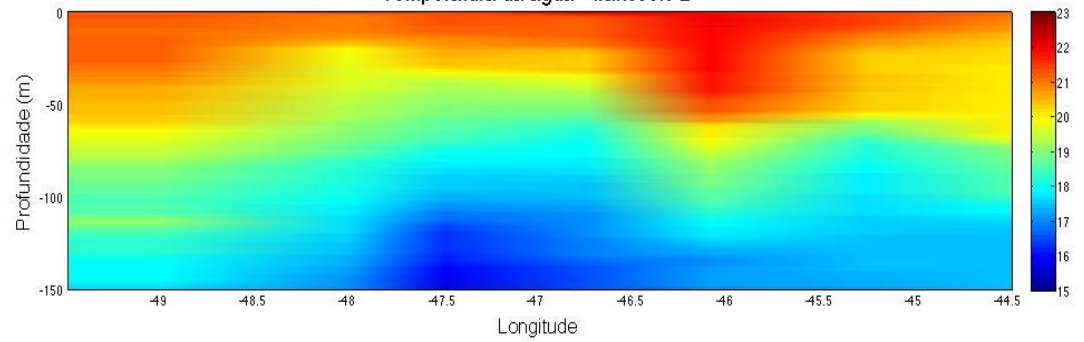




Temperatura do ar e magnitude do vento - transecto 2

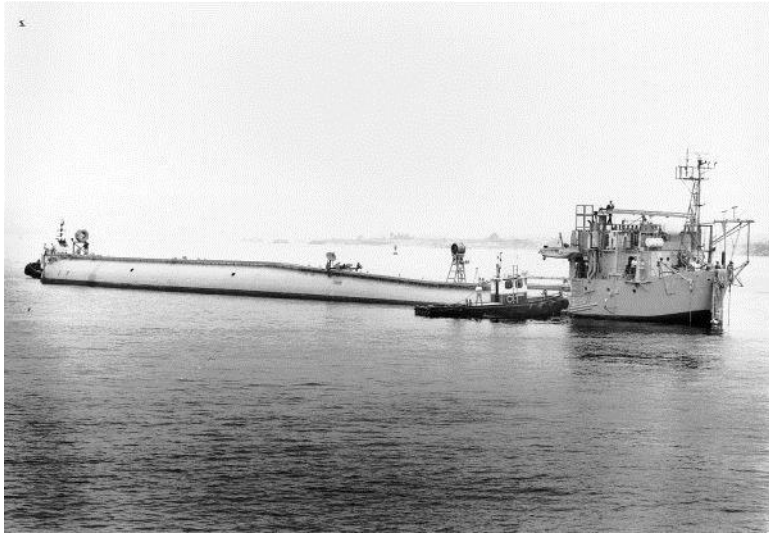


Temperatura da água - transecto 2



Floating Instrument Platform (FLIP)

R/P *FLIP* (FLoating Instrument Platform) is an open ocean research platform^{[4][5]} owned by the U.S. [Office of Naval Research](#) (ONR) and operated by the Marine Physical Laboratory (MPL) of the [Scripps Institution of Oceanography](#).^[6] The platform is 108 meters (355 ft) long and is designed to partially flood and [pitch](#) backward 90°, resulting in only the front 17 meters (55 ft) of the platform pointing up out of the water, with [bulkheads](#) becoming decks. When flipped, most of the buoyancy for the platform is provided by water at depths below the influence of surface waves, hence *FLIP* is stable and mostly immune to wave action similar to a [spar buoy](#). At the end of a mission, [compressed air](#) is pumped into the [ballast tanks](#) in the flooded section and the platform, which has no propulsion, returns to its horizontal position so it can be towed to a new location.^[7] The platform is frequently mistaken for a [capsized](#) ocean transport ship.



TIPOS DE MONITORAMENTO PARA OBTENÇÃO DE SÉRIES TEMPORAIS

- **ESTAÇÕES EM TERRA – DINÂMICA DE ESTUÁRIOS E ZONAS COSTEIRAS**

- VENTOS, PRECIPITAÇÃO, EVAPORAÇÃO, TEMPERATURA E UMIDADE DO AR, PRESSÃO ATMOSFÉRICA, NÍVEIS DAS ÁGUAS, DESCARGA DE RIOS. **DADOS DE AGÊNCIAS (ANA) E INSTITUTOS (INMET, INPE)**

- **FUNDEIOS**

- VENTOS, TEMPERATURA AR, UMIDADE, PRESSÃO, NÍVEIS DAS ÁGUAS, CORRENTES, SALINIDADE, TEMPERATURA, CONC. CLOROFILA E MATERIAL EM SUSPENSÃO (FLUORÍMETRO, TURBIDÍMETRO), NUTRIENTES (SENSORES), QUALIDADE DA ÁGUA (SENSORES), OD, CO₂ (SENSORES), PLÂNCTON (SENSORES). **PETROBRAS, PNBOIA, PIRATA, UNIVERSIDADES EM PONTOS ISOLADOS E DE FORMA IRREGULAR**

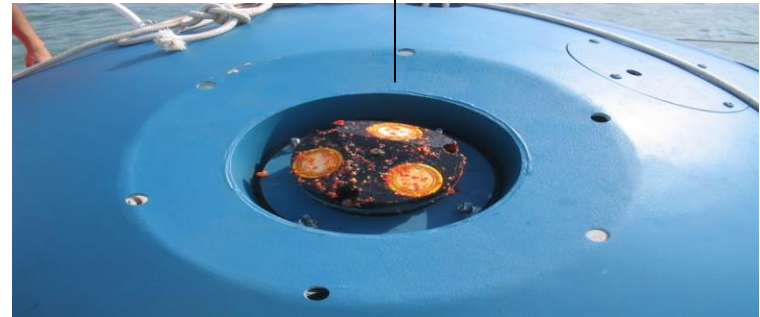
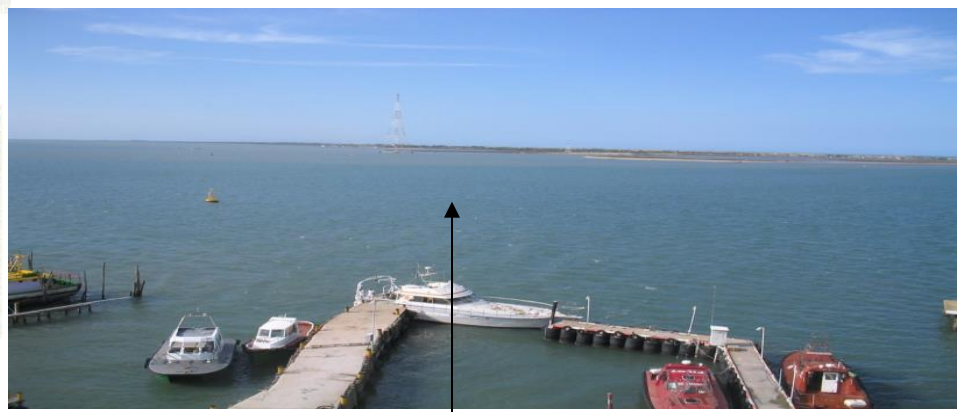
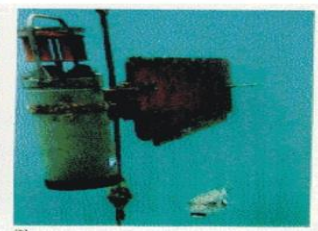
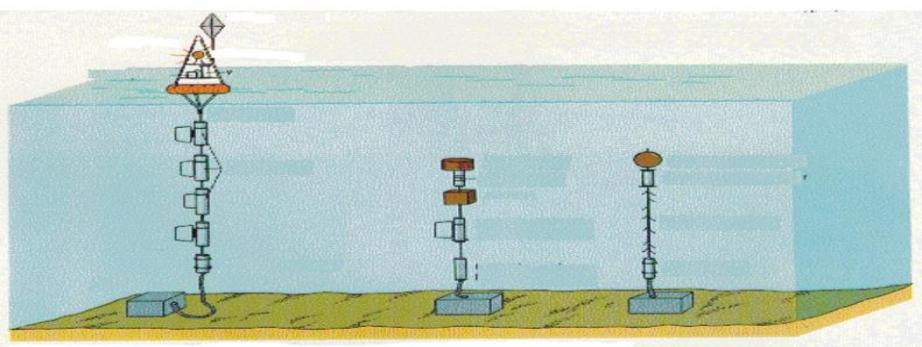
- **ESTAÇÕES DE RADAR**

ONDAS E CORRENTES

- **CRUZEIROS OU USO DE VEÍCULOS AUTÔNOMOS EM PERÍODOS REGULARES (GLIDERS, BOIAS)**

Oceanografia Física: Fundeios – Séries temporais

Medição de Correntes



MONITORAMENTO CONTÍNUO DE PROPRIEDADES: PARA QUE?

- **ESTUDAR UM PROBLEMA CIENTÍFICO**
 - ANALISAR VARIABILIDADE ESPACIAL E TEMPORAL, SUAS CAUSAS (NATURAIS E ANTRÓPICAS) E CONSEQUÊNCIAS
 - AVALIAR TENDÊNCIAS
 - ELABORAR CENÁRIOS
 - CALIBRAR E VALIDAR MODELOS NUMÉRICOS
- **APLICADOS**
 - ESTUDOS DE IMPACTO
 - SEGURANÇA À NAVEGAÇÃO E OPERAÇÕES NAVAIS
 - DISPERSÃO DE SUBSTÂNCIAS LANÇADAS

- **O QUE MONITORAR?**

- **INDICADORES METEOROLÓGICOS, HIDROLÓGICOS E OCEANOGRÁFICOS:**
 - FÍSICOS: **VENTOS**, PRECIPITAÇÃO, EVAPORAÇÃO, UMIDADE, PRESSÃO, DESCARGA DE RIOS, **NÍVEIS DAS ÁGUAS**, **CORRENTES**, **ONDAS**, SALINIDADE, TEMPERATURA DO AR E DA ÁGUA, **VISIBILIDADE**;
 - BIOLÓGICOS: CONC. CLOROFILA; ZOO+ ICTIOPLÂNCTON; PEIXES; CRUSTÁCEOS; MOLUSCOS;
 - QUÍMICOS: NUTRIENTES; QUALIDADE DAS ÁGUAS (PH, O₂, CO₂), ÓLEO
 - GEOLÓGICOS: CONC. MATERIAL EM SUSPENSÃO: COMPOSIÇÃO; **BATIMETRIA** (TAXAS DE SEDIMENTAÇÃO);

TIPOS DE MONITORAMENTO PARA OBTENÇÃO DE SÉRIES TEMPORAIS

- **ESTAÇÕES EM TERRA – DINÂMICA DE ESTUÁRIOS E ZONAS COSTEIRAS**

- VENTOS, PRECIPITAÇÃO, EVAPORAÇÃO, TEMPERATURA E UMIDADE DO AR, PRESSÃO ATMOSFÉRICA, NÍVEIS DAS ÁGUAS, DESCARGA DE RIOS.
DADOS DE AGÊNCIAS (ANA) E INSTITUTOS (INMET, INPE)

- **FUNDEIOS**

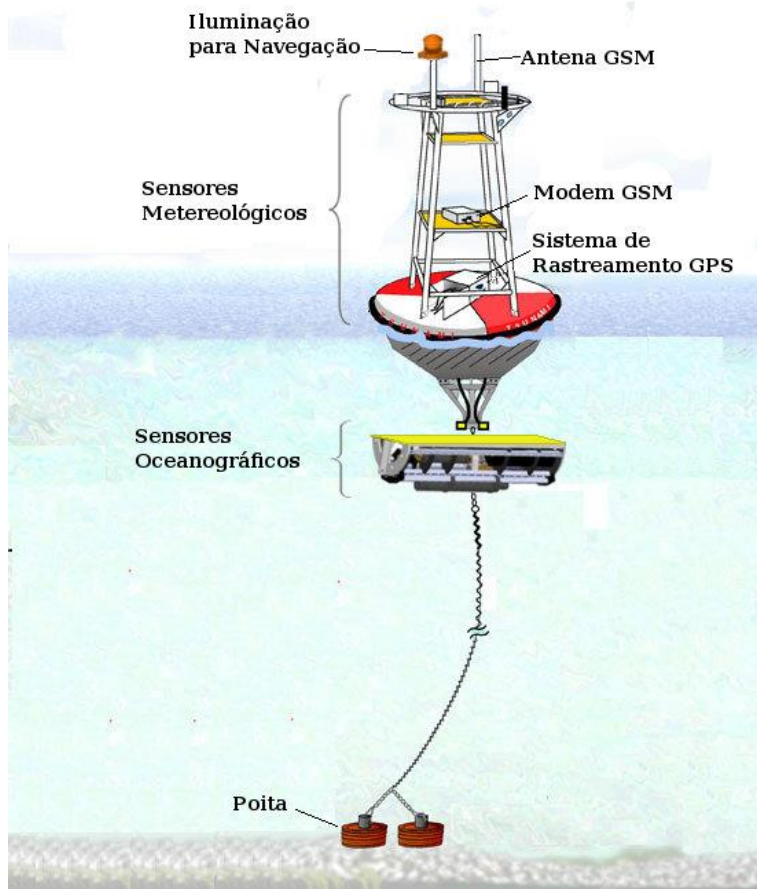
- VENTOS, TEMPERATURA AR, UMIDADE, PRESSÃO, NÍVEIS DAS ÁGUAS, CORRENTES, SALINIDADE, TEMPERATURA, CONC. CLOROFILA E MATERIAL EM SUSPENSÃO (FLUORÍMETRO, TURBIDÍMETRO), NUTRIENTES (SENSORES), QUALIDADE DA ÁGUA (SENSORES), OD, CO₂ (SENSORES), PLÂNCTON (SENSORES). **PETROBRAS, PNBOIA, PIRATA, UNIVERSIDADES EM PONTOS ISOLADOS E DE FORMA IRREGULAR**

- **ESTAÇÕES DE RADAR**

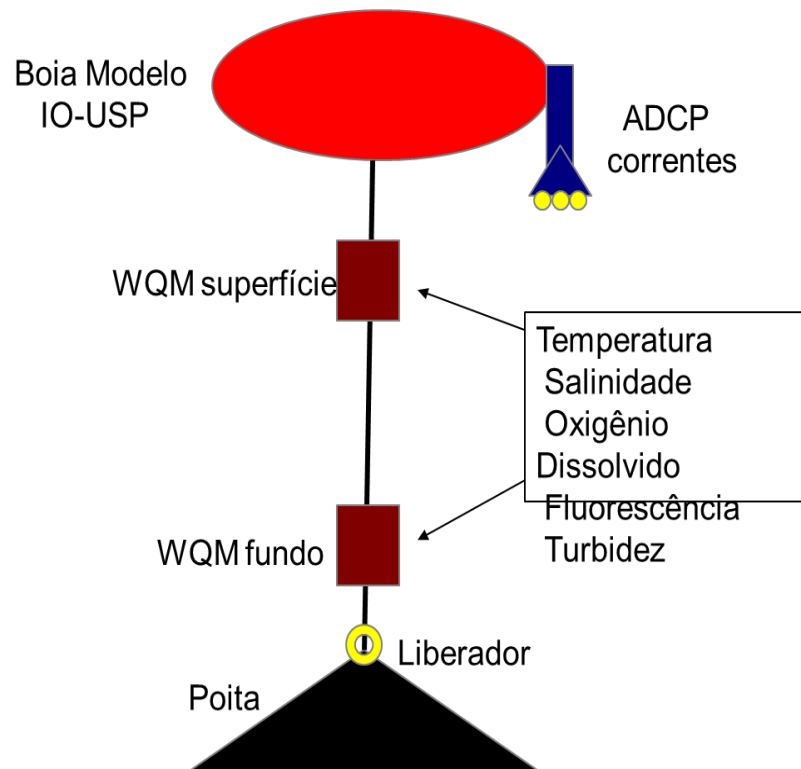
ONDAS E CORRENTES

- **CRUZEIROS OU USO DE VEÍCULOS AUTÔNOMOS EM PERÍODOS REGULARES (GLIDERS, BOIAS)**

Fundeios SIMCOSTA com transmissão de dados



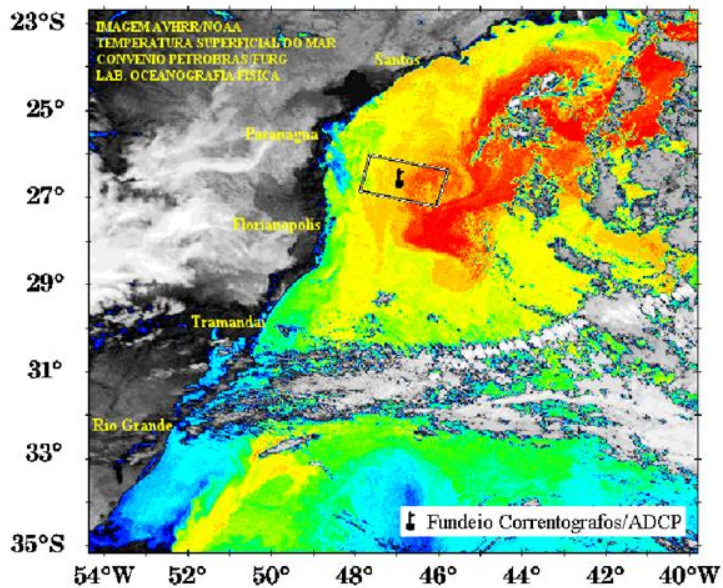
◆ Fundeios INCT-Mar-COII



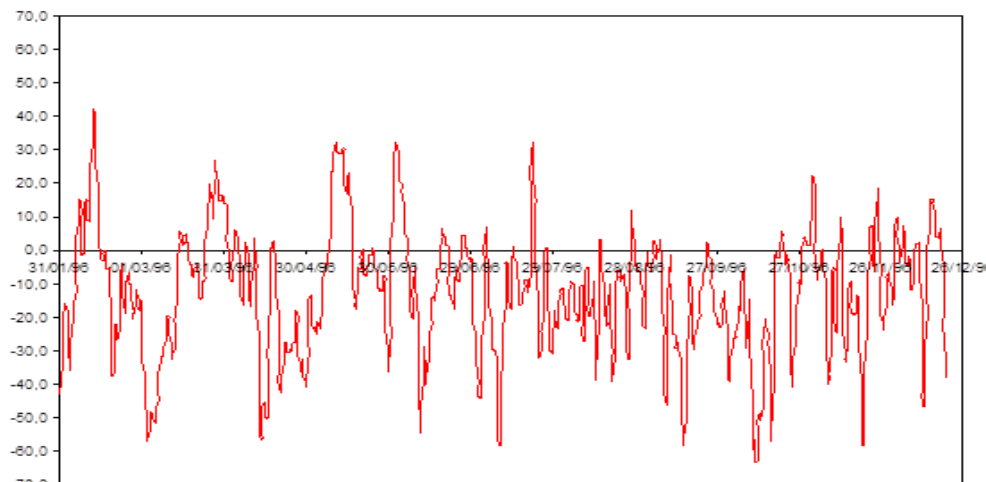
DIFICULDADES:

- MANUTENÇÃO REGULAR – NORMALMENTE SE OBTÉM FINANCIAMENTO PARA ADQUIRIR O EQUIPAMENTO (IMPORTADO). FALTA DE TÉCNICOS ESPECIALIZADOS; PROBLEMAS COM EMBARCAÇÕES.
- VANDALISMO
- PESCA DE ARRASTO – RS -150.000 KM ARRASTO/ANO (BOIAS SUBMERSAS)

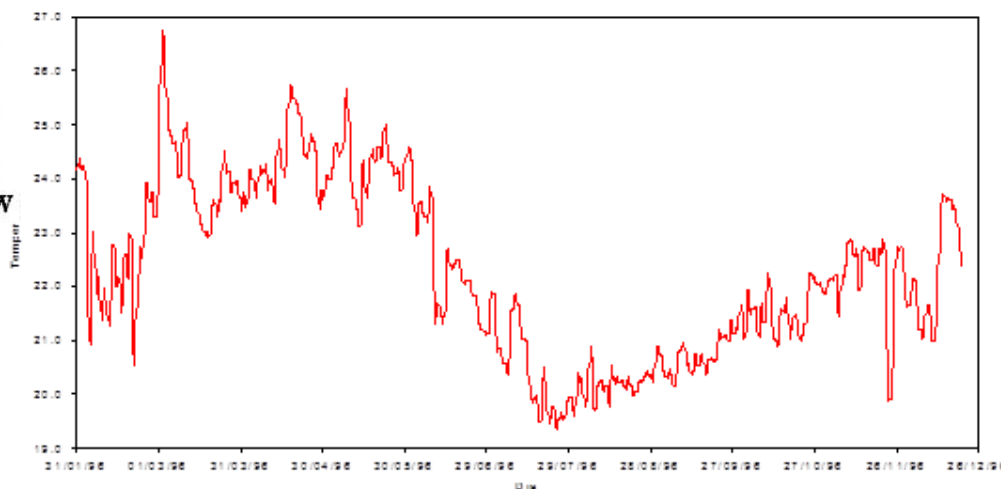
SÉRIES TEMPORAIS DE CORRENTES, NÍVEIS, SALINIDADE E TEMPERATURA NA PLATAFORMA CONTINENTAL DE SANTA CATARINA – PETROBRAS/FURG/UFGRS/UFSC/UFPR



Componente Norte - Sul - Dado Filtrado 6h - RMC11860

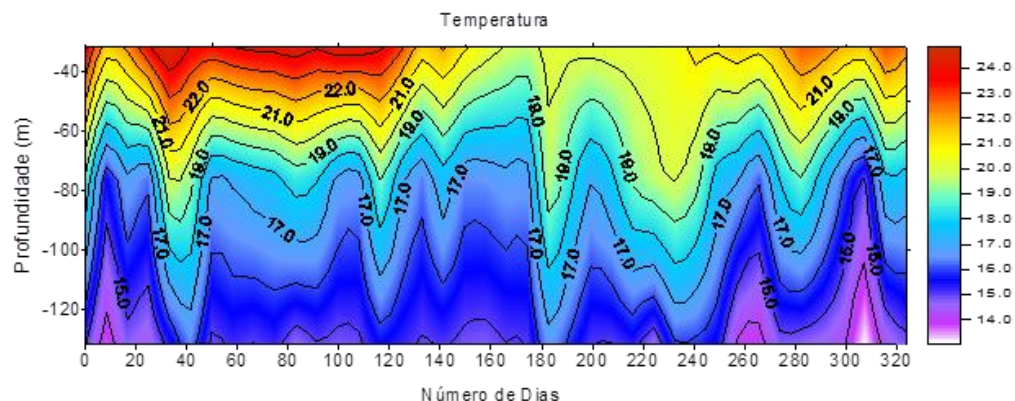
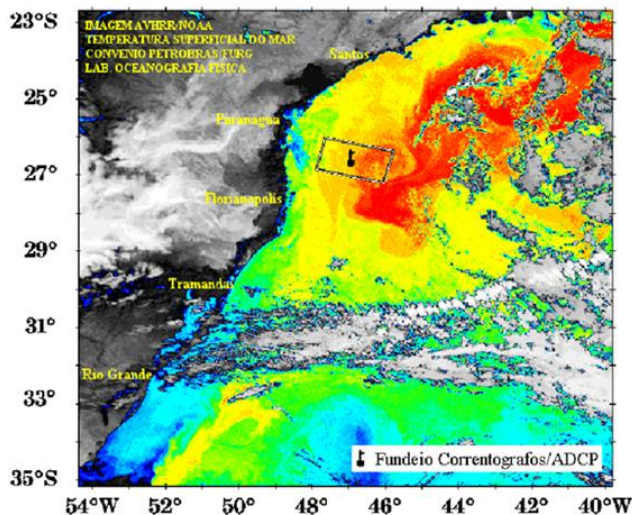


Temperatura - Dado filtrado 6h - RMC 11860

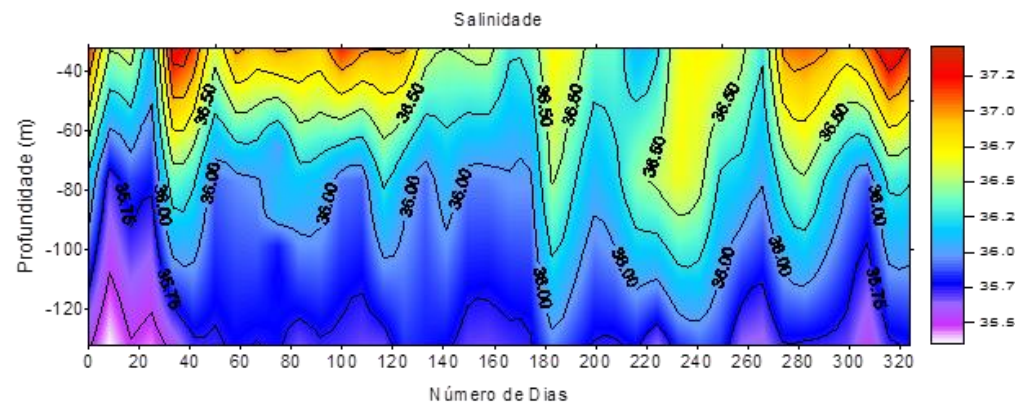


Poita 1000 kg

SÉRIES TEMPORAIS DE CORRENTES, NÍVEIS, SALINIDADE E TEMPERATURA NA PLATAFORMA CONTINENTAL DE SANTA CATARINA – PETROBRAS/FURG/UFGRS/UFSC/UFPR



Dia 01/02/96 01/04/96 01/06/96 01/09/96 01/10/96 20/12/96



FUNDEIOS COM TRANSMISSÃO DIRETA DE DADOS

[HTTP://WWW.NDBC.NOAA.GOV/](http://www.ndbc.noaa.gov/)

National Data Buoy Center x
www.ndbc.noaa.gov

Historical
DART®
Oil & Gas ADCP
Obs Search
Ship Obs Report
Glidens
BuoyCAMs
APEX
TAO
DODS
HF Radar
OSMC
Dial-A-Buoy
RSS Feeds
Obs Web Widget
Email Access

Station Status
NDBC Maintenance
NDBC Platforms
Partner Platforms

Program Info
Find us on Facebook
NDBC on Facebook
About NDBC
Met/Ocean
Moored Buoy
C-MAN
TAO
DART®
VOS
CSP
IOOS® Program
IOOS® DAC

Publications
NDBC DQC
Handbook
Hurricane Data Plots
Mariners Weather
Log

To save the current map view, [right click on this link](#) and select either "Add to Favorites" or "Bookmark this link".
To view observations, left-click a marker on the map.
To zoom the map, use the zoom slider on the map; or hold down the **Shift** key while dragging a box; or click the magnifying glass below the zoom slider to turn drag zoom on and off.

Mapa Satélite

Select a region:
[Atlantic \(Tropical\)](#)
[Atlantic \(West\)](#)
[Australia](#)
[Bay of Bengal](#)
[Caribbean Sea](#)
[Central America](#)
[Chile](#)
[Europe](#)
[Gulf of Alaska](#)
[Gulf of Mexico \(West\)](#)
[Gulf of Mexico \(East\)/Florida](#)
[Nova Scotia](#)
[Pacific \(North\)](#)
[Pacific \(West\)](#)
[USA-Alaska](#)
[USA-Hawaii](#)
[USA-Great Lakes \(East\)](#)
[USA-Lake Superior](#)
[USA-Northeast](#)
[USA-Northwest](#)
[USA-Southeast](#)
[USA-Southwest](#)
[World](#)

Google
Imagens ©2014 NASA, TerraMetrics | 2000 km | Termos de Uso

Mouse Cursor Coordinates: **3.16S, 99.49W**
1213 stations deployed
873 have reported in the past 8 hours

◆ Stations with recent data
◆ Stations with historical data only
◆ Stations with no data in last 8 hours (24 hours for tsunami stations)
◆ Tsunami station in event mode (within previous 24 hours)

[Disclaimer](#)
[Get Observations by Program as KML](#)
[Get Observations by Owner as KML](#)

<http://www.ibi-roos.eu/Observing-systems>

Moorings
Sea State,
Atmosphere,
Ocean



Argo
floats

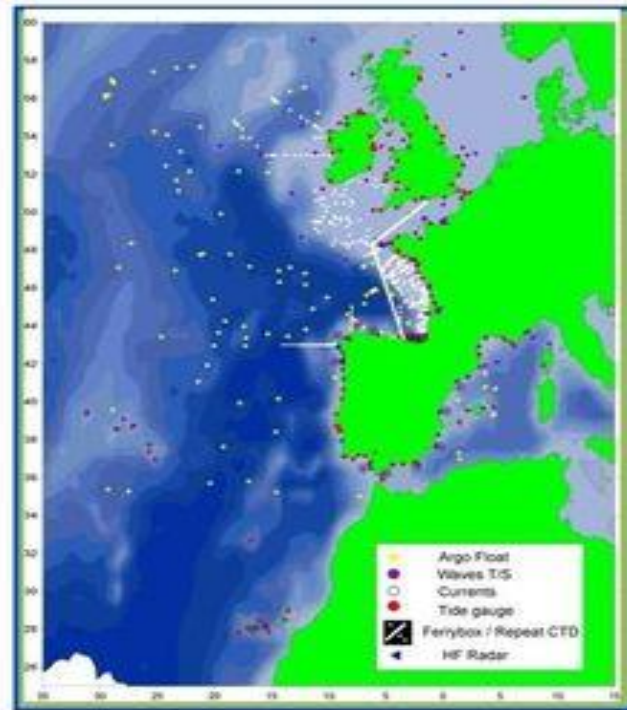
Coastal
floats



Voluntary fishing
ships
Recopesca



Satellite
SST, Ocean
Color SSH



Research
Vessels

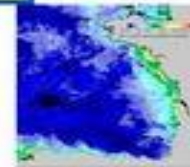


Ferrybox
Lines



High
Frequency
data

Tide
gauges



IRELAND-BISCAY-IBERIA REGIONAL OPERATIONAL OCEANOGRAPHIC SYSTEM

THE GOAL OF IBI-ROOS IS TO SET UP AN OPERATIONAL OCEANOGRAPHY ORGANIZATION OPERATED BY PARTICIPATING PARTNERS FROM THE 5 COUNTRIES BORDERING THE **IBERIAN-BISCAY-IRISH MARITIME AREA** (FRANCE, IRELAND, PORTUGAL, SPAIN AND UK), COLLABORATING TO DEVELOP AND IMPLEMENT OCEAN OBSERVING SYSTEMS FOR THE IBI-ROOS AREA, WITH DELIVERY OF REAL TIME OPERATIONAL DATA PRODUCTS AND SERVICES.

OCEAN NETWORKS CANADA

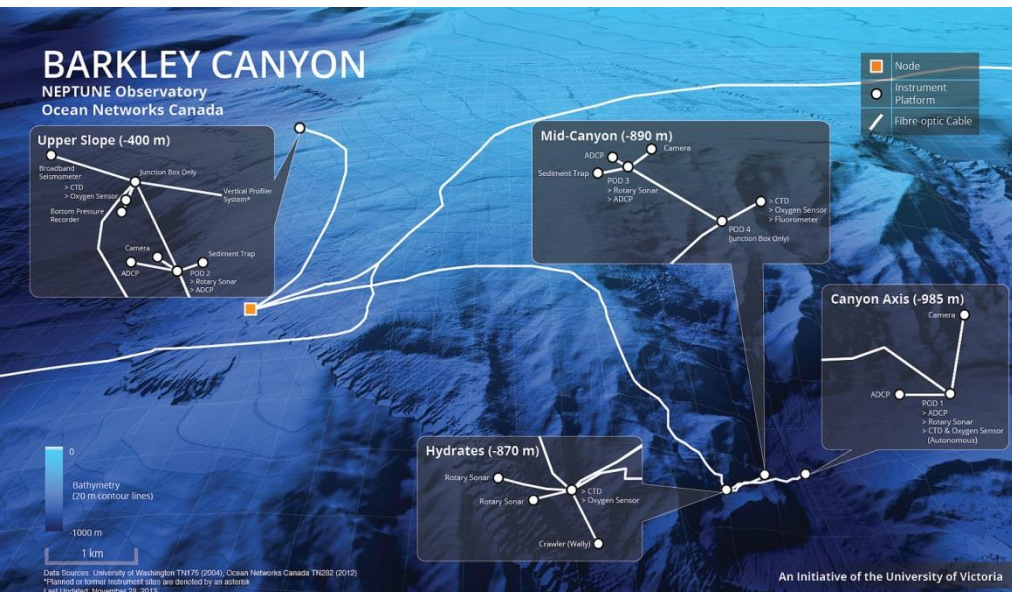
WWW.OCEANNETWORKS.CA



OCEAN NETWORKS CANADA HAS OBSERVATORIES INSTALLED IN 3 REGIONS:

- ARCTIC MINI-OBSERVATORY IN CAMBRIDGE BAY, NUNAVUT
- NEPTUNE OBSERVATORY IN THE NORTHEAST PACIFIC
- VENUS OBSERVATORY IN THE SALISH SEA

NEPTUNE: THE NORTH EAST PACIFIC TIME-SERIES UNDERSEA NETWORKED EXPERIMENTS PROJECT



- UNDERSTANDING HUMAN-INDUCED CHANGE IN THE NORTHEAST PACIFIC OCEAN
- LIFE IN THE ENVIRONMENTS OF THE NORTHEAST PACIFIC OCEAN AND SALISH SEA
- INTERCONNECTIONS AMONG THE SEAFLOOR, OCEAN, AND ATMOSPHERE SEAFLOOR AND SEDIMENT IN MOTION

OCEAN OBSERVATORIES INITIATIVE – COASTAL AND GLOBAL SCALE

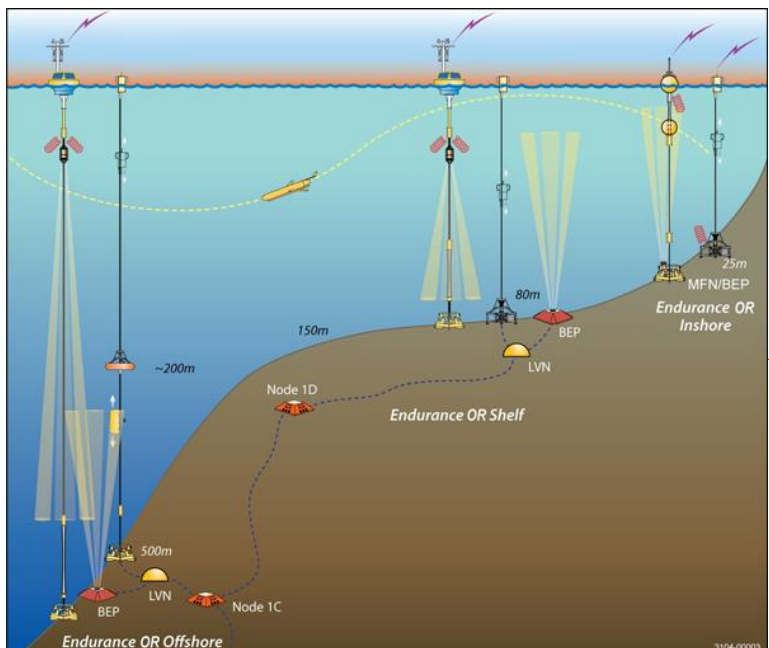
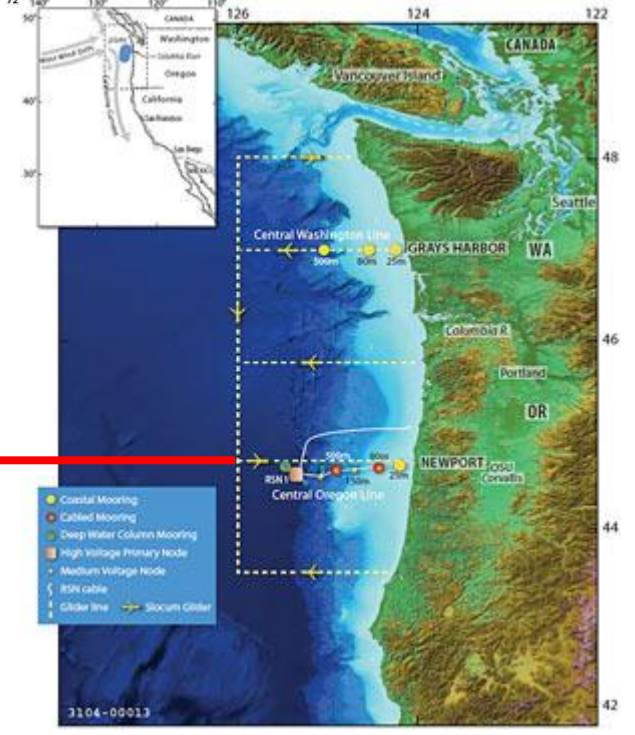
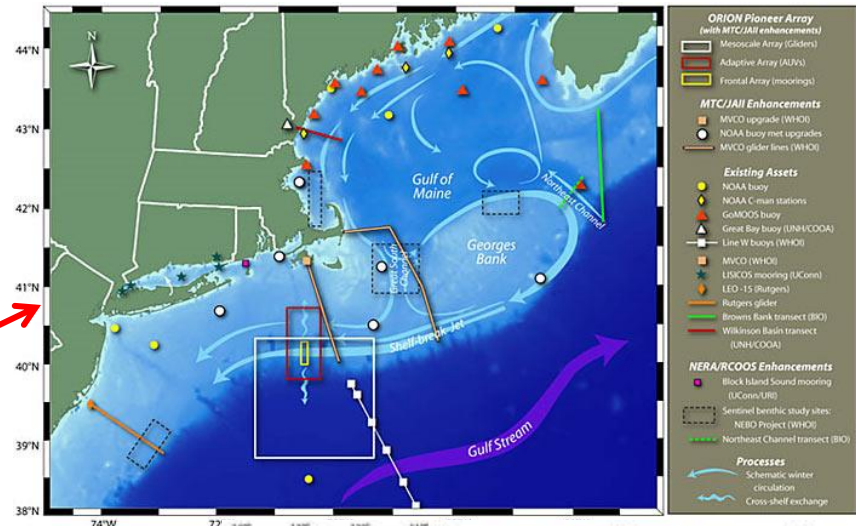
NODES – WHOI.EDU/OOI_CGSN/

GLOBAL NODES

- OCEANO AUSTRAL
- MAR DE IRMINGER
- BACIA ARGENTINA
- ESTAÇÃO PAPA (50°N, 145°W)

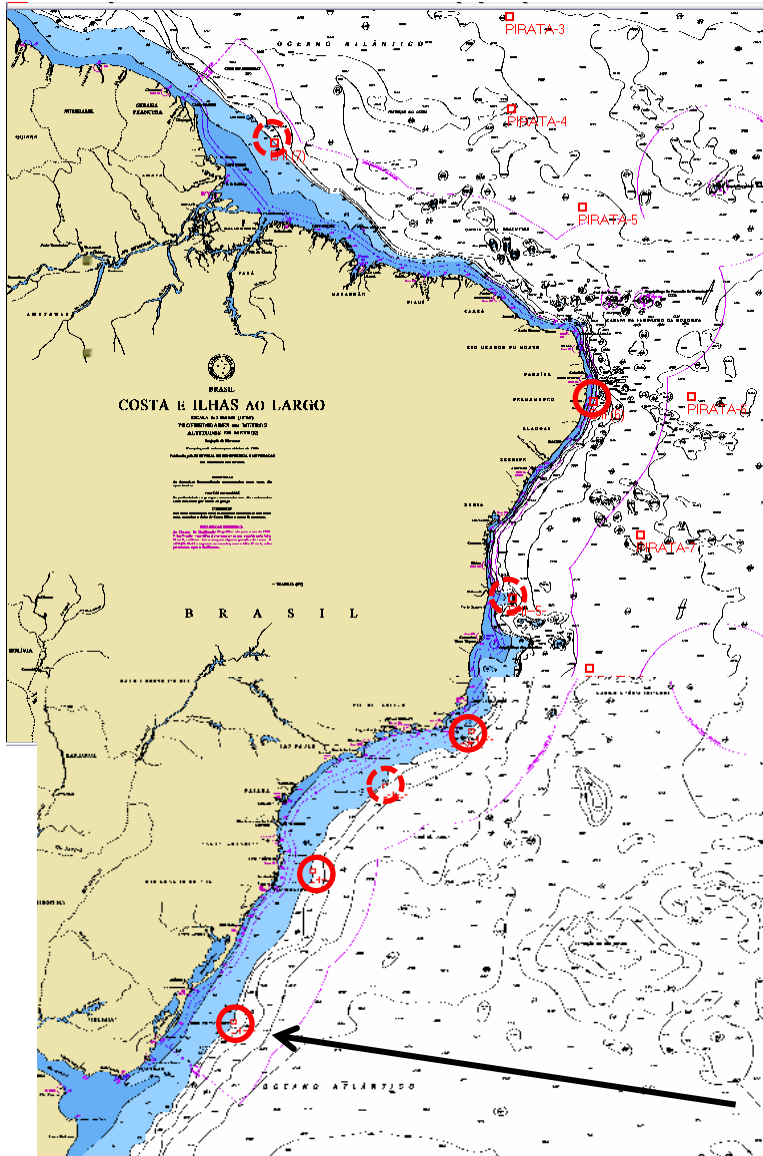
COASTAL NODES

- PIONEER – COSTA LESTE EUA
- ENDURANCE – COSTA OESTE EUA



PNBOIA

[HTTP://WWW.MAR.MIL.BR/DHN/CHM/PNBOIA](http://www.mar.mil.br/dhn/chm/pnboia)



PNBOIA – Programa Nacional de Boias Oceanográficas

Objetivos e Justificativas OBJETIVO GERAL

Disponibilizar, em tempo quase-real, à comunidade de interessados, dados meteorológicos e oceanográficos, obtidas nas áreas oceânicas de interesse Brasil.

OBJETIVOS ESPECÍFICOS

- Implantar uma rede de boias de deriva rastreadas por satélites;
- Implantar uma rede de boias fundeadas rastreadas por satélites;
- Implantar um sistema de recepção, processamento e divulgação dos dados recebidos através das duas redes acima.

○ **INSTALADA**

○ **PREVISTA**

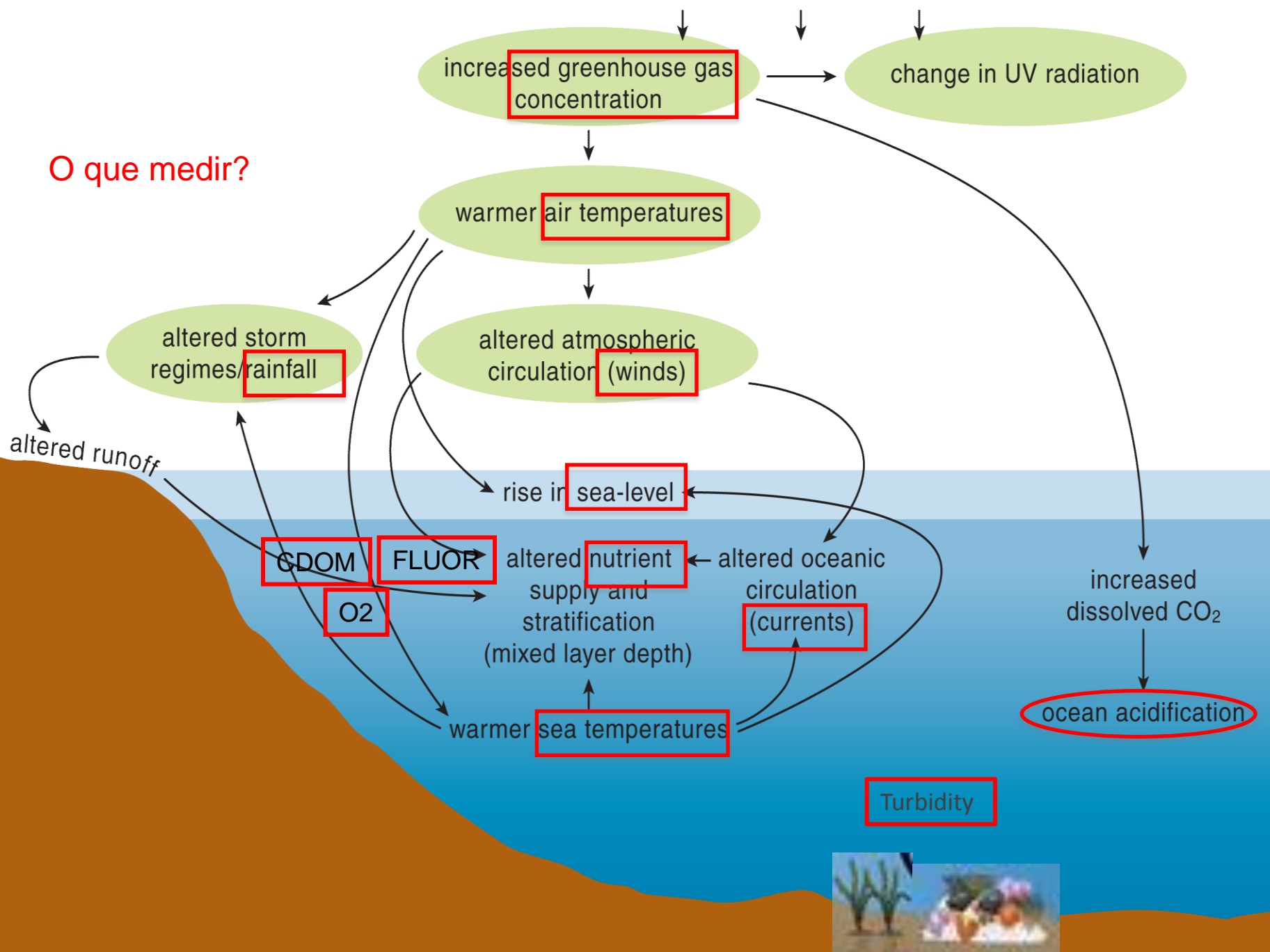
[HTTPS://WWW.MAR.MIL.BR/DHN/CHM/METEO/](https://www.mar.mil.br/dhn/chm/meteo/prev/dados/pnboia/boia_rg.htm)
[PREV/DADOS/PNBOIA/BOIA_RG.HTM](https://www.mar.mil.br/dhn/chm/meteo/prev/dados/pnboia/boia_rg.htm) - INÍCIO
EM 2011 COM ADCP E ONDAS. A PARTIR DE
2012, SÓ ONDAS E DADOS METEOROLÓGICOS

SiMCosta

Configuration

human activities

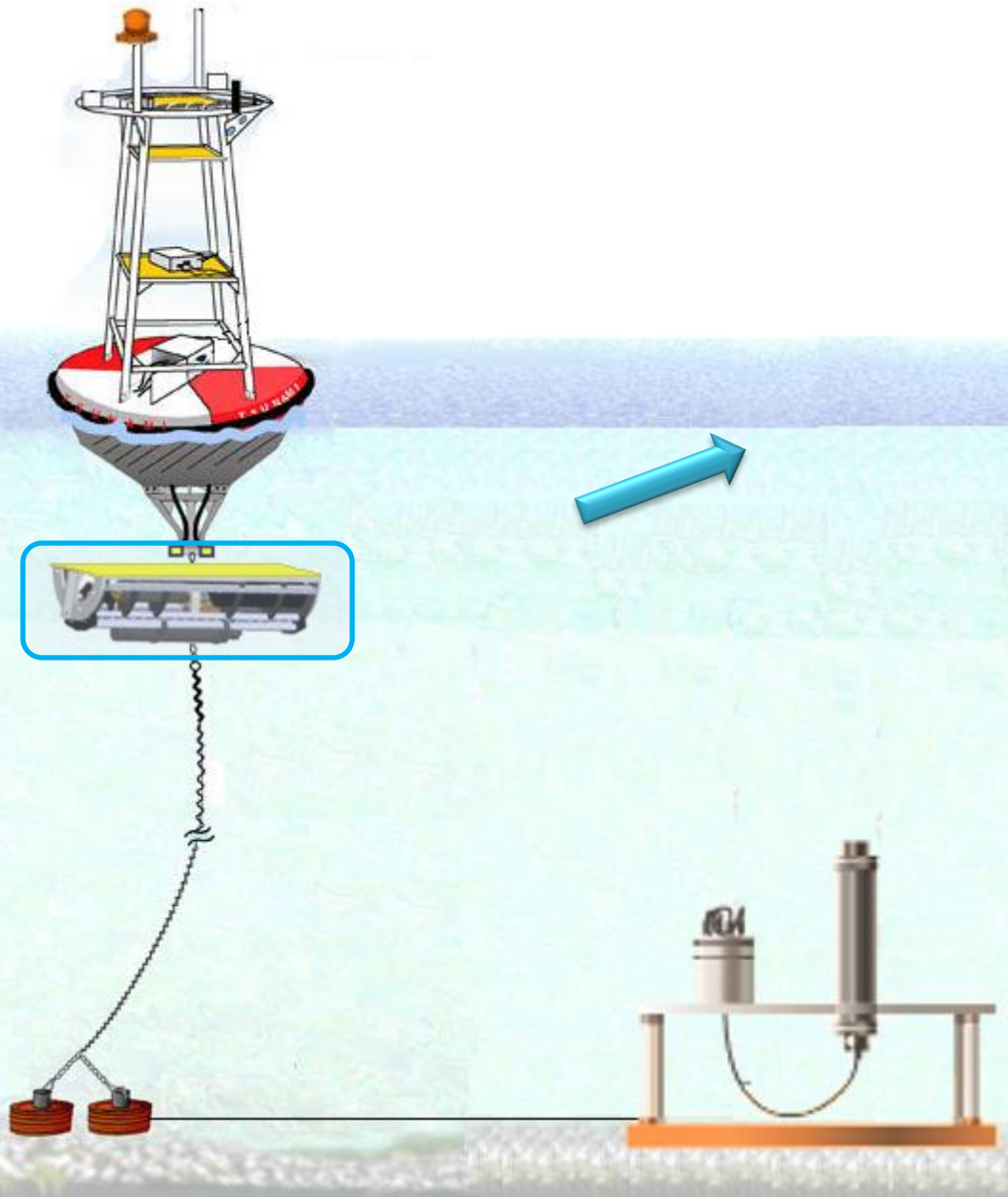
O que medir?



System Oceanographic Surface:

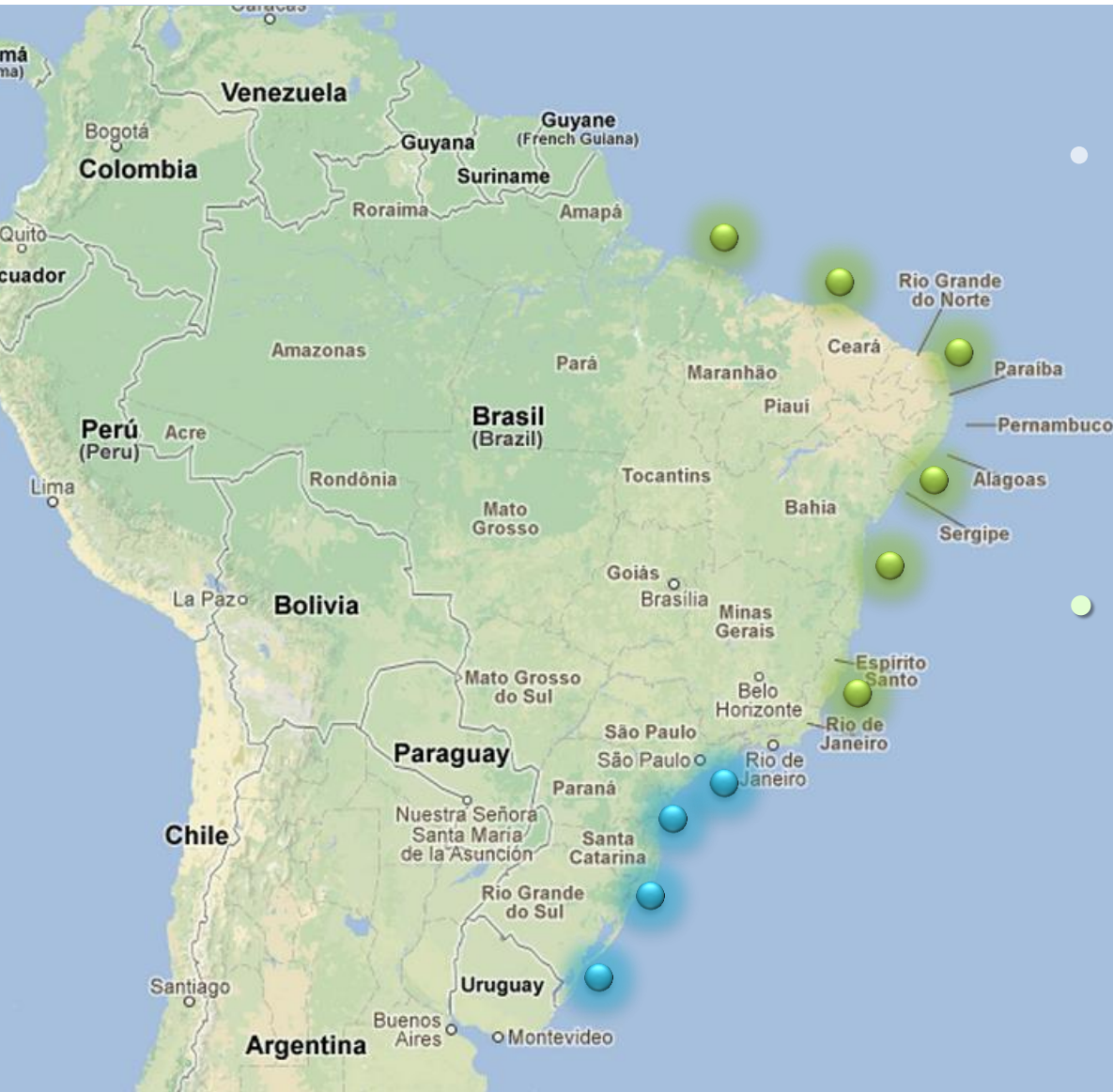
- Backscatter
- Chlorophyll
- Colored Dissolved Organic Matter
- Nitrate
- Dissolved O₂
- Depth
- pH
- Salinity
- Sea Surface Temperature
- Turbidity
- Data Logger Stor-X

(Satlantic Inc.)



SiMCosta

Brazilian Coastal Monitoring System

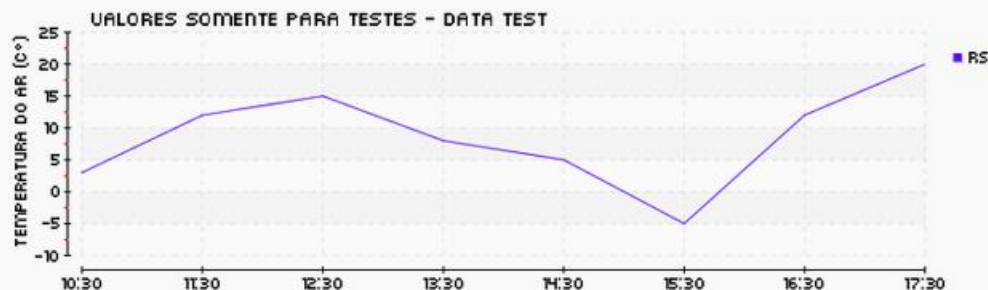


- Initial Phase: ●
south-southeast -
states of RS, SC,
PR and SP
- In Medium Term: ●
entire coastal
region along the
Brazilian territory

Buoy RS

Latitude: 32°12' S Last Update: (teste)
 Longitude: 51°45' W City: Rio Grande

Oceanographic		Meteorological	
Water Temperature (°C)	NaN	Air Temperature (°C)	NaN
Turbidity (NTU)	NaN	Wind Direction (°)	NaN
Salinity	NaN	Wind Speed (m/s)	NaN
Profundity (m)	NaN	Atmospheric Pressure (mbar)	NaN
Dissolved O ₂ (ml/l)	NaN	Pluviom. Precipitation (mm)	NaN
Nitrate (µM)	NaN	Conc. of CO ₂ (ppm)	NaN
CDOM (QSDE)	NaN	Solar Radiation (Wm ²)	NaN
Chlorophyll-a (µg/l)	NaN	Air Rel. Humidity (%)	NaN
Perfil de Corrente	NaN		
Wave height	NaN		
pH	NaN		



Click on a buoy in the above map to receive information. If you do not see the markers (buoys), click SiMCosta in the top menu to reload the map items. Click above for a parameter to update the chart.

News

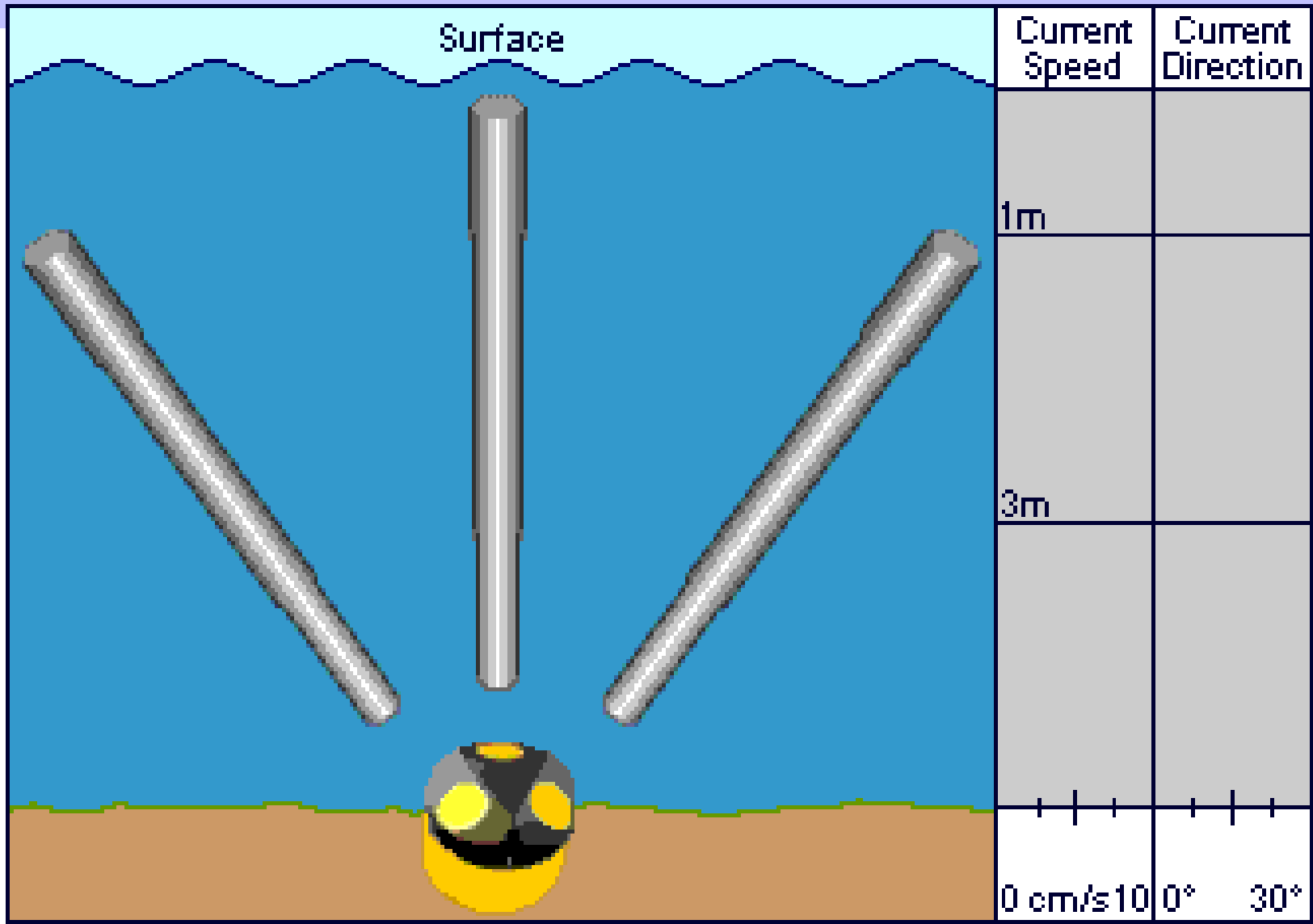
Sistema centralizado em Rio Grande vai monitorar toda a costa brasileira

18/10/2013

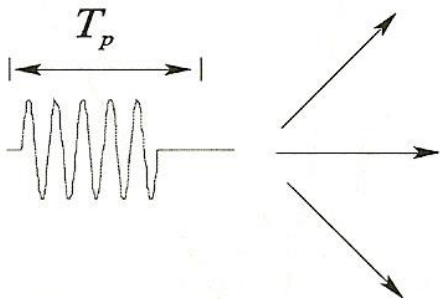
Projeto auxiliará na prevenção de catástrofes em cidades litorâneas.

www.simcosta.furg.br

Princípio de funcionamento do ADP



transmitted
pulse F_0



target moving
towards

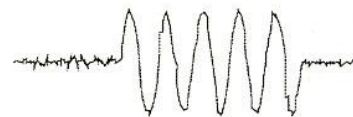


received signal F_D



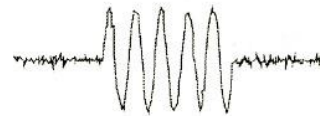
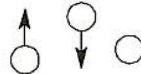
$$F_D < F_0$$

moving away



$$F_D > F_0$$

stationary or
moving across



$$F_D = F_0$$

SonTek, Inc

$$F_D = -2 F_S (V / c)$$

V - velocidade relativa entre fonte e alvo

C - velocidade de propagação do som

F_S - frequência de transmissão do som

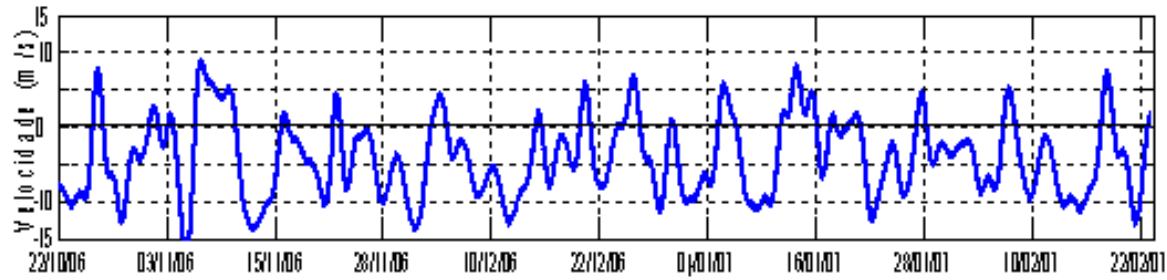
F_D - mudança na frequência de transmissão (Efeito Doppler)

PROJETO SIMTECO: FUNDEIO ADCP-AWAC – CORRENTES, NÍVEIS E ONDAS – PARCEL DO CARPINTEIRO

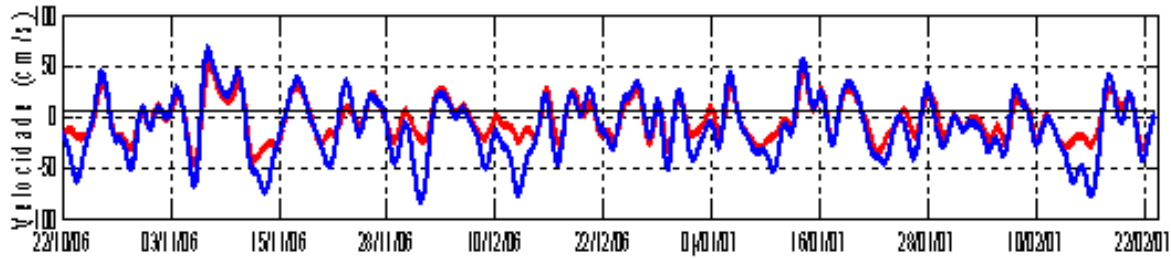


Componentes

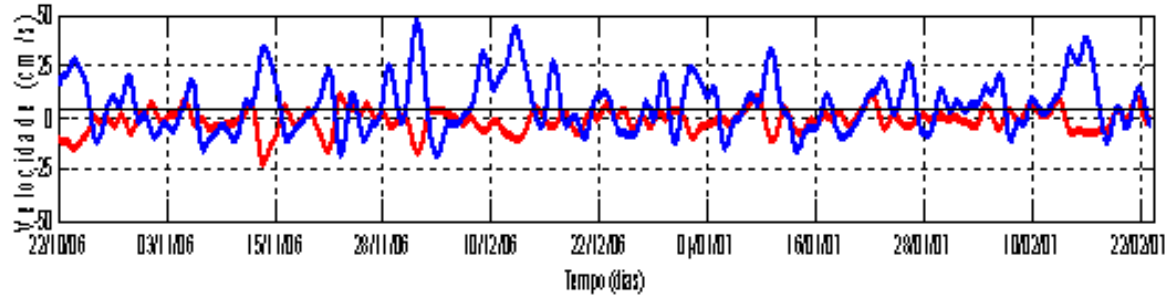
Vento paralelo à costa (longitudinal)



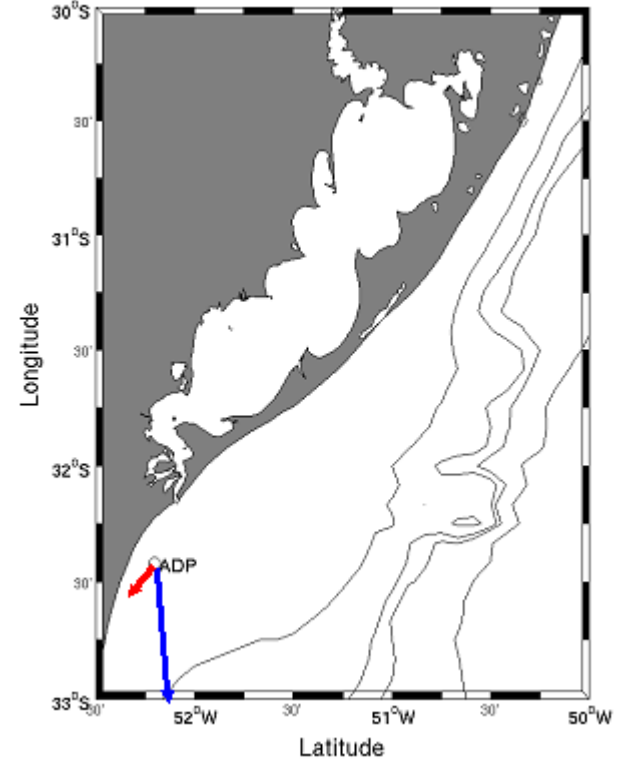
Corrente paralela à costa (longitudinal)

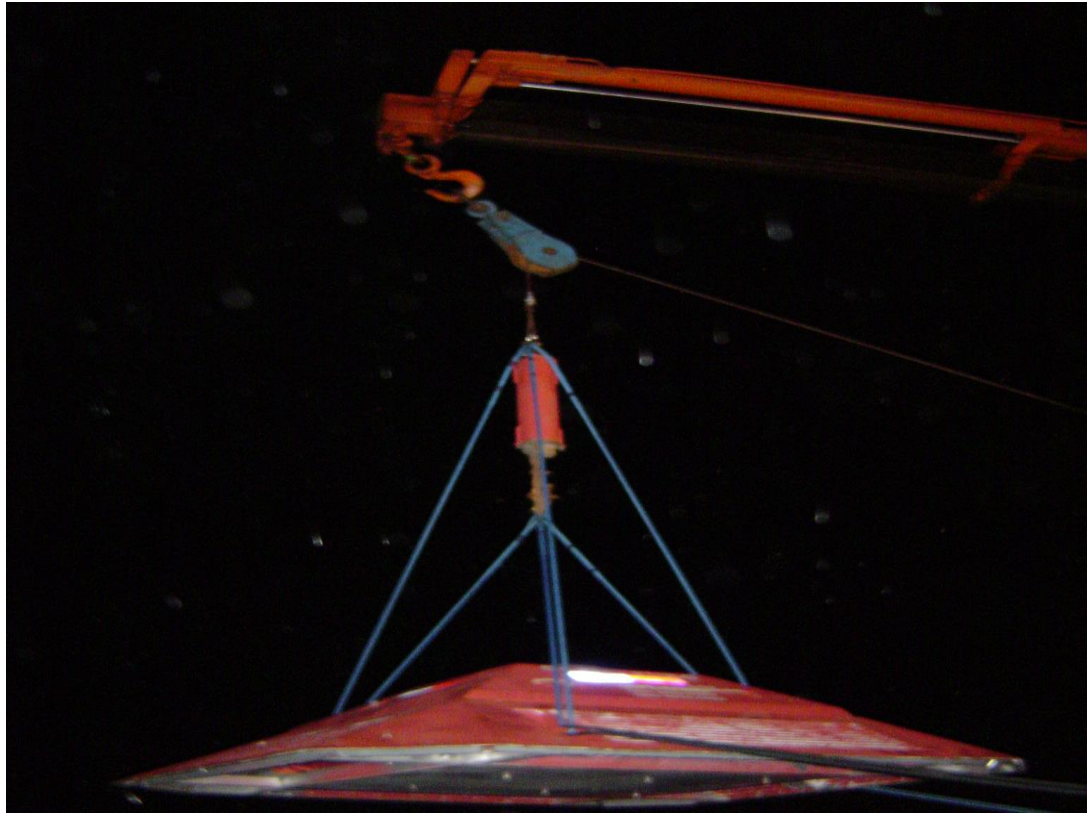


Corrente perpendicular à costa (transversal)



Estações de Fundeio - ADP





MONITORAMENTO EM TEMPO REAL PARA MANOBRAS DE PLATAFORMAS DE PETRÓLEO



River, Estuary and Coastal Observing Network

<http://recon.sccf.org> – Florida (USA)

recon.sccf.org

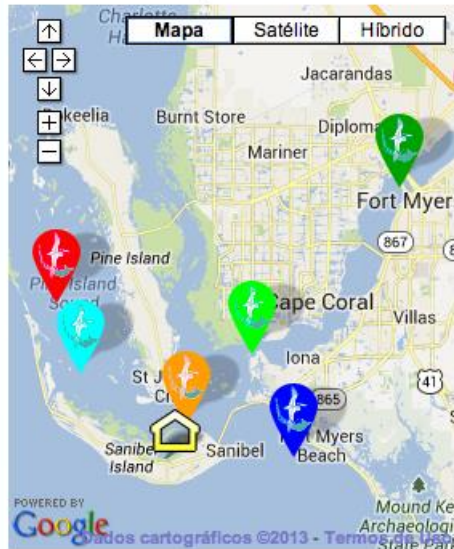
[CO2 Webpages](#)
[Google Maps](#)
[Ocean Colour](#)
[Wikipedia](#)
[News](#)
[Screenplay](#)
[Popular](#)
[Gmail: Email from G](#)
[Google Translate](#)
[GreenSeas](#)



SCCF RECON

Sanibel-Captiva Conservation Foundation
River, Estuary and Coastal Observing Network

[Home](#)
[Water Quality](#)
[Weather](#)
[Feeds](#)
[Definitions](#)
[About](#)
[Sponsors](#)



Sites

- Beautiful Island
- Blind Pass
- Fort Myers
- Gulf of Mexico
- Redfish Pass
- Shell Point
- Tarpon Bay
- Home**

Roll over any RECON map icon or site name for information and latest sensor measurements for that location.

SCCF RECON

The River, Estuary and Coastal Observing Network (RECON) is a network of optical water quality sensors deployed throughout the Caloosahatchee river and estuary to provide real-time, water quality data to scientists, policy makers, and the general public. RECON's network of high-quality, autonomous, *in situ* sensors can detect the presence of algal blooms and nutrient hotspots.

The extensive watersheds of the Caloosahatchee (1,400 square miles) and Lake Okeechobee (4,400 square miles) each contribute water that flows into the Caloosahatchee estuary and the Gulf of Mexico. Water quality is affected by both Lake Okeechobee discharges and runoff from the Caloosahatchee watershed. Over time, these watersheds have changed from low-nutrient loading marshes and wetlands to high loading urban and agricultural land uses. Nutrients increase turbidity and decrease concentrations of dissolved oxygen (DO). In addition, excess nutrients fuel nuisance algal blooms. Losses of low-nutrient adapted communities, such as seagrasses have contributed to changes in fish, crustacean and marine mammal communities.

Latest RECON News

NEW RECON RIVER SITE

We have established a new RECON site in the Caloosahatchee River. The sensor that had previously been deployed in Moore Haven, has been relocated down the River off of Beautiful Island, approximately one mile downstream from the I75 overpass. This new location will help fill in a data gap for conditions in the upper estuarine section of the River.

[Past News Stories >](#)



River, Estuary and Coastal Observing Network

<http://recon.sccf.org> – Florida (USA)

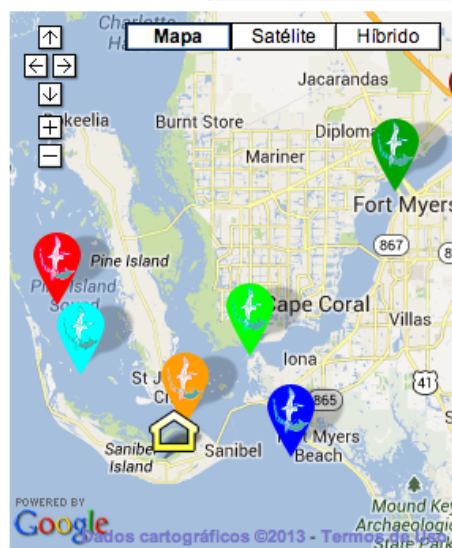




SCCF RECON

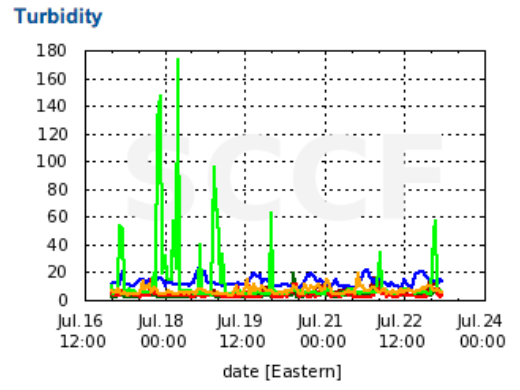
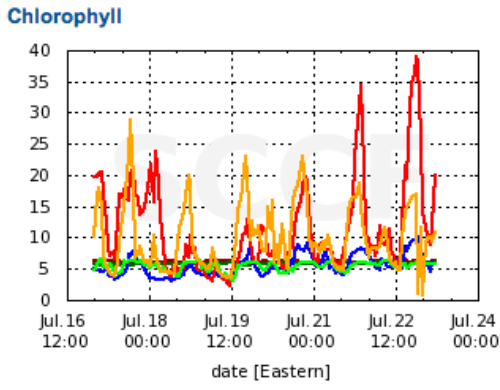
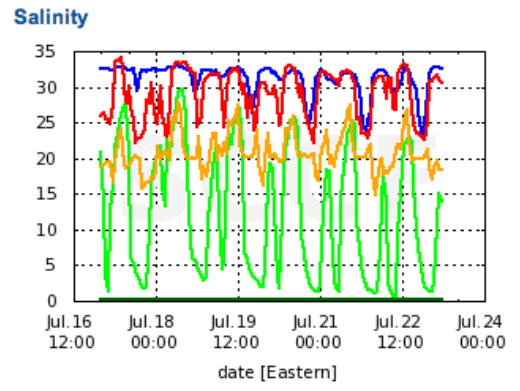
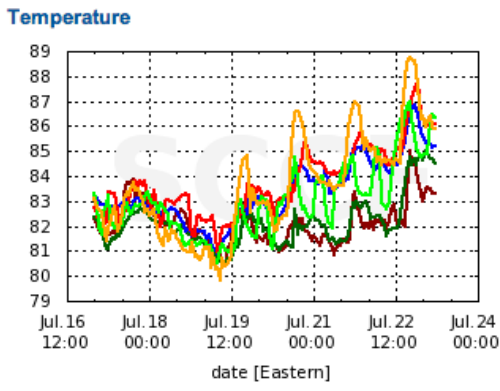
Sanibel-Captiva Conservation Foundation
River, Estuary and Coastal Observing Network

- [Home](#)
- [Water Quality](#)
- [Weather](#)
- [Feeds](#)
- [Definitions](#)
- [About](#)
- [Sponsors](#)

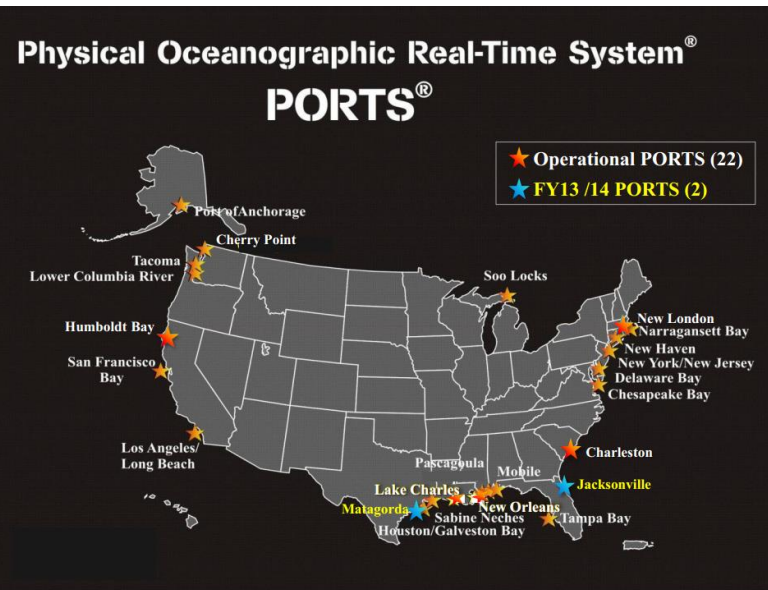


- Sites**
- | | |
|---|--|
| — Beautiful Island | — Redfish Pass |
| — Blind Pass | — Shell Point |
| — Fort Myers | — Tarpon Bay |
| — Gulf of Mexico | All Sites |

Roll over any RECON map icon or site name to see graphs of recent sensor measurements from that location.



NO CASO DE ESTUÁRIOS, UM EXEMPLO É O PORTS®. HÁ TAMBÉM O CBO, O LEO-15 E OUTROS



PORTS® IÉ UMA PARCERIA ENTRE NOAA E A COMUNIDADE MARÍTIMA LOCAL.

PORTS® É UMA FRERRAMENTA PARA APOIAR DECISÕES QUE INTEGRA E DISSEMINA OBSERVAÇÕES AMBIENTAIS, PREVISÕES E INFORMAÇÕES GEOESPACIAIS EM TEMPO REAL. O OBJETIVO É A SEGURANÇA À NAVEGAÇÃO

[HTTP://AAPA.FILES.CMS-PLUS.COM/PHYSICAL%20OCEANOGRAPHIC%20REAL-TIME%20SYSTEM%20\(PORTS%C2%AE\)](http://aapa.files.cms-plus.com/Physical%20Oceanographic%20Real-Time%20System%20(PORTS%C2%AE))

PARCEIROS

- AUTORIDADE PORTUÁRIA
- AGÊNCIAS ESTATAIS
- PRATICAGENS
- MARINHA
- CORPO DE ENGENHEIROS DO - EXÉRCITO
- COMPANHIAS DE PETRÓLEO
- INDÚSTRIA
- ACADEMIA

FONTES DE RECURSOS

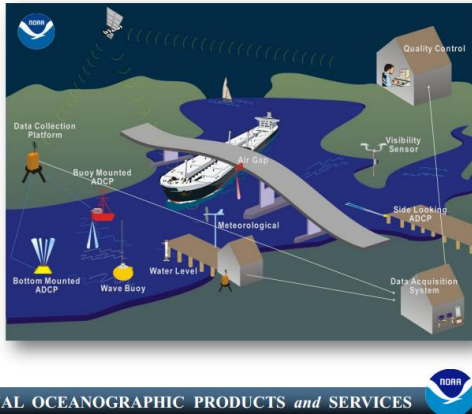
- AUTORIDADE PORTUÁRIA
- TAXAS LOCAIS
- AGÊNCIAS ESTATAIS
- GOVERNO FEDERAL
- SETOR PRIVADO

DADOS MEDIDOS

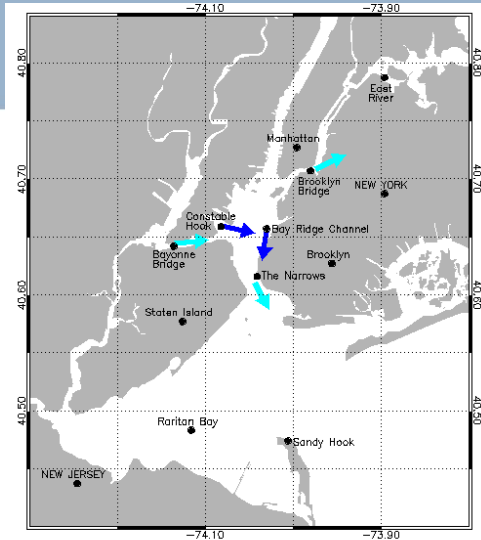
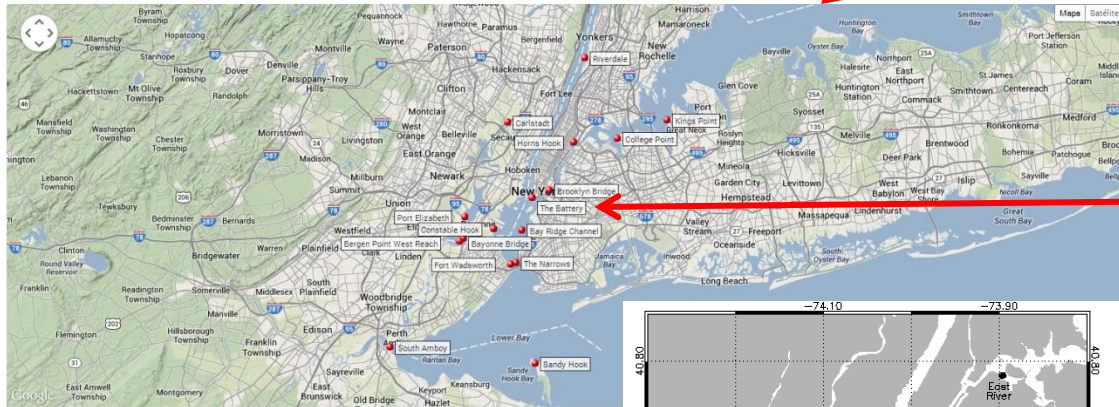
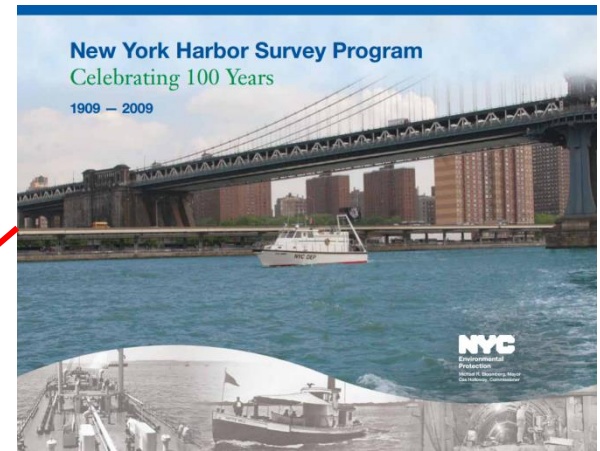
- NÍVEL DAS ÁGUAS
- CORRENTES
- SALINIDADE
- VÃO LIVRE DE PONTES
- PARÂMETROS METEOROLÓGICOS
- VISIBILIDADE
- ONDAS

Measures and disseminates observations and predictions

- Water levels
- Currents
- Salinity
- Air gap
- Meteorological parameters
- Visibility
- Waves

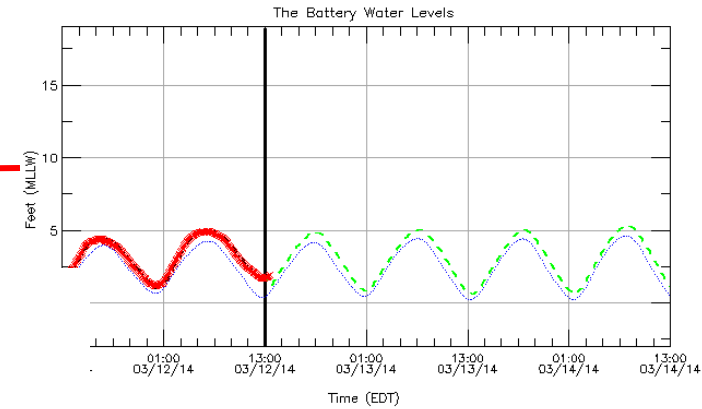


NOAA's CENTER for OPERATIONAL OCEANOGRAPHIC PRODUCTS and SERVICES



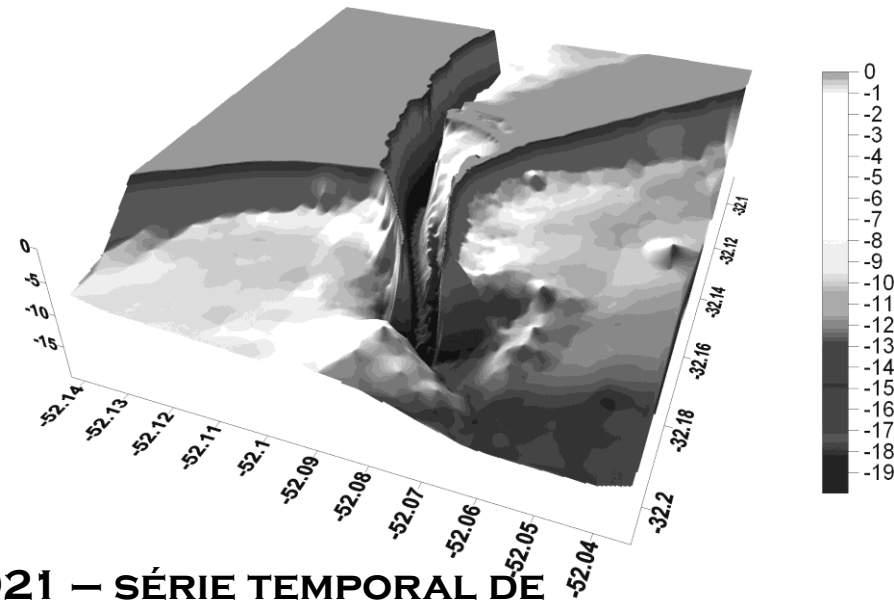
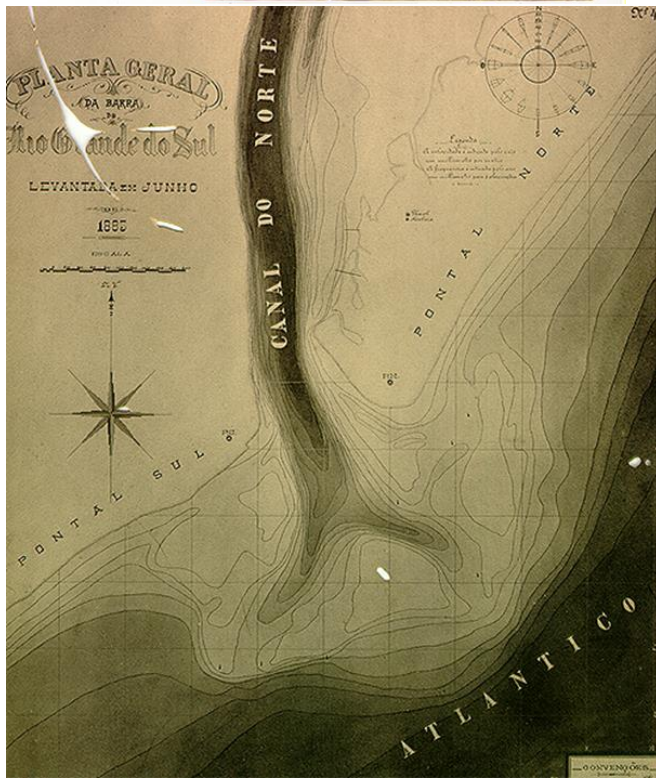
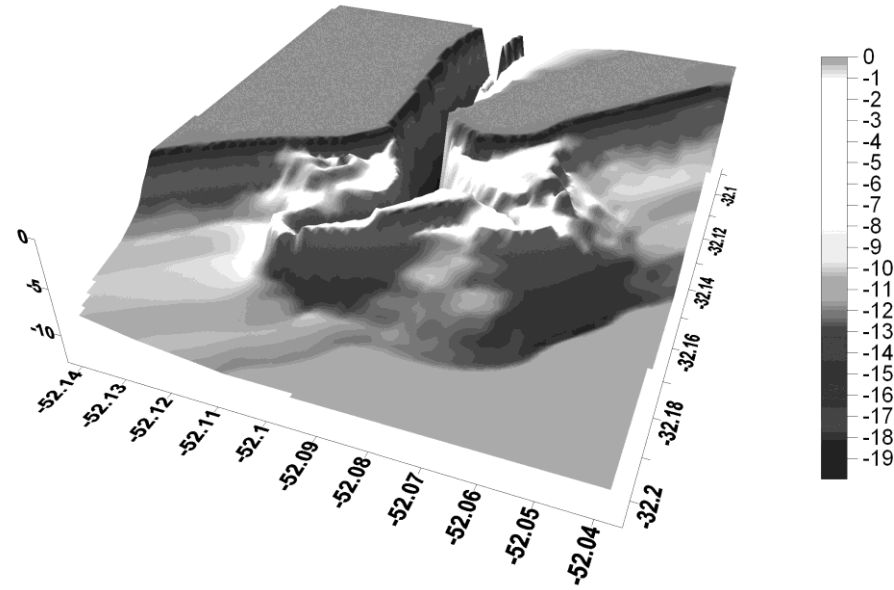
NOAA/National Ocean Service
New York Harbor Operational
Forecast System (NYOFS)

Observation: x
Tidal Prediction: -
Nowcast: -
Forecast Guidance: -



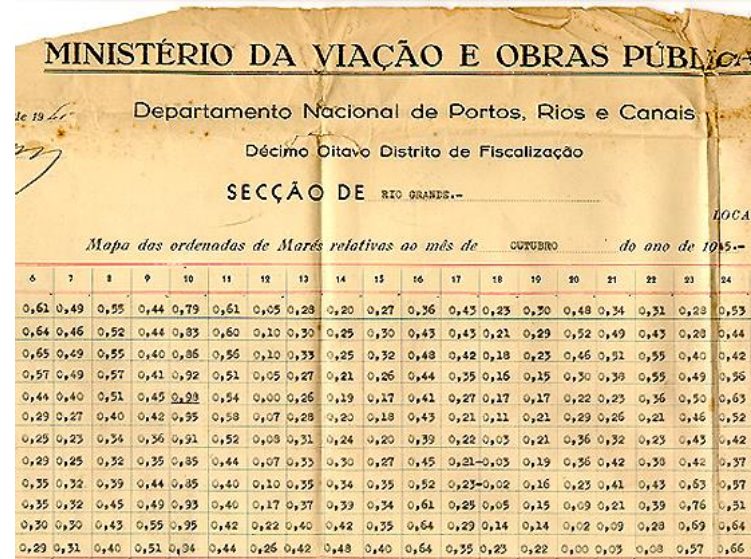
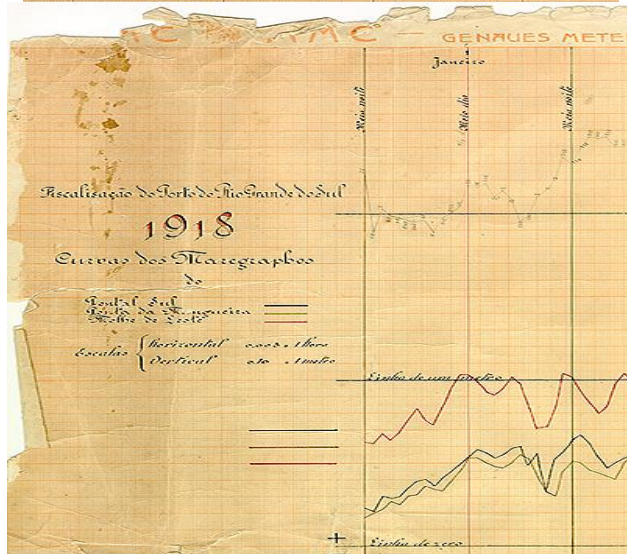
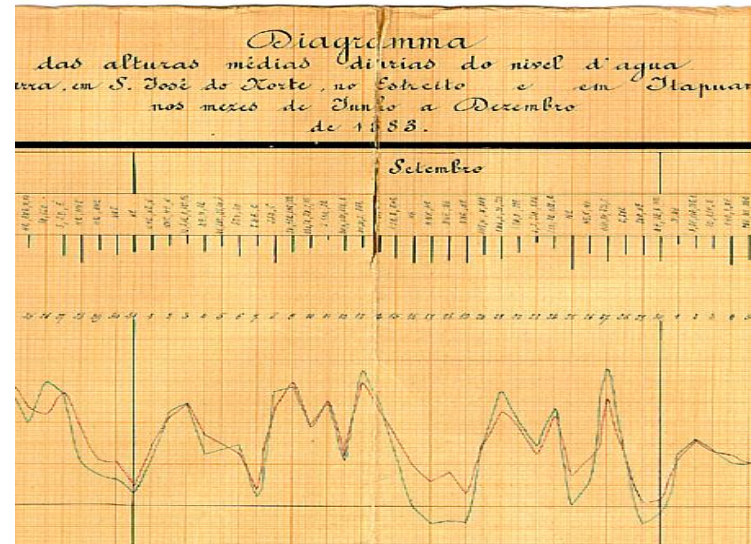
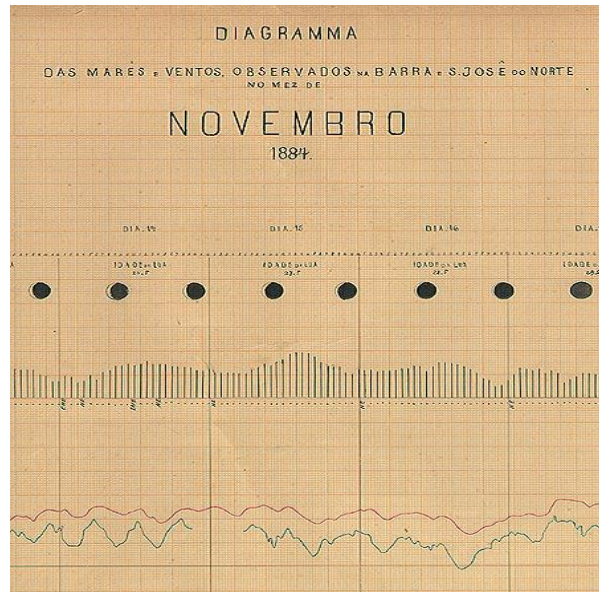
- Current Knots
- < 0.3 →
 - 0.3 - 0.6 →
 - 0.6 - 1.0 →
 - 1.0 - 1.3 →
 - 1.3 - 1.6 →
 - 1.6 - 2.0 →
 - >= 2.0 →

Valid at 0900 (EDT) 03/13/14

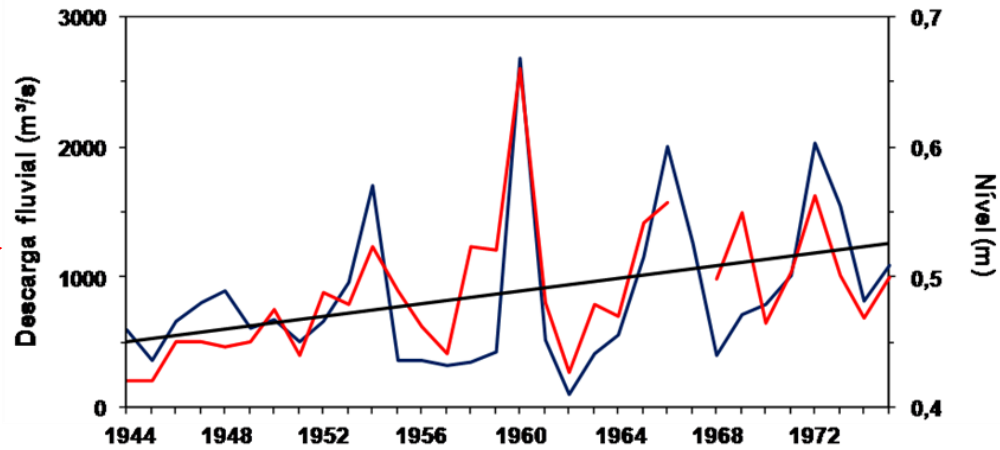
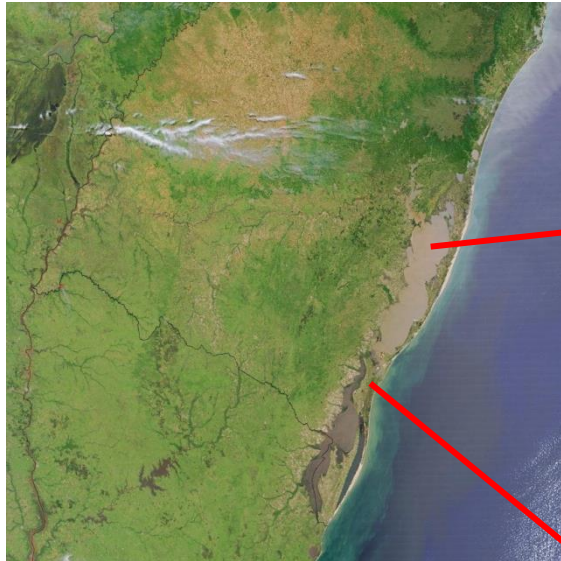


DE 1883 A 1921 – SÉRIE TEMPORAL DE BATIMETRIA – ANTES, DURANTE E APÓS A CONCLUSÃO DOS MOLHES

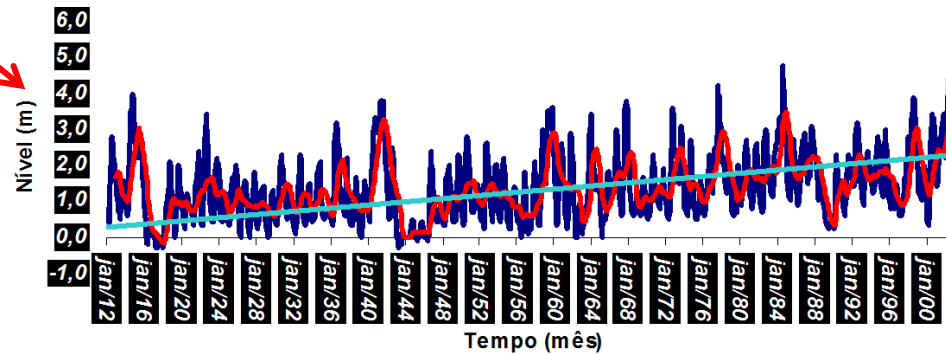
DE 1883 A 1975 – NÍVEL DAS ÁGUAS EM DADOS HORÁRIOS, POR VEZES EM TRÊS PONTOS



RECUPERAÇÃO DE DADOS HISTÓRICOS



MÖLLER E FERNANDES, 2010



HIRATA ET AL., 2010

TENDÊNCIA DE AUMENTO DE NÍVEL

LAGOA MIRIM - 1,6 CM/ANO

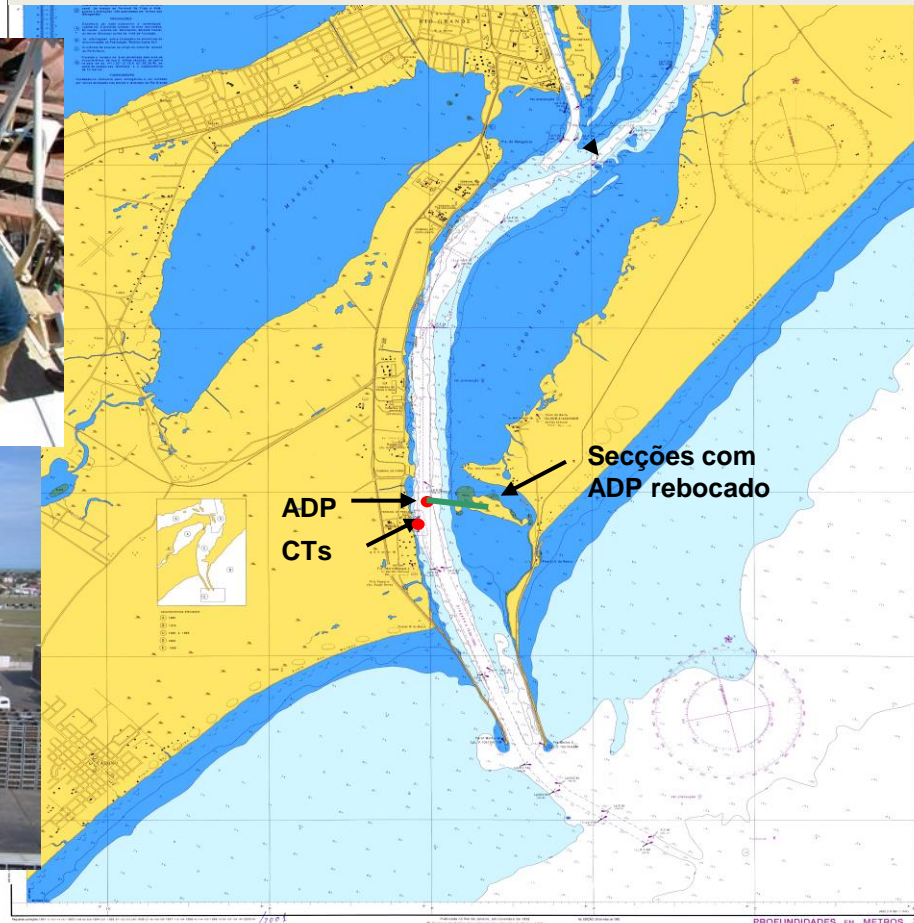
LAGOA DOS PATOS – 2,5 MM/ANO

LOCOSTE – MONITORAMENTO E MODELAGEM

ADP Sontek fundeado de Aug. 2005 a Dez. 2012 - dados horários em **tempo real** de nível e correntes em vários níveis. Interrupções em 2009 e 2012 por dragagem. Panes.

2 CTs Seabird 37SM desde Out. 2003

Secções com ADP *bottom tracking*



MANTIDO COM:

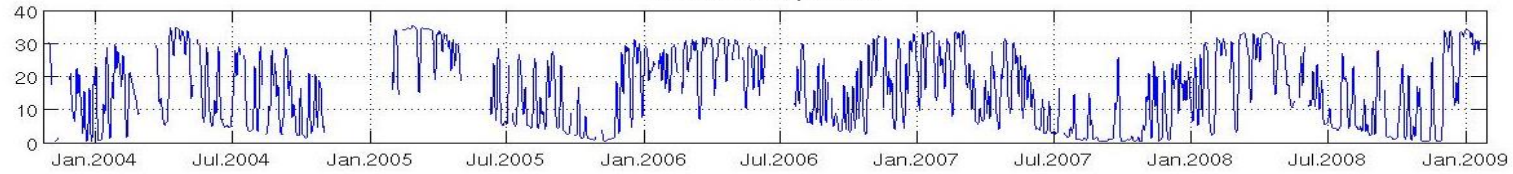
- PROJETOS
- PELD/CNPQ
- FINEP
- PRESTAÇÃO DE SERVIÇOS
- PARCERIAS-PRATICAGEM

**DADOS SERÃO
DISPONIBILIZADOS NO
SIMCOSTA**

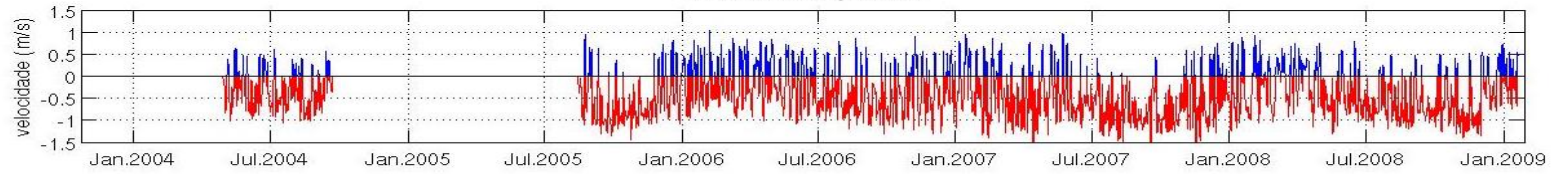
Temperatura Superficial



Salinidade Superficial



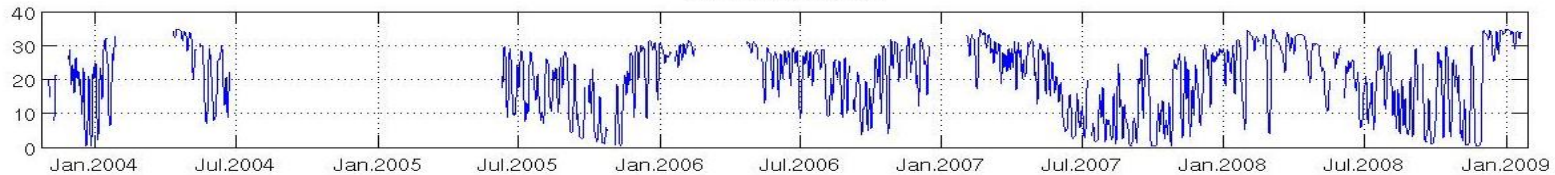
Velocidade Superficial



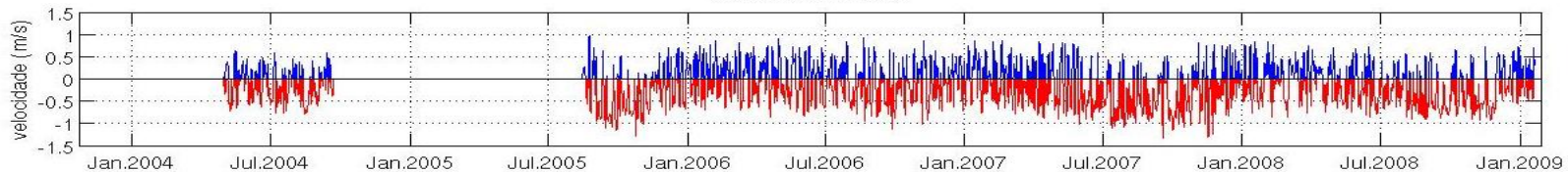
Temperatura Fundo



Salinidade Fundo

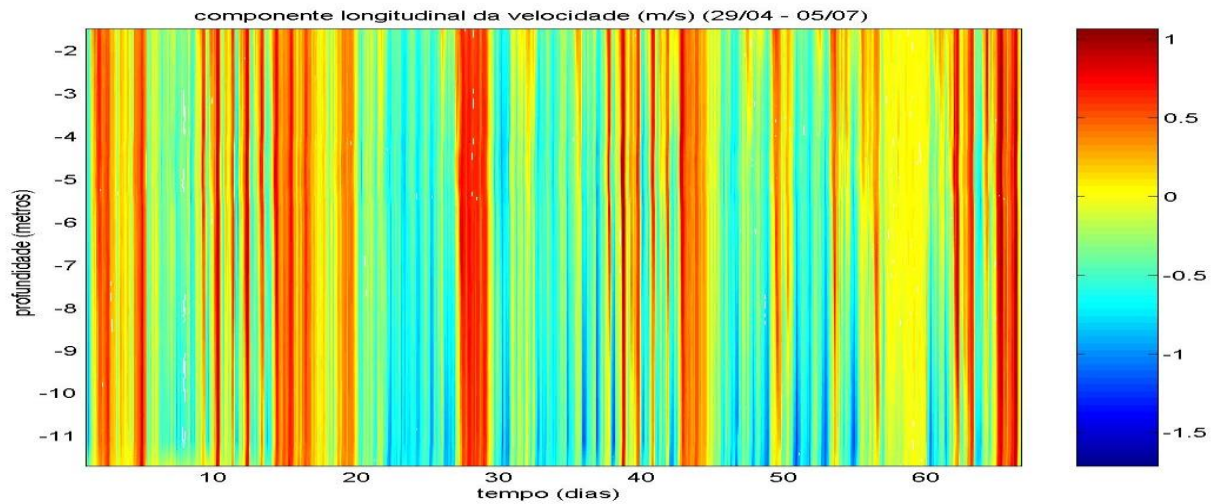
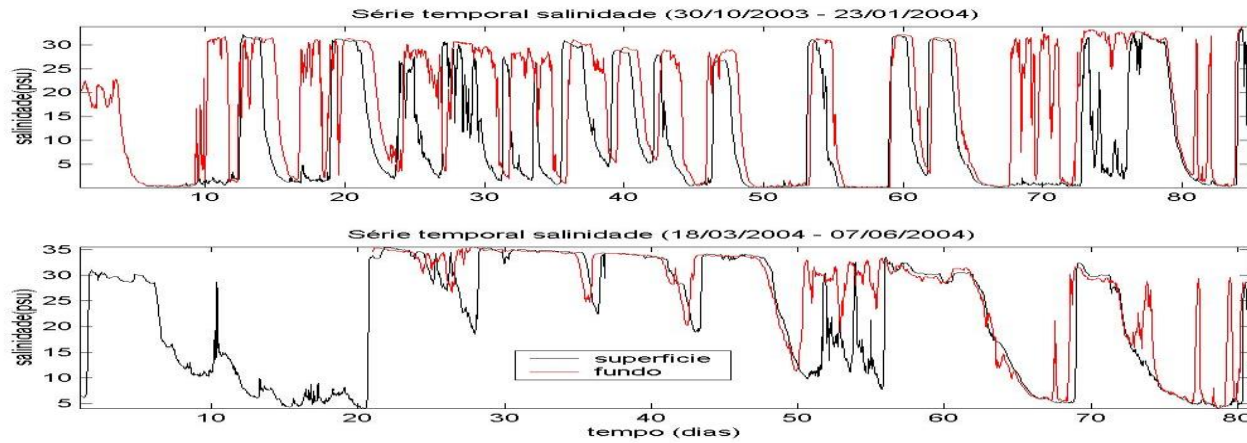


Velocidade Fundo



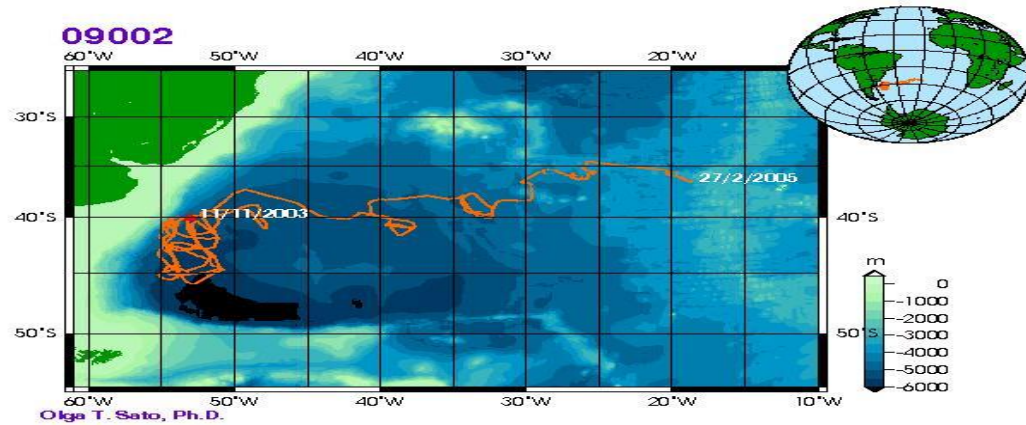
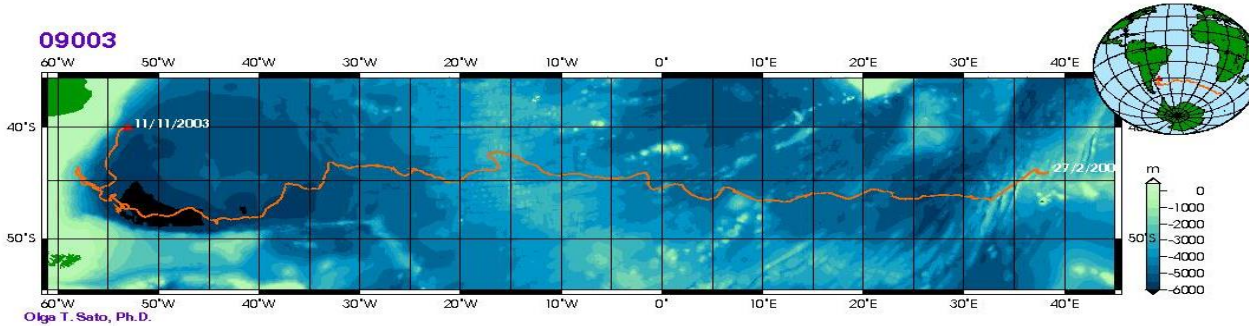
Oceanografia Física

Séries temporais

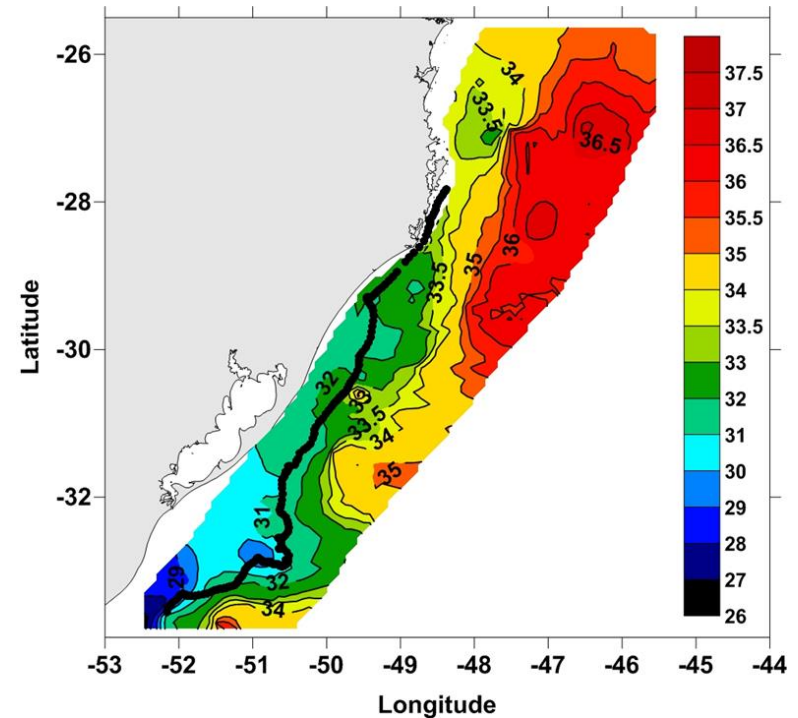
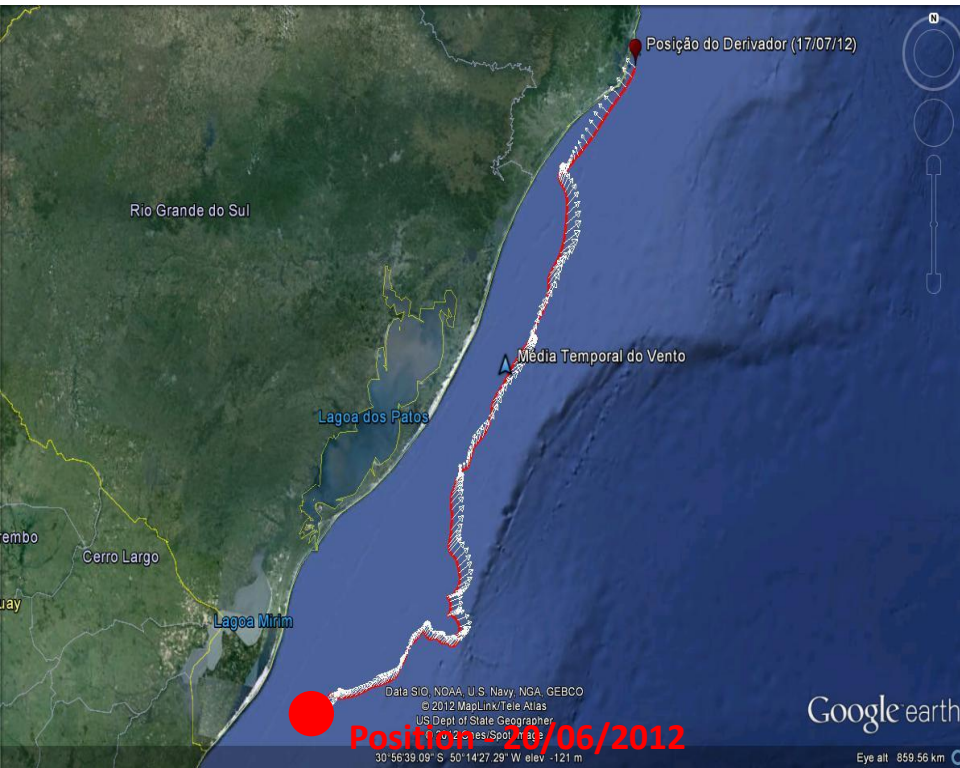


Oceanografia Física

Derivadores

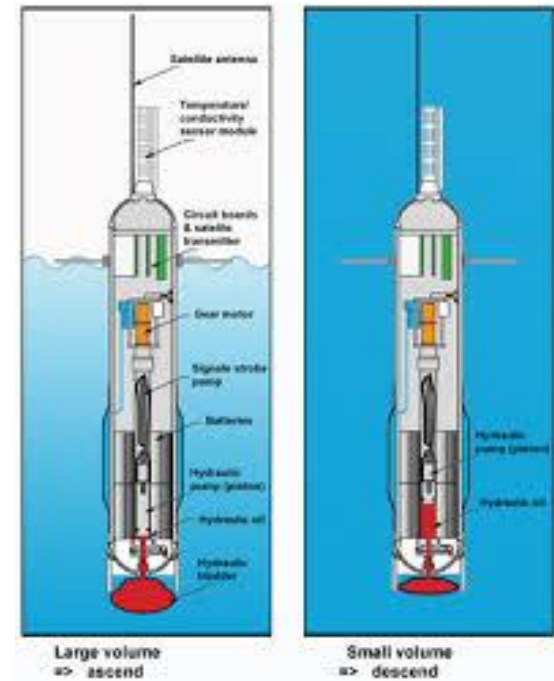
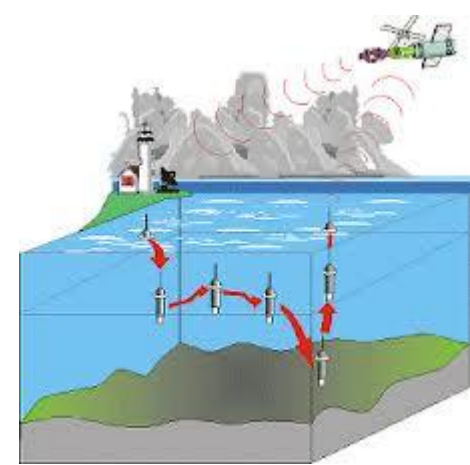
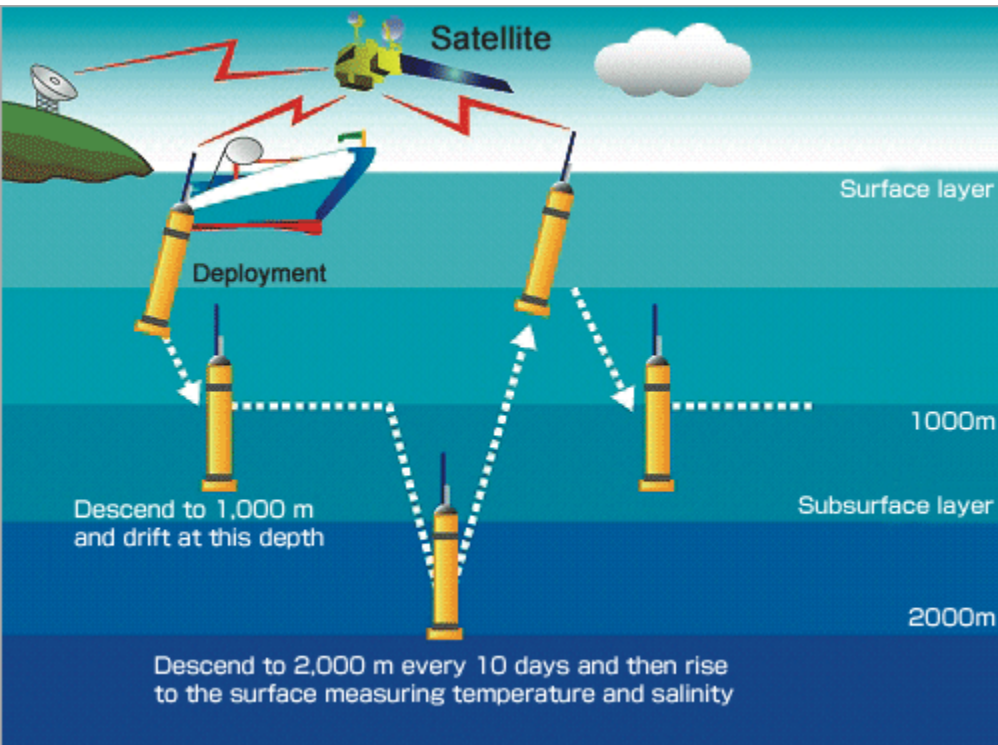


DERIVADOR DE BAIXO CUSTO (LCD) LANÇADO EM 20/06/2012 - ~0.3 M/S

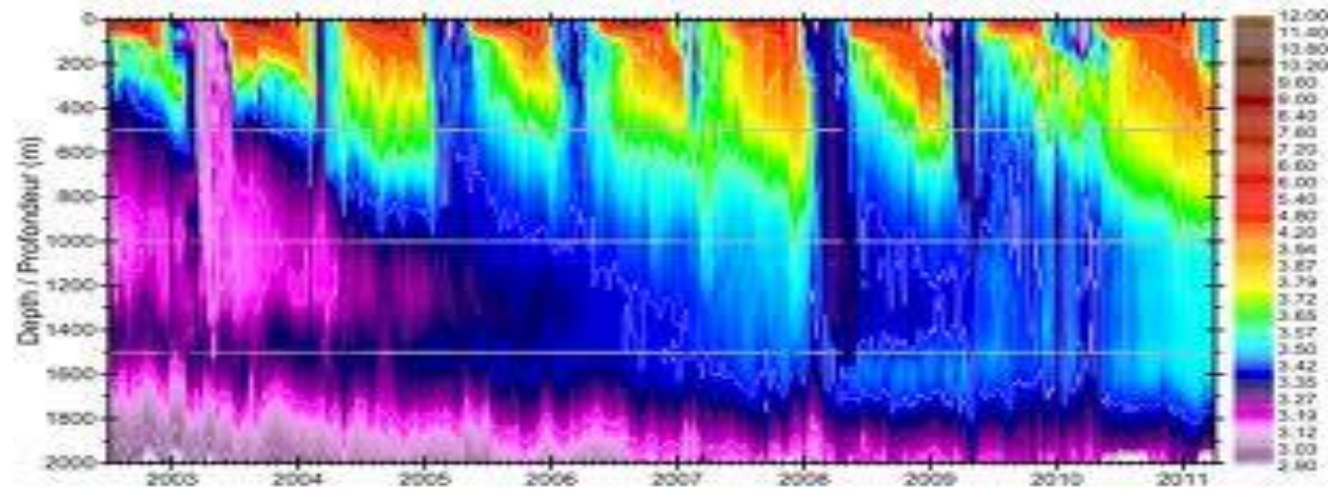
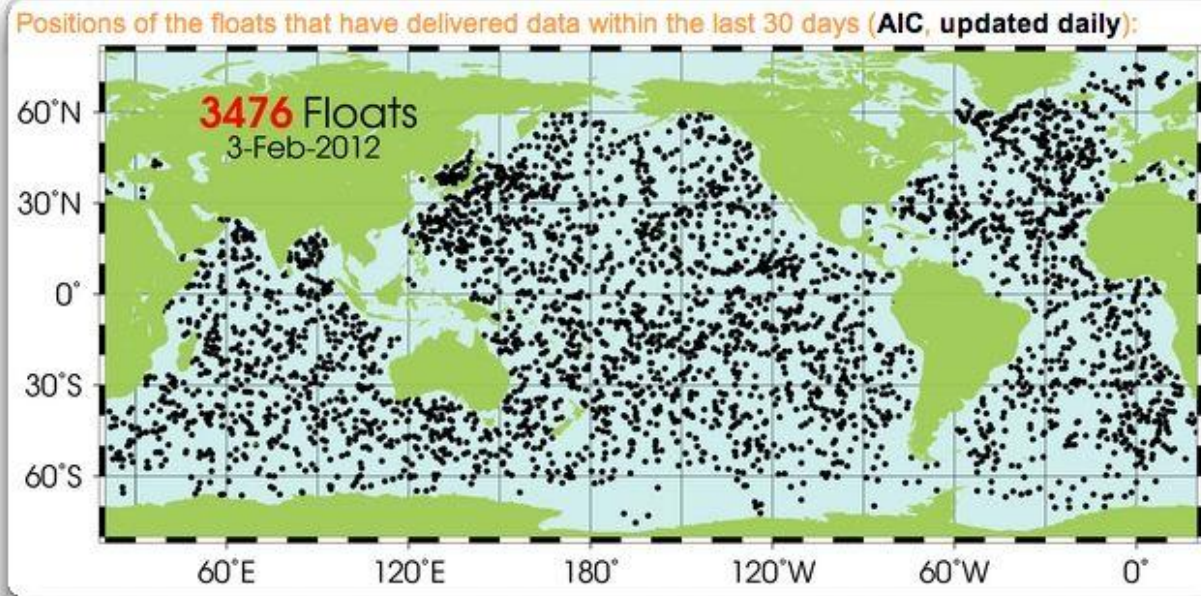
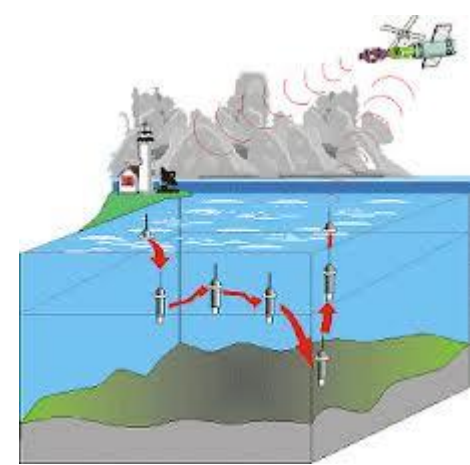


MESMO VENTOS FORTES DE NE NÃO ERAM CAPAZES DE REVERTER O DESLOCAMENTO PARA O NORTE DO LCD. A CAUSA: FLUXO PARA O NORTE DEVIDO AO GRADIENTE DE PRESSÃO FORMADO PELA PRESENÇA DE ÁGUAS DE BAIXA SALINIDADE E TEMPERATURA DERIVADAS DO RIO DA PRATA

Flutuadores ARGO



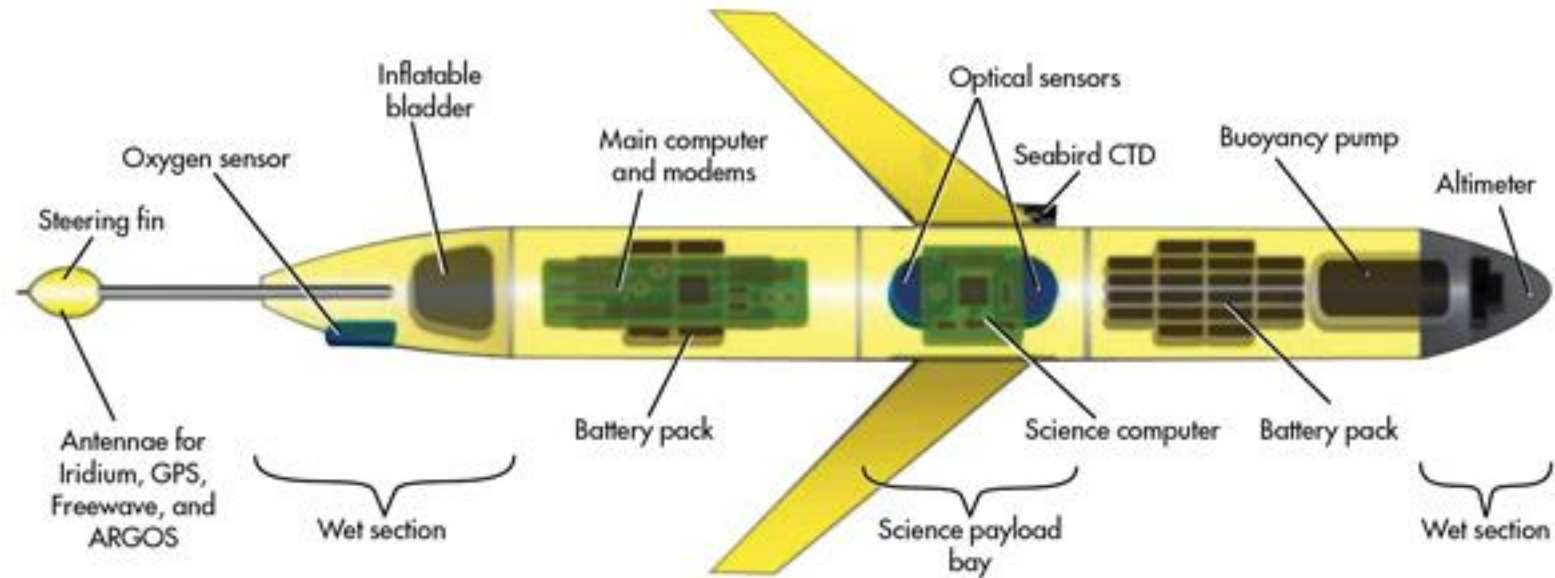
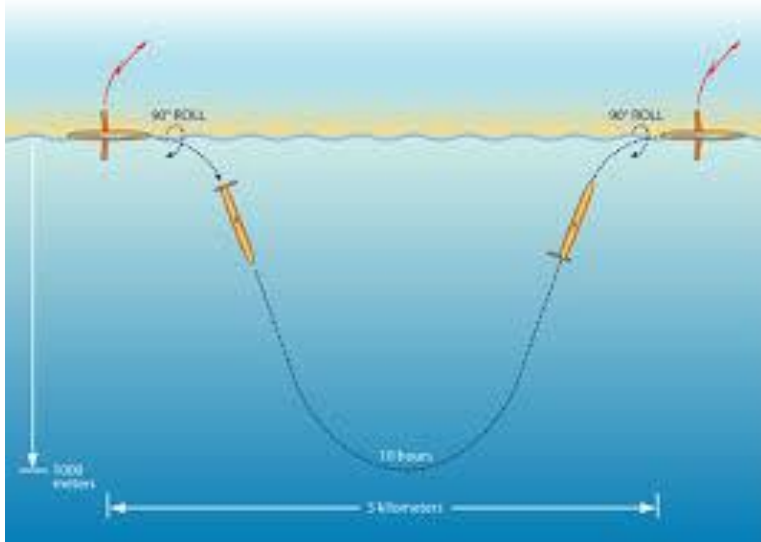
Flutuadores ARGO



GLIDERS



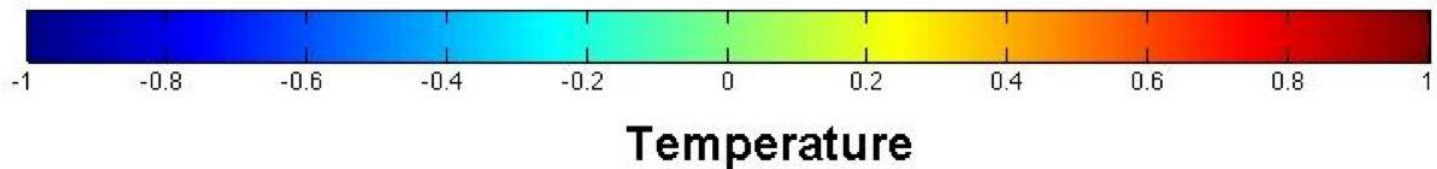
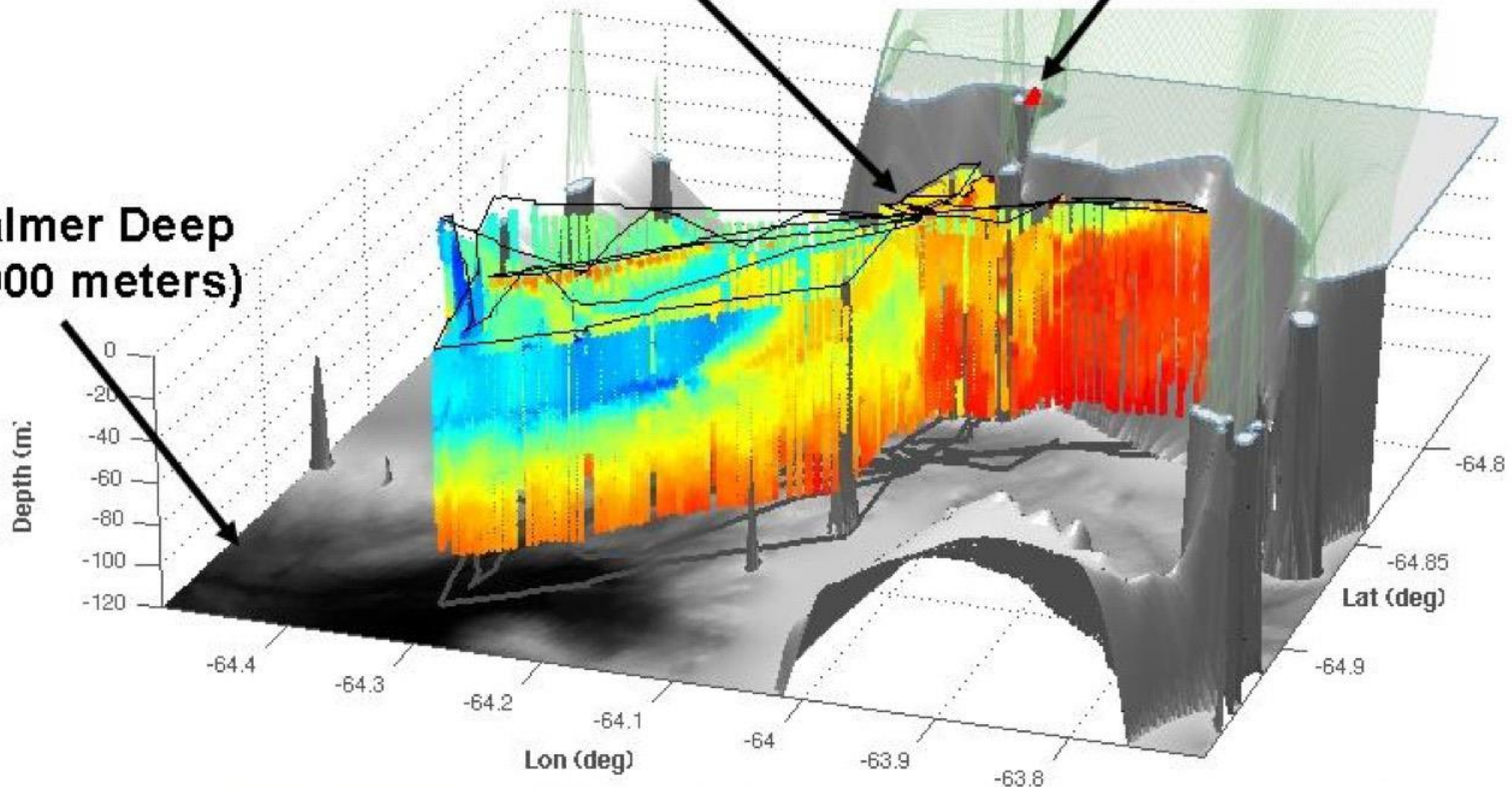
**SISTEMA MULTI-
SENSOR
FLUTUABILIDADE E
MOVIMENTO DE
LASTRO
CTD,
FLUORÍMETRO
TURBIDÍMETRO
OXÍMETRO
ADCP
CDOM
TRANSMISSÃO DE
DADO POR SATÉLITE**



Adélie Penguin colony

Palmer Station

Palmer Deep
(1000 meters)



Palmer Deep Glider Survey, December 2010

Oceanografia Física

Sensoriamento Remoto

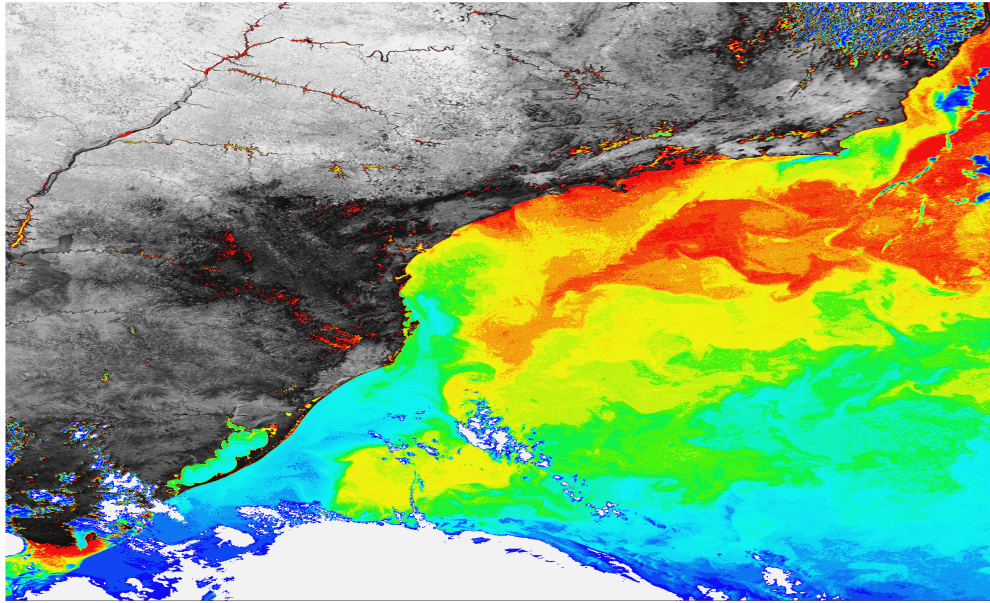
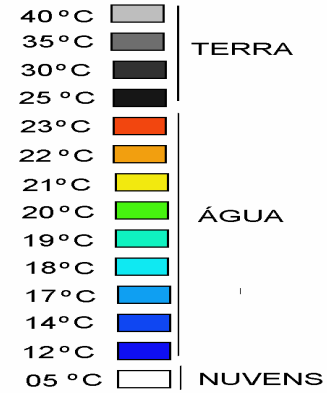


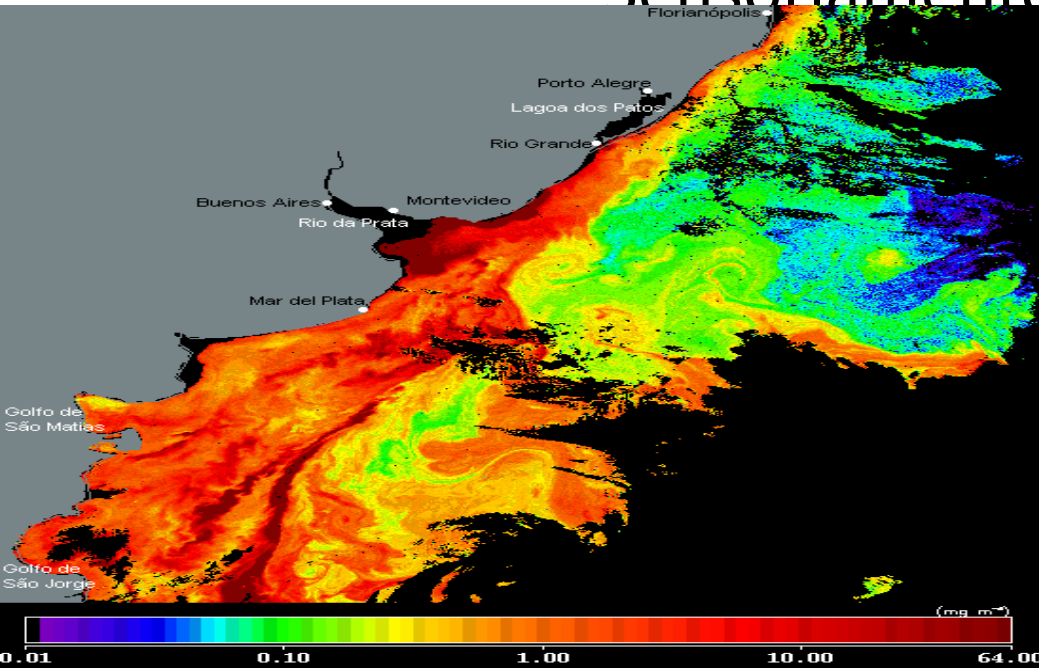
Imagem AVHRR/NOAA-14
18 AGO 1997 - 17:50 GMT

TEMPERATURAS



Oceanografia Física

Sensoriamento Remoto



Oceanografía Física

Modelagem Numérica

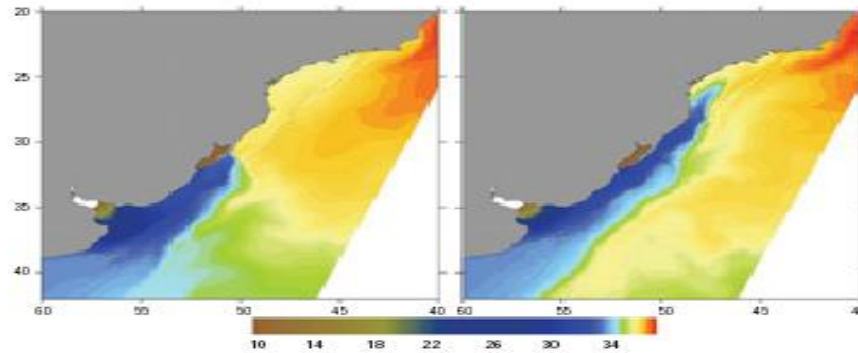


Figura 5. Salinidade de superfície simulada com o Princeton Ocean Model, para um caso do Rio de la Plata igual a 20.000m³/s e ventos típicos de esse tipo de evento (irregularidade y jelo biancha).

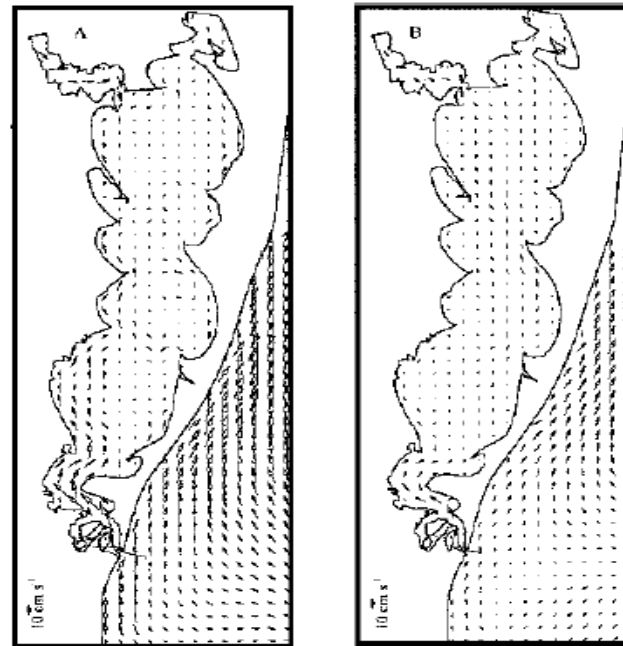


Fig. 14. Plot of surface (A) and bottom (B) currents obtained at hour 35 during a southwest wind event. The model was forced with data recorded between April 6 and 12, 1992.

Network 1 – Harbour environmental management



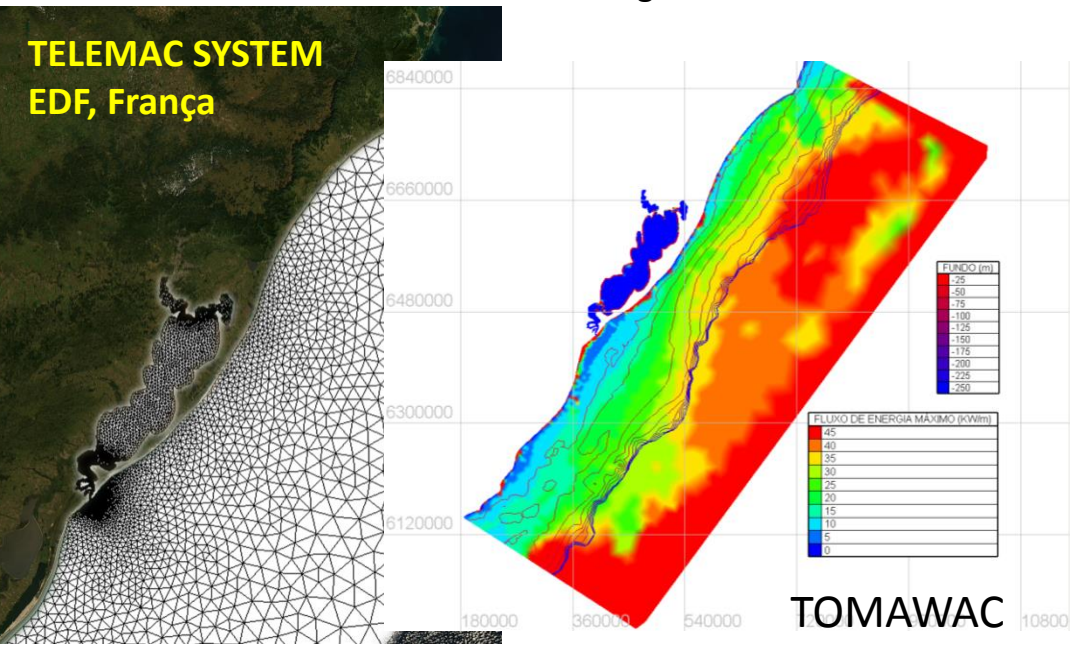
TRANSAQUA

Network 2 – Continuous monitoring

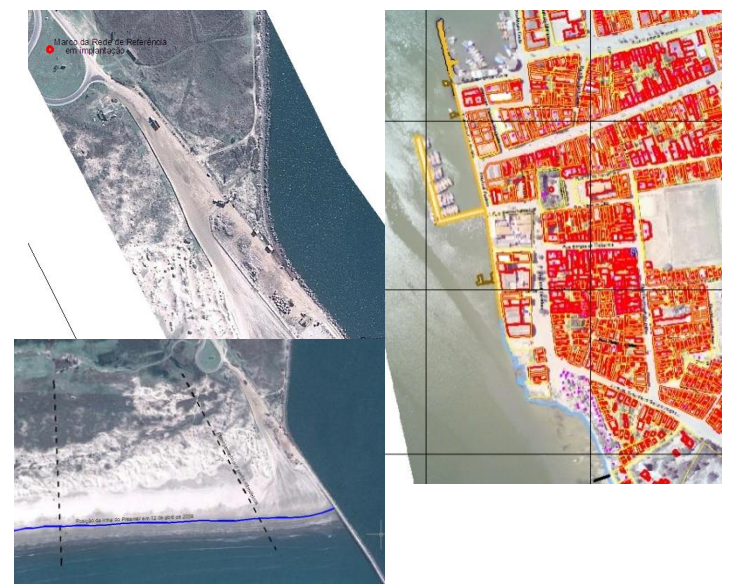


Net work 3 - Numerical modeling

TELMAC SYSTEM EDF, França



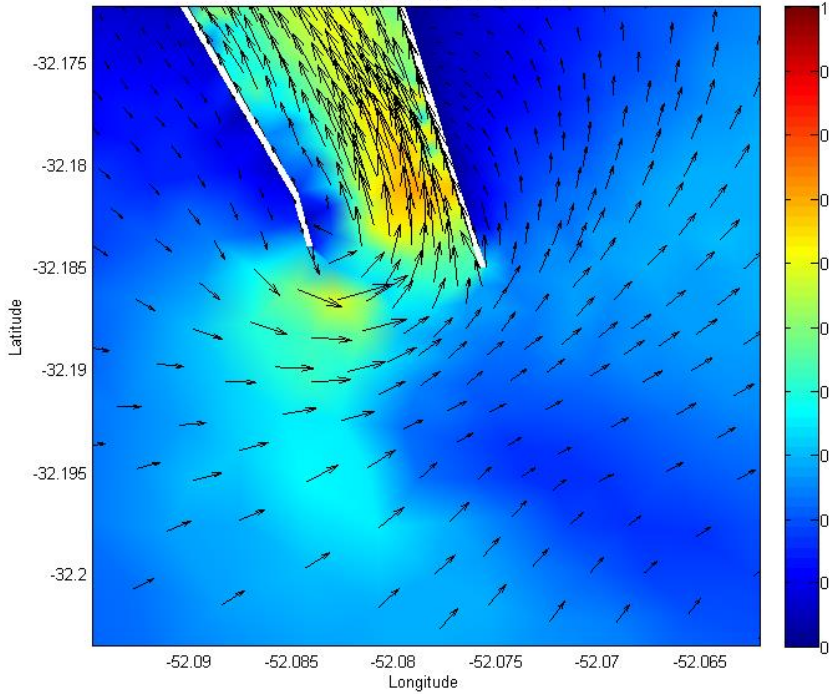
Network 4 - GIS



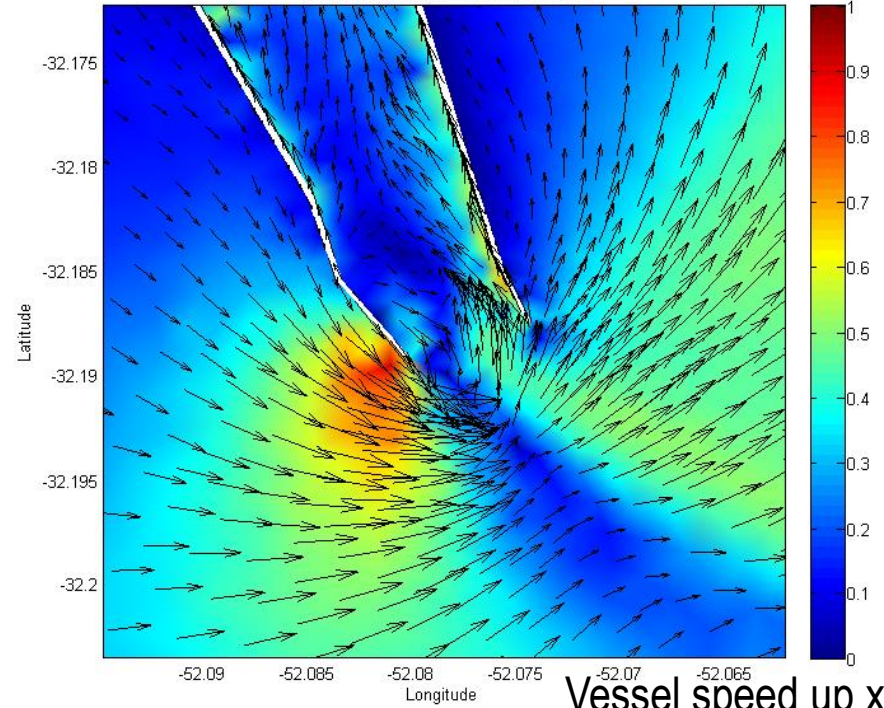
Results

Current velocity at the surface - Flood event

VELOCIDADE SUPERFÍCIE (C. Antigo)



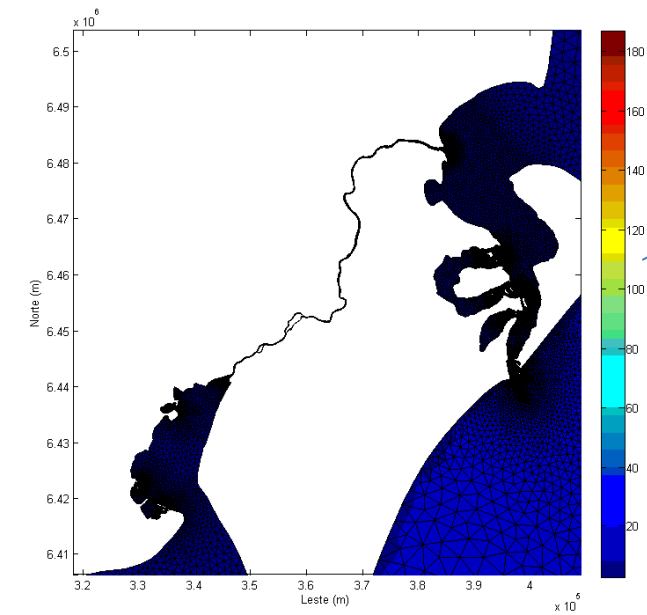
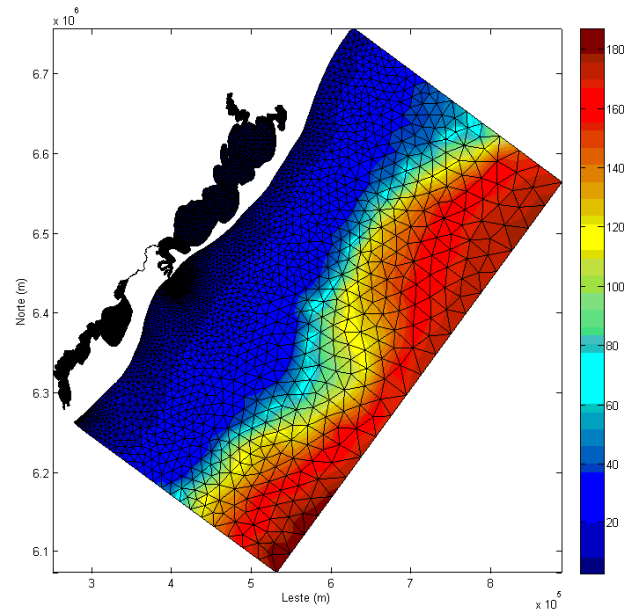
VELOCIDADE SUPERFÍCIE (C. Atual)



Vessel speed up x UKC

ALÉM DA PARTE CIENTÍFICA, DADOS TAMBÉM SÃO USADOS PARA CALIBRAR E VALIDAR MODELOS NUMÉRICOS APLICADOS EM:

- A) OBJETIVOS CIENTÍFICOS**
- B) ESTUDOS DE IMPACTOS AMBIENTAIS**
- C) SIMULADOR VIRTUAL PARA TREINAMENTO DE PRÁTICOS EM SITUAÇÕES CRÍTICAS**



EM IMPLANTAÇÃO PELO LOCOSTE: RADAR EM PARCERIA COM A IACIT – SCT- RS – APROVADA A SEGUNDA ETAPA PARA INSTALAÇÃO DO SEGUNDO GRUPO

