Lições Aprendidas no Desenvolvimento da Boia Meteoceanografica Nacional (BMO-BR)

Lessons Learned from the Development of a Brazilian Metocean Buoy (BMO-BR)

Partners:

PETROBRAS Research Centre

UFRJ (COPPE/PENO/LIOc)

HOLOS Brasil Ltda.

NAVCON (Navegação e Controle Ltda.)

AMBIDADOS (Soluções em Monitoramento Ambiental Ltda.)

Overview

1. Introduction;
2. Development Phases;
3. Results so far;
4. Lessons learned;
5. Concluding remarks.

What exactly is BMO-BR?

- Buoy-based metocean multi-parameter measuring system;
- Internal data processing & storage payload;
- Two-way satellite data transmission, Wi-Fi, BT;
- Entirely built (hull) and integrated by local (Brazil) suppliers;

BMO-BR as a R&D Project

"New Technology and Innovation in Sensors and Metocean Sampling"

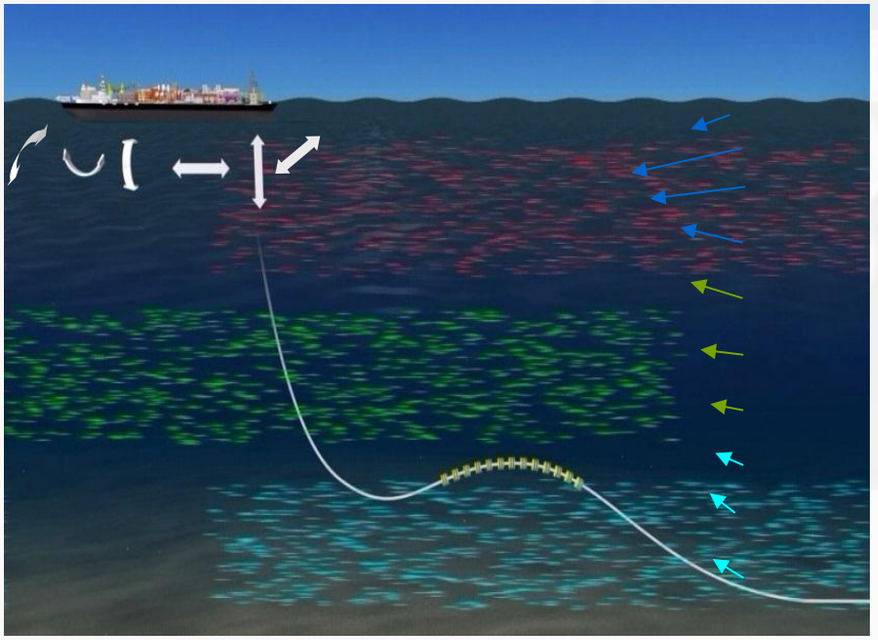
Kick-off: 2009 (but planned since 2006);

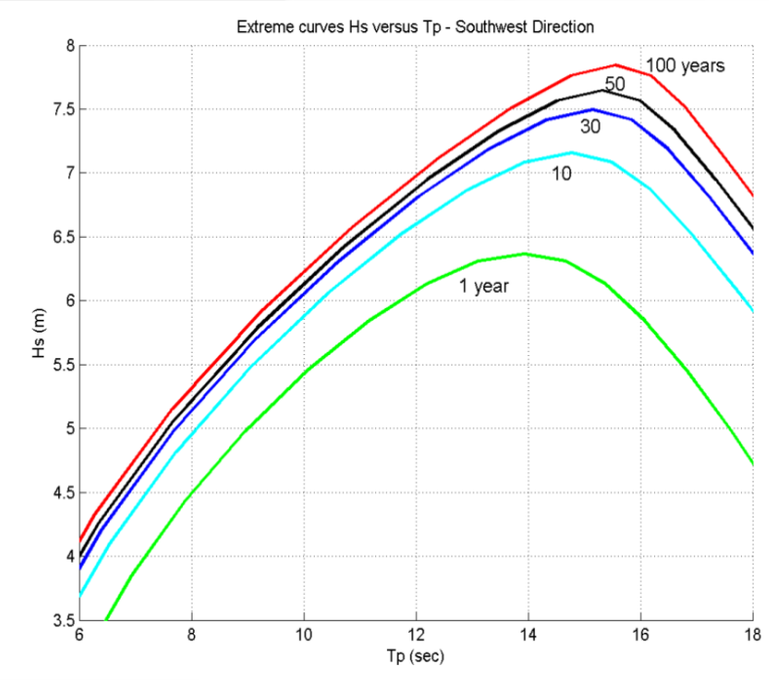
Objective: Develop a buoy system with local suppliers;

Deliverable: BMO-BR on TRL-8 (operational).

Introduction

What do offshore O&G Enterprises need ocean data for?



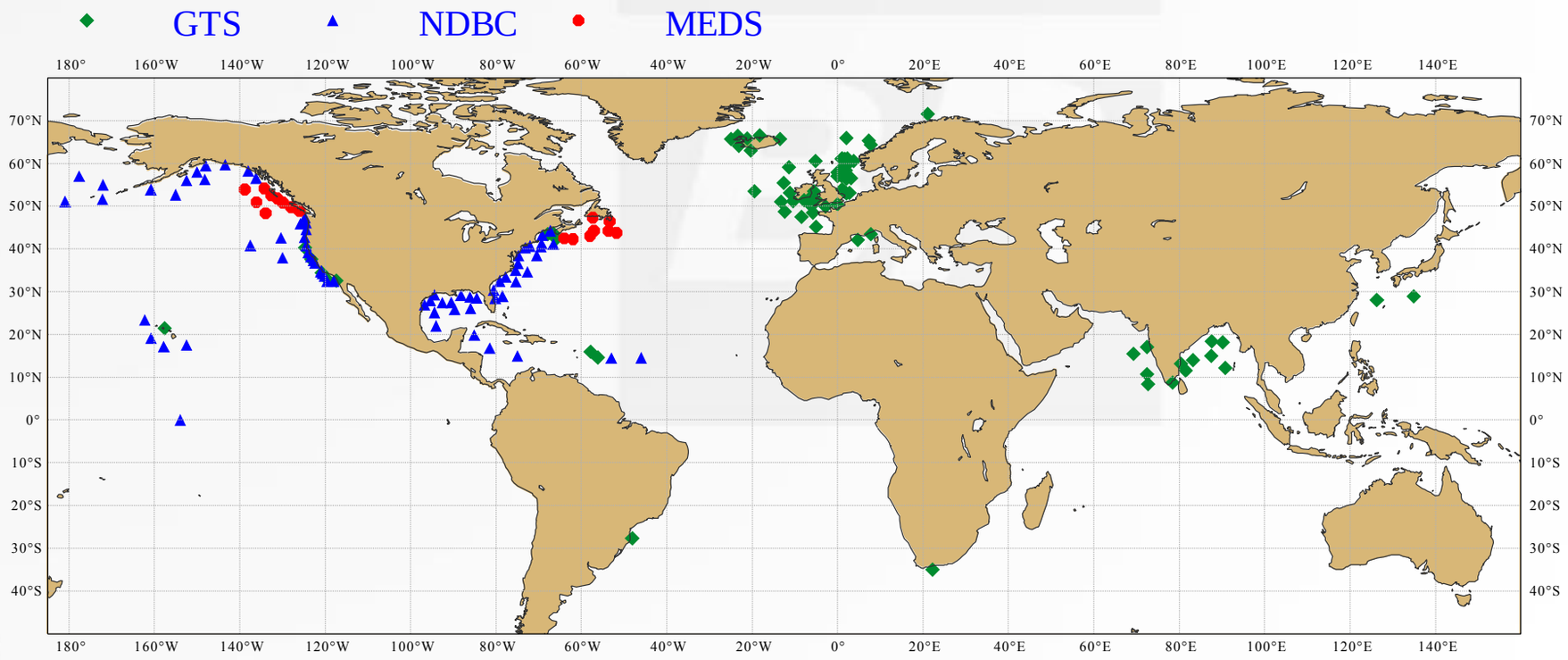


PETROBRAS experience with commercial systems

- High acquisition costs (Currency rates, transport, customs);
- High operational costs (logistics, commissioning, maintenance);
- High downtime rate (parts & technical assistance from abroad);
- Low flexibility, non-scalable proprietary systems;
- Data quality uncertainties;

Introduction

Motivation… (back in 2006)



Development Phases

Phase 1 (2009 - 2012)

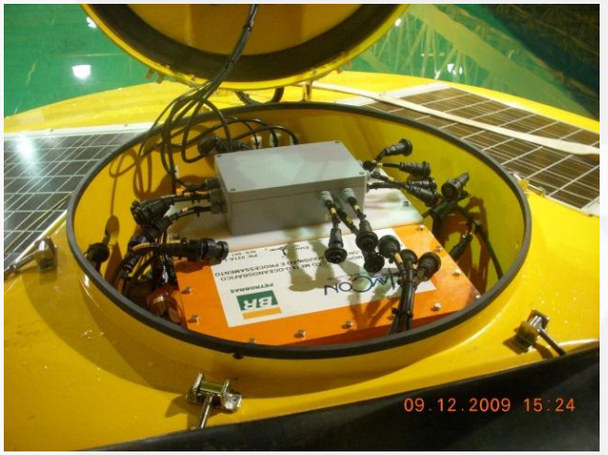
- Full Scale Prototype and and Environmental Test;
- System functions, performance and reliability;

Phase 2 (2013 - 2016)

- Pre-production System Test;
- Operational units w/ full interface in the intended environment;

Development Phases

Phase 1 (2009 - 2012)



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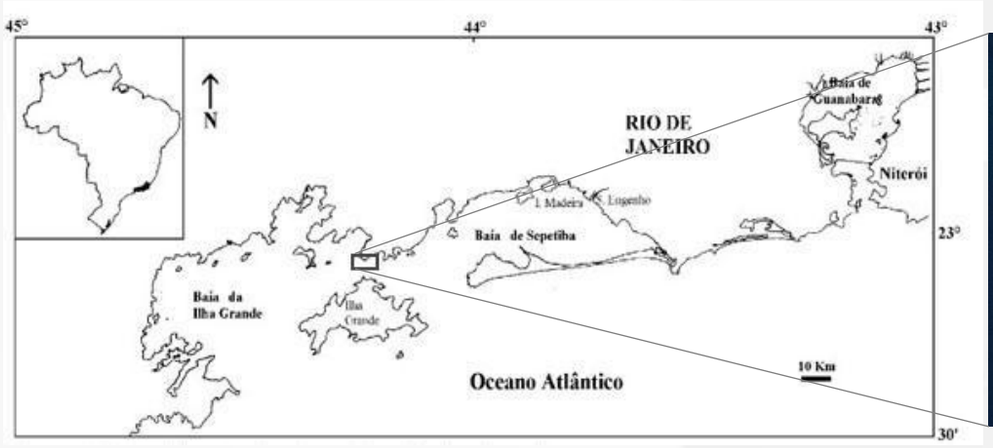

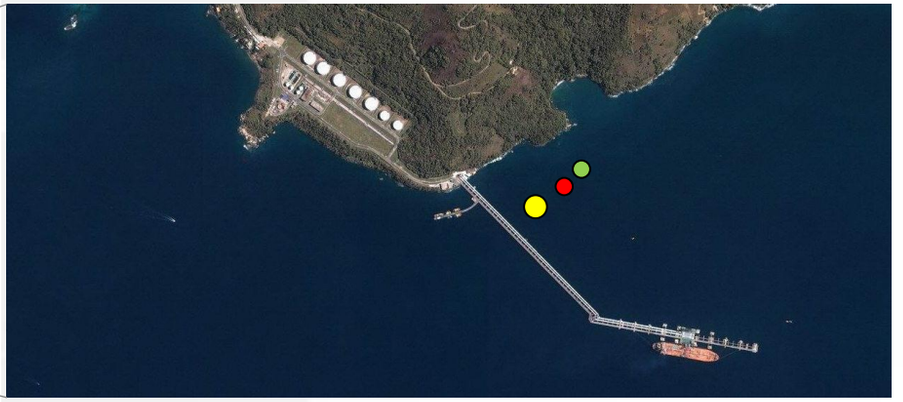

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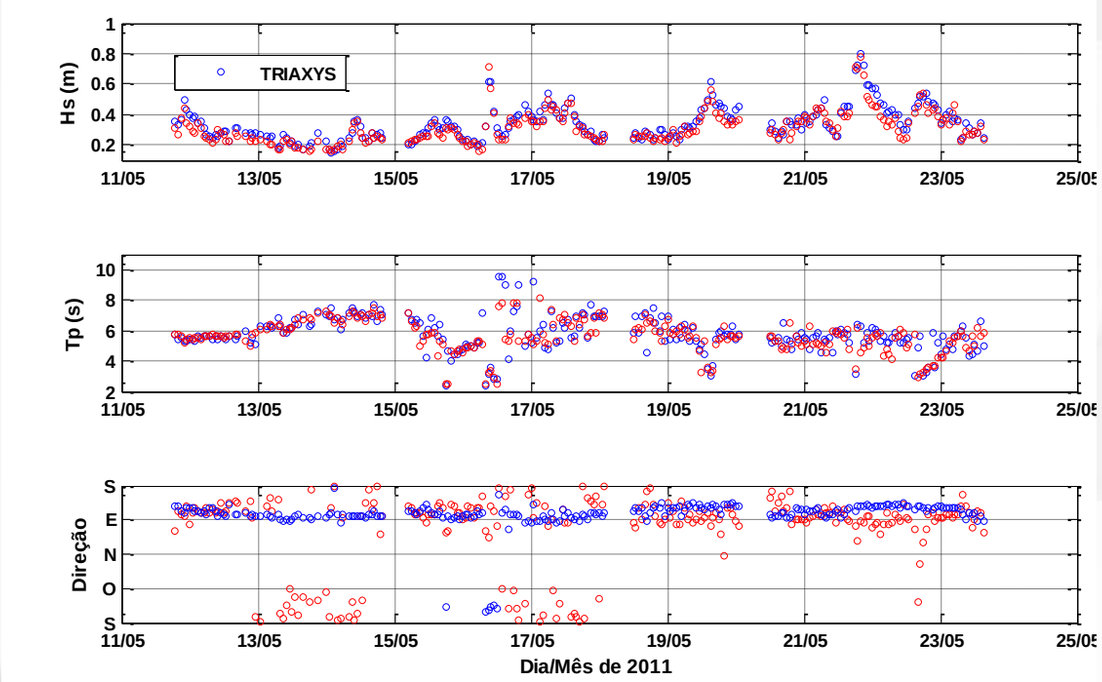

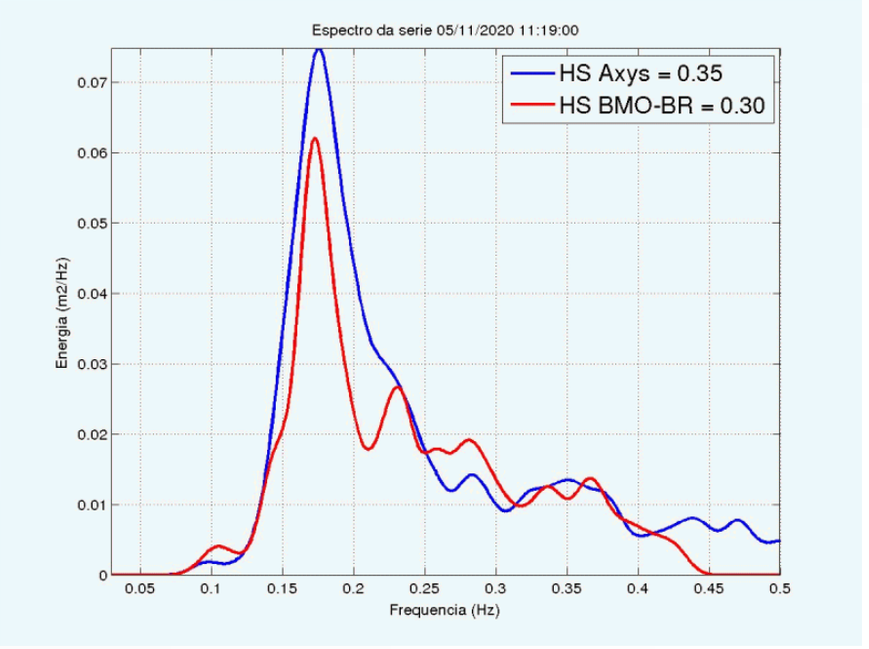

Development Phases

Phase 2 (2013 - 2016)

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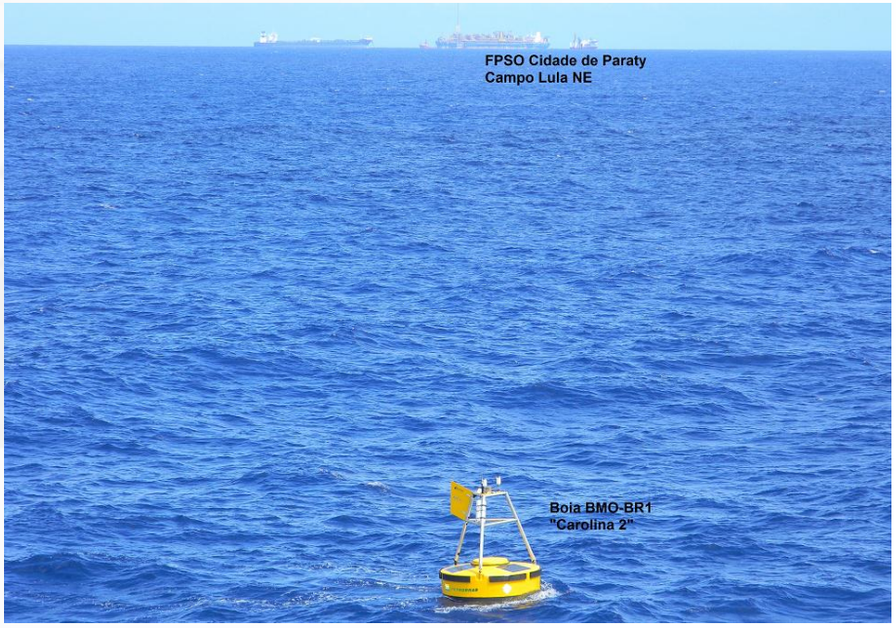

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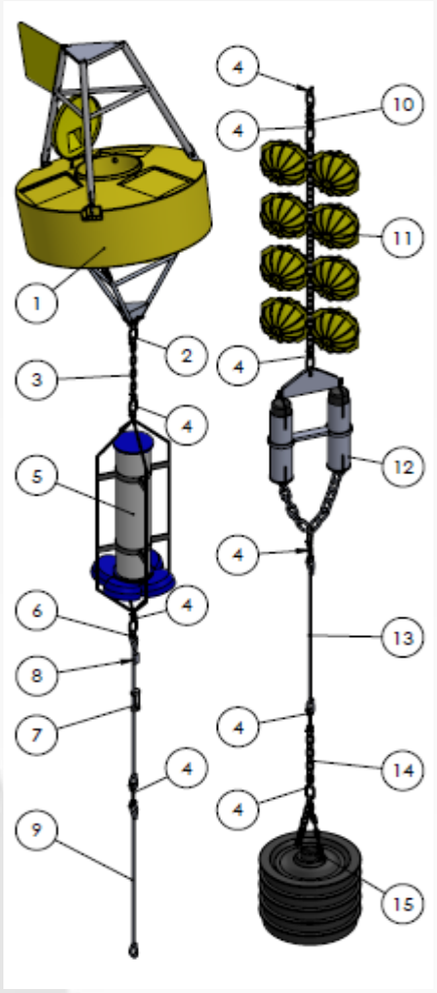
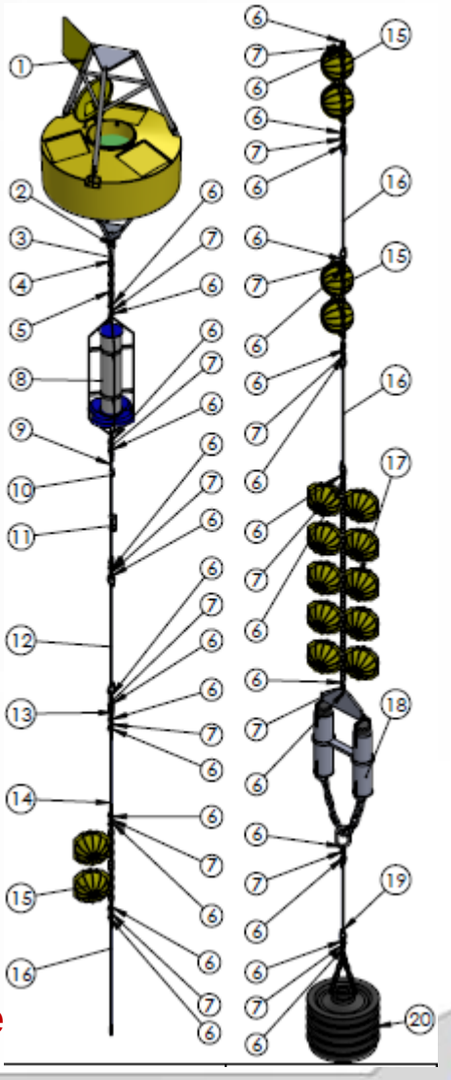


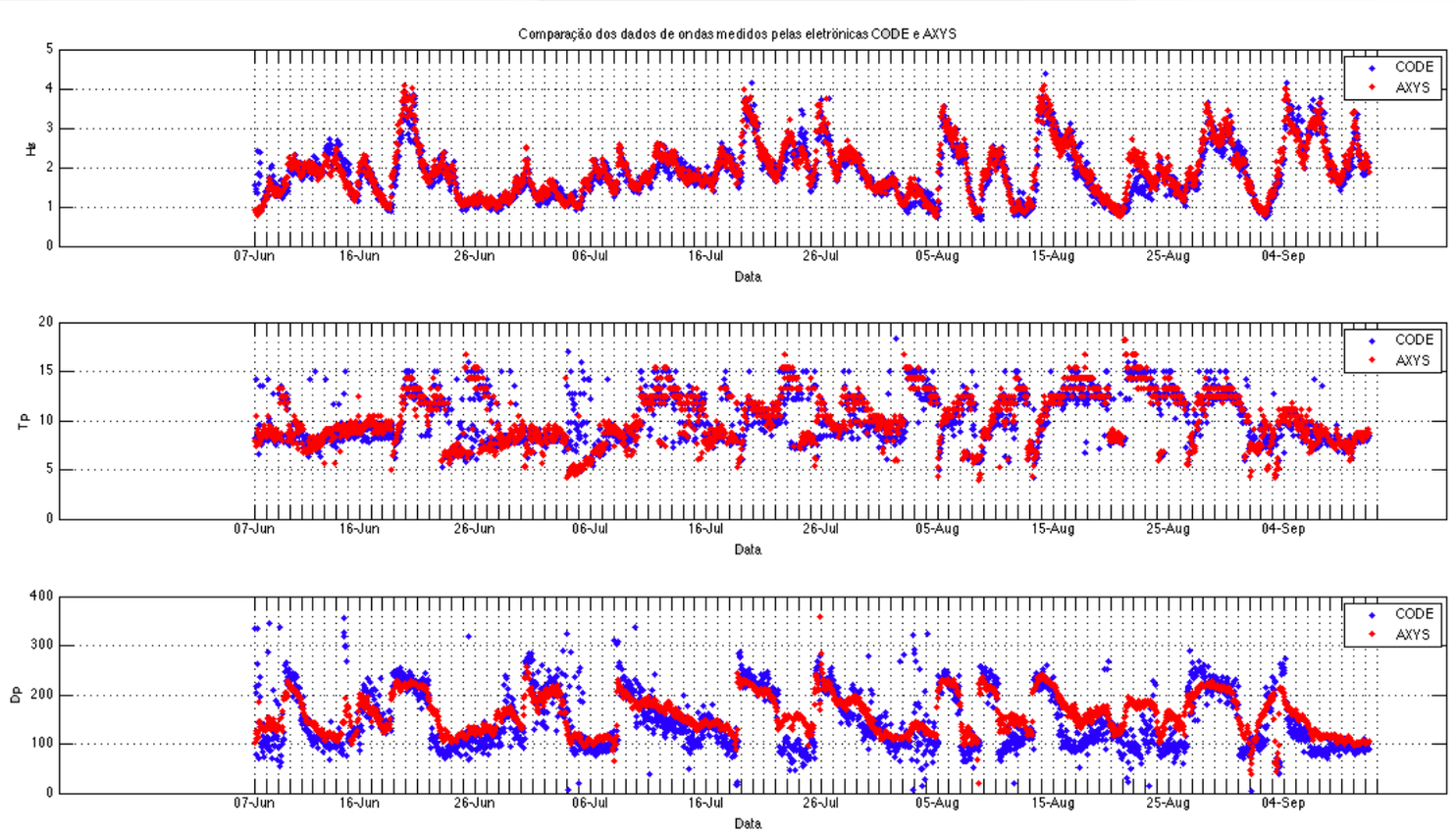


300 meter mooring line

2200 meter line

Development Phases

Phase 2 (2013 - 2016)



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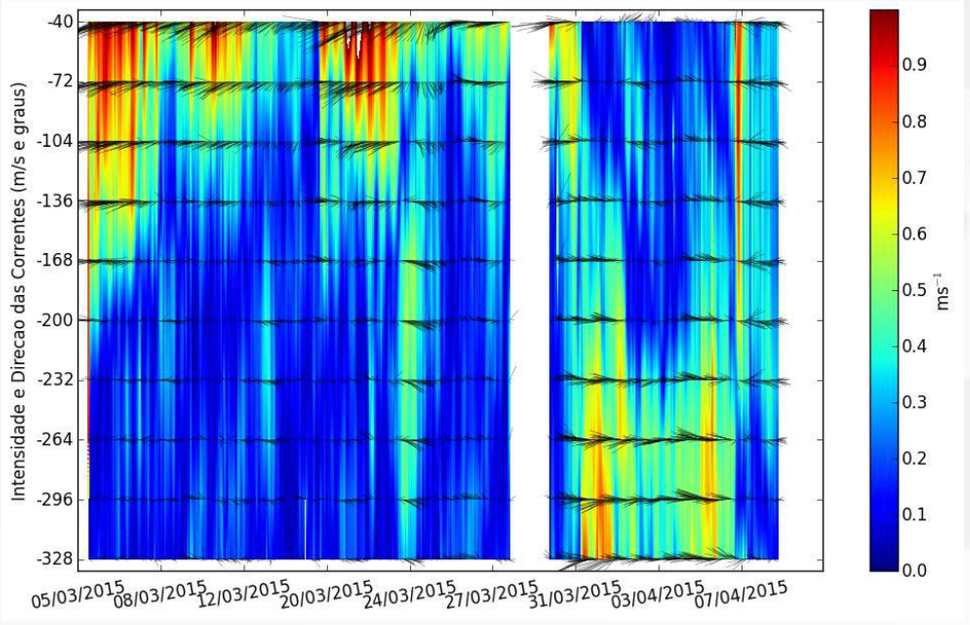
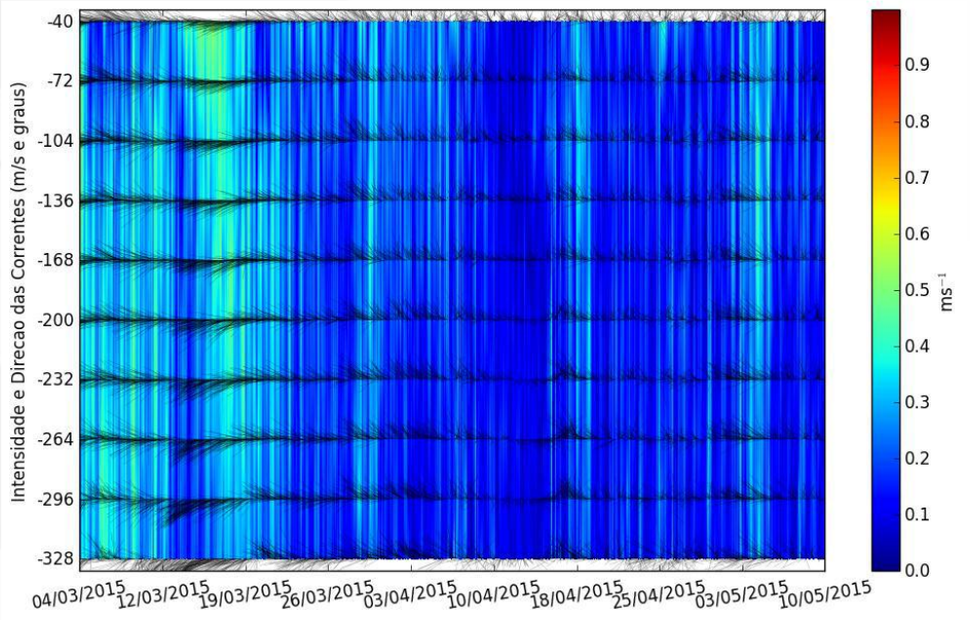
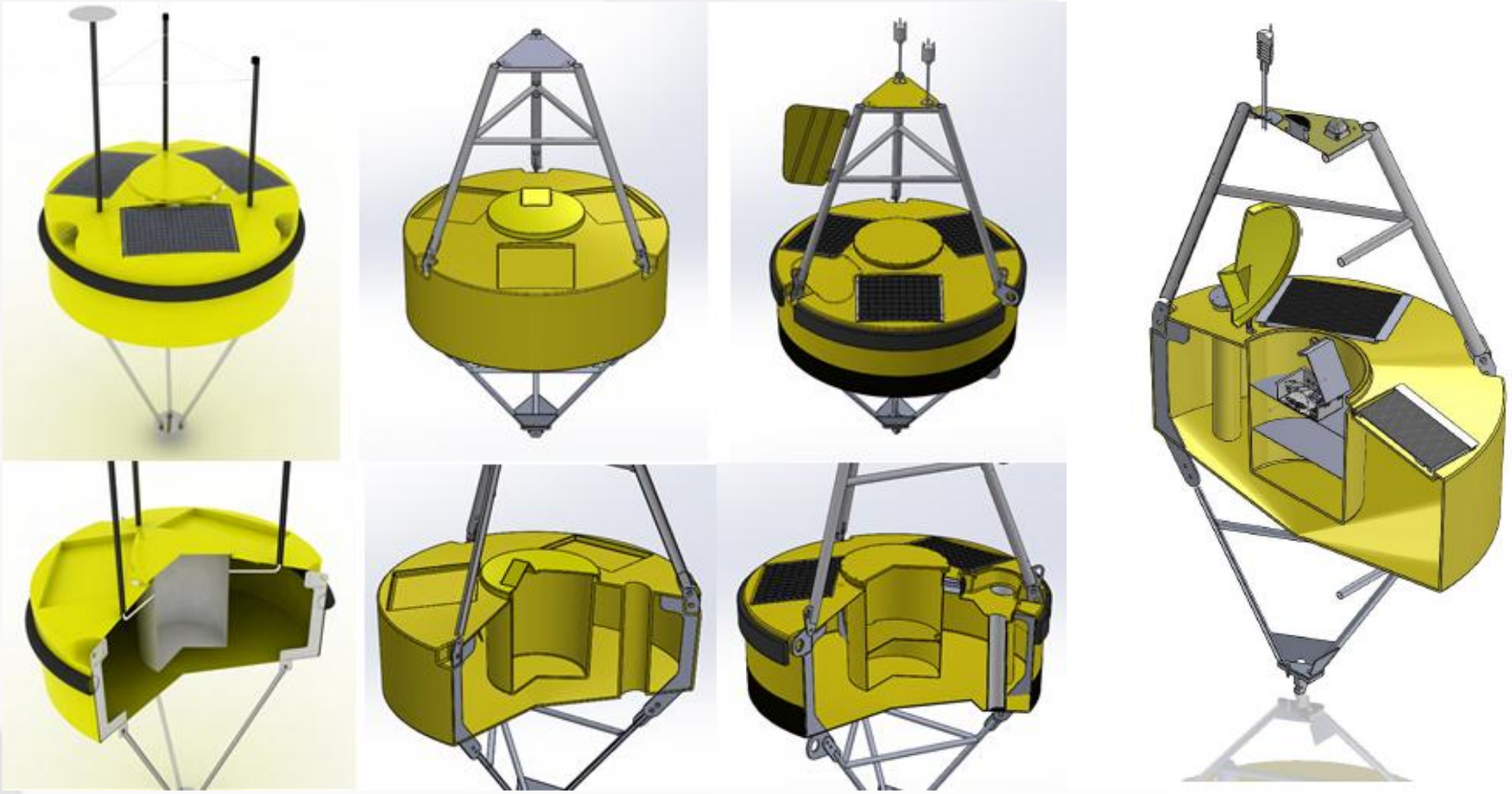




Buoy Hull

- ✓ 2.5-meter diameter;
- ✓ On-site assembly of brible and tower;
- ✓ Fiber-glass w/ INOX structural inserts;
- ✓ Payload compartment w/ extra room;
- ✘ Payload compartment hatch w/ bolts;
- ✘ No groove or recess for passind cables on deck;
- ✘ No moon pool for surface sensors;

Buoy Hull



Lessons Learned

Mooring Line

- ✓ Locally supplied steel cables (up to 6 month);
- ✓ Locally supplied synhetic PP cables;
- ✘ Locally supplied shackles (size upgrade);
- ✘ ADCP cable assembly (not solved);
- ✘ Line Configuration Project (new approach).

Lessons Learned

Mooring Line

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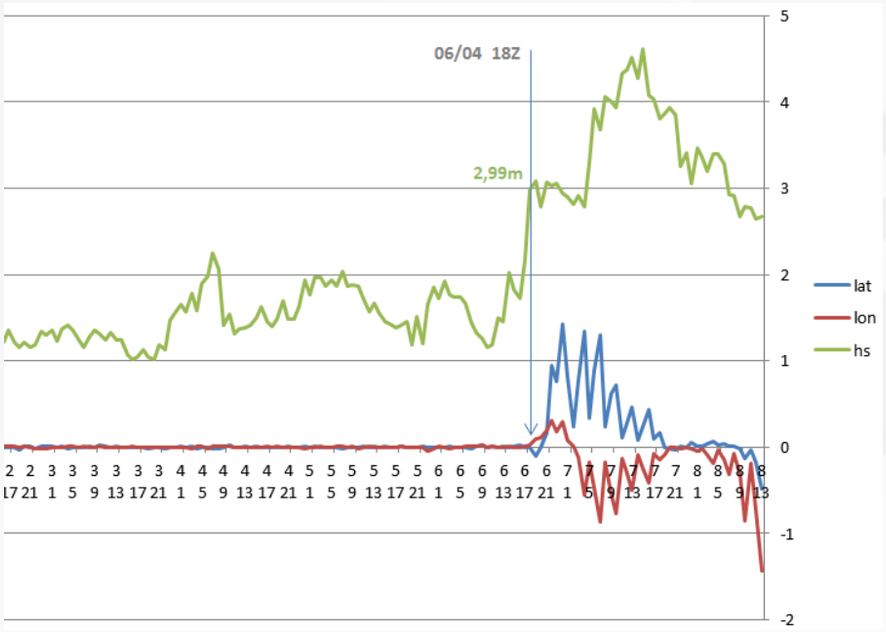
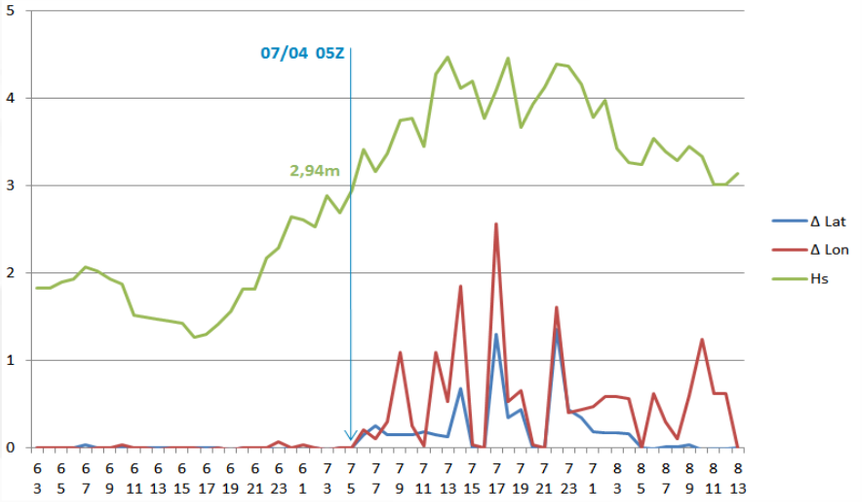
Mooring Line





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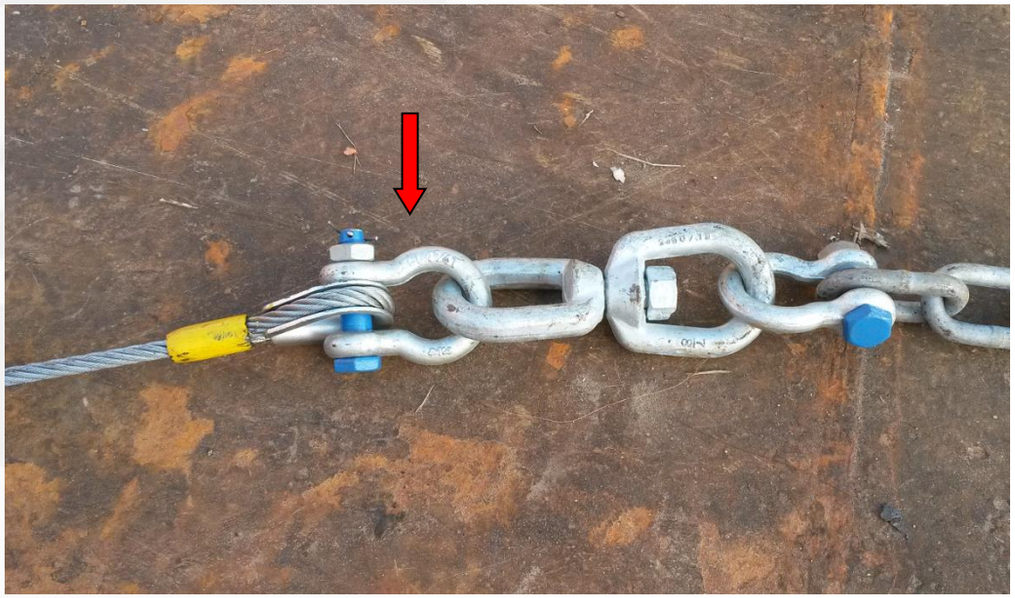

Lessons Learned

Electronis Payload

- ✓ AHRS for hull motions (waves);
- ✓ FOG reference sensor for hull motions;
- ✓ Satellite, BT and local wi-fi comm;
- ✓ Integration of new sensors (Bouy-cam, etc.)
- ✘ Corrosion on connectors, cables terminals, etc;
- ✘ Leakage of batteries;