Sailing meets science: Pushing the Ferry Box concept forward

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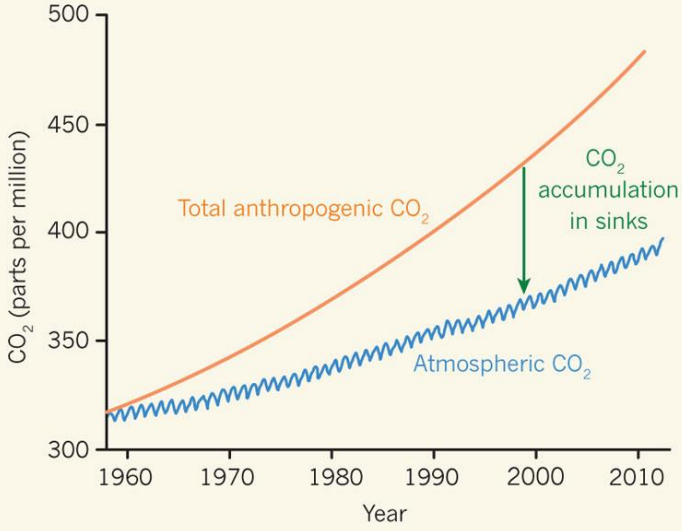
hcmr
ΕΛΚΕΘΕ

FerryBox
TaskTeam

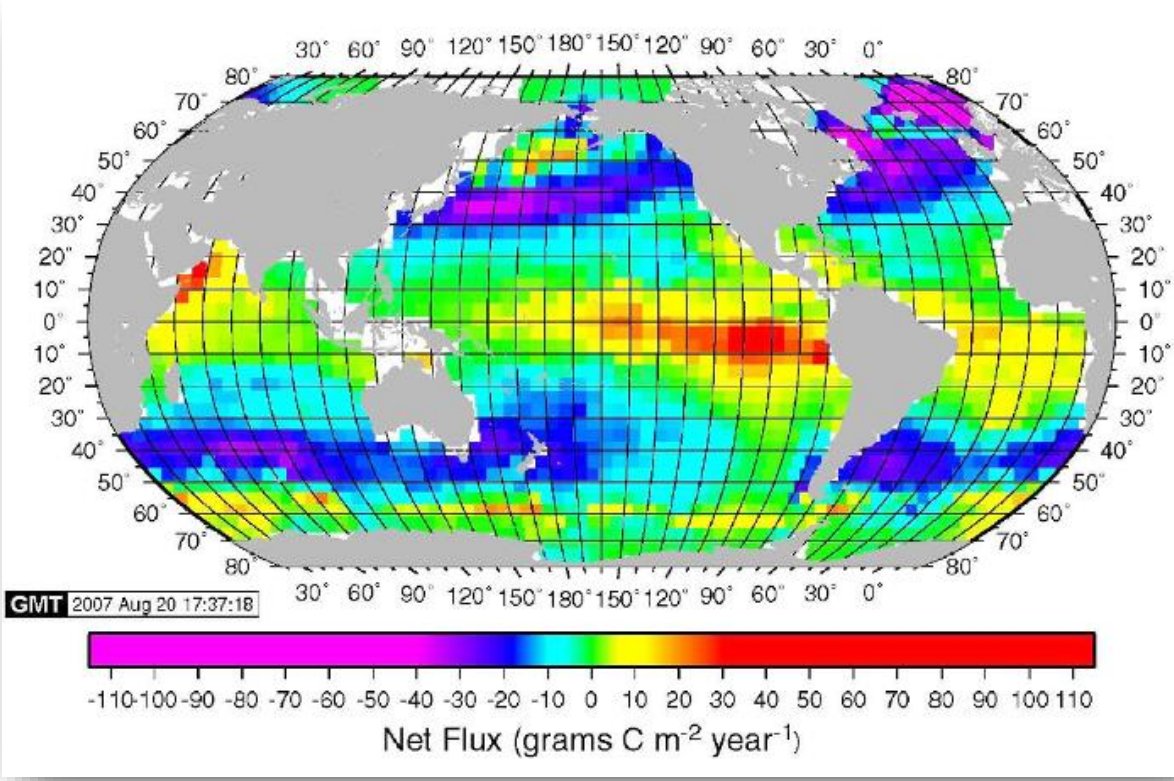
EuroGOOS
European Global Ocean Observing System

7th FerryBox Workshop, Heraklion, April 2016

Motivation: why measuring pCO_2 in the Ocean



Levin et al., 2012



Estimation by Takahashi et al., 2009

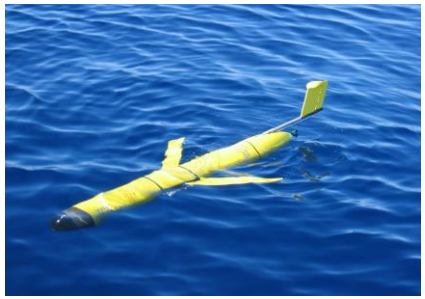
Red Areas: Oceanic Source of CO_2

Blue Areas: Oceanic Sinks of CO_2

- Scientists need reliable data from the oceans

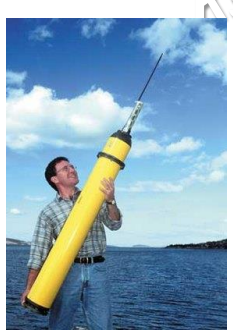
Current observation platforms: pros & cons

Research Vessels



Underwater glider

Moored and drifting buoys



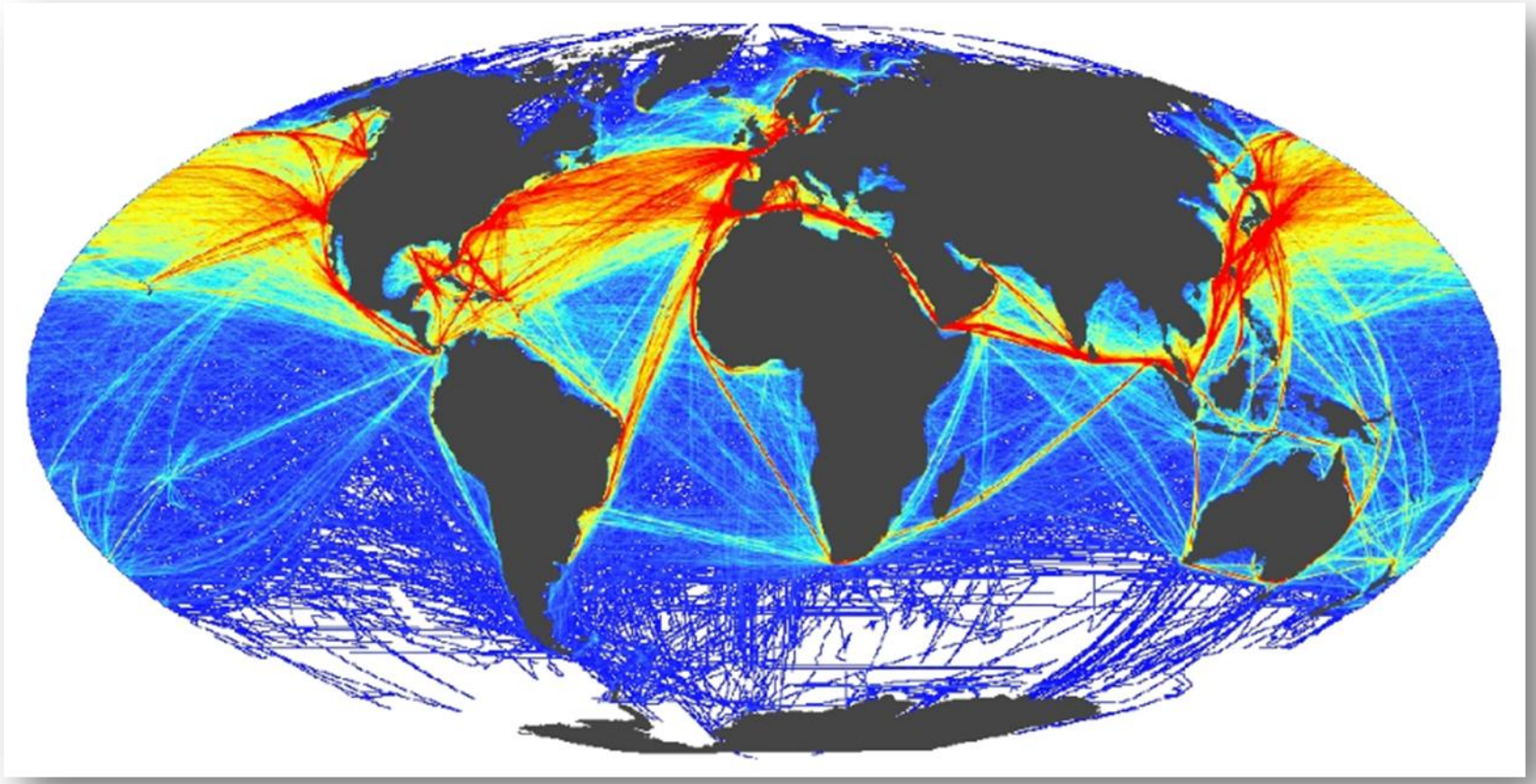
Argo floats

Ships of Opportunity

Satellites (e.g. AQUA MODIS)

Coastal observation

The need for observation off the beaten tracks



- Oceanographic data. All data ever recorded.
- Source: Boris Kelly-Gerreyn; NOC, EuroGOOS FerryBox Meeting, Goteborg 16-17 March 2010

- ➢ The southern hemisphere is poorly investigated
- ➢ The Southern Ocean is a huge white spot on the map

How can the gaps be filled? Sailing ships!

Partner MARTEC – OSC

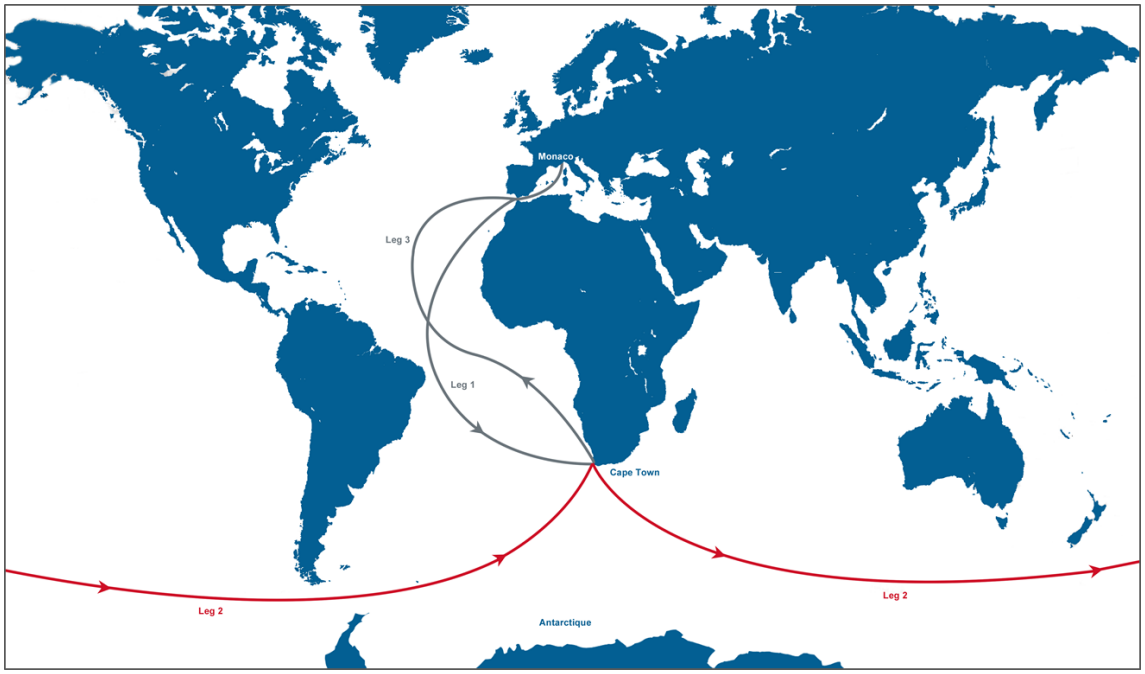
Project management, Development Ocean Racer

Development underway system

Scientific consulting; in charge for oceanogr. data

Telemetry; in charge for metrological data

The OceanoScientific Program (2006 – 2015)



- Bringing passionate “ocean people” together: sailors and scientists
- Using racing yachts as a new observation platform
- Development of a 16-meter racing yacht
- 100% energy self-sufficient (hydro generators)
- No CO_2 emission
- Measuring the sea surface in regions where RV usually do not operate

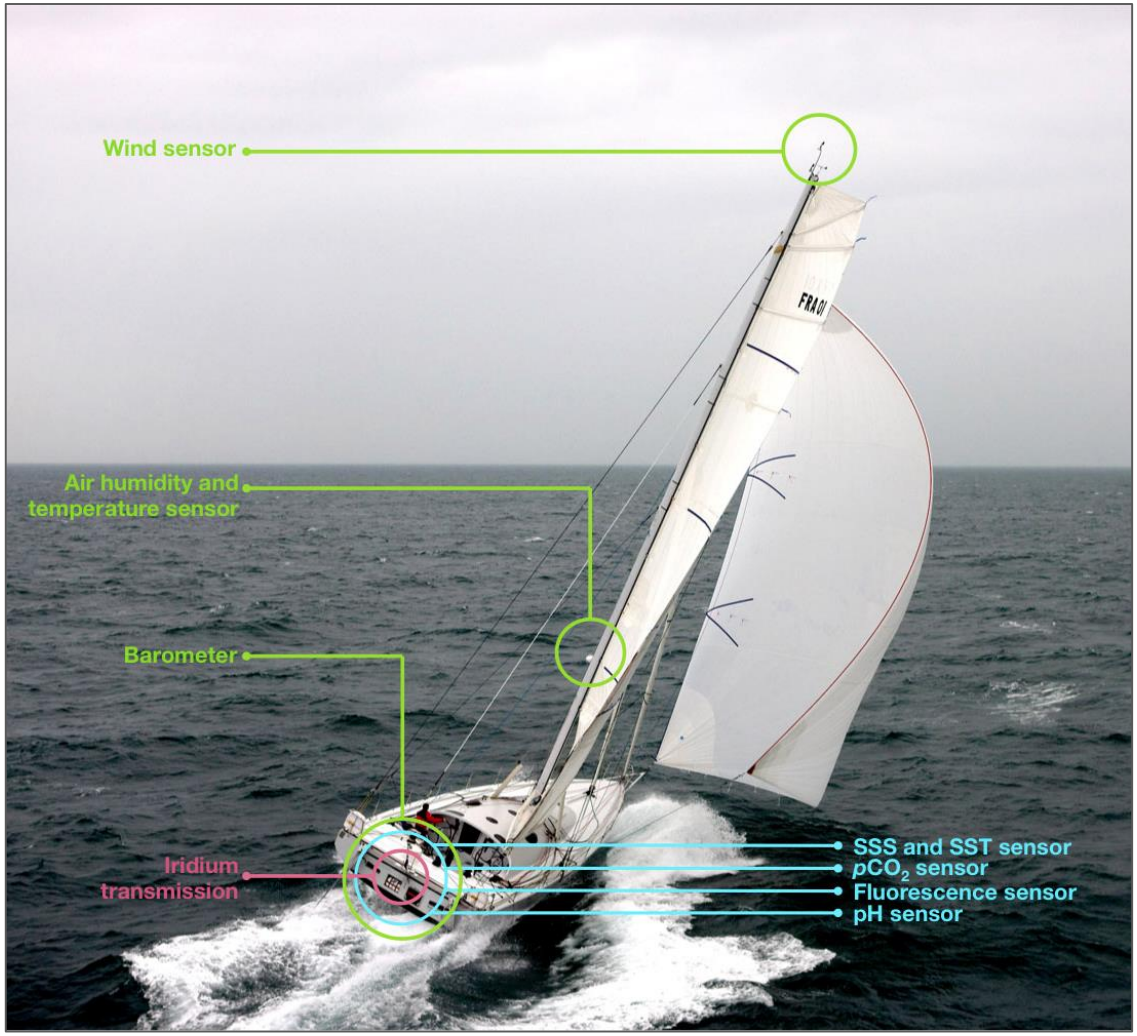
Going fast : The Challenges

- High boat speed (up to 27 knots)
- Extreme conditions: sailing the Southern Ocean
- Ship is moving in every direction (jumping!)
- Up to 120 day no maintenance
- Very unstable power supply

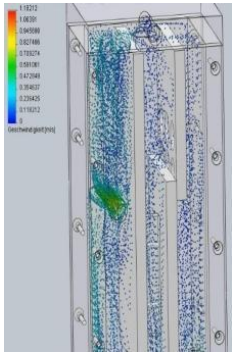
➢ Weight, sizes, energy consumption

➢ How to get analysable water in the instrument?

Going fast : our Compact Mobile System



Patented debubbling system

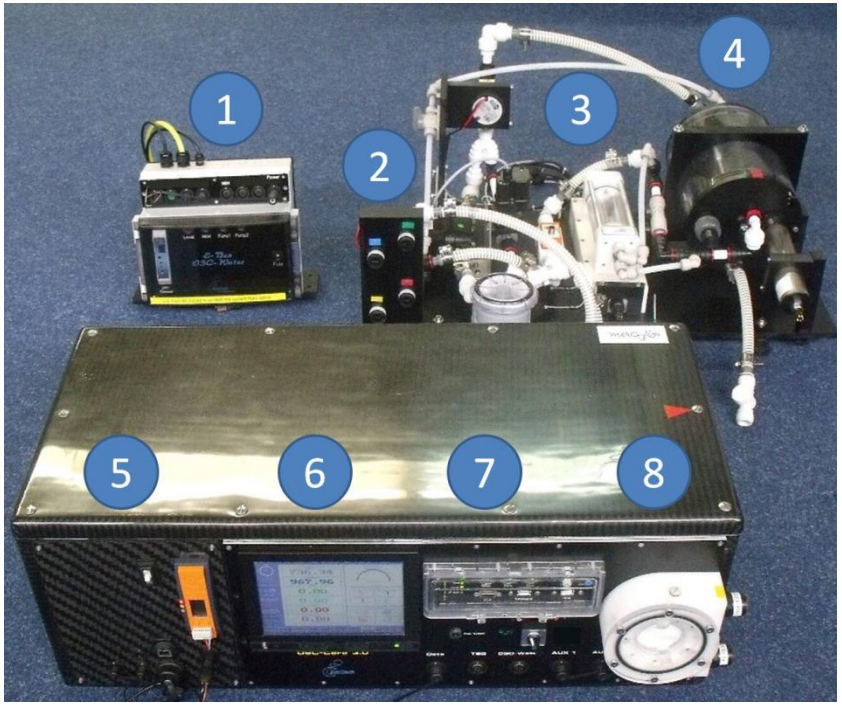


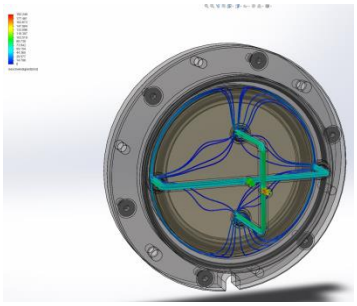
Compact flow through system

- *p*CO2, SSS, SST, fluorescence, pH
- 25 kg; 500x500x800 mm ; <75 Watt

Going fast : our Compact Mobile System

The underway system



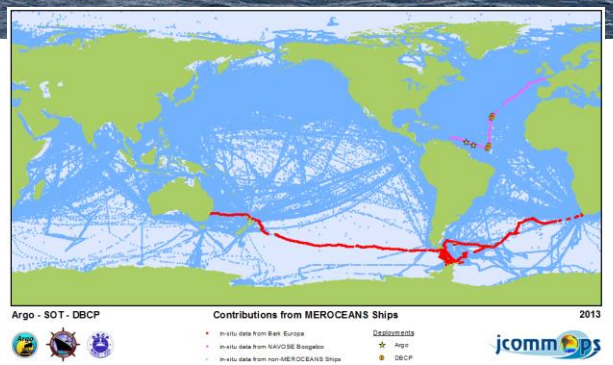


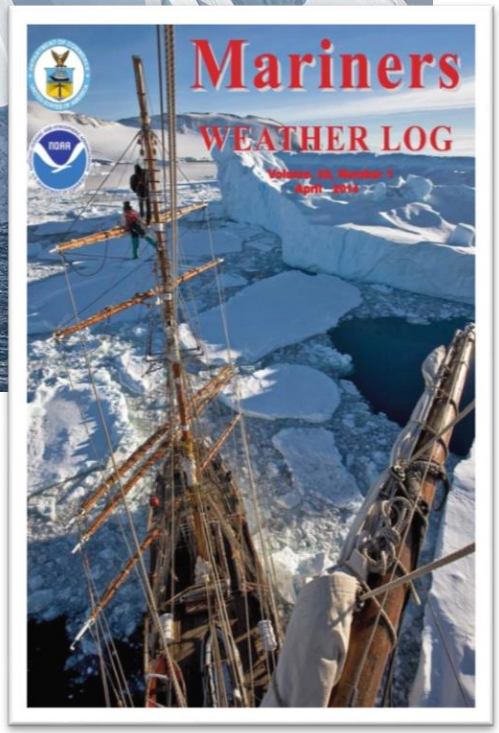
(1) Seewasserventil Controller
(2) Doppelpumpensystem
(3) Sensorpack
(4) Optimierter Debubbler
(5) IRIDUM / INMARSAT
(6) Data Logger / Autokalibrierung
(7) Manuelle Steuerung
(8) CO_2 Analyzer / Autokalibrierung

- Keine Korrosion
- Kaum Fouling
- Einfachste Wartung
- Geeignet für schwerste See
- Autokalibrierung
- Automatische Reinigung
- Stand der Wissenschaft

Antarctic: *Bark Europa* (tall ship)

12 Months Antarctic (2012-2013)





Arctic: *La Louise*

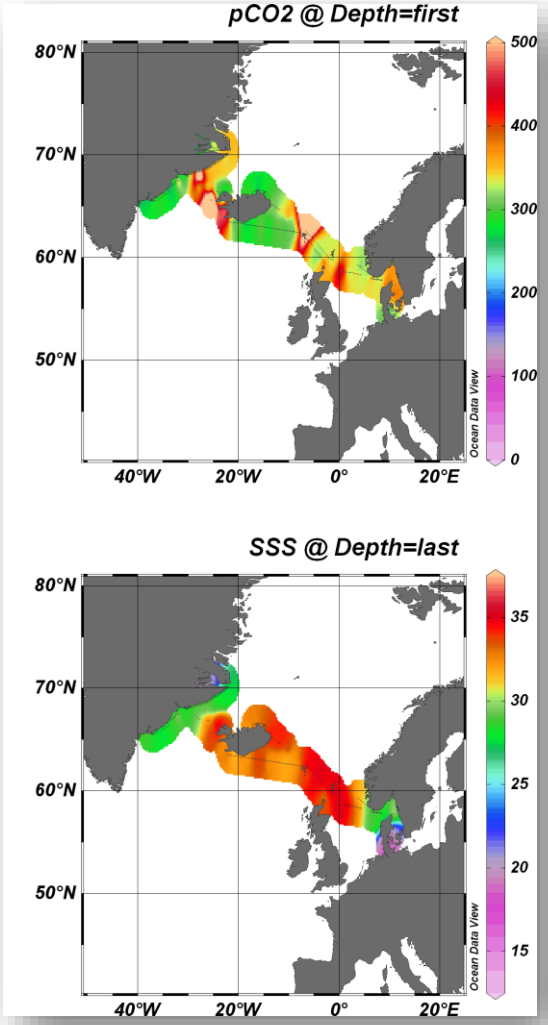
5 Months Arctic (2012)

OceanoScientific

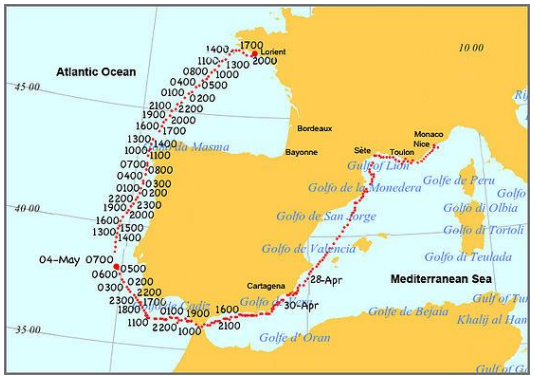
Arved Fuchs: *Dagmar Aaen* – 3 month Arctic

Expedition: PITTARAK Greenland 2014

www.arved-fuchs.de



Last test for OSC: Tour de France pour le Climat 2015



Tour de France POUR LE CLIMAT

MOBILISER LES LITTORAUX

PARIS CLIMAT 2015

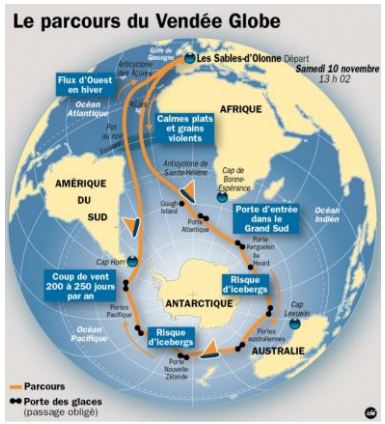
Onboard the *OceanoScientific Explorer "Boogaloo"* (Brest), from left to right:

Pierre Blouch (Météo-France), Thierry Reynaud (IFREMER), Dimitri Voisin (Mer Agitée), Cindy Guillemet (SailingOne), Martin Kramp (JCOMMOPS)

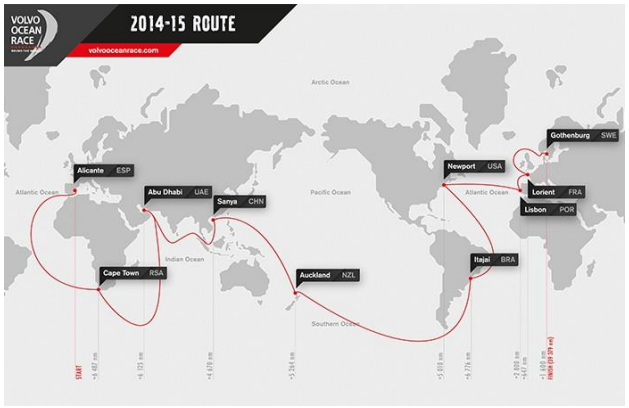
Start & Conference Monaco,

Yvan Griboval, Catherine Chabaud, Prince Albert II of Monaco and Pierre Casiraghi

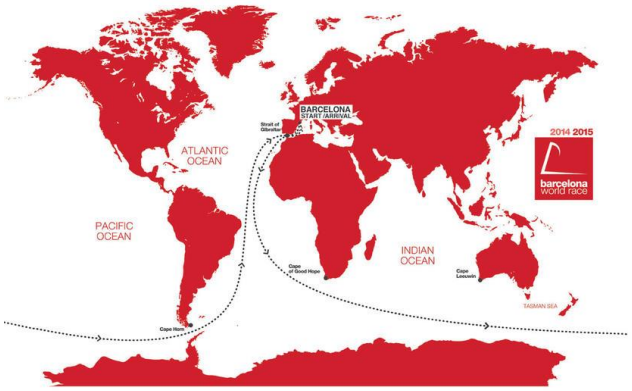
Next steps: Yacht Racing



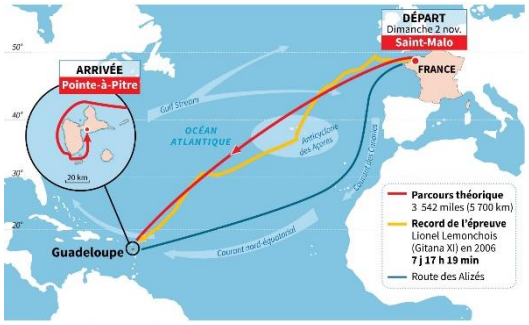
Vendée Globe
(IMOCA60)



Volvo Ocean Race
(VO65 One Design)



Barcelona Ocean Race
(IMOCA60)



Route du Rhum
(IMOCA60)

Clipper Round The World Race
(Clipper 70 yachts)

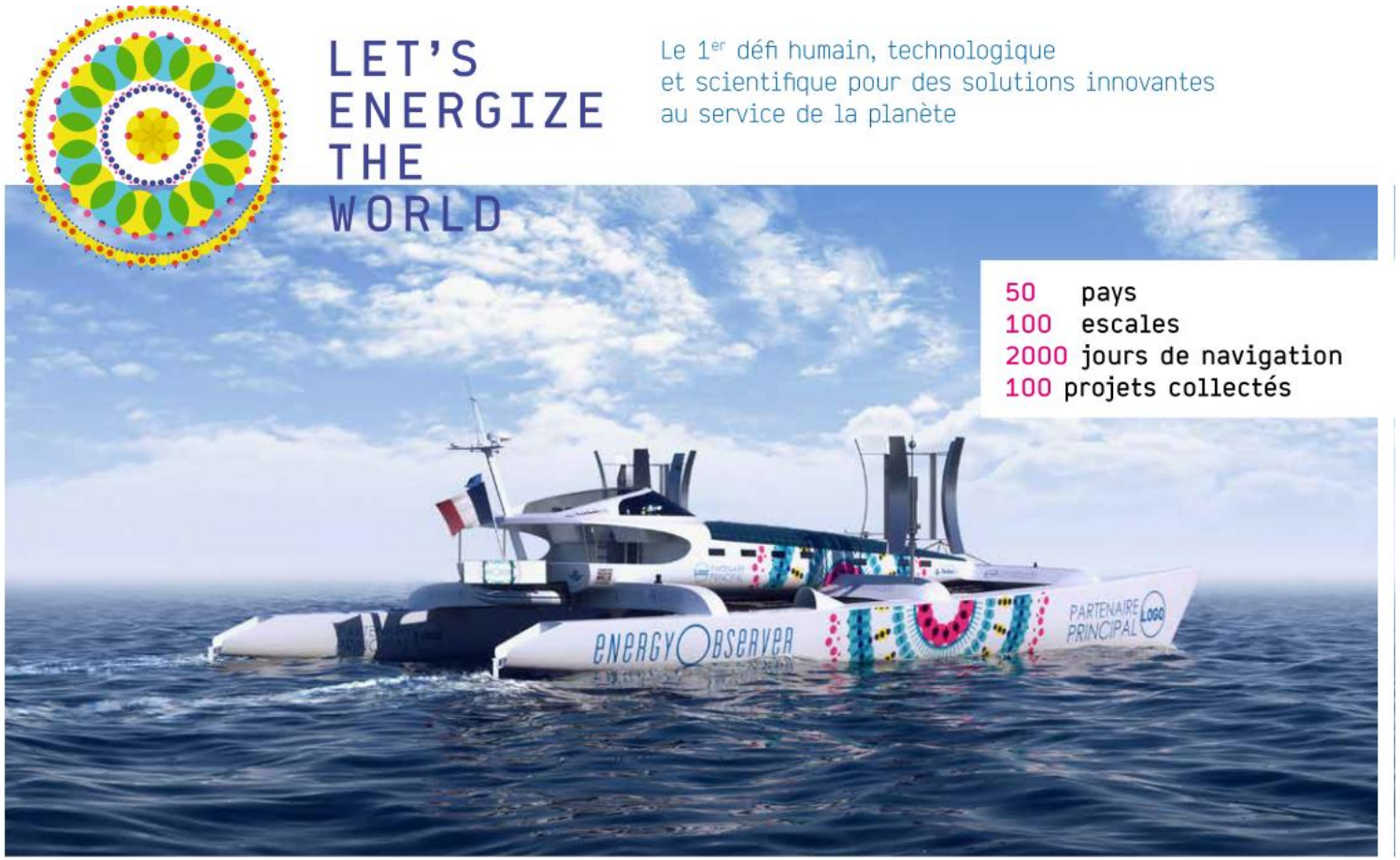
Transat Jacques Vabre
(IMOCA60)

Assets of Yacht Racing

- Operation of about several flow through systems
- Fleet observation: higher data precision, higher temporal and special cover
- Ship time is already paid
- Autonomous for long time
- plug and play: operated during different racing events
- Modular sensor configuration
- Calibration before, (during) and after the race = high quality data
- Remote System monitoring (limited onboard maintenance)
- Observation off the beaten tracks (e.g. Southern Ocean)
- Acquisition of highly relevant data

- Yacht racing = high-profile events = sponsoring

Outlook: unorthodox projects



Thank you!

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