

## Meerestechnischer Systeme in Einsatz auf „Ships of Opportunity“

Stefan Marx, CEO SubCtech GmbH





# Was sind "Ships of Opportunity" ?



Alle Schiffsverbindungen dieser Welt  
(mit freundlicher Genehmigung ShipView AIS)



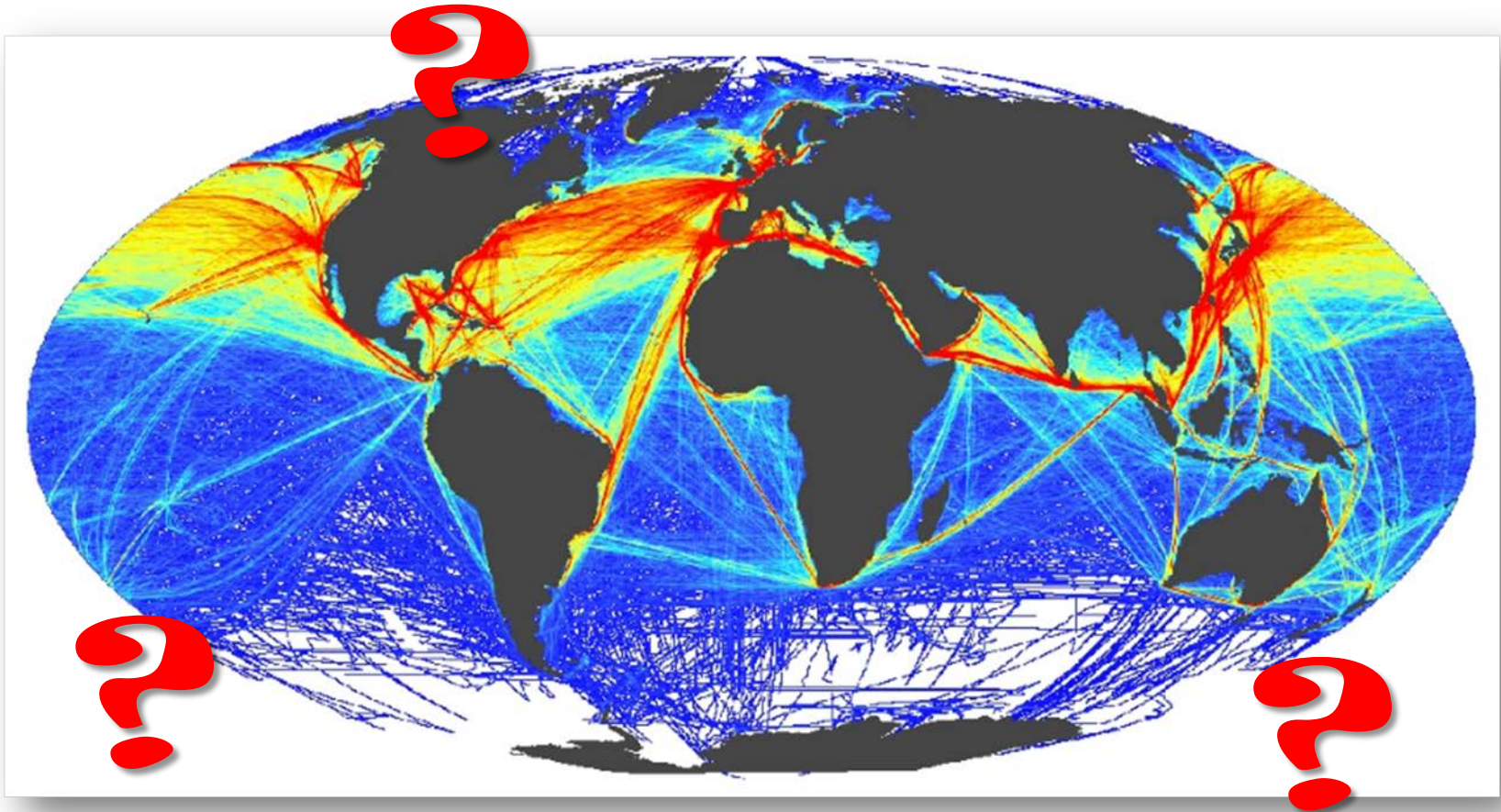
RSV Nuyina, © AAD/Flying Focus



# Wo gibt es welche Daten ?

Ozeanographische Daten. **Alle bekannten Aufzeichnungen** (Ohne satellite Daten).

Quelle: Boris Kelly-Gerrey; NOC, [EuroGOOS FerryBox Meeting, Goteborg 16-17 March 2010](#)



- Wir kennen nur sehr wenig von unserer Erde.
- Kaum jemand kommt überall hin. Große Gebiete sind noch unbekannt.
- Diese haben aber enorme Auswirkungen auf Klima, Energietransportmodelle etc.

Prof. Colijen sagte in meinem Studium vor fast 30 Jahren:

„Es gibt tausende von kommerziellen Schiffen. Das sind SOOP.  
Die müssen wir nutzen“.

Wie ist der Stand heute: ein Reeder sagte mir vor einiger Zeit:

„Ihr habt 40 Schiffe ausgerüstet, und habt viel erreicht.  
Aber es gibt doch Tausende...???“

1995 startete das EU FerryBox Projekt bei der GKSS (HZG)

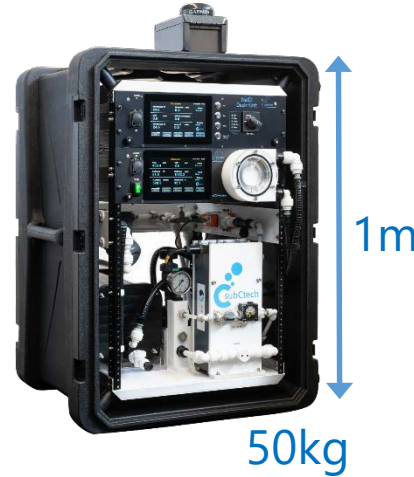
1999 begann die Kommerzialisierung

2009 begann SubCtech eine neue Episode....

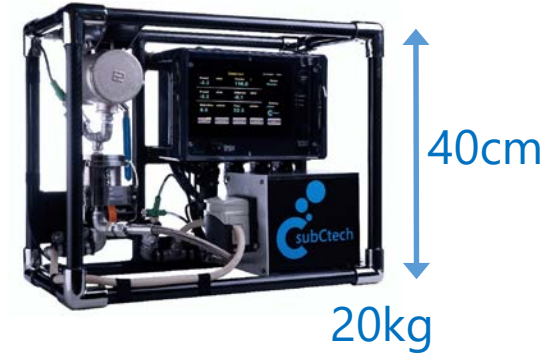
## Classic



## Mobile CUBE®



## RACE®



- Autonome „Underway“ Messsysteme: Autonomie für mehrere Monate
- Messung aller typischen Parameter der Meeresoberfläche und Meteorologie
- Neueste Sensoren: höchste Präzision und Genauigkeit und ROBUST
- Vollautomatisch: Wasserversorgung, Kalibrierung, Reinigung, Diagnose, Verarbeitung, Aufzeichnung, Übertragung



# OceanPack™ auf Forschungsschiffen

Large Icebreakers & Research Vessels



FS Polarstern © private



Xue Long 2 © PRIC



RSV Nuyina © AAD/Flying Focus



Xe Kue © IOCAS



AlMostakshif RV © KISR



© Blue Star Ferries



North Pole © admship.ru



RV Belgica © Hans Hillewaert, LtCdr Peter Ramboer



RV Belgica II © Freire Shipyard



Marion Dufresne © Eric Kerverde, Hubert Pédurand



Celtic Explorer © Skipsteknisk AS



Pelagia © NIOZ



RV Cape Ferguson © AIMS



UCadiz © University of Cadiz



Xiang Yang Hong 10 © Andreas Schlatterer, SOA



Zhong Shan Da Xue © Xinhua, Sun Yat-sen University

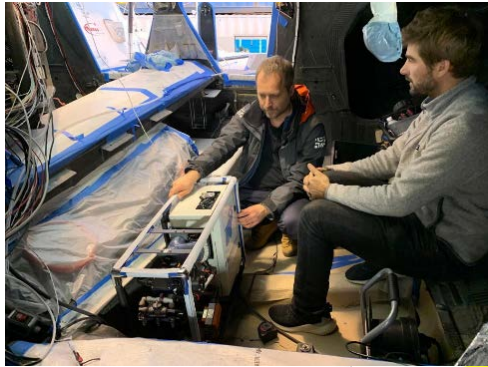




Boris Herrmann / Vendée Globe 2020-21

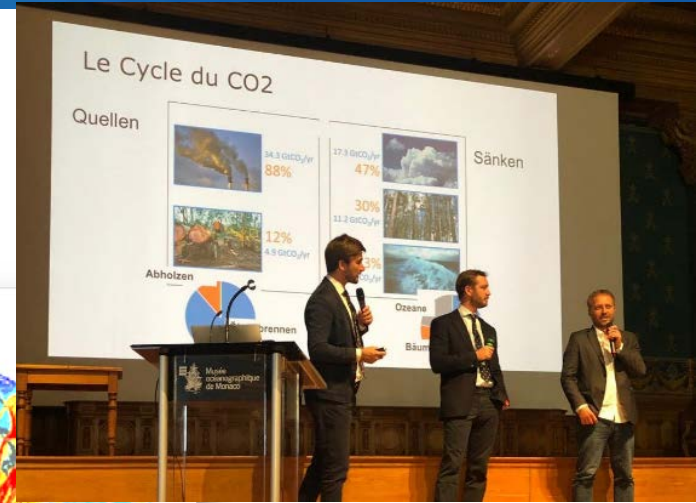
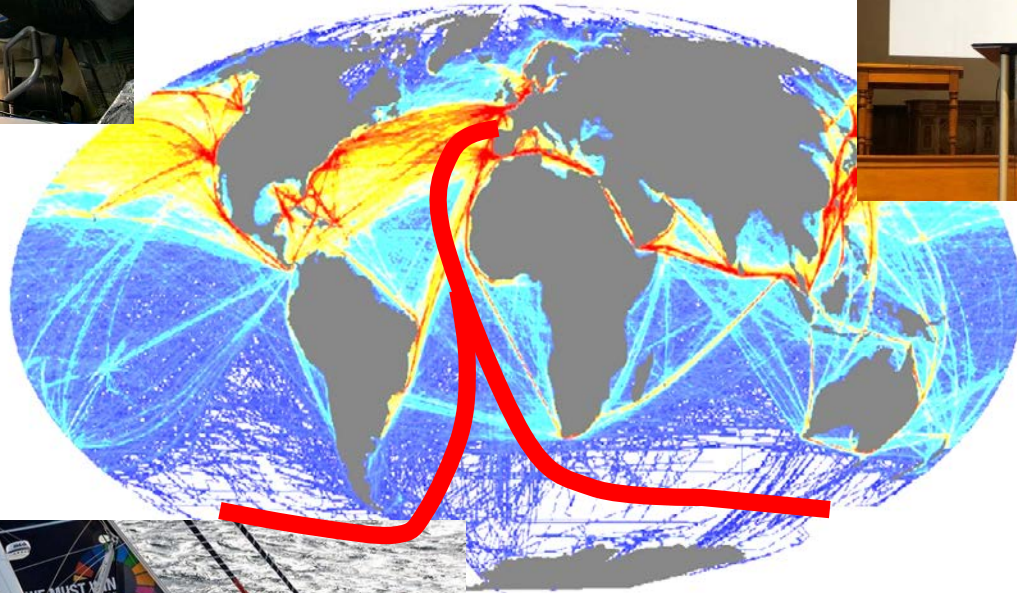






"We cannot stress enough the importance of the oceans, without them there would be no life on earth"

*Boris Herrmann*

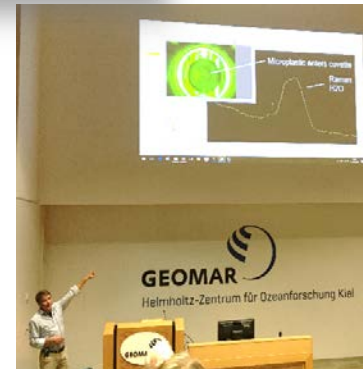


Pierre Casiraghi, Boris Herrmann and Stefan Raimund from SubCtech presenting at the Oceanographic Museum of Monaco May 2019.

Photo credit: Cedou.



Vendée Globe closed data gaps by up to 25kn with SubCtech's OceanPack RACE®. Toste Tanhua, GEOMAR





## Was macht den Unterschied ?

- Praxiserprobt
- Optimiert für raue Umgebung
- Zusammenarbeit mit führenden Instituten
- Benutzerfreundlich, servicearm
- Extrem robust
- Tragbar
- Energiesparend, geringes Gewicht, geringe Größe
- Modulare, flexible modernste Sensorik



© BorisHerrmannRacing



Sciences Un skipper sur les traces du phytoplancton

19/20 Bretagne

## Was macht "Sailing meets Science" möglich?

- Neue Märkte, die Investoren und Stiftungen begeistern
- Mehrwert des Extremsports und Expeditionen: **ARVED FUCHS**
- Neue Chance für die Wissenschaft mit exzellenter und bewährter Datenqualität
- Öffentliche Begeisterung für das Verständnis von Wissenschaft, Sport, Wirtschaft, unserer Welt
- **Ideal für Citizen Science-Projekte zur Unterstützung der UN-Dekade der Ozeane.**







© La Louise, Thierry Dubois



© Arved Fuchs Expedition



© Rederij Bark EUROPA



© Michael Amme, Max-Planck-institute für Chemie



Micro-Plastic on board

© JAMSTEC



Micro-Plastic on board

© JAMSTEC



© Iodysséus



© ALDEBARAN Marine Research & Broadcast



© private



Micro-Plastic on board

© Ainhoa Sanchez/Volvo Ocean Race



© Konrad Frost / Volvo Ocean Race



Micro-Plastic on board

© Pierre Bouras #VG2020, Fabrice Amédéo, Newrest - Art & Fenêtres



© BorisHerrmannRacing



© Amory Ross / 11th Hour Racing

## Research Sailing Vessels



- Racing Yachts
- Volvo Ocean Race
- IMOCA
- Vendée Globe



**volvooceanrace.com** is 11th Hour Racing and a non-racing vessel before the Leg 4 finish - read mo

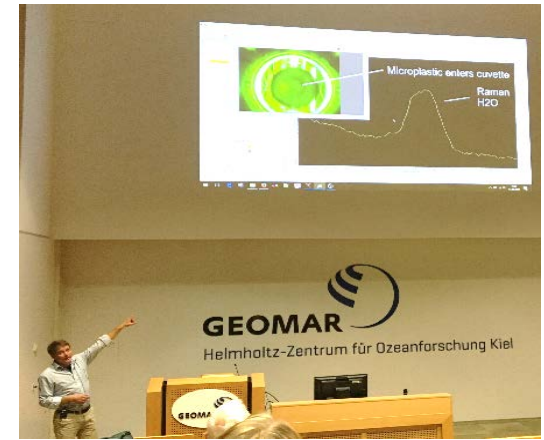
MENU HOME NEWS TEAMS ROUTE HOST CITIES BOAT SHOP GAME RACING

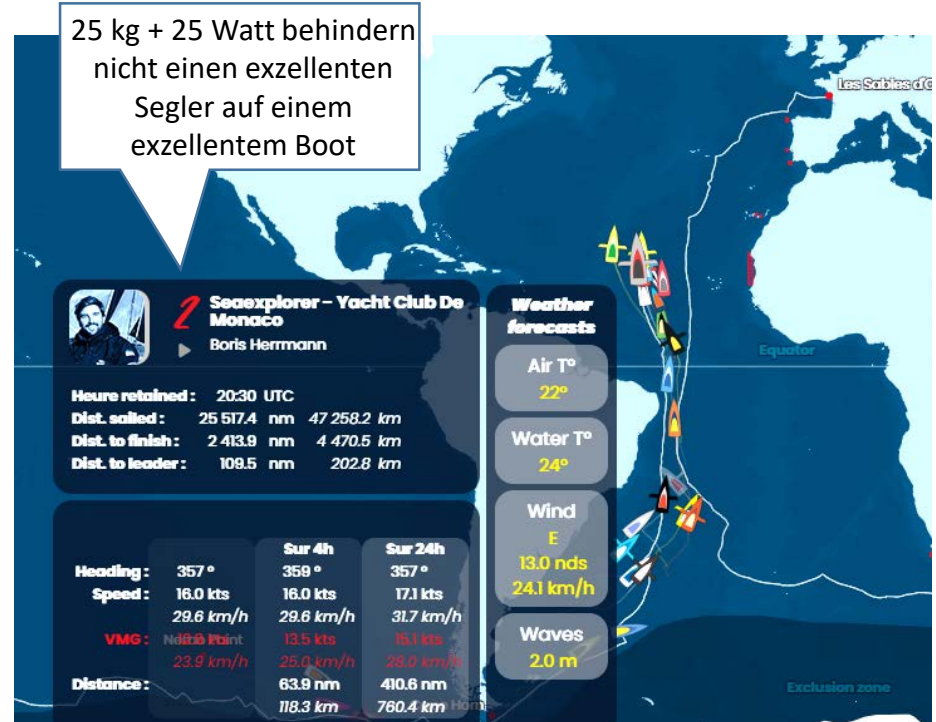
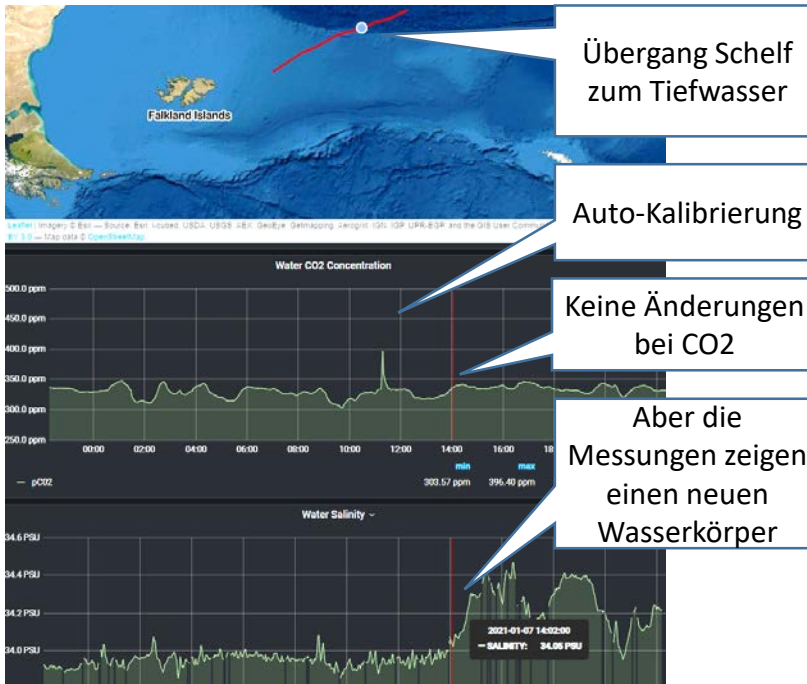
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## Microplastic particles found in Antarctic waters

New data, collected during the Volvo Ocean Race, revealed during the Hong Kong Ocean Summit, microplastic particles have been found in the oceans close to Antarctica

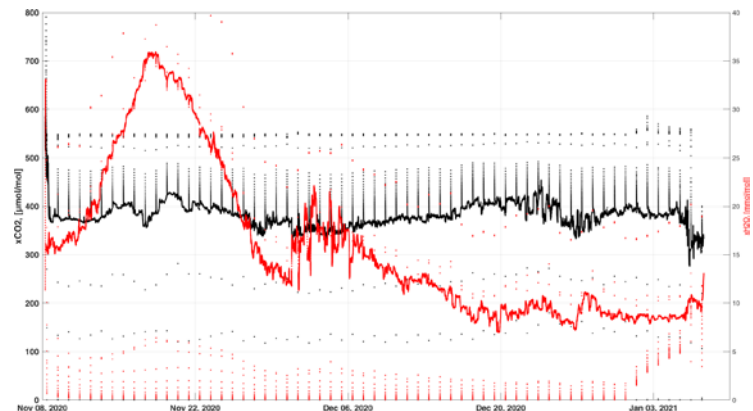
© Ainhoa Sanchez/Volvo Ocean Race





All screenshots © BorisHerrmannRacing

- Real-time Daten auf dem "Dashboard"
- **Rohdaten!** Keine Fehler werden verschwiegen
- Öffentliches Dashboard. Jeder sieht alles.
- Daten für Klimamodelle (SOCAT)
- **Es ist interessant. Es ist transparent. Es ist offen.**



Alle Rohdaten über 80 Tage

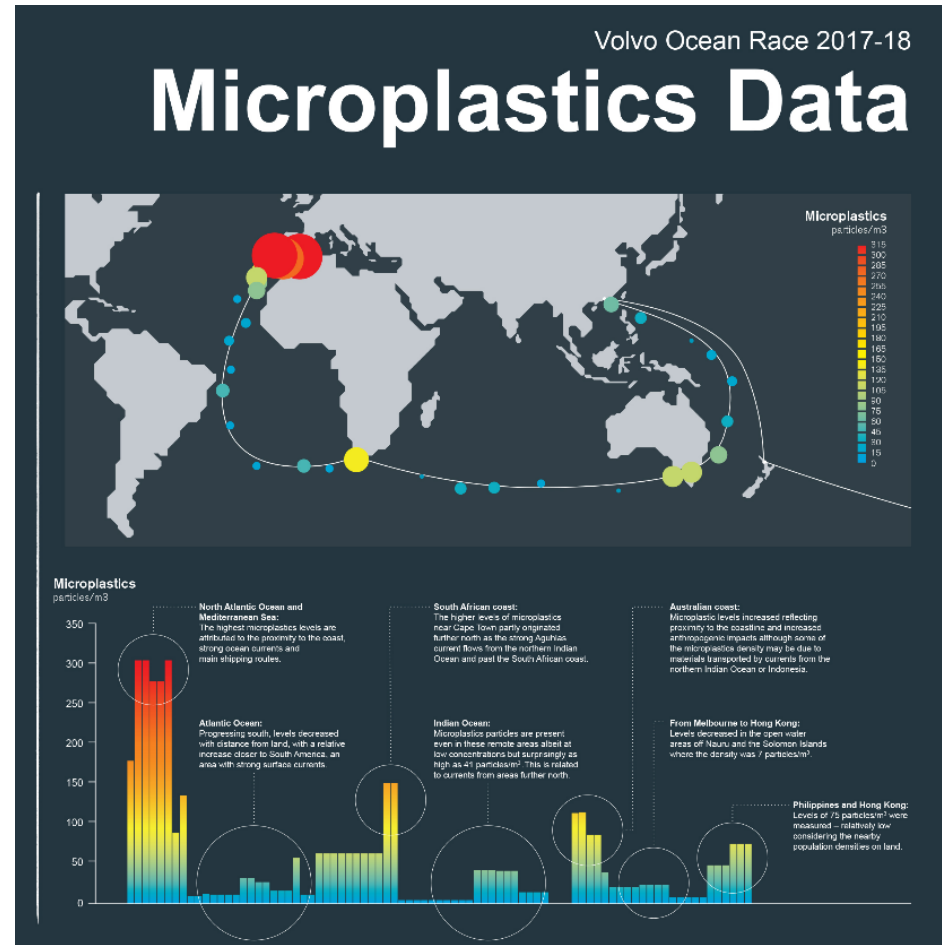




Roh- und **SOCAT** Daten vom Max Planck Institut für Meteorologie (Peter Landschützer), GEOMAR (Toste Tanhua) und "Team Malizia - Seaexplorer - Yacht Club de Monaco" Vendée Globe 2020-2021.

*"A new era of sailing for science is beginning, with support for vital ocean observations from the high-profile round-the-world [Vendée Globe](#) yacht race."*

News from **WMO** - [Sailing for Science | World Meteorological Organization \(wmo.int\)](#)



Micro-Plastik Daten von GEOMAR (Toste Tanhua, Sören Gutekunst, © Image Volvo Ocean Race, "Turn the Tide on Plastic", Volvo Ocean Race 2017-2018.



team\_malizia • Folgen

team\_malizia Stefan Raimund, scientific consultant at SubCtech, is checking the OceanPack to guarantee highest quality of data acquisition. He came on his bike. #unitebehindthescience #aracemustwin #teammalizia#gretathunberg #FridaysForFuture @GretaThunberg

7Std.

\_valiazurledragonmc980604\_ 🙌🙌🙌

6Std. Antworten

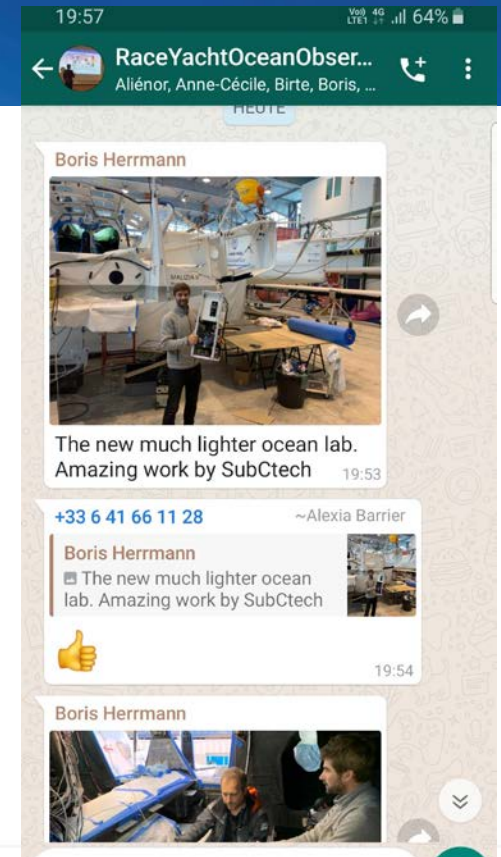
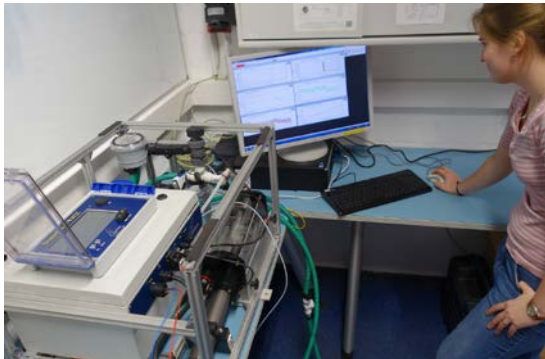
cyndibilder 🍷🚲

5Std. Antworten



Gefällt 314 Mal

VOR 7 STUNDEN



Boris Herrmann



The new much lighter ocean lab. Amazing work by SubCtech

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~Alexia Barrier

Boris Herrmann

The new much lighter ocean lab. Amazing work by SubCtech



19:54

Boris Herrmann



borisherrmannracing 🌍 During the trip we contribute actively to ocean research and study the impact of climate change on marine environments by measuring ocean CO2 and other sea surface data with our on-board laboratory. #ARaceWeMustWin #TeamMalizia#UniteBehindTheScience#fridaysforfuture #gretathunberg

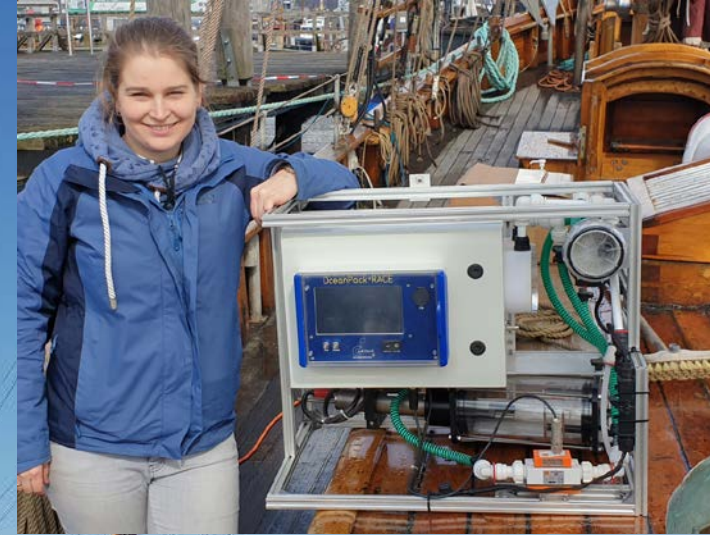
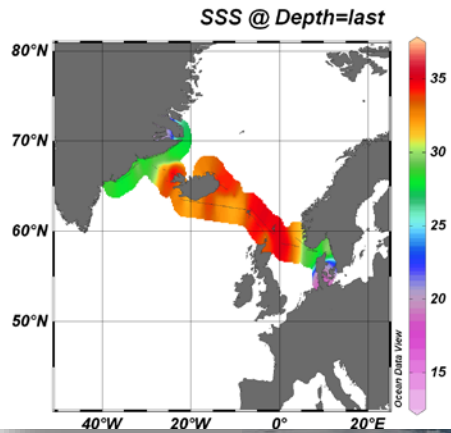
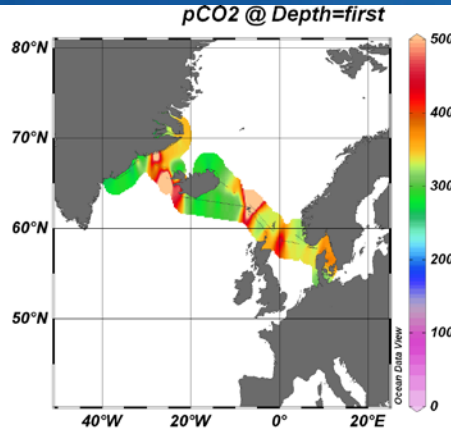
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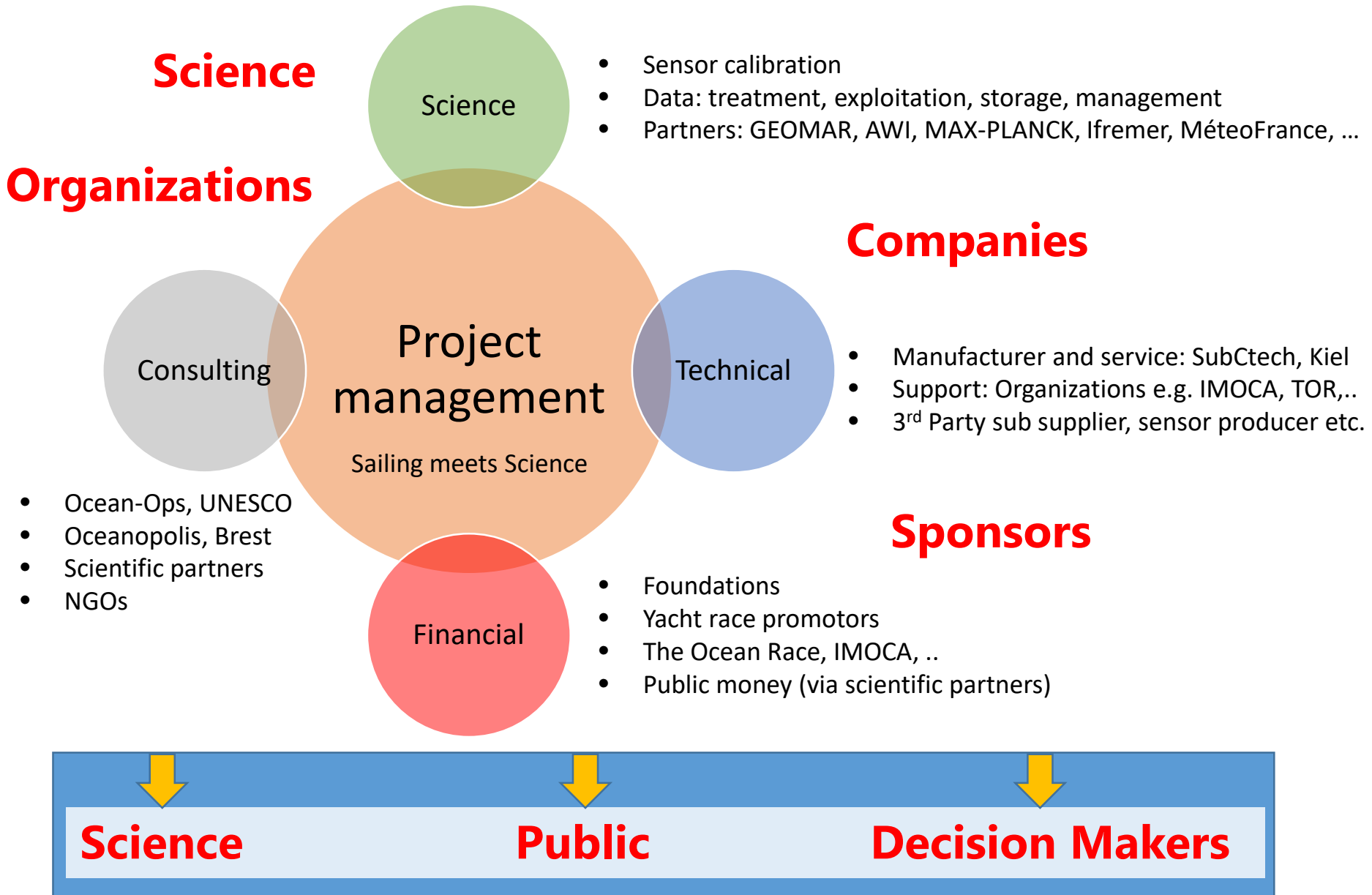
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VOR 1 TAG





Überprüfung der Kalibrierung:  $\Delta pCO_2 < 3ppm$   
© Daten Uni Flensburg





Requested by Scientists  
Developed by Scientists and Engineers



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## Latest messages 02. Feb. 2021:

*“A new era of sailing for science is beginning, with support for vital ocean observations from the high-profile round-the-world [Vendée Globe](#) yacht race.”*

News from **WMO** - [Sailing for Science | World Meteorological Organization \(wmo.int\)](#)

*“We cannot stress enough the importance of the oceans, without them there would be no life on earth.*

*As major players in our climate system, they store over 90% of the excess heat from radiative forcing and absorb about a quarter of the human-produced CO2 emitted annually.*

*This is why we are continuing our ocean research mission to protect this incredible wilderness”,*

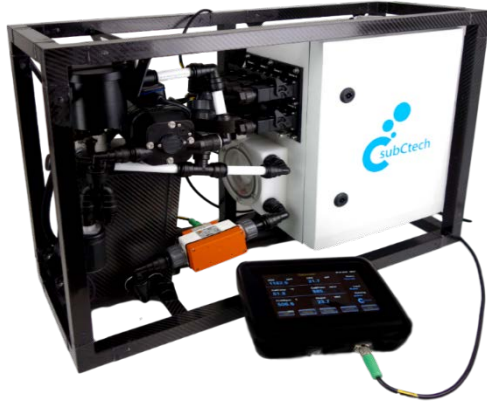
says **Boris Herrmann**, Team Malizia/IMOCA skipper



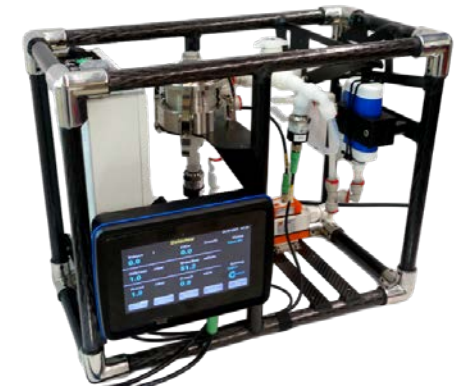
© BorisHerrmannRacing



# Sailing meets Science – How it Looks



© BorisHerrmannRacing, Photo Jean-Marie Liot/Malizia 2020



RACE® Micro-Plastic Sampler  
flow-through



© Fabrice Amédéo, Kapitän der Newrest - Art & Fenêtres, Photo Pierre Bouras #VG2020



RACE® Micro-Plastic Sampler  
for autonomous operation

OceanPack RACE® 6<sup>th</sup> generation  
autonomous monitoring system  
for Greenhouse gases (CO<sub>2</sub>),  
Salinity, Temperature, Algae etc.

*“An unprecedented circumnavigation of  
high quality CO<sub>2</sub> data in 80 days. I think  
this has never been done before. That is  
a great testimony to the instrument that it  
survived a very bumpy ride!”*

Tosta Tanhua, Feb. 2021, GEOMAR



© Jean-Marie  
Liot / Newrest –  
Art & Fenêtres.  
2020

