



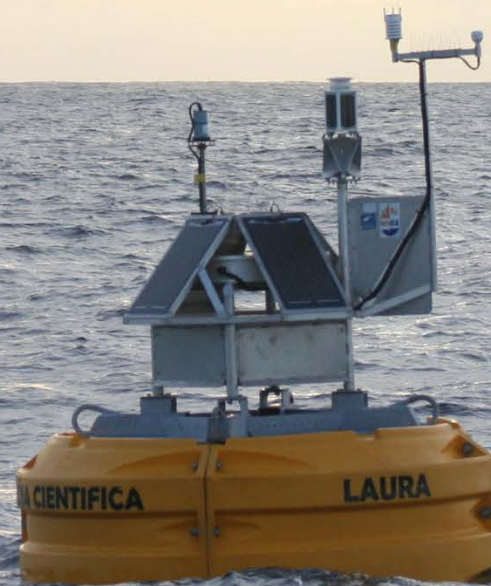
DUST TRAFFIC



European
Research
Council

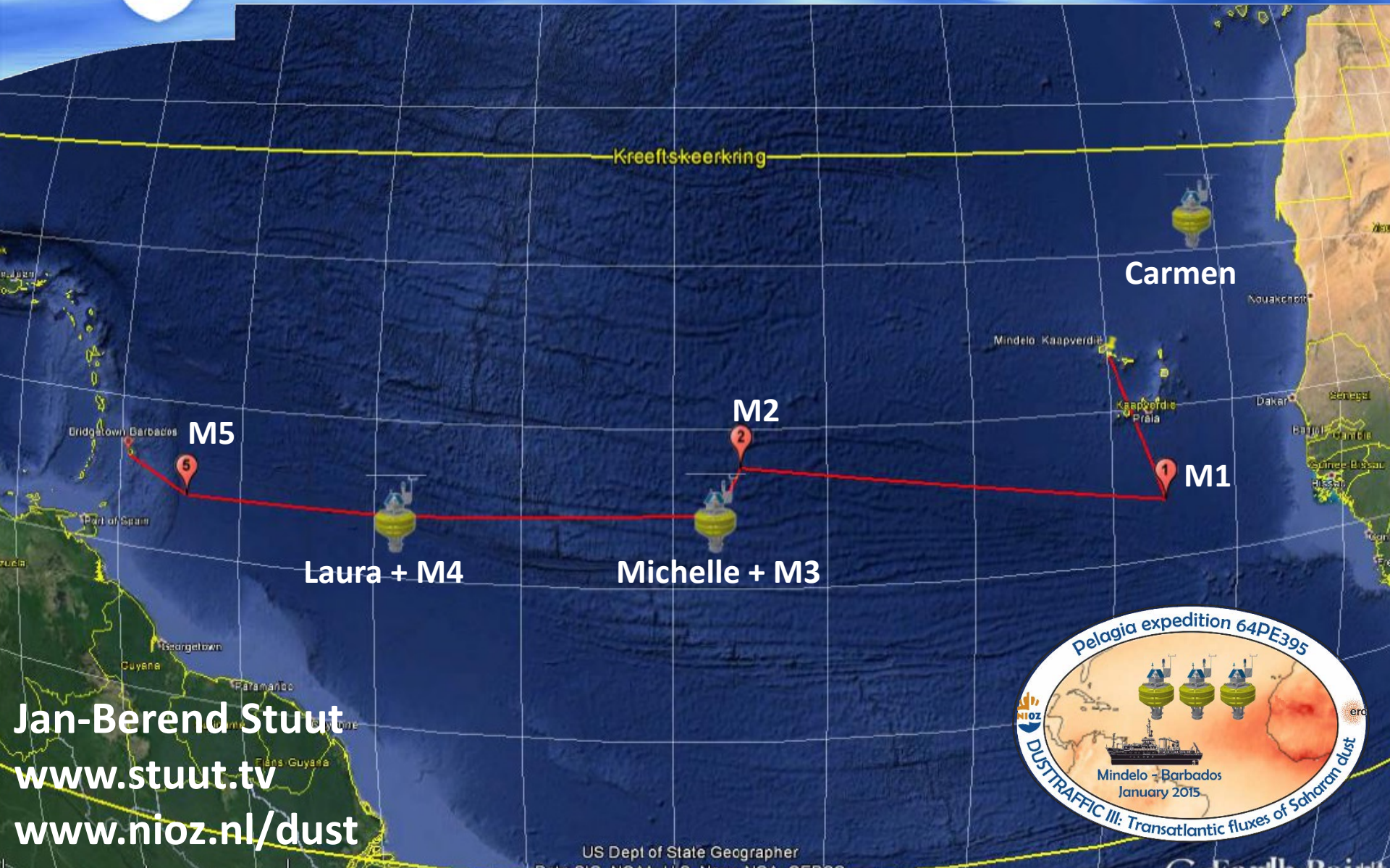
The Mid Atlantic surface buoys project “catching Sahara dust in the Mid Atlantic”

Yvo Witte, NIOZ





Dust Traffic Program



Kreeftskeerkring

Carmen

M2

M1

M5

Laura + M4

Michelle + M3

Pelagia expedition 64PE395



DUSTRAFFIC III

Mindelo - Barbados
January 2015



Jan-Berend Stuut
www.stuut.tv
www.nioz.nl/dust



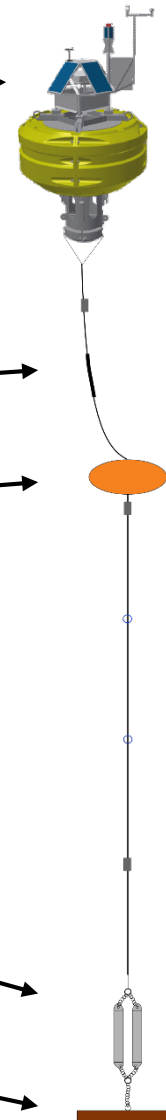
Challenges of project

- Monitoring Saharan dust from source to sink
- Project will run for at least 4 years
- Water depths between 4200 m and 4600 m
- Only once a year servicing, or less
- Could be very bad weather
- Buoy can not be too heavy for ship winches/cranes
- Possibility to service buoy with different vessels
- Need to know position of the buoy (in case of drifting)
- Want to know the status of measurements



Buoy mooring design

- Dust collector
- Surface buoy
- 15 m, 32 mm chain
- Swivel
- 600 m rope
- 45 m rubber stretcher
- 900 m rope
- Subsurface buoy
- Swivels
- 3600 m rope
- Releasers
- 5 m 20 mm chain
- 30 m 32 mm chain
- 3000 kg steel weight





Top of buoy

GPS / Iridium antenna

Weather sensor

Batteries / Electronics

Filter carrousel

Solar panels



SCIENTÍFICA

MICHÈLLE

Filter carousel



- 24 filters
- 16 days / filter
- 4 h pumping / day
- 3600 liter / day
- 60,000 liter / filter

- Synchronized with sediment traps in mooring



Solar panels-batteries-weather sensor

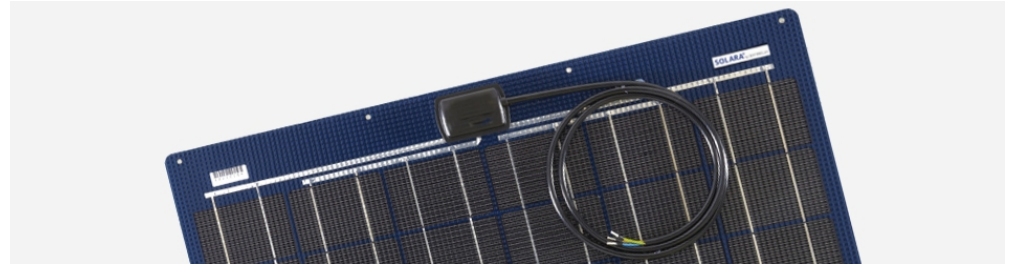
- 4 solar panels = 180Wp (max)
- 1 day sun gives 4 days sampling
+/- 45 days of autonomy

- 4 batteries = 240Ah @ 12V
- Long battery life-time > 5 years



SEMI-FLEXIBLE PANELS

SOLARA® Panels Profi M Series



Weather Sensor which measures:

- Rain
- Wind
- Temp.
- Pressure
- RH

Conditions for sampling:

Rain < 0.2mm/h

Wind < 20m/s



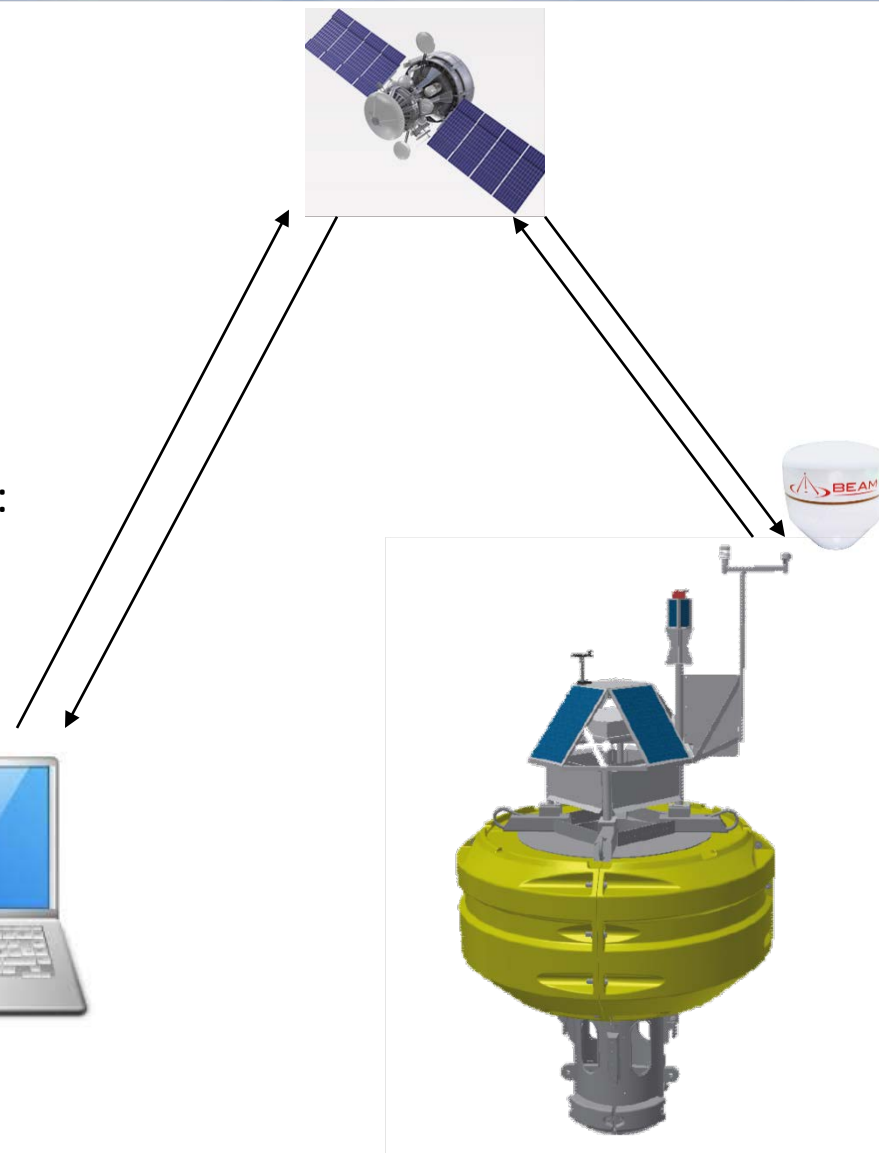


Communication

- Trimble GPS
- Iridium communication with satellite
- < 5mtr accurate

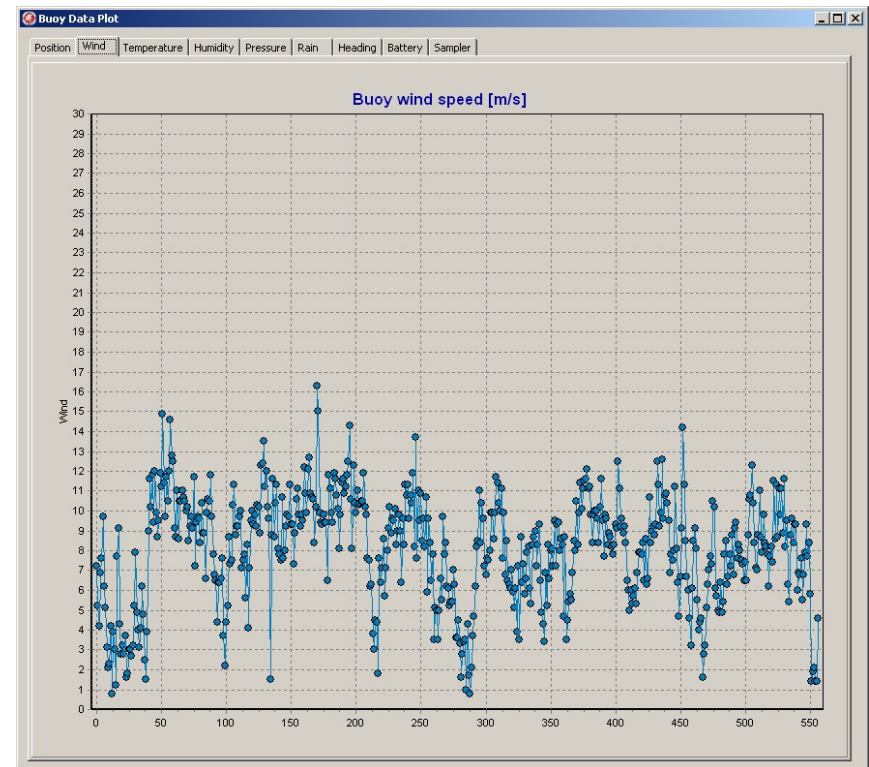
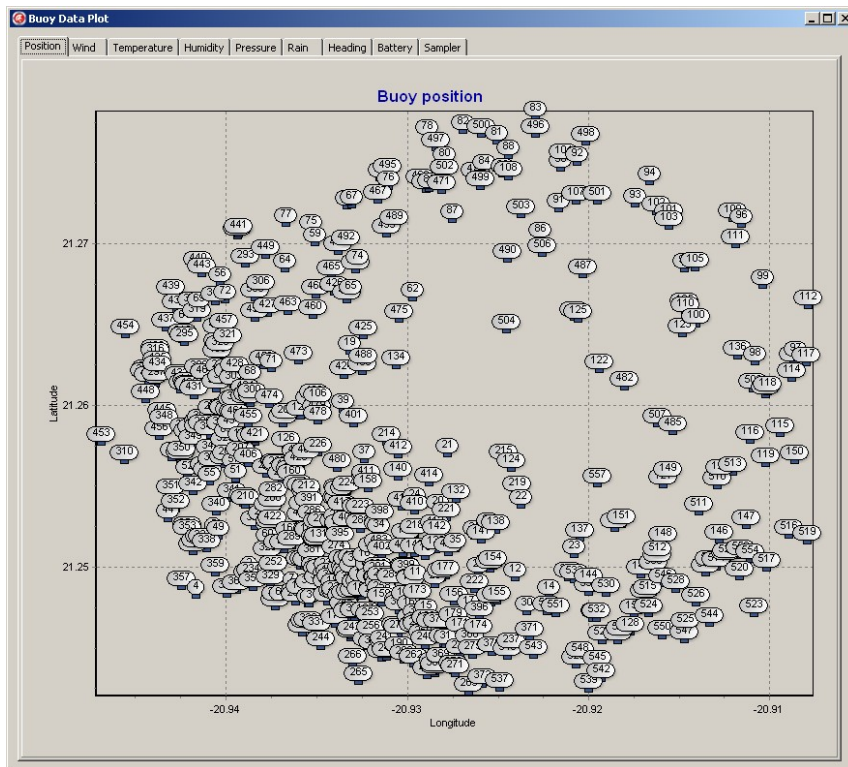
Buoy status by e-mail (SBD file) each 12hours:

- Filter carousel status
- GPS data
- Heading/Pitch/Roll data
- Weather data
- Errors





Buoy data




Surface buoy

Mobilis DB 8000

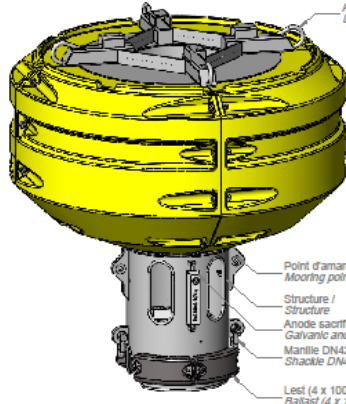
- Diameter 3 m
- 4 compartments
- Gross buoyancy 8000 kg
- Total weight 2327 kg including ballast weights

Buoyancy is provided by multiple-section rotationally mounted polyethylene (PE) floats

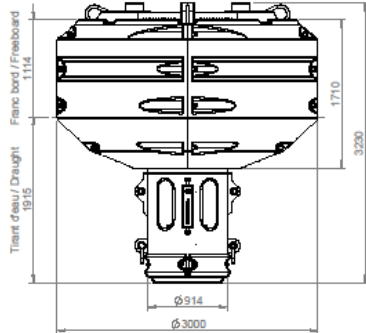
river and sea equipment



Jupe Ø914 - DB 8000





- Anneau de manutention (x4) / Lifting point (x4)
- Flotteur vide / Float empty
- Jaune RAL 6024 / Yellow RAL 6024
- Point d'amarrage (x7) / Mooring point (x7)
- Structure / Structure
- Anode sacrificielle (x3) / Galvanic anode (x3)
- Manille DN42 / Shackles DN42
- Lest (4 x 100Kg) / Ballast (4 x 100kg)



Hauteur totale / Total height: 3200
 Hauteur structure / Structure height: 1710
 Hauteur flotteur / Float height: 1114
 Tirant d'eau / Draught: Ø914
 Diamètre extérieur / Outer diameter: Ø3000

Spécification générale / General Specifications			Spécifications matière / Material specifications	
Masse / Weight	Kg	2327 avec lests with ballasts	Structure / Structure	Acier S235 galvanisé à chaud / Hot dip galvanized S235-steel
Flottabilité par Centimètre / Submergence	Kg /cm	64	Flotteurs / Floats	Polyéthylène moyenne densité / Polyethylene medium density
			Lest / Ballast	Fonte grise / Cast Iron
			-/-	-/-

M_STR_DB8000-J914_01

par JL REF ED
 rev: 001001D IT10 02
 n°: 1/2 03062013

MOBILIS - BP 49000 -13792 Aix-en-Provence cedex 3- France - Tel.: +33 (0)4 42371500 Fax: +33 (0)4 42371501
www.mobilis-sa.com E-mail: mobilis@mobilis-sa.com
 Images specifications et dimensions non-contractuelles / Images and specifications for information only

- Nylon core
- Big elongation
- Spliced breakload 17.8 ton
- Working with max 900 m, reel capacity
- Use for at least 4 years



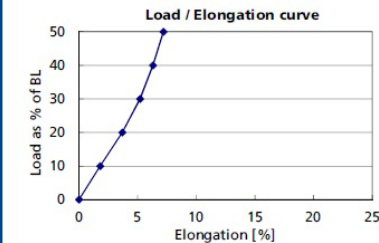
Ropes for oceanography

GeoTwin Tiefseeleine

Construction

- Double braid
- Core: Polyamide
- Cover: Polypropylene multifilament
- Colour: black
- Constructive elongation: 1.50 %
- Break elongation: 16.80 %

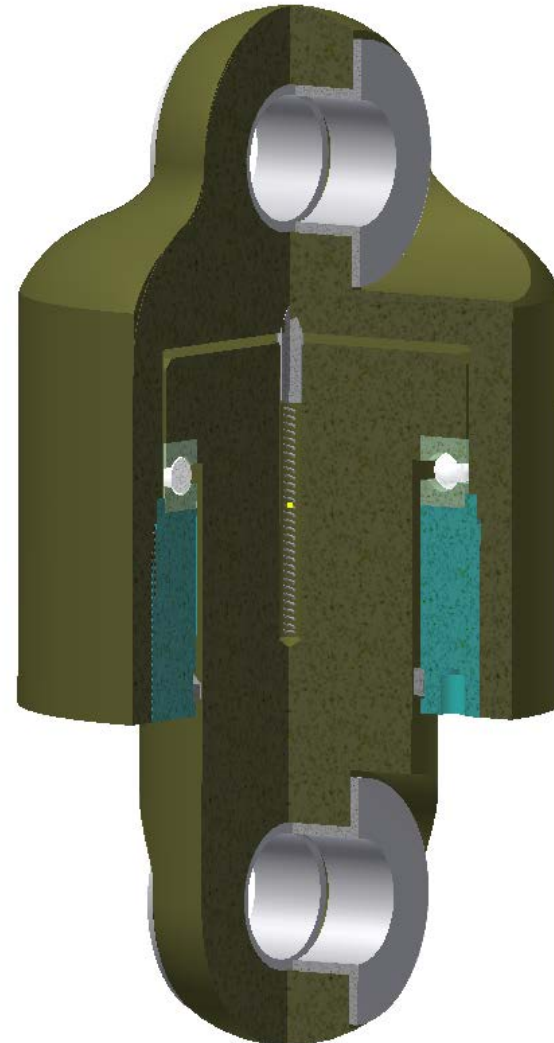
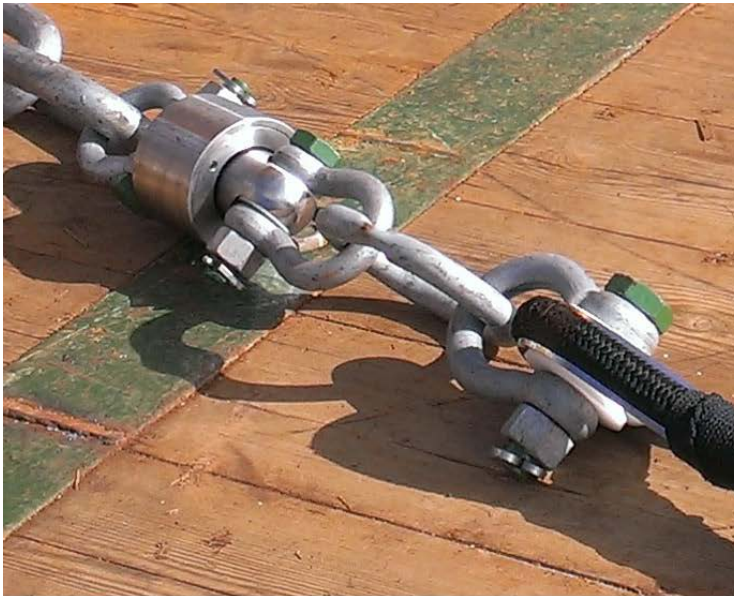
Ø [mm]	Weight [kg/100 m]	BL linear [kN]	BL spliced [kN]
11	6,30	34,10	31,00
14	11,40	60,50	55,00
17	17,30	77,00	70,00
20	22,40	118,80	108,00
26	42,30	192,50	175,00





Swivels

- NIOZ design Titanium swivel
- 10 ton safe working load
- Ceramic bearings
- Light construction only 4.5 kg





Rubber stretcher

- Natural rubber cords
- 3 cords of 15 m in series
- Rubber works as absorber for peaks
- Safety line when rubber reach max elongation
- Elongation of 350%
- Titanium connectors



Diameter (mm)	Hardness (Shore A)	Max Elongation (%)	Max Force (Kg)	Max length available (m)
50	60	350	2000	15



Servicing complete mooring

What happened during almost a year of deployment??

- Surface buoy
- Nylon line
- Swivels
- Chain
- Rubber cord



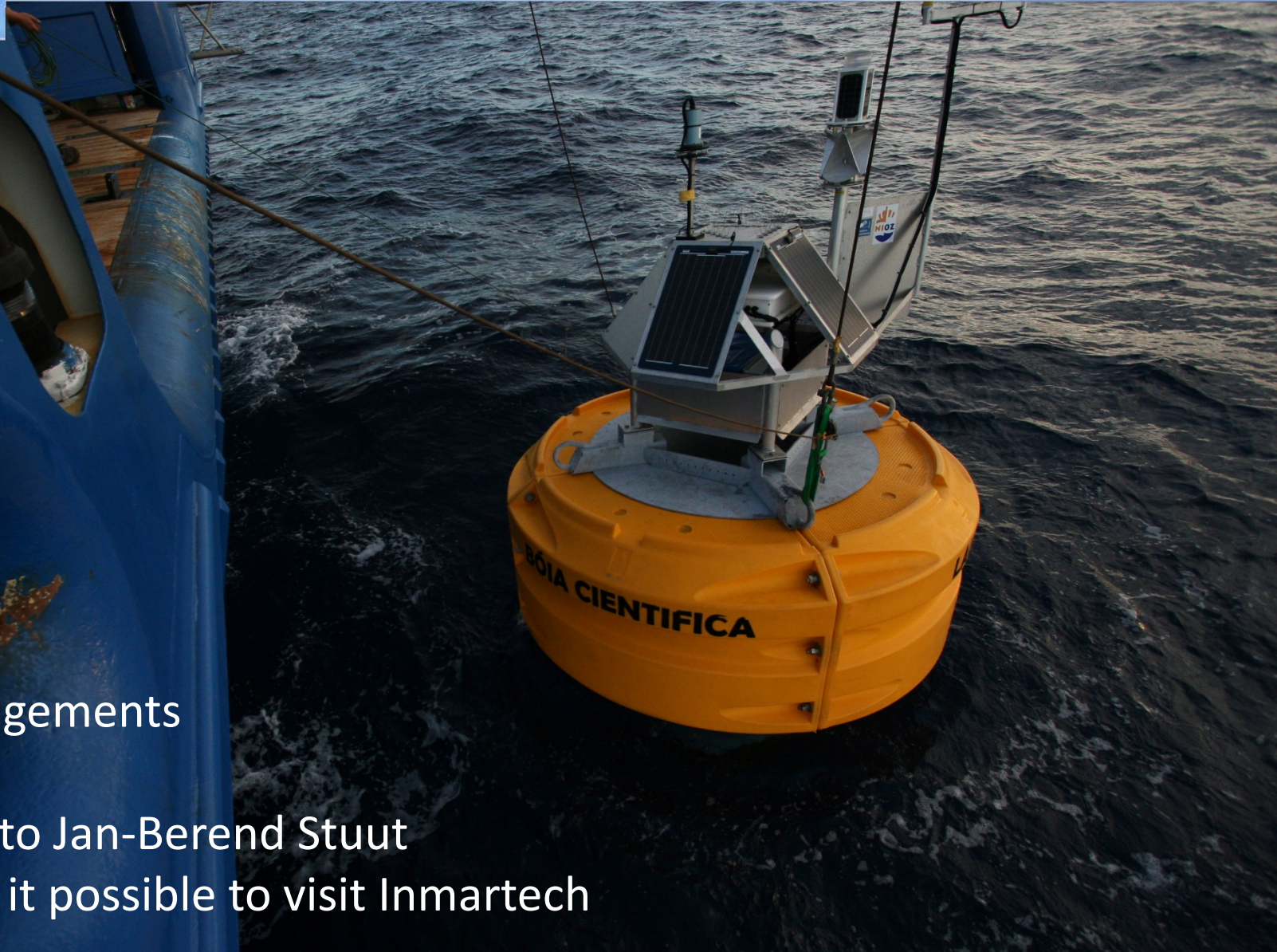
What's next

- Make sure safety line rubber cord gives zero damage
- According to results, looking for longer intervals servicing mooring?
- More instruments connected to surface buoy?
 - e.g., Temperature/salinity sensors
 - XRF in filter carousel
 - Atmospheric observations
 -





Thank you



Acknowledgements

Big thanks to Jan-Berend Stuut
for making it possible to visit Inmartech

