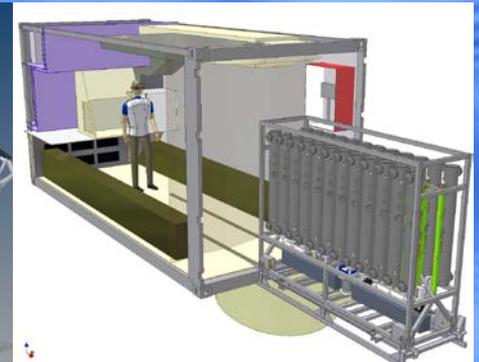
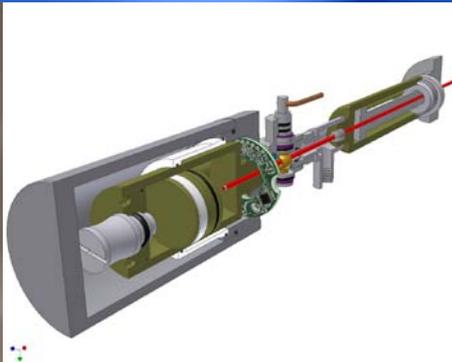
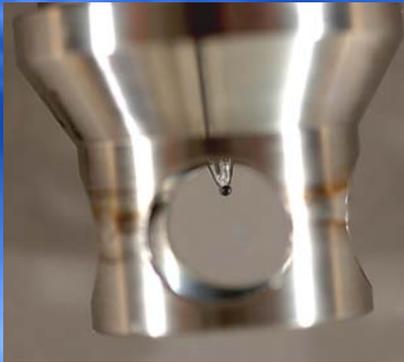




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# Some Instrument Development at NIOZ

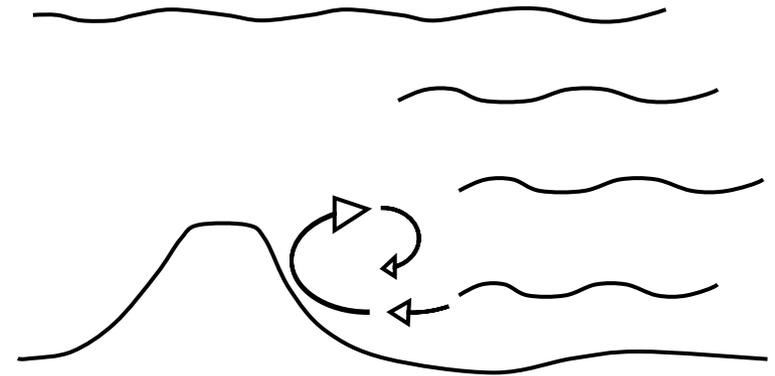


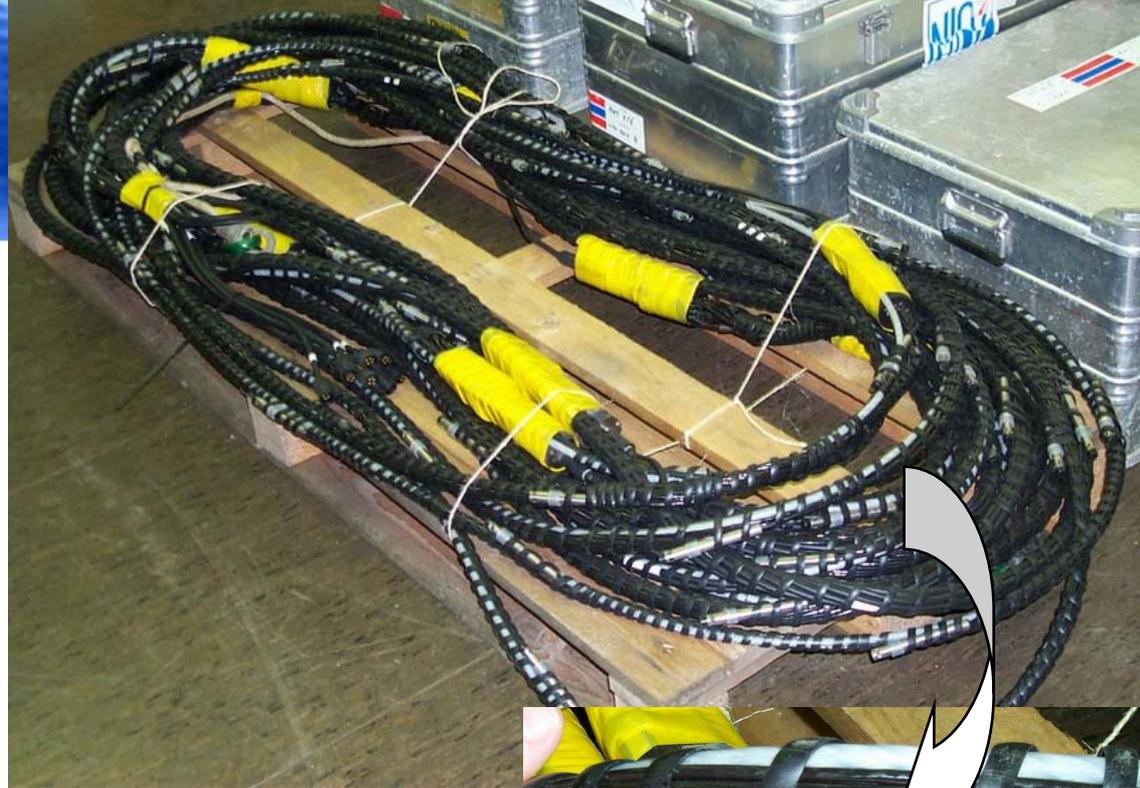
Marck G Smit



# NIOZ Fast Thermistor String, model 3 for measuring internal waves

- **Goal: monitoring fast vigorous internal waves in the ocean down to 6.000 m depth by tracing the temperature changes**
- **Some design specifications:**
  - **128 sensors**
  - **Accuracy: 1,5 mK**
  - **Sampling time: 0,5 sec**
  - **Sampling interval:  $\geq 1$  sec**
  - **Vertical interval: 0,5 m**
  - **Battery life: 15 days**





- **Problems of model 2:**

- **Complex cabling**
- **Breaking conductors in connecting cables**
- **Water intrusion**

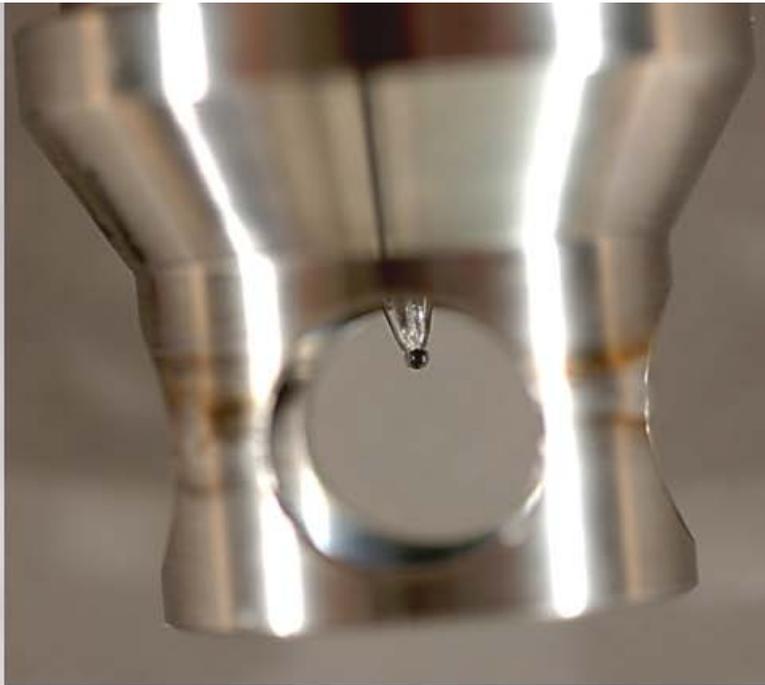
- **Solutions for model 3:**

- **No connecting cables anymore**
- **Stand alone sensor units**
- **Local data storage**
- **Synchronization of local clocks by electrical pulse in mooring cable**





# Thermistors of Model 3





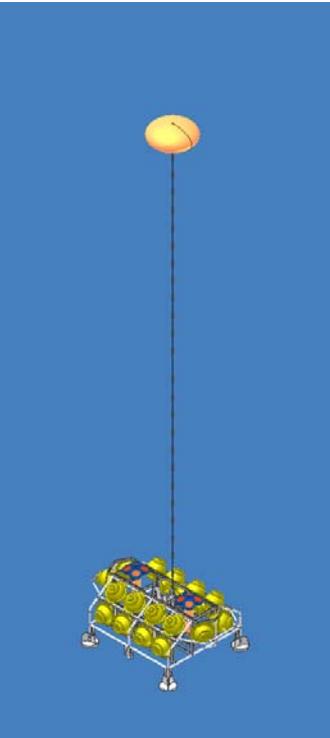
# Major Features

- No connecting cables anymore
- Variable sensor spacing
- Clock synchronization by inductive pulse in mooring cable
- Simultaneous programming by inductive communication
- Local data storage on mini SD-card





# Thermistor 3 at sea



Lander configuration



On the mooring drum



Recovery during the LOCO-IW cruise 2006





# Thermistor 3: major specifications

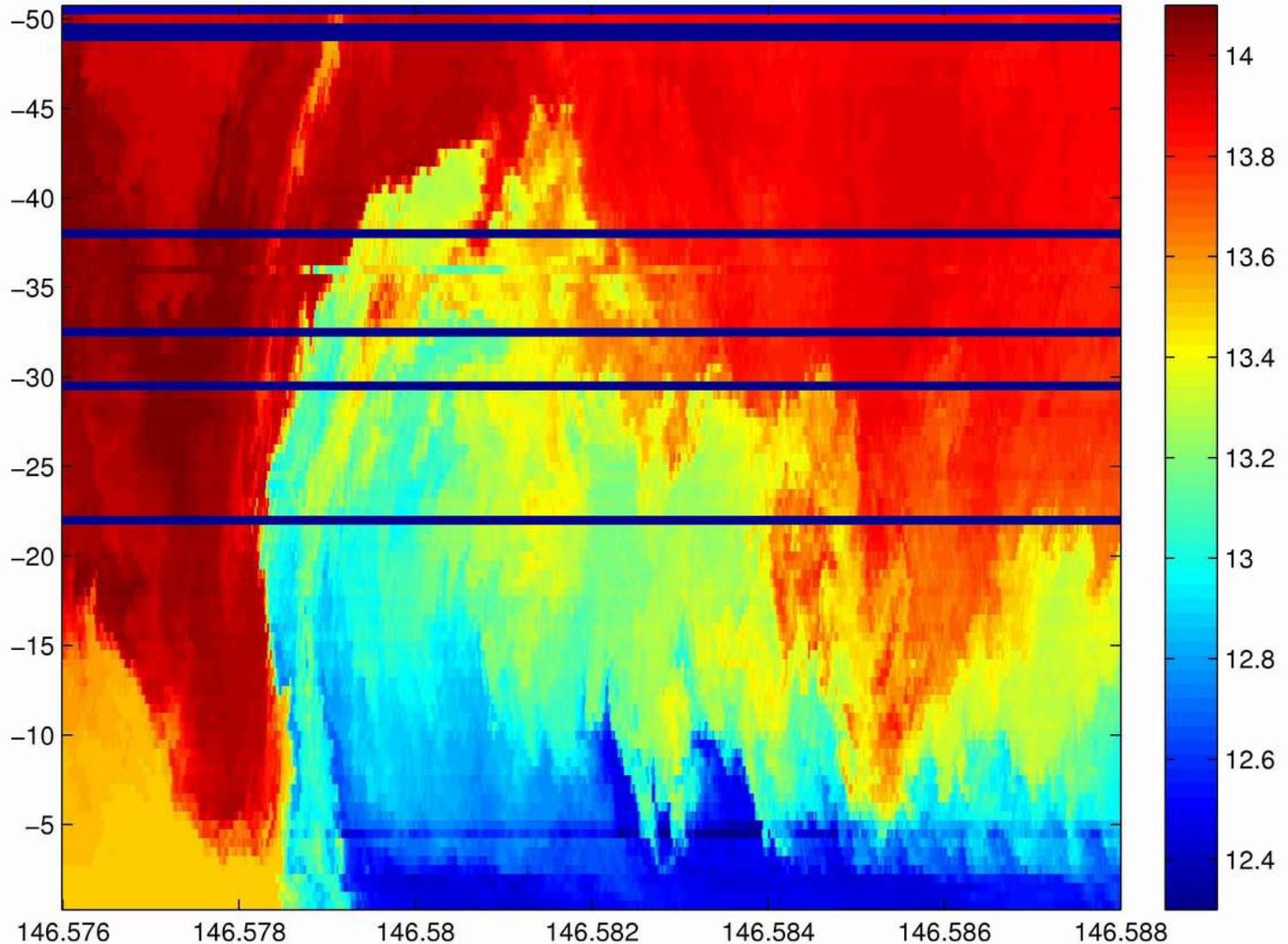


- Number of sensors Free
- Max. string length 200 m (cascading is possible)
- Depth rating 6.000 m
- Accuracy 1.0 mK
- Signal to noise ratio 0.1 mK
- Response time ( $\tau$ ) 0.25 s
- Sampling frequency adjustable: 0 – 2 Hz
- Memory + battery life 2 years
- Data capacity 60 million samples



# Thermistor 3: first output

NIOZ3 wave Great Meteor Seamount May 2006



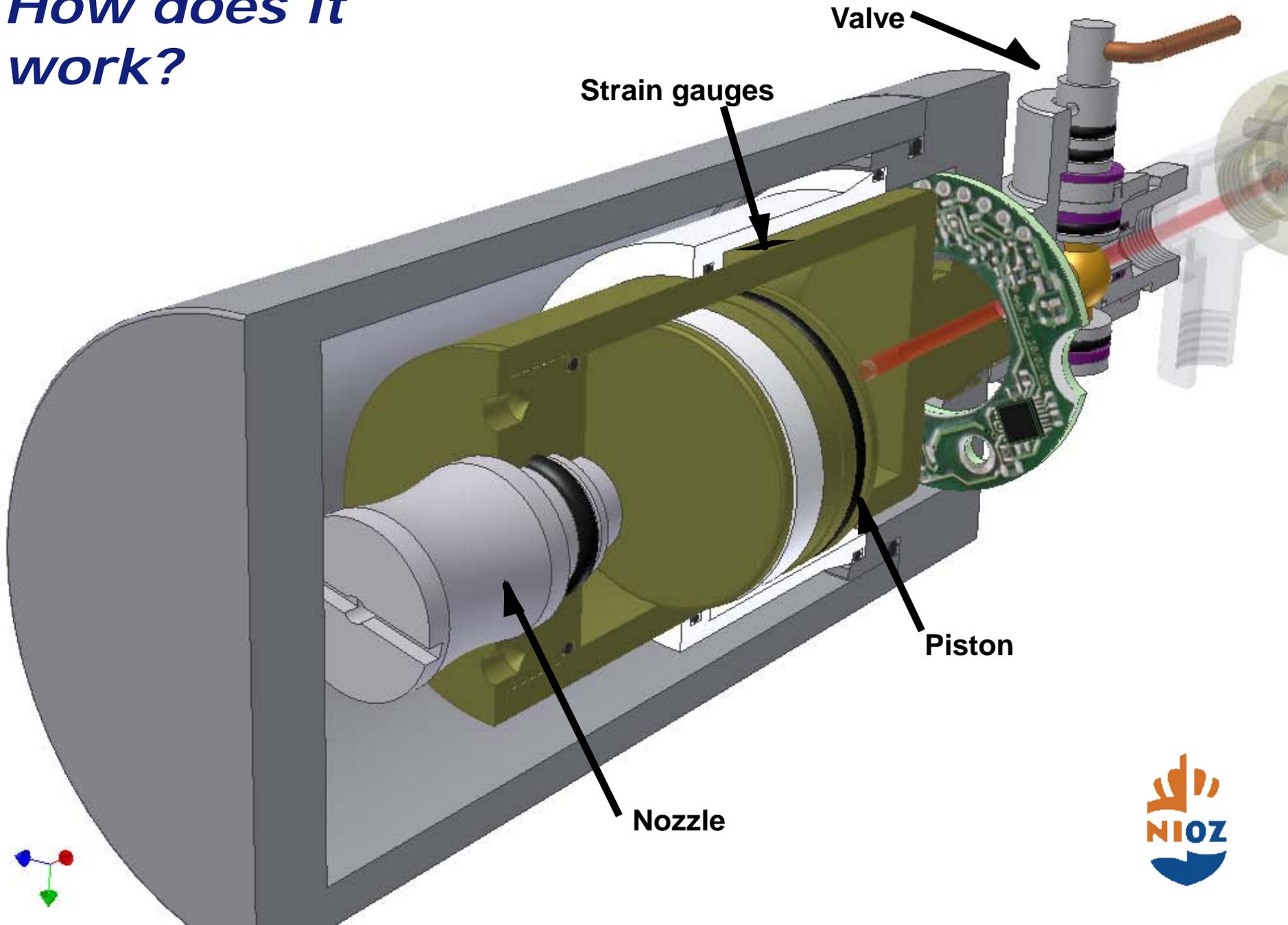
from:  
Van Haren et al



# Pressure Retaining Deep Sea Sampler

- Goal: deep-sea undecompressed water samples for biological purposes
- Specification:
  - Max. pressure loss = 5%
  - Small biological inert bottles: titanium
  - Several volumes: 50, 200 and 500 ml
  - Appr. 12 bottles/depth, 4/6 depths/cast, 4 sets  
== > 288 bottles
  - Onboard radioactive tracer addition
  - Water depth down to 6.000 m

# How does it work?





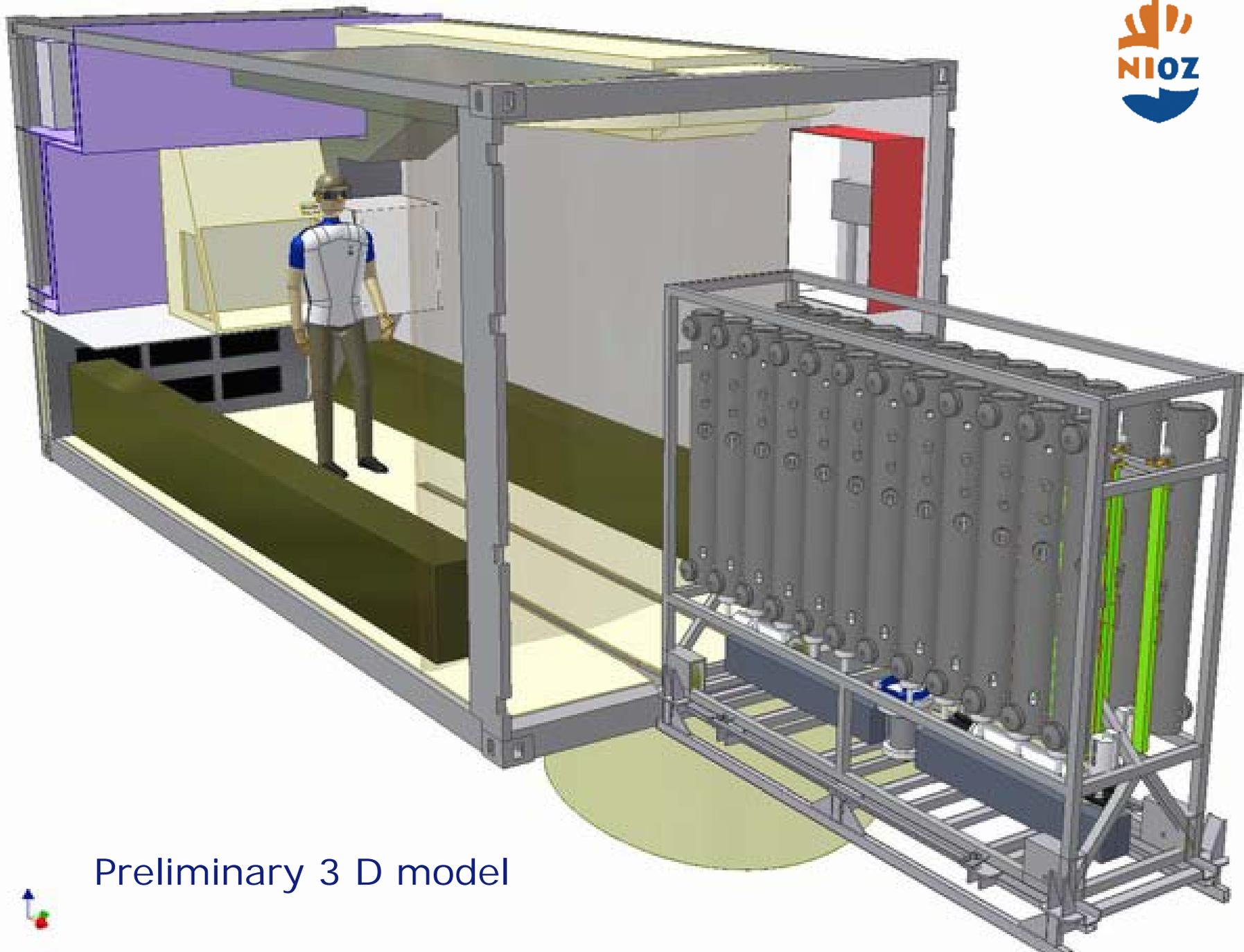
## *Mounting in CTD-frame*





# "TITAN": Ultra Clean CTD-water sampling

- Goal: contamination free sampling and sub sampling
- Standard CTD-water sampling is inadequate for clean samples (trace metals: mainly Fe but also Zn, Cd, Cu)
- Solution:
  - Titanium CTD-rosette new
  - Clean sampling bottles (Go-Flow) existing
  - Use of Kevlar CTD-cable (Kley France winch) existing
  - Clean Room container for sub sampling (also for use on other ships) new
- Participating in SCOR program GEOTRACES
- 2 cruises in International Polar Year 2007-2008 (RV Polarstern)



Preliminary 3 D model





## Trials on board of the Pelagia

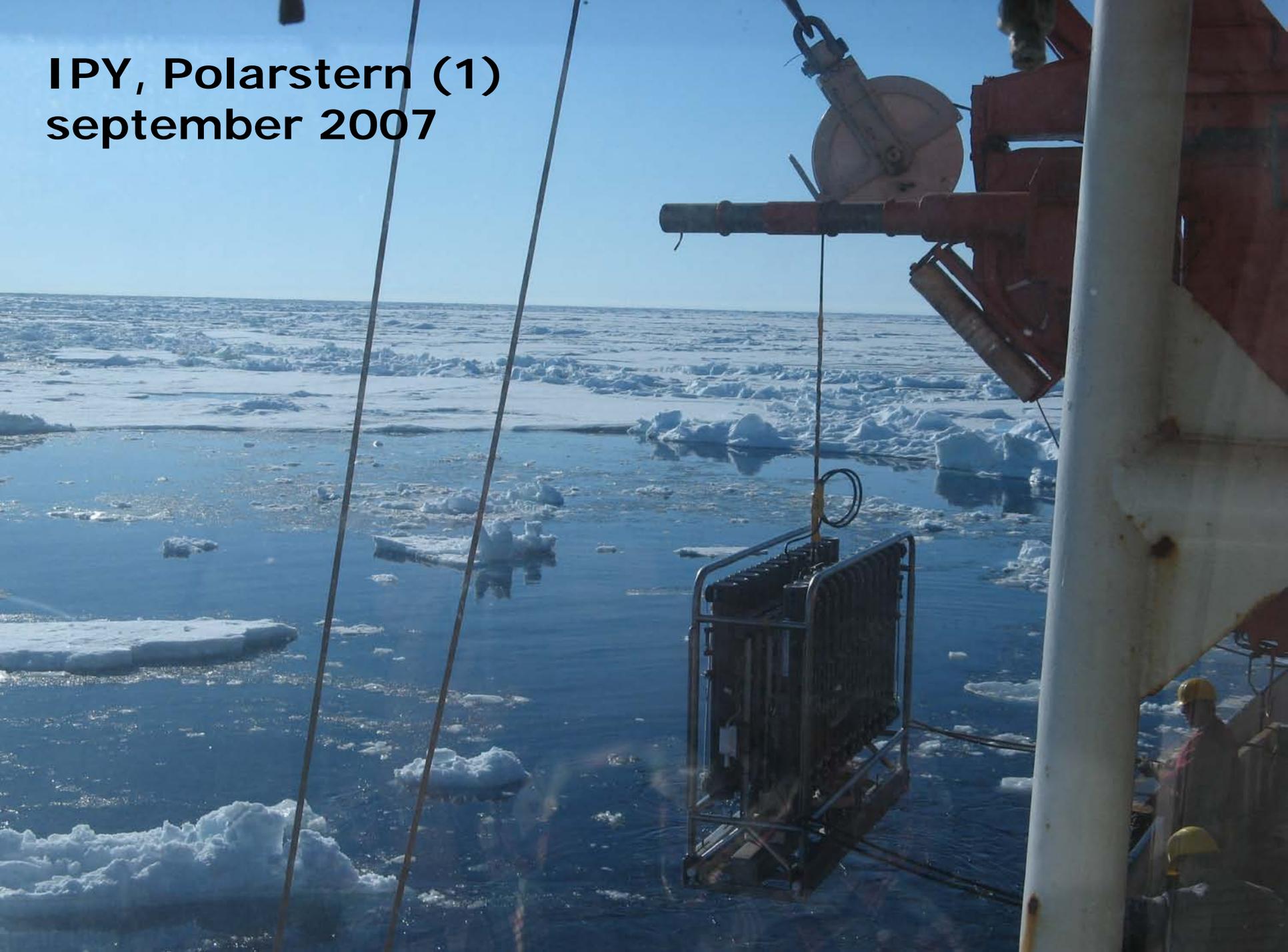






Beaufort 7

**IPY, Polarstern (1)  
september 2007**



# IPY, Polarstern (2) september 2007



Kevlar cable  
deep sea winch

Clean Room  
tapping container

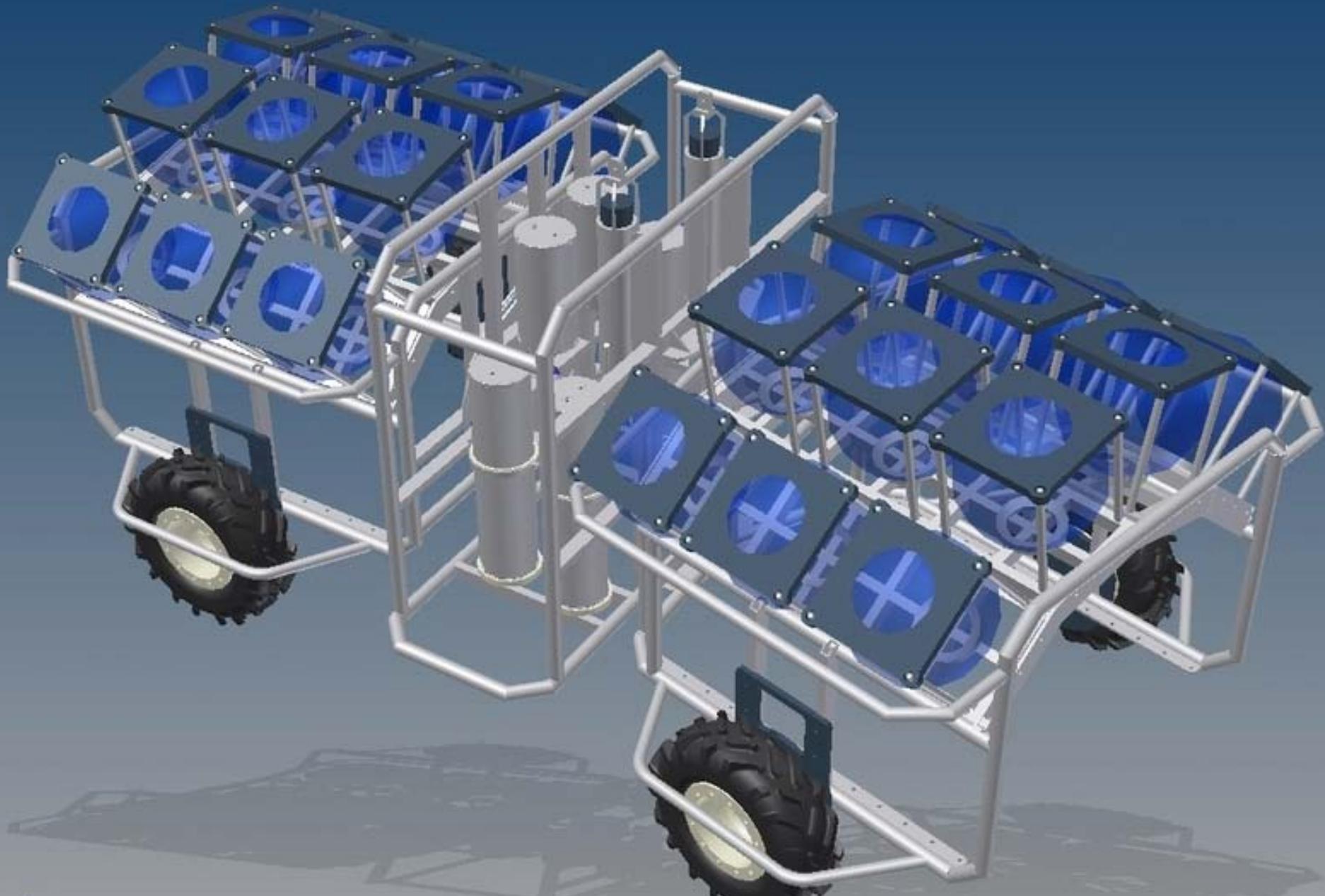


- Mobile Vehicle for benthic research
- Crawler
- Upstream, undisturbed seafloor measurements/sampling
- Designed to cover 30 stations
- Max depth = 6.000 m
- Max deployment period = 9 months

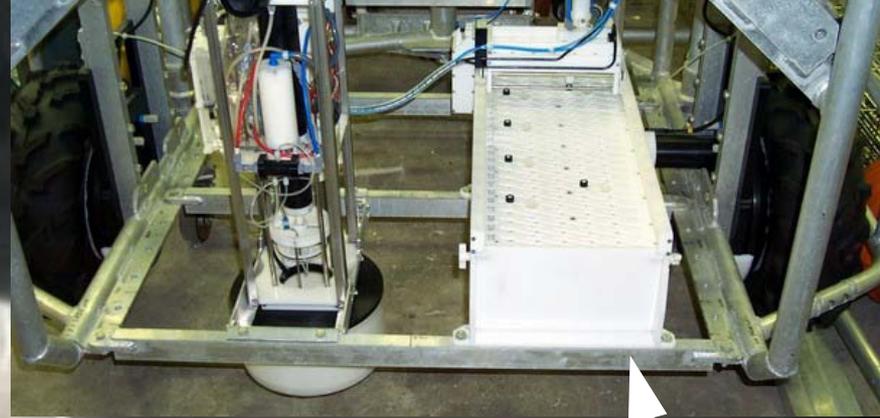




# MOVE: 3-D model



MOVE TEST 01



83

**ALBEX in situ measuring chamber:**

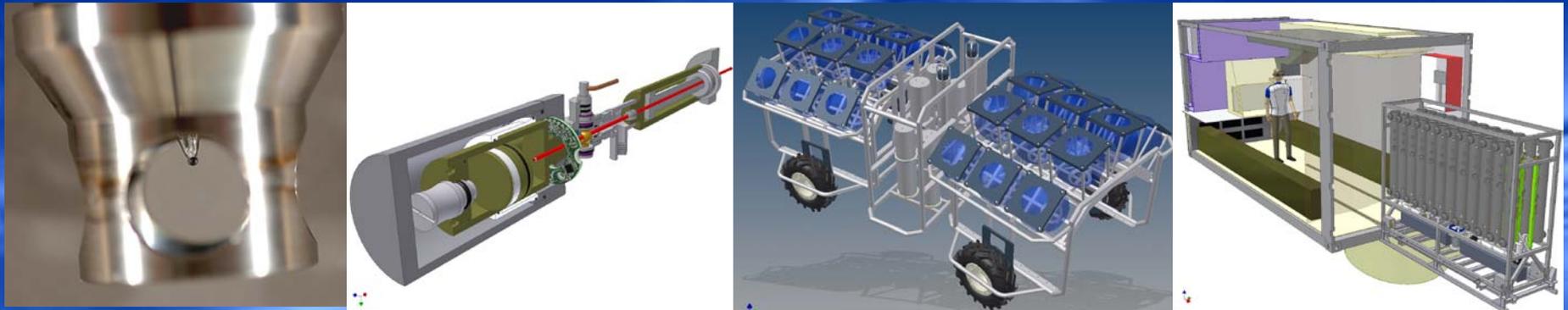
- Oxygen sensor (optode)
- Stirring device
- Water sampling capability
- Sample bag tray (150 samples a 60 ml)

30 4 2005  
10:29:20





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Remarks, suggestions, questions?