

Marine Robotics

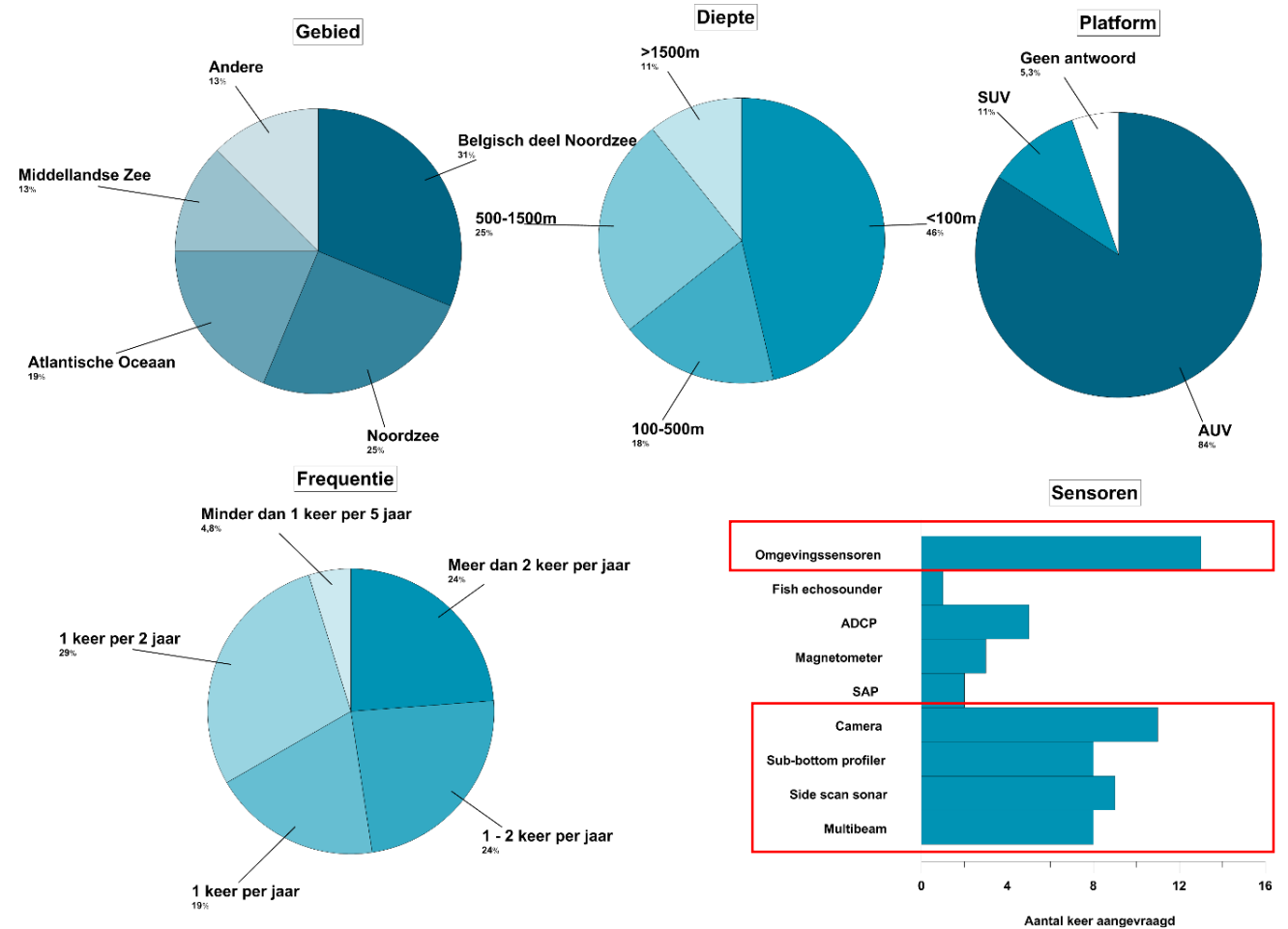


History - Financing

- Flemish government invests 3 000 000€ into a marine robotics center
- Distribution investment
 - AUV (autonomous underwater vehicle) – 1 850 000€
 - USV (unmanned surface vehicle) – 400 000€
 - Technical workspace – 750 000€
- Operational cost (mentioned): 200 000€/year
 - Includes hiring two persons

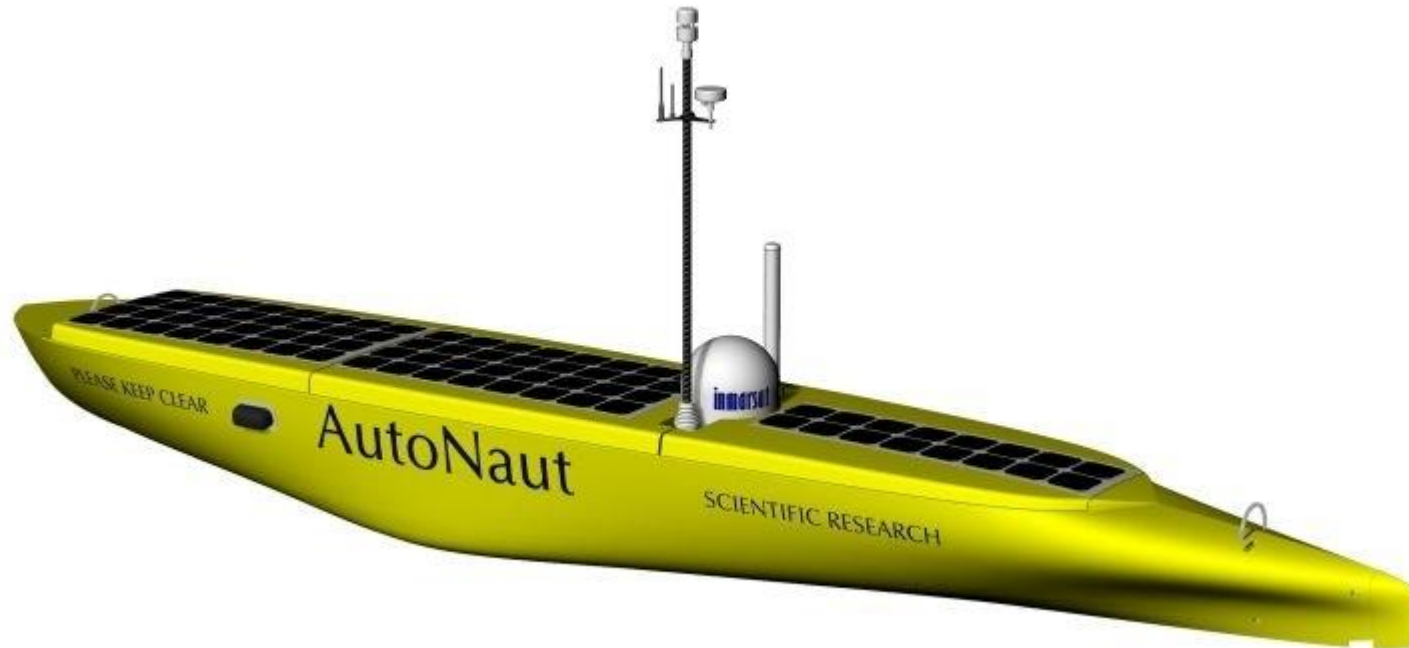
History - Timeline

- Summer 2017 – Feasibility study
- Autumn 2017 – first contacts
- December 2017 – Tender
- May 2018 – deadline response to tender
- September 2018 - decisions



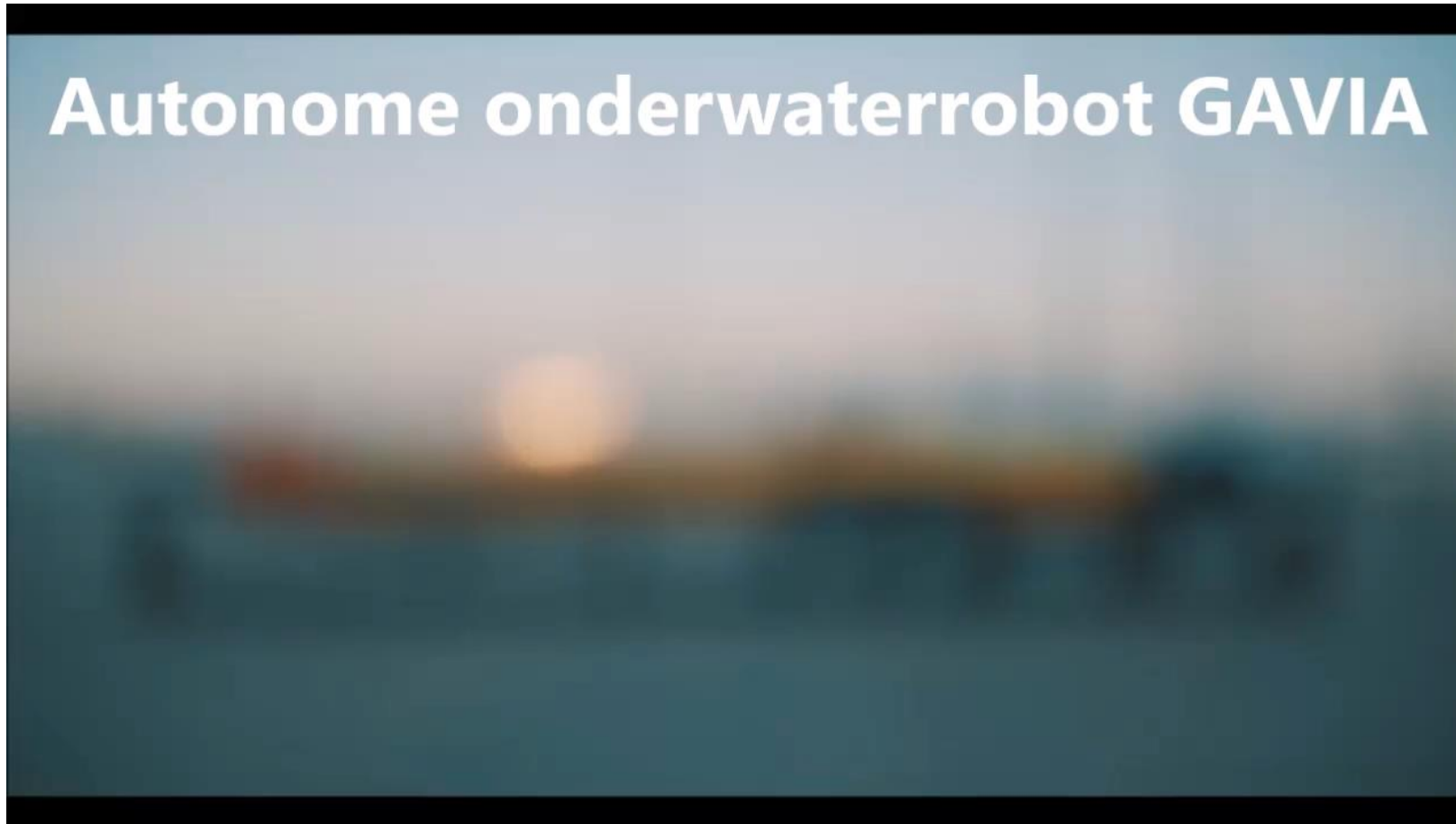
Marine robotics

Teledyne **GAVIA**



Seiche **AUTONAUT**

Marine robotics

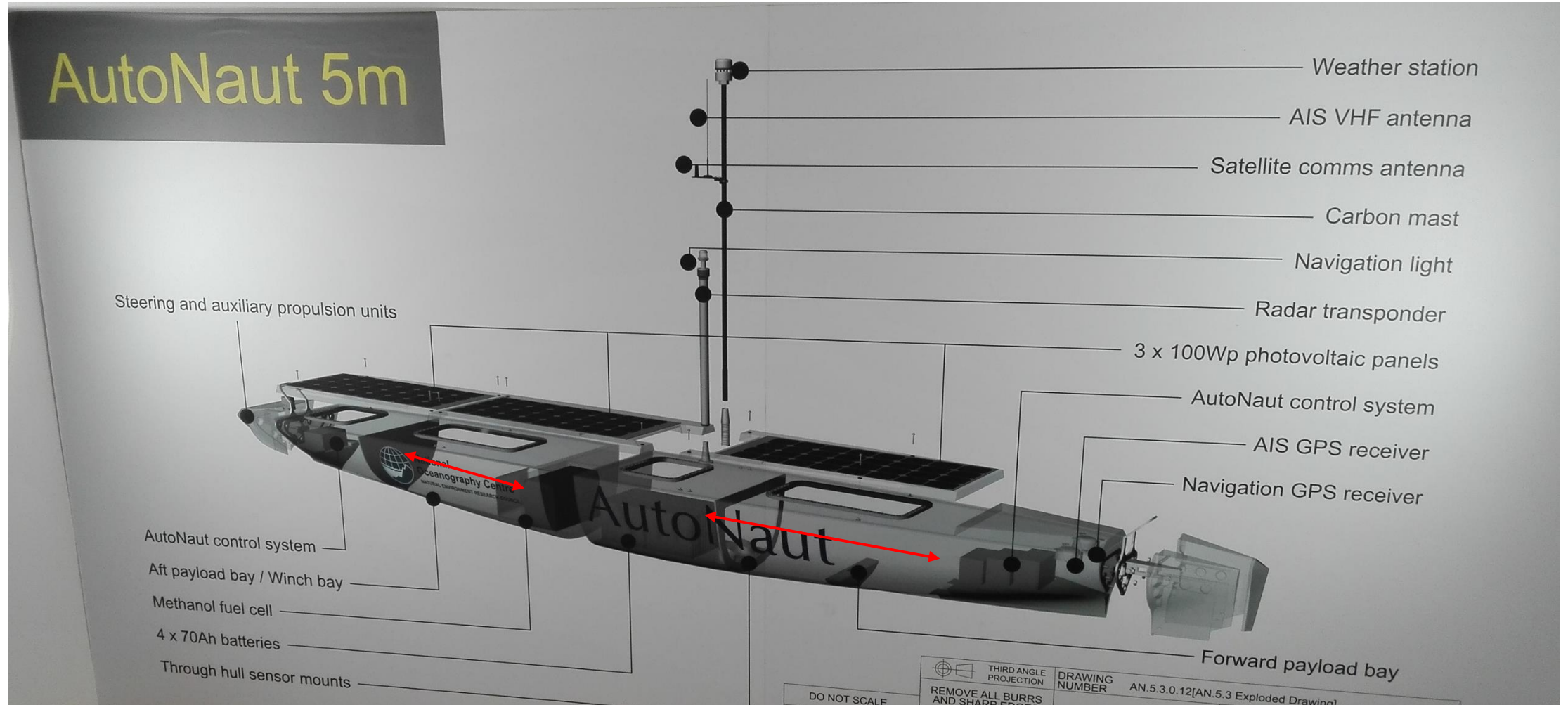


AUTONAUT

- 5m long boat, 250 kg
- 0.8m beam with thruster
- Transported in two flight cases (3 and 3.5m)
- Propulsion: wave-energy
- Energy: Solar panels
 - Batteries if needed
- IAS transponder present
 - Obstacle avoidance



AUTONAUT



AUTONAUT - sensors

Payload: max 130 kg/500 liters

Sensors acquired by VLIZ

1. CTD
2. Chlorophyll A, turbidity, OM
3. Oxygen
4. Webcam
5. ADCP
6. Acoustic receiver
7. Wave motion sensor
8. Hydrophone

Seabird Fastcat

Wetlabs Ecopuck

Aandera 4831

Teledyne RDI 600 kHz workhorse

Vemco V2RC

Aandera MOTUS

Seiche Micropam

AUTONAUT – Additional info

- Piloting training course: 5 days at VLIZ
- Maintenance and re-calibration of sensors included for 3 years
- Piloting: Fixed rate/day for coming 3 years
 - 410€/day inshore
 - 274€/day offshore
- Autonomy
 - Weather conditions/climate
 - Payload
 - Frequency of sampling
 - Weeks – months

AUTONAUT – communication

- WIFI connection for data transfer
- Network (4G) compability for data transfer
- WIFI for line of sight navigation
- RUDICS iridium for status and position updates



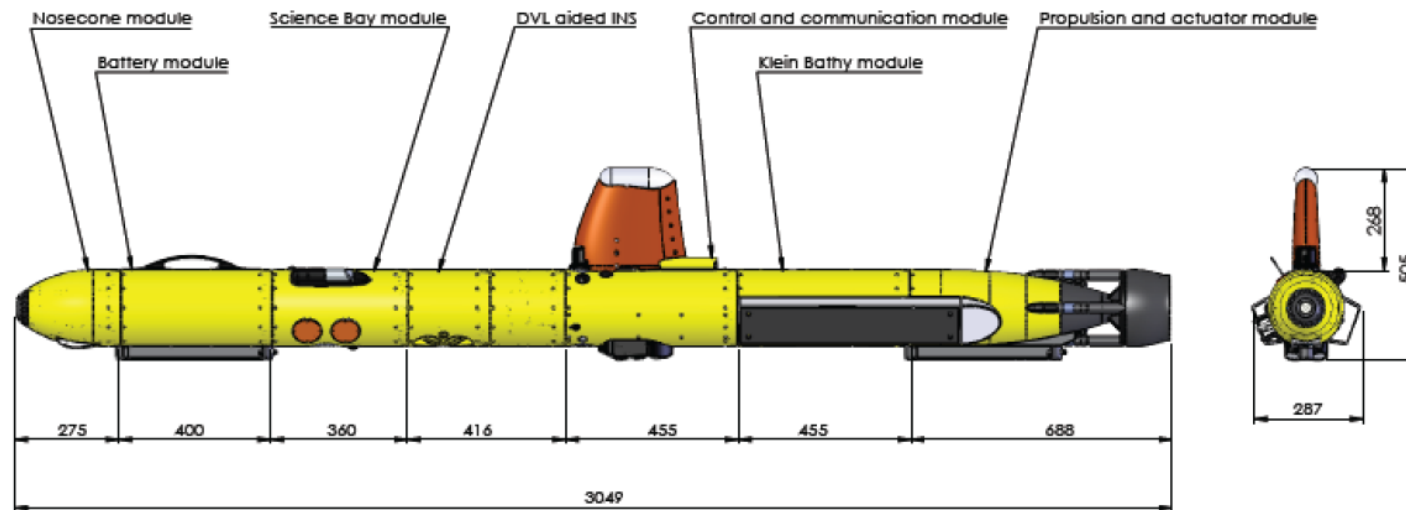
GAVIA

- Length – 1.7 to 3.55m
- Weight – 49 to 94.3 kg
- Diameter – 20 cm
- Depth rating – 1000m
- Max speed – 5.5 knots
- Endurance – 4 to 7 h/battery
- Memory – 480 GB
 - Dedicated memory on sensors



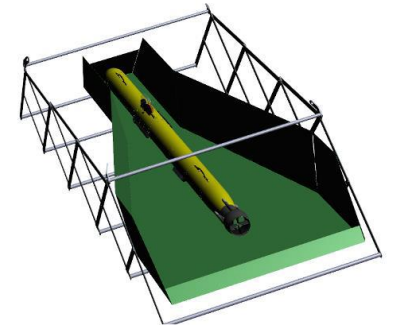
GAVIA – communication & GPS

- Ethernet – 100 Mbit/s
- WIFI – up to 54 Mbit/s (300m)
- Satellite iridium
 - Communication (small rate)
 - Positioning
- Acoustic modem (Benthos) – 2kbaud (1200m)
- GPS receiver on surface
- RTK enabled tower
- Corrections through USBL



GAVIA - Logistics

- Recovery:
 - LARS system – cage
 - Man-portable (slipway, docks)
 - Nosecone detachable
- Rapid turnaround: 1h
 - 2 sets of batteries
- Travelling cases

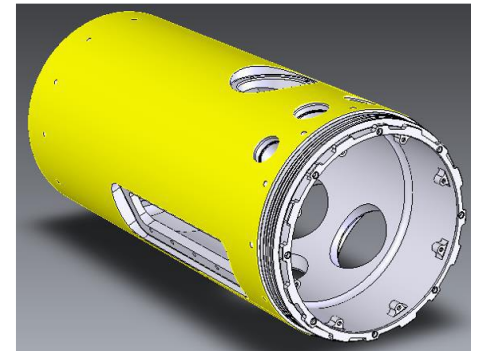


GAVIA – sensors

Sensors can be combined

Sensors acquired by VLIZ:

- | | | | |
|----|-------------------------------|---|-----------------|
| 1. | Multibeam | Klein 3500 (455 kHz) | range 125m |
| 2. | Sidescan sonar | Klein 3500 (455 & 900 kHz) | range 150 & 75m |
| 3. | Sub-bottom profiler | Benthos (14 & 21 kHz) | |
| 4. | Science bay module | | |
| 1. | CTD | RBR Brevio | |
| 2. | Oxygen | Aandera 4831 | |
| 3. | Chlorophyll 1, turbidity & OM | Wetlabs Ecopuck | |
| 4. | Carbondioxide | Pro Oceanus Mini | |
| 5. | Nitrate | Wetlabs Suna | |
| 6. | USBL transponder | GAPS | |
| 5. | ADCP | RDI Workhorse (600 kHz, up and down) | |
| 6. | Camera | 1.9 megapixels camera, 1600x1200 resolution, LED lighting | |



GAVIA – Additional info

- Training
 - Operator (5 days)
 - Maintenance (4 days)
- Maintenance & recalibration of sensors: 3 years
- Support during first missions



Questions?

