

DOLAN

Experiences with Iridium
installed on the North Atlantic
on a long time mooring

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Contact:

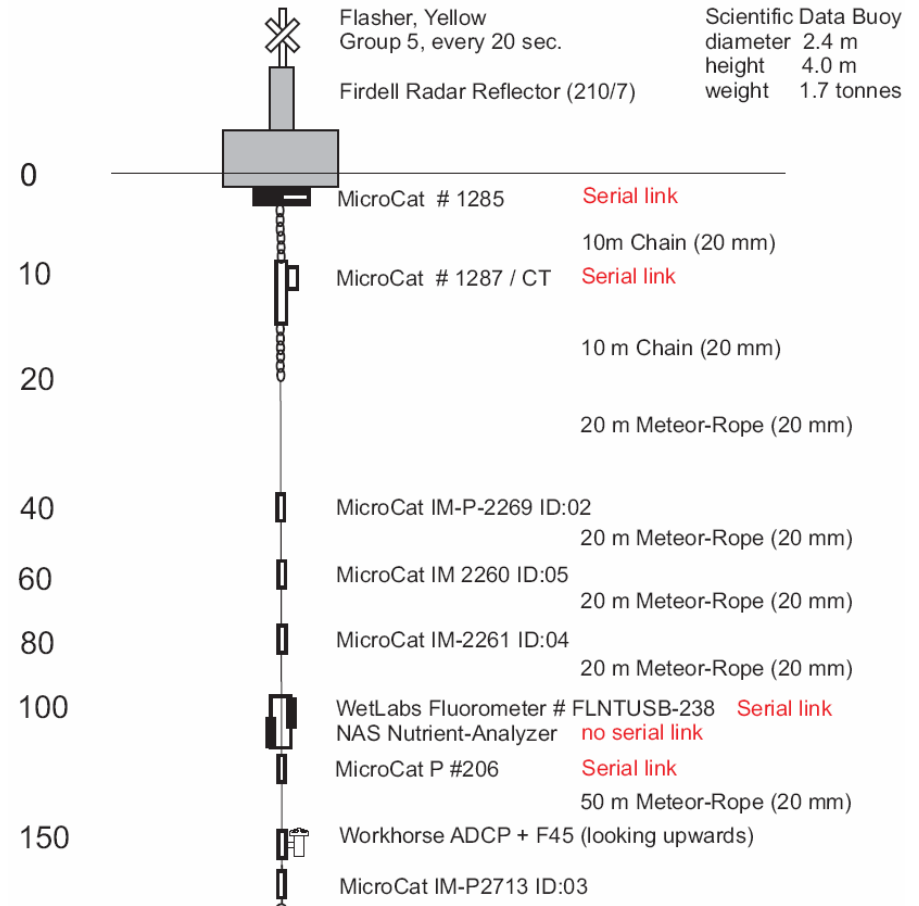
Marum – Center for Marine Environmental Sciences
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Tel: +49 421 218-65608 E-Mail: ekopiske@marum.de

What & where is DOLAN



- DOLAN

- Deep sea mooring (3600m)
- North Atlantic north of Canary Islands
- Near real time telemetry
- Scientific task: Investigation of carbon flux from air to seawater
- Meteorological Sensors
- Chemical / Oceanographic Sensors in the upper 100m
- Since 1993: DOMEST, DOLAN, ANIMATE, MERSEA
- First Iridium tests: 2002
- Iridium implementation: April 2004



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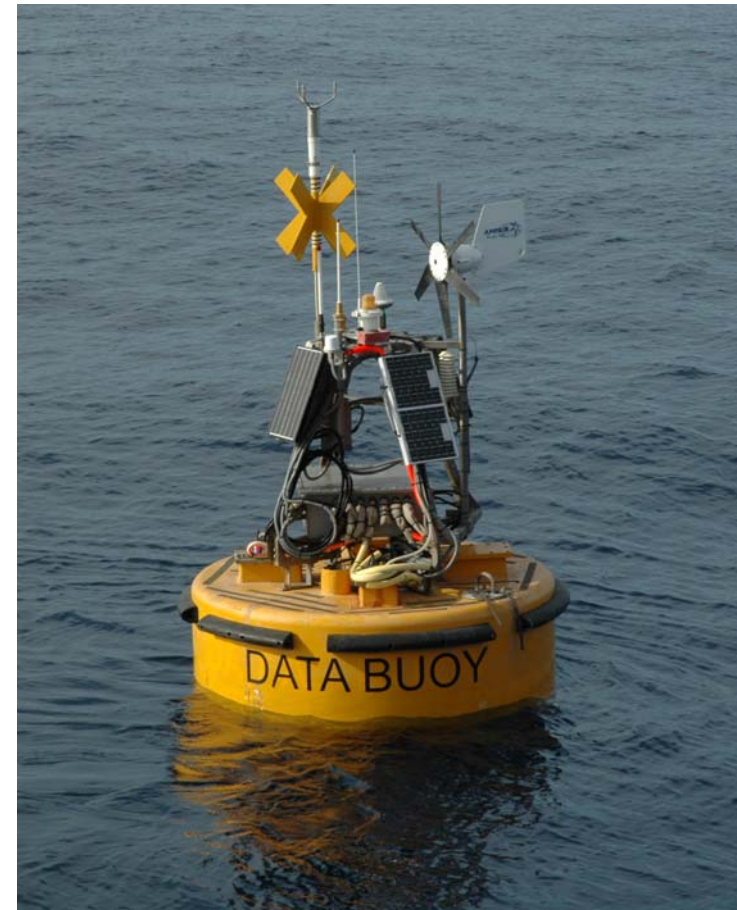
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The DOLAN buoy



- Power Supply
 - 12V system powered by solar panels
 - 108 Ah accumulator
 - 24V system powered by wind & solar
 - 108 Ah accumulator
 - Power control board
 - programmed by DOLIX via rs232
 - Overcurrent protection / resettable fuses
 - Power monitoring
 - Switching of all systems on board
- Control Computer DOLIX
 - Linux (2.4.20)
 - Low power PC104 computer (ELAN420 processor)
 - 10 serial interfaces (RS232)
 - LAN
 - CAN etc.
 - WLAN



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DOLAN / MERSEA Sensors



- Meteorological Sensors
 - Air temperature
 - Air barometric air pressure
 - Relative humidity
 - Ultrasonic Windspeed Sensor
 - Kompass
- Sub surface Sensors
 - CT Microcat @ 0,5m and 10m
 - CTD Microcat @ 40, 60, 80, 150m
 - Nutrient Analyser @100m
 - Fluorometer @ 100m
 - CTD (Microcat) @100m
 - ADCP @150m



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DOLAN Configuration



The sensors are connected via different links to the satellite telemetrie:

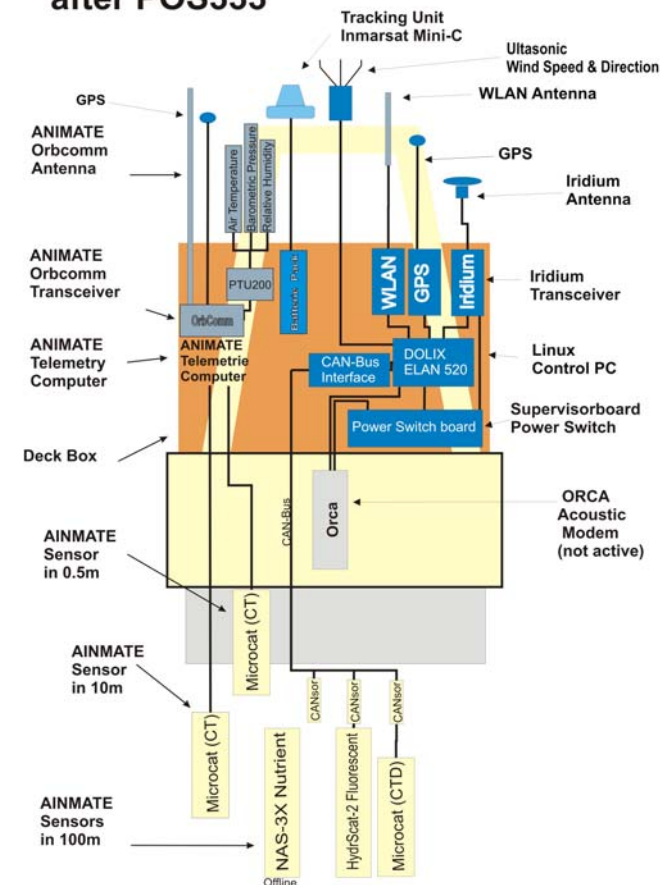
1. DOLIX (Linux)

- Iridium SBD / Dial-In access
- CAN bus interface
- 10 x RS232

2. Orbcmm telemetrie (microcontroller board)

- Panasonic Orbcmm Transceiver (GPS)
- 4 x RS232

Configuration of the DOLAN buoy after POS333



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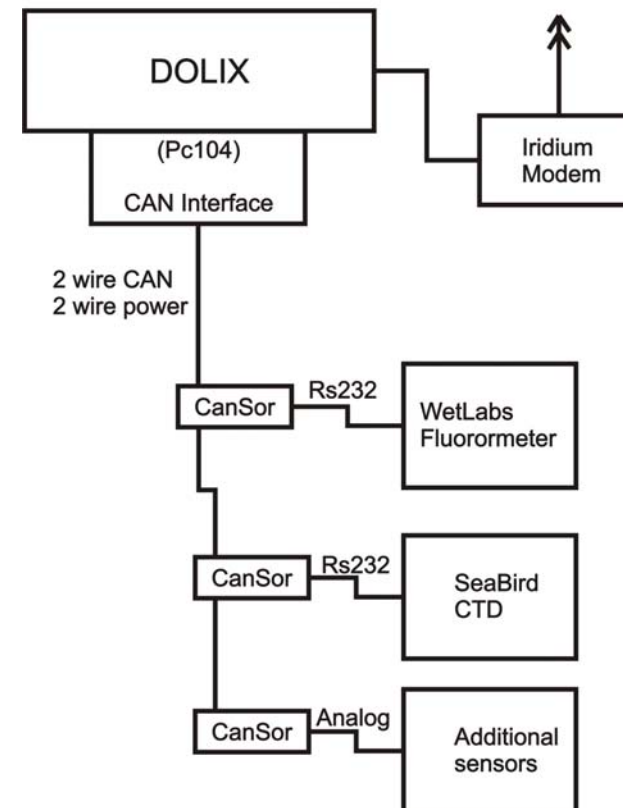
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CAN Sub Sea Telemetry



- The sub sea sensors are connected via CAN bus (4 wire cable, CAN and Power)
- Only one CAN port on the DOLIX computer required for more than 100 sensors
- CanSor board
 - Converts RS232 to can
 - A/D converter & Digital I/O
 - add sensor meta data
 - perform averaging or other conversion tasks
 - Offers bidirectional access to sensor
 - send data in XML / Sensor ML
 - implement CanOpen protocol

CAN Bus on DOLAN



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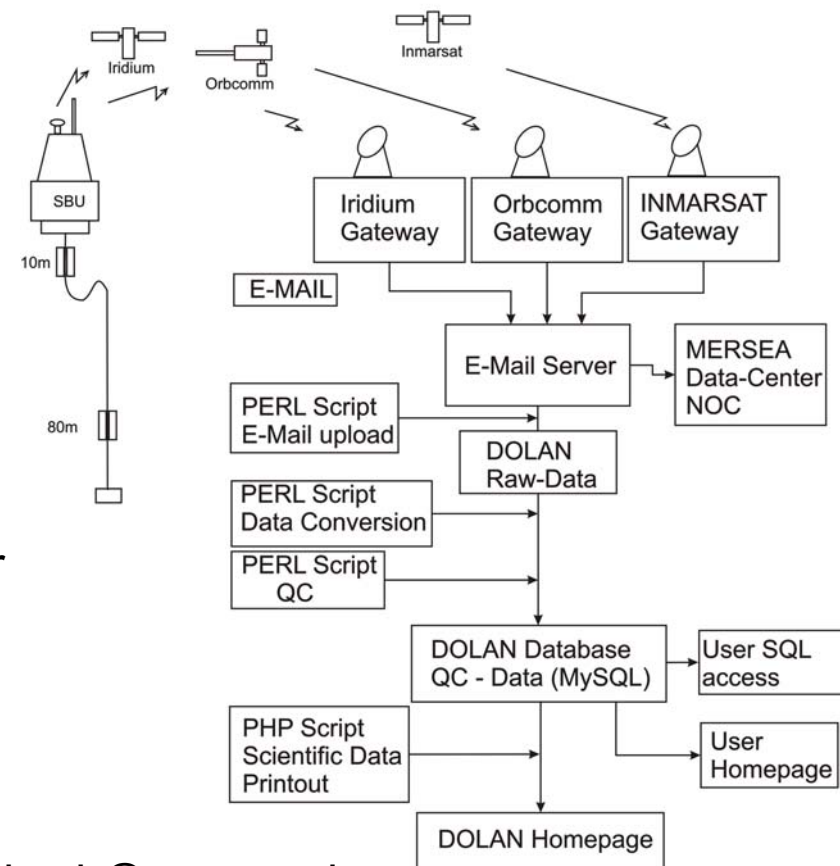
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DOLAN telemetry data path



- Sensor data is converted into telemetry data
- telemetry data is sent via satellite link
- All data is received via E-Mail
- Data extraction / conversion
- Quality control
- Data storage in MySQL database
- User access via
 - user software via SQL query / odbc driver (e.g. Excel, open office, ...)
 - PHP Script for display on a homepage
 - Export of 'comma separated values' files

Communication Pathways DOLAN / ANIMATE / MERSEA



Database engineering: Holger Kalweit kalweit@marum.de

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Where do we plan to go



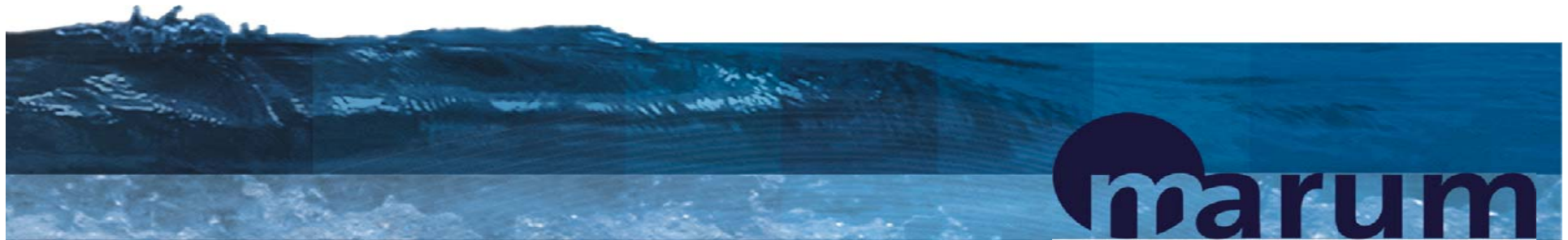
- **Modular system / easy integration or exchange of sensors**
- Standardization of interfaces and protocols
- Analysis of XML / SensorML implementation
- **Improvement of CanSor software / implementation of CanOpen Protocol**
 - All sensor specific tasks shall be performed near the sensor
 - The system shall not be affected by the installation of new sensors
- The system should contain and deliver meta data for all sensors like serial no., calibration data etc.
- **The system should allow diagnostics and reprogramming of the sensors in the deployed system**
- **Monitoring and logging of relevant housekeeping data of all systems including power supply units**
- **Fault management system, automatic preventive actions, safe mode**
- **Linux Project for a free exchange of information**

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Thank you for your attention!

Please feel free to contact us:

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Eberhard Kopiske ekopiske@marum.de (DOLAN)

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Appendix: data Format



- Wind Speed Message (Iridium)
 - 09.03.06 17:15:00 DOLIX
 - WI:,Ws:,9.0537,Wd:,238.6572,n:600
- Air sensors:
 - FIXED_MSG:WE 19,1: PA: 1020.69 T: 17.82 RH: 80.02,100326,31,03
- Microcat:
 - FIXED_MSG:MC1 18,1: T\$\$\$ 19.1400, 4.92194, 31 Mar 2006, 09:51:18\$\$\$>\$\$,095155,31,03
- INMARSAT Mini-C
 - Maritime Mobile Position Report
Atlantic East Ocean Region, DNID : 27057, Member Number : 1
Position : 29 11.68' N, 15 56.80' W
Speed : 1.2 knots, Course : 286 degree
Time of position : 31-MAR-06 07:02

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