OFEG-Tech 2nd ROV Workshop @ GEOMAR 11. Dec. 2019

Participants:

Name		Institute	E-Mail
O'Driscoll	Paddy	Irish Marine Institute	Paddy.ODriscoll@pomaritime.com
Toal	Daniel	Irish Marine Institute	Daniel.Toal@ul.ie
Furlong	Maaten	National Oceanographic Institute	maaten.furlong@noc.ac.uk
Mutlu	Emre	National Oceanographic Institute	emre.mutlu@noc.ac.uk
Opderbecke	Jan	IFREMER - Unité Systèmes Sous-Marins	Jan.Opderbecke@ifremer.fr
Simeoni-Mercier	Patrick	IFREMER - Unité Systèmes Sous-Marins	Patrick.Simeoni@ifremer.fr
Raugel	Ewen	IFREMER - Unité Systèmes Sous-Marins	
Jaussaud	Patrick	IFREMER - Unité Systèmes Sous-Marins	
Duchi	Christophe	IFREMER - Unité Systèmes Sous-Marins	
Meyer	Joern Patric	Institute of Marine Research	joern.patrick.meyer@hi.no
Ernstsen	Eyvind	Institute of Marine Research	Eyvind.Ernstsen@hi.no
Ratmeyer	Volker	MARUM	ratmeyer@marum.de
Nowald	Nicolas	MARUM	nnowald@marum.de
Wenzhöfer	Frank	Alfred Wegener Institute	frank.wenzhoefer@awi.de
Smith	Chris	Helenic Centre for Marine Research	csmith@hcmr.gr
Bialas	Joerg	GEOMAR	jbialas@geomar.de
Abegg	Fritz	GEOMAR	fabegg@geomar.de
Huusmann	Hannes	GEOMAR	hhuusmann@geomar.de
Bischof	Florian	GEOMAR	fbischof@geomar.de
Bodendorfer	Matthias	GEOMAR	mbodendorfer@geomar.de
Pieper	Martin	GEOMAR	mpieper@geomar.de
Matthiessen	Torge	GEOMAR	tmatthiessen@geomar.de
Suck	Inken	GEOMAR	inkens@geomar.de
Cuno	Patrick	GEOMAR	pcuno@geomar.de

1. News from the institutes

- GEOMAR:
  - very happy with Schilling ROV
  - PHOCA, Sub-Atlantic
    - Still lots of difficulties with command software etc.
    - No real improvement
  - Industry 10 years lifetime => difficulties with support from manufacturer
- NOC
  - ISIS since 2003
    - Generally operating well
    - Looking to upgrade power supply

    Lot investments update HYBIS

    Winch and cable from vessel
    - Problems with thruster, PT Marine Indonesia, electric thrusters
    - Update remote control, pressure compensated for better cooling
    - Common onboard control system in MARS group
  - Difficulties with cable turns during number of shallow dives
    - Several terminations of cable
  - Update telemetry system, replace by FOCAL system
- AWI
  - No ROV, interested because of new purchase plans
  - POLARSTERN II will have a Moonpool for deployment
- NORWAY, Aegir
  - Upgrade by manufacturer
  - Drop off buoyancy (part of it) for under ice
  - Not permanent activated
  - Automatic drop off after 10 s if connection is lost (dead vehicle)
  - TMS can become positive buoyant
  - Rest on seafloor for easy recovery
- IFREMER
  - Victor
    - Since 1998
    - 80 dives in 2019, 1000 - 4000 m
    - Cable problems
    - Power control failed, recover procedure worked ok
    - Reason to be investigated
    - Software problem link between PC and Phins
    - Change of hemisphere failed
    - Software updates always interrupt well established procedures
    - All modules are updated upon need
  - New ROV to come

        - Which parts will be bought, which parts developed in-house?
        - Control software: no in-house capacity
        - Imaging, video - major user request
        - In-house development binds a lot of capacity
        - Difficult to keep up with industry
        - In-house / purchase balance - lifetimes versus capacity
- HCMR
    - 1999 system working on DOS
    - electronic drive motors company out of service
    - Difficulties with replacement, spares
    - Last years more service work (wreck recovery) instead of science
    - New system not decided if TMS or not
    - 4500 m system planned
    - Pro and cons to discuss
- Ireland, Univ. Limerick
    - Create own control system
      Difficult to connect with internal control, system of ROV
    - Liability questions while testing own control system
    - Kinematic control
    - Realtime imaging
    - Target referenced flight control
    - Difficult if target moves
    - Small and big system with same flight control
- Ireland, Marine Institute
    - ROV Holland updated lightning with Teledyne Bowtech LED series V lights
    - Science tooling using hydraulic and electric connections
    - Several hydraulic leakage problems resolved by upgraded junction boxes from Delrin to Aluminium
- MARUM
    - New mobile system SQUID (Saab-Seaeye Leopard)
        - Control System installed in lab on the vessel, no dedicated control van
        - Weight on soft teaser not easy, took a while to develop depressor
        - Thruster problems solved
        - Hydrolec valvepack for Orion manipulator leakage problems, now solved by good company service
    - Quest
        - In 2019 seven dives Antarctic
        - Free flying in rough conditions
        - Telepresence real time mission video
        - The more in-house development the more expertise is required onboard
            - Less personal available for science

    - Running out of spares from Schilling Robotics (electric systems)
    - New funding for ROV
    - Probably hydraulic from Schilling
    - No problems with noise expected

2. TMS vs free flight

- TMS Complex deployment
- User community concerned about draw backs on manoeuvres in free flight
- Free fly widens sea condition window for deployment/recovery
- Free fly needs more attention in strong current conditions, maybe pinger
- 2018 cable workshop @ WHOI
- cables from same production line not predictable in behaviour
- Measure torque of the cable not only turns
- Pinger in cable to control bend in deep sea cable
- Decide right / left turn due to torque
- MARUM custom development for torque measure on ROV
- Have a heavy weight deployment with new cables before attaching ROV

3. Weight control

- User request NO drop weight operations
- Expensive development of ballast systems
- Strong demand for elevators
- Requires Two wire operations
- Difficult in deep water
- Two wire operations
- Video by GEOMAR
- Hook attached to second deep sea cable
- MARUM weights on the wire
- HCMR second rope by buoyancy from crate

4. Do we measure currents to predict bending of deep sea wire?

- Open ocean no problems expected
- ADCP not deep enough
- CTD cast

5. Heave compensation

- Would be nice but often not available

6. Elevator

- GEOMAR
    - Second generation with fibre plastic frame

    - Deployment with video controlled launcher
    - Free float recovery
    - Payload protection
        - foldable grid plate in consideration
        - actual technology use bungee ropes to secure payload
    - use basket with second wire hooked off and on
- Iron weights will become an issue in protected areas
- IFREMER
    - Floating basket about 5 m above ground
    - Operates well in rough terrain
    - Future development solid fuel gas generator (rescue device for submarines)?
    - Generate gas for buoyancy (airbag technology)
    - Difficult to carry on research vessels
- Oxygen generation for airplanes
    - Maybe adaptable?
- Use HYBIS on second wire to deploy and pick up elevator
    - But need to have winch capabilities
- Use ROV to recover lander
    - ROPOS / JASON dock lander underneath ROV
    - But issue with the cable - heavy deployment / free flight

7. Export licenses

- Germany, Britain becoming more focused on export issues
- but need to become aware

8. Dangerous goods

Problems with used lithium batteries during commercial transports
Purchase DGs in port of departure

9. Operation

- IFREMER
    - Problems receiving diplomatic clearance in due time within EEC
    - Brazil
- GEOMAR
- as well with port call with one of the crew
- MARUM
- custom problems with US
- Forms changed within weeks
- Could not be shipped as ship supply (no transit to vessel)

10. Interoperability

- Might be interesting for high valuable equipment

- Observatories to be serviced by different groups
- Up to now individual degree of infrastructures on ROVs not ready for this
- Science often does not know what equipment is available in the community
- Science often did not check what possibilities the ROV provides
- Plugs and technology coax, fibre optic are to much individual
- Hydraulic requests from users
    - Vibrio coring, cutters, grinders
    - Requires early information on connectors

11. Data acquisition

- Standards for ROV ?
- Germany
    - PANGAEA @ AWI
    - DAM will work on standards for meta data
- IFREMER
    - operates central data base
    - With DOI for data sets
    - Navigation post processing with DELPH of iXblue (expensive)
        - Post processing of navigation most valuable step in data provision, has to be done/organized by scientific users

12. Launch / recovery

- Videos to share? Internet/Youtube?
- Participants please add links for videos

13. Hydraulic operated ROVs

- Impact by hydraulic motors?
- Pumps cause more noise than thruster
- USBL beacon may pick up noise

14. UW navigation

- Germany
    - USBL calibration
        - Once for a fixed installation
        - Moonpool once per cruise
        - Two transducers on the ROV allow heading display in USBL (new SONARDYNE System on RV M.S. MERIAN)
- Ireland
    - Sonardyne 15° off after service

15. Software

- NOC: plans to develop own software
- Schilling control software does not allow to configure third party devices
- Ireland/Univ. Limerick: developed own control software
    - Might be implemented on other vehicles

- MARUM
    - own development for hybrid ROV
    - Open for exchange
    - OFOP logging software
        - GEOMAR, NOC, Ireland
    - WERUM software overloaded
    - QGIS for scientific mapping
- IFREMER
    - Own control system
    - Based on ROS
    - To be used on ROV and AUV
    - Large effort in GUI
    - Topside integrated QGIS
- Is Web based architecture useful for ROVs ?
    - Mission control
    - Access for scientific users

16. Special devices

- NOC
    - drill for manganese crust
        - Below basket
        - Device moveable to break off the sample

      Vibro corer
        - Weight on the drill for constant pressure
        - Emergency release ??
        - Provide link for cruise report ??
- Ireland
    - Rock samples 3000 m water depth
    - Vibro corer
        - Carousel with 5 samples per dive
        - 75 mm diameter, up to 2.4m length with PVC-liner
        - ROV required because of accuracy on location
        - YouTube: “ROV Holland1”

17. Video

- HD or UHD?

        - UHD more pixels but resolution of moving items become blurred (motion blur)
            - If sensor size is not increased
        - Shorter shutter times
            - Cause darker pictures
            - May cause strobe effects
- Codec H265
    - Lot of devices
    - Common format
    - But large volume
- Marum
    - Apple ProRes 422 on demand only
    - Video telemetry / telepresence
- Ireland
    - 1/4 Mbit/sec across the Internet
    - Compress / decompress causes latency
- Industry
    - Two ROV on the vessel
    - Second ROV remotely operated from shore
- Protocols
    - Secure Reliable Protocol
    - Open Source
- Ireland
    - own protocol
    - Taking care of data security
- PHOCA
    - no latency measured
    - 4K less 100 msec latency
- IFREMER
    - New control van
    - 27” 4K displays, individual chose of video channel
    - 8 videos in one screen
    - Recording 4K in H265 on NAS, 30 Tbyte / one cruise
    - Controlled through ROS (ROS.org)
- MARUM
    - HD satellite link 30 k€ per three weeks

18. new developments

- IFREMER
    - Overhaul of VICTOR
        - 2* 4K camera, 2*HD cams, Stereo cam,
        - 2 Schilling arms

        - New tool sled modular
        - Compact multibeam to be included in sled
- Usage of obstacle sonars for photogrammetry?
- Is 3D video mosaic useful for science?
    - Habitat mapping
    - Biomass calculations
    - Time repetition of coral growth
- NOC
    - replacing HYBIS
        - More thrusters for better manoeuvres
        - Build new payload systems
        - Link to active heave compensated winches on the RRS Discovery & RRS James Cook
- Germany
    - R/V MERIAN
        - ROV follow mode
        - Connected to USBL tracking
        - Plausibility check
- IFREMER
- VICTOR Fibre optic cable test in Feb. 2020
- Berth available for guest

ROV workshop format with open discussions instead of individual talks was welcome.

ROV workshop should be connected to OFEG-Tech meeting.
ROV workshop should be held every 2nd year.