



*ROV Operator Workshop  
Kiel 21-22<sup>nd</sup> February 2012  
Holland 1 ROV*

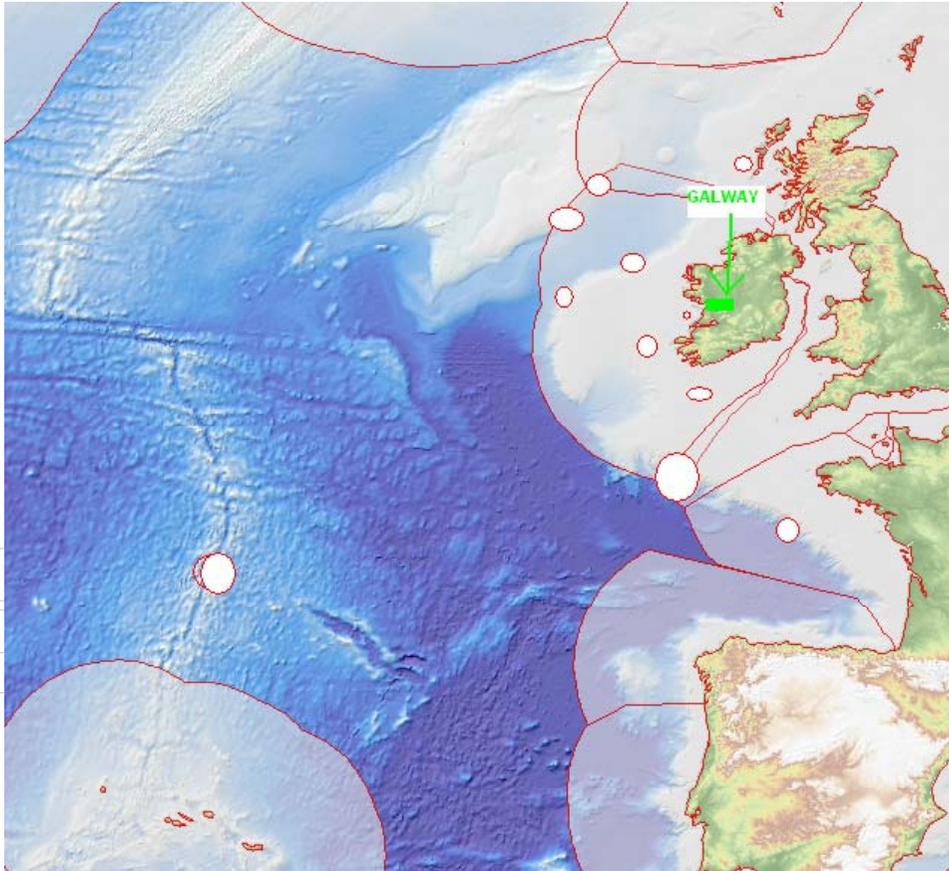
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*Marine Institute*  
Foras na Mara



## Operating areas



**Working mostly to the North, West and South of Ireland + mid Atlantic North of Azores.**

**Depths 100-3000m.**

**System based in Galway Ireland.**



## Platforms

**Celtic Explorer** : 65m dp1 Research Vessel adapted to accommodate ROV A-frame.

Mobilisation 2 days, demobilisation 1 day.

**ILV Granuaile** (80m Lighthouse service vessel) , DP1, currently configured to accommodate ROV deployment with lock latch from 20t Crane using soft tether for shallow ops, to be modified to accommodate full system in September 2012.

1 day mob/ ½ day demob in shallow water mode.

**RRS James Cook**: Deployment using full system planned for May 2012.

4 day mob (first time), 1 day demob.





## "Holland 1" ROV General

- Scientific version of the "Quasar" ROV system.
- 3000M depth rated system
- Consists of ROV, TMS, LARS, Winch, Control van, Workshop and Deck Equipment.
- Delivered in September 2008
- 3 full survey seasons completed
- (8 surveys , 1 Trial)
- System designed for use from Celtic Explorer and other vessels (Ilv Granuaile, James Cook (2012))
- Planned utilisation ~ 50 science days per annum





## ROV

- Up-rated version of the Quasar ROV system. 1<sup>st</sup> Quasar to built by SMD.
- ROV Weight 3.3 Tonnes
- Up to 300kg of payload on the ROV
- Has a large science skid for sampler drawers, multibeam, CTD , Slurp sampler
- Hydraulic ROV





## Hydraulic Power

- 3000V 75kw 4 pole motor driving the hydraulic pump.
- Hydraulic pump produces up to 250 bar.
- Four lateral and three vertical thrusters, two intelligent 12 way valve packs.
- 15 litres per minute flow rate.
- Flow can be controlled on individual functions.
- One high flow function up to 40 litres per minute
- Issues: Oil leaks, handling oil (lots)





## Video Capability

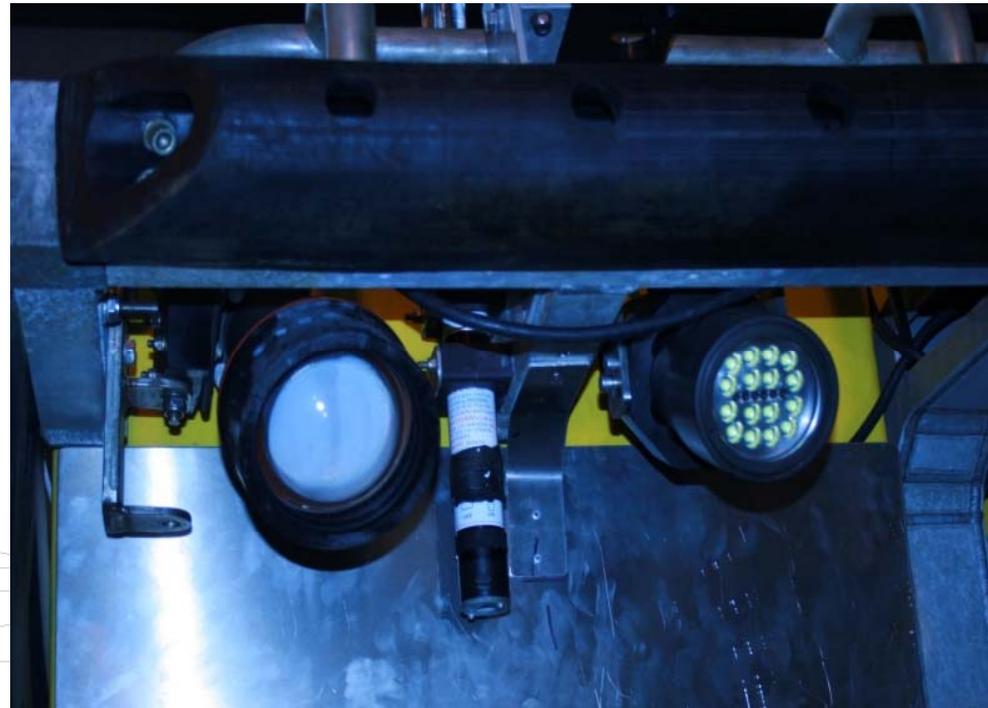
- 1 Dedicated high definition video channel using Kongsberg HDTV.
- 1 Stills camera.
- 7 video channels.
- 3 x dual DVD for standard definition video
- Currently record to KI pro hard drive for HD.
- System works well and is cheaper than HD tapes.





## Lighting

- Two HMI 12000 lumen lights currently fitted.
- Up to 12 dimmable Halogen lights.
- 2 x LED lights (HMI equivalent) from Cathx Ocean which work well.
- HMIs – expensive, LED c. 30% of cost of HMI's.
- LEDs sensitive to voltage fluctuations.





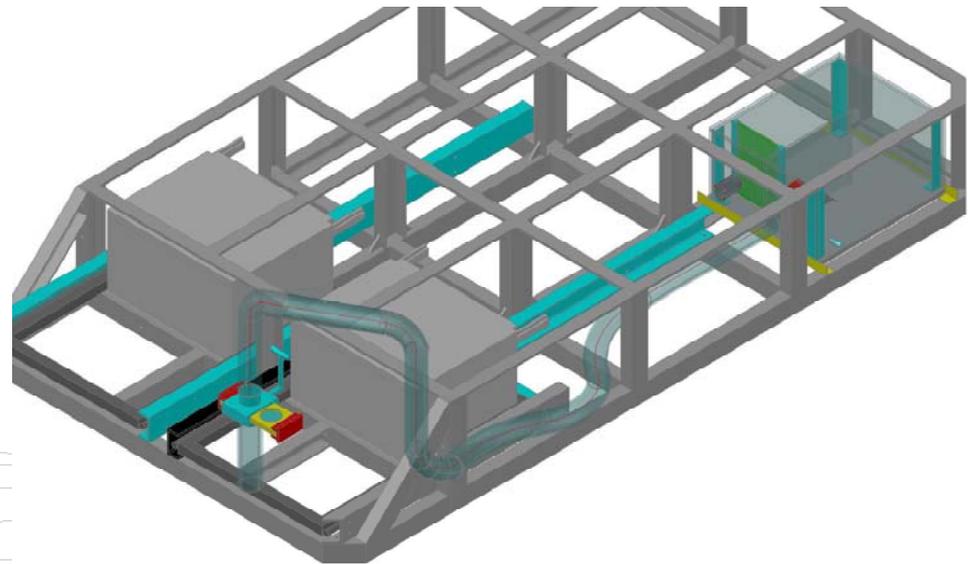
## Sensors and Standard equipment

- OA SONAR, DVL (Station hold), Altimeter, Digiquartz depth sensor
- Two manipulators. Either two seven function or one seven function and one five function.
- Science skid containing sample boxes and suction sampler, multibeam and MRU/INS
- Also capacity for sample collection and push cores (x12)
- Seabird 9+ integrated on vehicle allowing standard and ancillary sensors to be utilised and operated in realtime using seasave (seabird software)



## Spare capacity for additional sensors

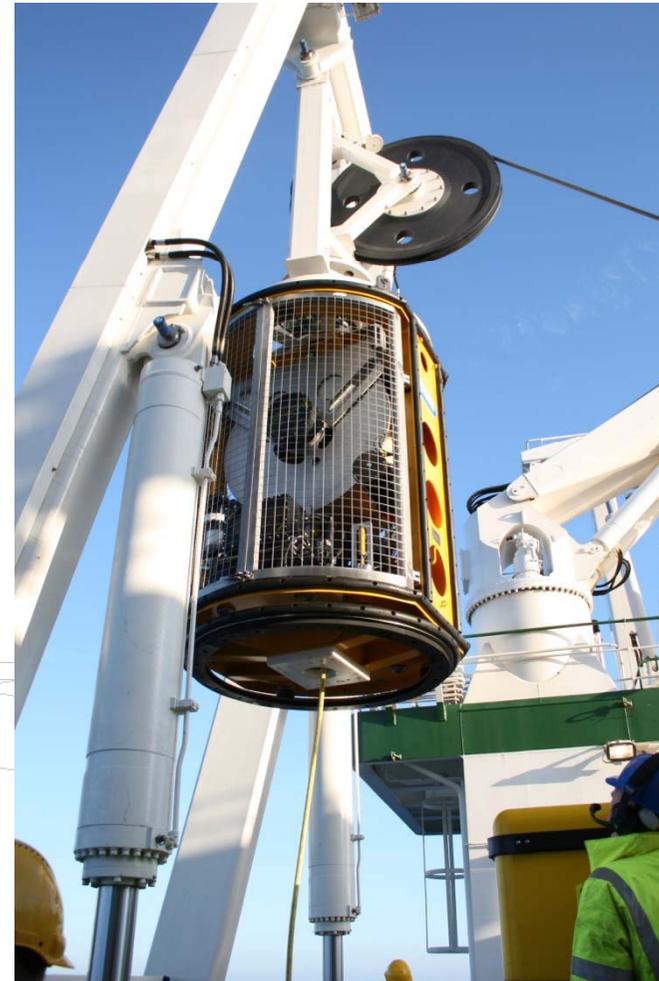
- 1 Ethernet instrument channel for Seabat/Multibeam
- 3 Spare RS232 Channels
- 6 spare switchable RS232/485 Channels.
- 7 analogue channels.
- System set up for Reson7125





## TMS

- Capable of carrying around 400m of tether.
- Power pack 3000v 11.5 hp
- Three cameras.
- Two lights
- Weight in air 2500kg
- Lift termination capacity 12000kg
- Issues : Docking in marginal conditions and risk to damage to Tether





## Non TMS Operations

- Deployment with cable floats trialled in 2010 and used for vents expedition in 2011
- 25 x flotation technologies floats utilised
- Successful deployment using float attachment platform requires additional crew
- Now is preferred method for deeper water





## Winch

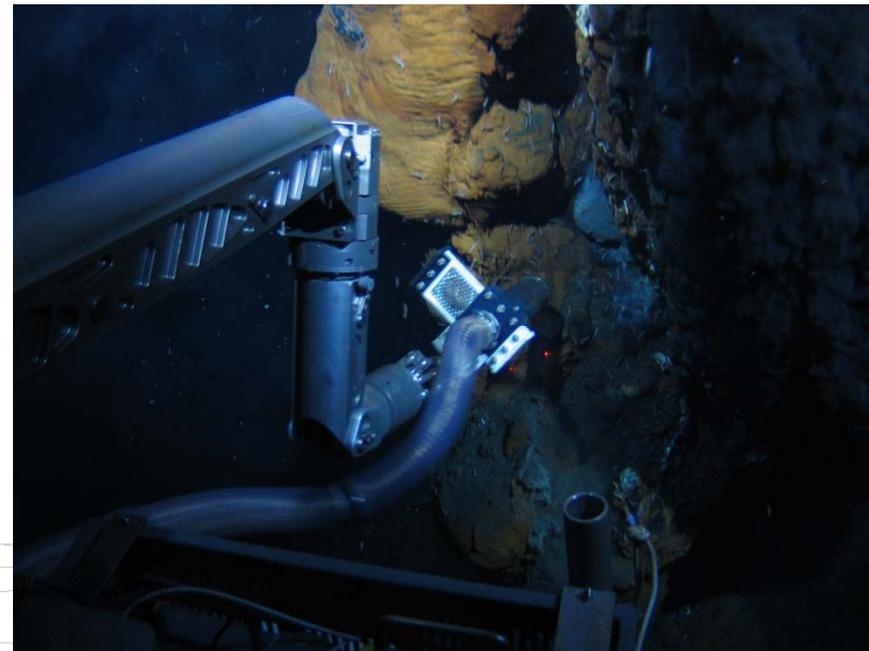
- Capable of holding 3250m of 31.5mm armored umbilical.
- 75 kw Hydraulic power pack operates winch and A Frame .
- Fully loaded weighs around 24000kg.
- 75kw motor.
- Operates well even in shallow water (no cable heating issues to date).





## High profile mission 2011

- The ROV complete its first survey on the mid Atlantic ridge system in 2011
- Successful expedition completed at c. 3000m.
- Decision made to freeboat with floats due to high temperatures and TMS risk.
- 2/3 of one layer left on winch due to depth of operations.
- Challenging surroundings but successful expedition found new vent field.
- Some lack of hydraulic power when thrusting and slurping.





## Lessons Learnt/ Issues after 3 years operations

### Manpower

- We maintain the system with 2 full time personnel only, and the system is operated with additional contract personnel.
- The manpower required for maintenance is greater than 2 persons so we have to supplement with contractors occasionally.
- Maintenance and preparation for surveys is at the limit of what a team of 2 can achieve
- Reviewing options for expanding permanent team at present



## Incidents /lessons learnt

- **Two losses of ROV experienced to date.**
- **1 complete loss of ROV and TMS in 780m of water due to failure of main umbilical at bullet.**
- **System recovered by chartered Oil support vessel with 2 x work class ROVs.**



## ROV recovery to surface by Work class ROV





## ROV Tether severed (again)

- During an attempt to latch back into the TMS in marginal sea state the soft tether was pinched and severed between the ROV and the TMS.
- 1500M water depth.
- ROV floats to surface and is recovered safely 5 hours after incident.



## Other issues

- System has very high start up current on ROV Motor (needs minimum of 500KVA generator).
- Shipping Large A Frame and Winch is very expensive.
- The current system is self contained and can be deployed on vessels without any A-Frame.



## Navigation

- Initial surveys completed with IXSEA GAPS USBL.
- OK in shallower waters but lots of problems at depths  $>2000\text{m}$ , with trigger managed to get to max  $2500\text{m}$ . Noise from Hydraulic ROV seems to be the issue.
- Sonardyne Ranger 2 system purchased in 2011, excellent results to  $3000\text{m}$  (except when close to or in vent plumes!).