International Ocean Systems

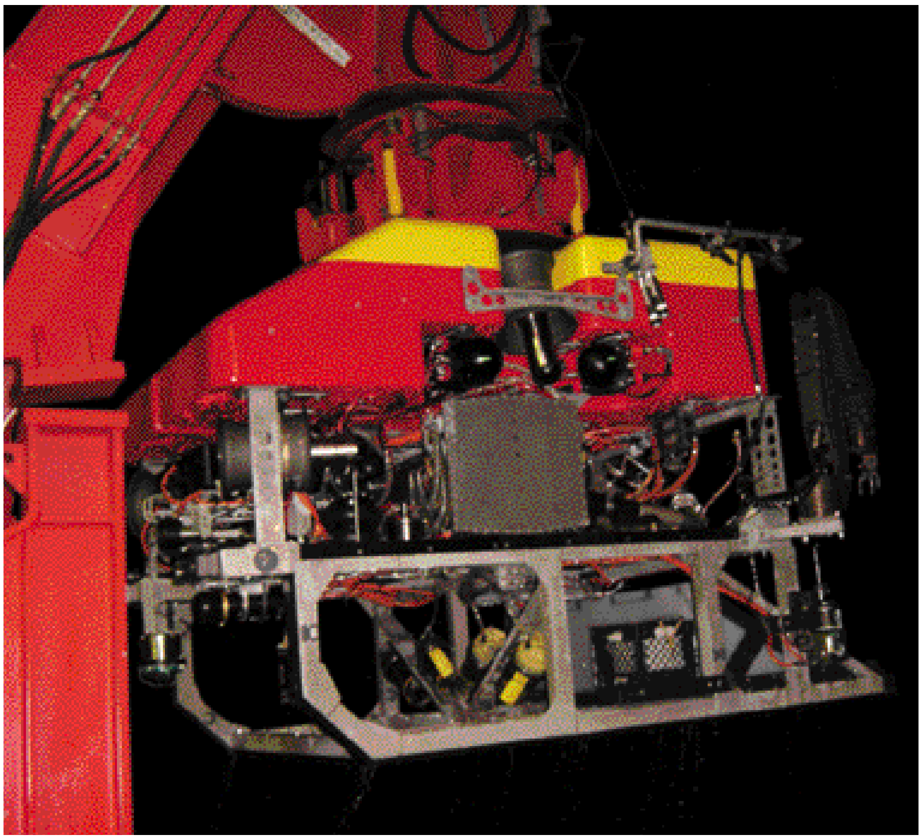
January/February 2004
Volume 8 Number 1

ROVs / AUVs

The workhorses leading a new voyage of discovery

By Ian R Hudson, DEEPSEAS Group, Southampton Oceanography Centre, Southampton, UK

Work-class ROVs have long been offshore exploration's hands and eyes on the deep-seafloor. With the demand for science-class vehicles to carry out experimental science in our deepest oceans far outweighing availability, an exciting collaborative project plans to harness the oil and gas industry's 'workhorse' in the pursuit of knowledge.



Isis, the UK's first full ocean depth science-class remotely operated vehicle.

The technology in many fields of oceanography has advanced rapidly since the golden era of HMS *Challenger* in 1872. Such is the difficulty of working at great depth however, the tools available for deep-sea oceanography have been much slower to advance and we still rely upon some of the technology used more than 150 years ago on pioneering expeditions to aid our understanding of the deep ocean.

Until the onset of scientific manned submersible technology in the 1970s, pioneered by the USA with *Alvin*, France with the *Nautile* and Russia with the twin *Mirs* (all of which are still in heavy use today), the best way to explore and interact with the deep-seafloor was to use a range of static gear lowered on wires.

At around the same time, the oil and gas industry began to expand into deeper and more difficult locations, and with this came the need for advanced intervention technology. The age of the remotely operated vehicle was truly born. Now operators had 'hands and eyes' on the seafloor without the risk of personnel being in situ. The experience of a first hand account of the seafloor could never be paralleled, but the increasing quality of camera systems linked to high-resolution monitors began to give ROV users a real feel for what life on the deep-seafloor might be like.

From industry to science and back again

Work-class ROVs became the workhorses of the oil and gas industry, and it was not long before marine scientists wanted to use the ROV as a tool for research. It is true many of the science-class ROVs around the world today can trace their roots back to industrial work-class vehicles, but as science-class vehicles became more available the true possibilities of what they could achieve was realised. With new vehicles like *Isis*, the UK's first full ocean depth science-class ROV, the potential for using ROVs for precision in situ science is on the increase. However, the demand for such technology still far outweighs the number of dedicated science ROVs and submersibles.

Although ROVs are operated by oil and gas producers and their contractors all over the globe and come in a great many shapes and forms – from diamond miners to eye-balls, up until now the majority of in situ experimental science in our most deepest of oceans has relied upon the fleet of science-class vehicles. Fortunately, this situation is slowly changing.

The oil and gas industry and science institutions have started to work together to allow the ROV technology and data used and collected every day in offshore exploration to be more freely available to researchers across a range of disciplines. A pioneering collaborative project, between Southampton Oceanography Centre (SOC), BP, Subsea 7 and Transocean, has begun to piece together a network of work-class ROVs that can be used in various ways to gather information and carry out experiments across oil and gas operations globally.

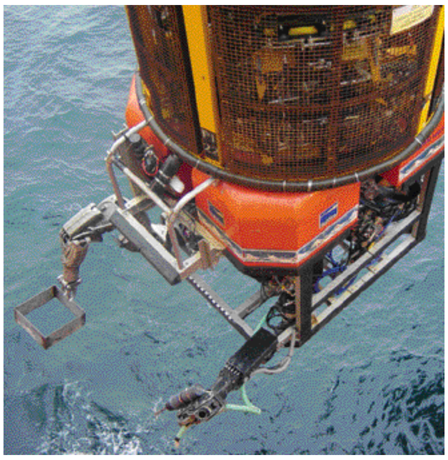
From observations to experiments

In its most basic form an ROV acts as a roving eye, a remote camera able to squeeze into tight spaces to observe and survey. But as a tool for improving our knowledge of the deep ocean, just taking a closer look can really make a difference. Upon watching a squat lobster sitting in a burrow eating sediment, as one would expect for this species, suddenly something novel to science unfolds before your eyes. It would appear that krill, returning to the ocean depths at dawn to escape predators, face another hazard on their arrival at the seafloor. The lobster in question has learnt to wait for their return, using long claws to catch the krill from above before ripping them into bite size pieces.

The 'murderous crab' is a classic example of how taking a look can really make a difference to what we know of our deep-sea environment. Perhaps what was most interesting about this finding was that the footage was shot by a working ROV crew on board the MSV *Regalia* as they waited on their next job – who knows what other gems people have hiding out there on video highlights tapes!

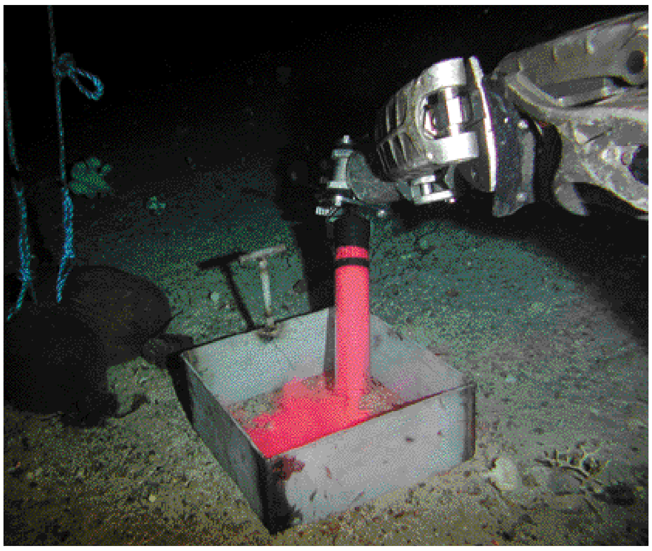
Taking the use of work-class ROVs beyond the observational stage, it has been possible to deploy experimental apparatus to the seafloor, collect specimens and return them to the seabed and

Caught on camera – the 'murderous crab' is a classic example of how taking a closer look can really make a difference to what we know.



Subsea 7's Centurion (left) and Pioneer work-class ROVS.

use specially adapted equipment to take precision seabed samples. This pioneering work took place as part of the SOC developed SERPENT (Scientific and Environmental ROV Partnership using Existing iNdustrial Technology) project and is an ongoing scheme designed as a science-industry partnership to increase our knowledge and expertise of experimentation in the deep-sea.



The SOC developed SERPENT project's work has so far focused in the deepwaters around the West of Shetland.

The work, in conjunction with BP, has so far been focused around the UK's deep-sea backyard, the West of Shetland. However, plans are in preparation to expand the project to a truly global fleet of drilling installations and ROVs in partnership with Subsea 7, Transocean and other oil producers worldwide and will include deepwater frontiers in the Gulf of Mexico, Brazil and West Africa.

ROVs as a whole have made a huge impact in deep-sea science, but now we have started to come full circle as work-class vehicles – through the use of science-class vehicle technology and ideas – begin to carry out important experiments and observations in the field. Through increasing partnerships between science and industry we can start to understand more about our ocean frontiers and, using the compelling footage and images produced by ROVs, help educate people about the deep-sea world that lies below them. ■

Acknowledgements

We would like to thank Subsea 7, Transocean and BP for their continued support of the SOC DEEPSEAS Group and their input into the SERPENT project.

Ian Hudson is project manager for the SERPENT project, a unique collaboration between science, the oil and gas industry and their contractors. The project aims to use ROV vehicles in offshore locations during periods of standby-time to enhance knowledge and understanding of the deep ocean and to develop new ideas and technology for in situ marine research using remote technology.

Also in the SERPENT team are Ben Wigham, David Billett, Brian Bett and Daniel Jones of SOC, Ian Edmonstone, Robin Davies, Paul Brain and Ian Cobban of Subsea 7 and Bob Clark, Adrian Rose and Guy Cantwell of Transocean.

The project hopes that resources throughout the world can be developed to involve new science institutions and industrial partners.