

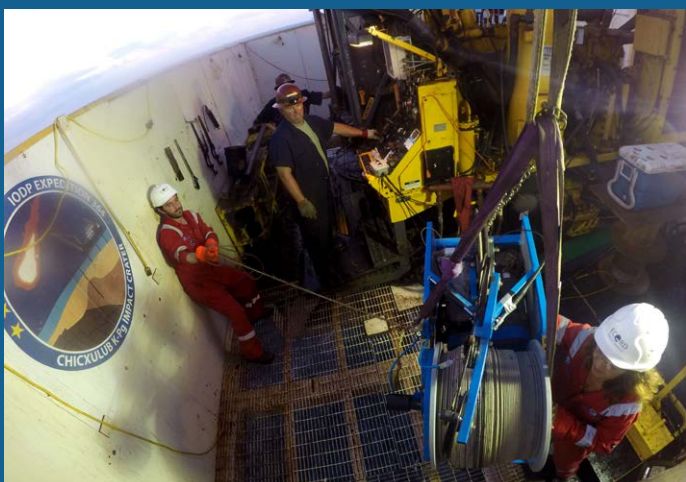
# European Petrophysics Consortium

The **European Petrophysics Consortium (EPC)** consists of the European universities of Leicester (UK) and Montpellier (France), which undertake petrophysics research combining borehole geophysics, laboratory experiments and geology. The Consortium is managed from a central office located at the University of Leicester.



*Sally Morgan (Petrophysics Staff Scientist) uploading diffuse colour reflectance spectrophotometry data at the Onshore Science Party of Expedition 357.*

The EPC team provides high-level scientific and technical support to the International Ocean Discovery Program (IODP) and the European Consortium for Ocean Research Drilling (ECORD) across a range of highly diverse environments drilled by mission-specific platforms (MSPs).



*Erwan Le Ber and Johanna Lofi (Petrophysics Staff Scientists) assisting with downhole logging operations during Expedition 364.*

The EPC is responsible for the acquisition of downhole logging data and core petrophysical measurements and data interpretation for all MSP expeditions, and the development of associated research programmes. The Consortium also links into the International Logging Consortium to make its combined petrophysical expertise available to all scientists in IODP.

The EPC provides:

- Petrophysics Staff Scientists and Petrophysicists;
- Expertise for development of tailored downhole logging and core petrophysics programmes;
- Dedicated equipment to acquire downhole logging data, including a suite of slimline geophysical borehole tools (now including Quick-link combinable tools);



*Laurence Phillpot processing core physical properties data during Expedition 364 (credit: AFP, Ronaldo Schemidt).*

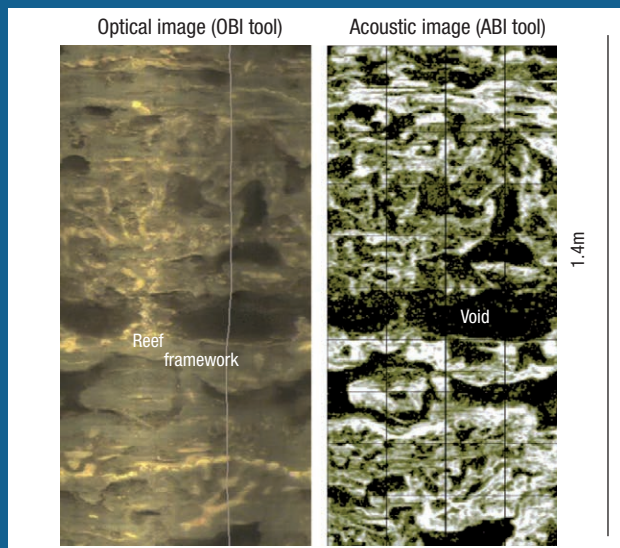
- Dedicated equipment for core logging and discrete measurements, including Geotek Multi-Sensor Core Loggers (standard and XYZ and a custom-built fast track magnetic susceptibility logger), a Geotek P-Wave Frame and Thermal Conductivity Probes;
- Data calibration and quality control;
- Evaluation and interpretation of downhole log and core petrophysical data.

## Downhole logging on MSP expeditions

### • Corals

*Expedition 310 Tahiti Sea Level (2005) and Expedition 325 Great Barrier Reef Environmental Changes (2010)*

EPC deployed super-slimline logging tools for the first time during Expedition 310, and subsequently for the linked Expedition 325. For both expeditions, high-resolution, millimetre-scale optical and acoustic images of the coral-reef systems provided invaluable insight into the *in-situ* reefal frameworks.



*Expedition 310 Tahiti Sea Level: Optical borehole viewer and acoustic image tools were used to examine the walls of the newly drilled boreholes to see the internal structures of the coral reefs. Combining logging images with continuous borehole geophysical measurements enabled the correct core depths and true recovery to be established ensuring accurate sea-level reconstructions (Inwood et al. 2008).*

### • Rocks

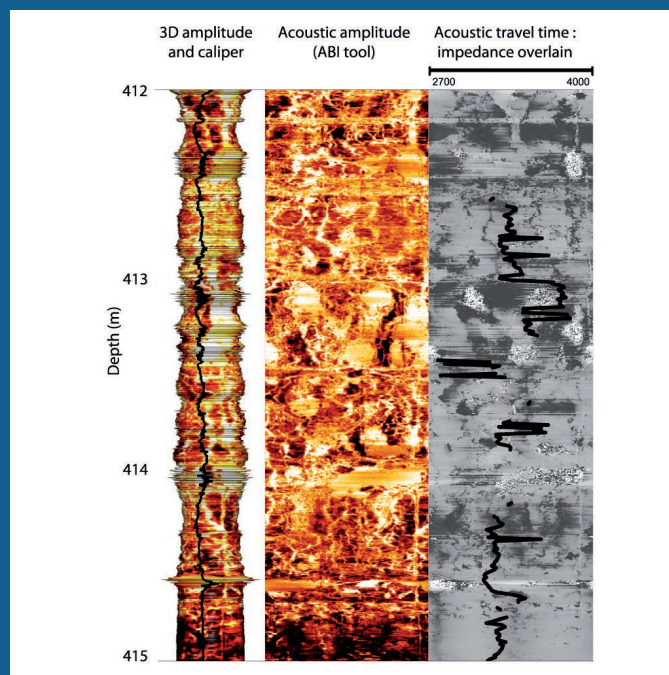
*Expedition 357 Atlantis Massif Serpentinization and Life (2015/16) and Expedition 364 Chicxulub K-Pg Impact Crater (2016)*

Most recently, MSP expeditions have been drilling and sampling rock formations including serpentinised ultramafics (357) and impact and post-impact lithologies (364). For the first time in IODP, logging was undertaken from seabed drills (357) utilising cable-less memory logging tools. For Expedition 364, EPC coordinated a combination of academic service providers and in-house super-slimline capability for the extensive logging programme. Expedition 364 logging data, fundamental for linking seismic data and the borehole, confirmed that these peak-ring rocks have an unusually low density and seismic velocity.

### • Sediments

*Expedition 302 Arctic Coring Expedition (2004), Expedition 313 New Jersey Shallow Shelf (2009) and Expedition 347 Baltic Sea Paleoenvironment (2013)*

For these projects, EPC coordinated downhole-logging services provided by industry (347) and academic (313) contractors, and in-house (313). Logging data, integrated with other geological and seismic data, have characterised the facies and 'fingerprinted' key surfaces and sequences, and examined the margin-scale reservoir geometry and permeability distribution in the siliciclastic successions cored during Expedition 313.



*Expedition 313 New Jersey Shallow Shelf: High resolution 360° acoustic images of the borehole wall capture fine detail of shelly sediments and sandy intervals in borehole M0028. The 3D image (left) combines the acoustic amplitude image and the acoustic caliper. The unrolled acoustic amplitude (centre) and travel time (right) images are shown alongside with impedance calculated from core density and sonic measurements overlain on the acoustic travel time image. Sonic (from wireline measurements and core) and density logs (from core) used to calculate impedance contrasts across all three sites have enabled sequence boundaries to be identified (Miller et al. 2013).*

### Contact EPC:

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Blog: <http://petrophysicsworld.blogspot.de>

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 European Petrophysics Channel



## Recent publications

- For all expeditions, Petrophysics and Logging reports are in the Proceedings of the IODP at <http://www.iodp.org/scientific-publications>
- Morgan JV, Gulick SPS, Expedition 364 Scientists (**Le Ber E, Lofi J**), 2016. The formation of peak rings in large impact craters. *Science*, 354, 878-882. doi: 10.1126/science.aah6561
- Insua TL, Hamel L, Moran K, **Anderson LM** and Webster JM, 2015. Advanced classification of carbonate sediments based on physical properties. *Sedimentology*, 62, 590-606. doi: 10.1111/sed.12168
- **Inwood J, Lofi J, Davies S**, Basile C, Bjerrum C, Mountain G, Proust J-N, Otsuka H and Valppu H, 2013. Log-based statistical classification of lithology: IODP Exp 313. *Geosphere*, 9, 1009-1024, doi:10.1130/GES00913.1