

Chikyu logging review in IODP and future of well logging in scientific drilling

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It has passed seven years since Chikyu joined the IODP expeditions. There were many expeditions where well logging were conducted: NanTroSEIZE exp314 in 2007, expeditions 319 and 322 in 2009, exp332 in 2010, exp338 in 2012-2013, exp348 in 2013-2014; Japan trench fast drilling project (J-FAST) exp343 in 2012; Deep coalbed biosphere off Shimokita exp337 in 2012. The total logged length on Chikyu during IODP Expeditions are 26.2 km in the seven years period. Well logging has increased its importance in science and operations. The reasons are 1) sensor and technological innovation brings more geological and geophysical information, 2) spot or partial interval coring in combination of logging-while-drilling and mudlogging is best option in deepwater expeditions, and 3) need of LWD real time data in decision making for precise location of observatory installation and spot coring. Riser drilling by Chikyu improves hole condition by means of drilling fluid control, which improves logging data quality, and its large hole diameter brings us more selections of tools, measurements, and downhole experiments.

The logging companies have been developing new measurement, higher accuracy and resolution tools. For example, resistivity image tools have wider azimuthal coverage and higher resolution, which help to deeper geological interpretations and breakout analysis. The new sonic tool improves accuracy of velocity in soft sediment and more availability of measurement in shear velocity.

With accessing deeper, more challenging management of time (coring is a time consuming operation), combination of spot coring in the most interesting interval and continuous logging may be one of solutions under limited cruise schedule.

Realtime LWD data acquisition and interpretation were required to install observatory at proper depth. Current LWD technology sends more data to surface, which helps to understand the lithology in real time.

To use large diameter of riser pipes brings us a lot of advantages against lowering logging tools through small drill pipes. Proper tool size and sensor position in the borehole improve data quality. Increasing of tool selection brings more variety of measurement and experiment. FMI resistivity borehole imager covers more image area of borehole wall. Pressure test by dual packer and fluid sampling were available with large diameter tools.

Logging activities and results by Chikyu as part of IODP (2003-2013) will be reviewed and discuss its potential, role, and challenges in the future scientific drilling.

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