Data acquisition of drilling parameters on D/V Chikyu: Current status and issues on integration with borehole scientific data

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In the drilling science, integration of various data sets derived from drilled borehole is an essential work to maximize scientific results obtained in a scientific drilling operation. Scientific dataset measured on geological sample (core and drilling cuttings) and acquired by well-logging is primary important. In addition to the scientific data, engineering data is acquired in a drilling operation (drilling parameters; e.g., hook load, Top Drive speed, Top Drive torque), and the engineering data is directly influenced by formation lithology and rock strength. Therefore, the engineering data is also important for research of the drilling science.
On D/V Chikyu, drilling instruments are controlled by Drilling Control and Instrumentation System (DCIS) equipped on the Chikyu. The DCIS does not only control the drilling instruments but also acquire and monitor data derived from each drilling instrument. The DCIS is driven by the PROFIBUS (Process Field Buss) technology, and data output from the DCIS is also controlled based on regulations of the PROFIBUS system.
In order to acquire data of drilling parameters in real-time, 3rd party tool has to connect to the DCIS via DP/DP-link of the PROFIBUS system for 3rd party tool. In 2015, the DCIS was replaced and data communication interface with 3rd party tool was also changed to the DP/DP-link. The DP/DP-link is a technology to enable accurate data synchronization between the DCIS and 3rd party tools (e.g., mud logging data). It is critical to acquire the DCIS data in real-time for mud logging. Therefore, the replaced DCIS and DP/DP-link are powerful tools for integration of drilling parameter data with borehole scientific data. In this presentation, outline of the DCIS and data acquisition system including 3rd party tools will be introduced, and quality of data integration and synchronization of the DCIS data with borehole scientific data will be discussed.

Keywords: D/V Chikyu, Drilling parameters, Borehole scientific data, Data integration, Data synchronization, DP/DP-link

