

# D/V *Chikyu*

## Standard Measurements

(Ver. 3; July 2023)

### A. Standard Measurements

*Chikyu* standard measurements are those that are collected on all *Chikyu* IODP riser and riserless expeditions, if practical for the material being drilled or recovered. Data from standard measurements are critical to long-term IODP and *Chikyu* science, regardless of scientific or operational purposes of an expedition. Deviations from standard measurements should be identified in the Scientific Prospectus or pre-expedition meeting. In addition, the Institute for Marine-Earth Exploration and Engineering (MarE3), as operator of *Chikyu*, may require additional measurements to meet safety requirements and protocols.

#### 1. Core Characterization Measurements

These measurements are made on cores or subsamples from cores. They are grouped in whole round and split round measurements. Split rounds are separated into working halves and archive halves. Archive halves are for non-destructive observation and measurements, while working halves are open for all sampling and analysis.

#### Whole round (WR) core measurements

##### *Non-destructive*

- Borehole depth scale
- X-ray Computed Tomography (CT)
- Natural Gamma Ray (NGR)
- Gamma Ray Attenuation (GRA)
- Magnetic susceptibility (MS)
- Non-contact Resistivity (NCR) (sediments)
- P-wave Velocity (PWV) (sediments)

##### *Destructive*

- Porewater chemistry - salinity index, pmH/alkalinity, chlorinity, anion/cation, minor & trace elements
- Thermal conductivity (TC)
- Headspace gas and void gas analysis

#### Split core measurements

##### *Non-destructive*

- Digital imaging
- Spectrophotometry
- Thermal conductivity (hard rock)
- Visual core description

### *Destructive*

- Moisture and density/porosity (MAD)
- P-wave velocity (sedimentary hard rock)
- Smear slides and/or thin sections
- Carbonate analysis
- Bulk carbon-nitrogen-sulfur (CNS) analysis
- X-ray fluorescence (XRF: major elements in hard rock)
- X-ray diffraction ( XRD )

## **2. Downhole Logging and Measurements**

Performed either by logging while drilling or by wireline and availability of logging services subject to budgetary constraints.

- Natural gamma ray
- Resistivity
- Leak-off test (LOT; **riser drilling only**)

## **3. Cuttings measurements (riser drilling only)**

- Visual cuttings description
- Cuttings smear-slide and/or thin sections
- Moisture and density
- Carbonate analyses
- Bulk carbon- nitrogen-sulfur (CNS) analysis
- Whole rock major elements
- magnetic susceptibility

## **4. Mud gas monitoring (riser drilling only)**

- Methane carbon isotope
- Whole gas mass spectrometry
- Hydrocarbon and and natural gas analysis

## **5. Drilling mud measurements (riser drilling only)**

Data below are mainly collected by the mud engineer (service company), and are available upon request,

- Mud component
- Specific gravity (s.g.)
- Acidity or alkalinity (pH)

## **6. Rig Floor Measurements**

These data are collected in real-time by the drillers. No QA/QC performed on these data, and these data available upon request.

- Driller's depth
- Heave compensation
- Weight on bit
- Penetration rate (ROP)

- Rotation rate (RPM)
- Torque
- Mud pressure
- Pump rate

## **B. Optional/Supplemental Measurements**

These measurements are defined as additional measurements that may be needed for expedition objectives, and are conducted where possible and scientifically justified. These will be outlined in the Scientific Prospectus for each expedition, available online 6-9 months pre-expedition.

### **1. Core measurements**

- Natural remanent magnetism (NRM) with stepwise demagnetization
- Biostratigraphy\*
- Anhyseretic Remanent Magnetization (ARM) and Isothermal Remanent Magnetization (IRM) with step-wise acquisition and demagnetization
- Shear strength
- Cell counts
- Contamination testing
- Micro-imaging (Scanning Electron Microscope) \*
- Particle size analysis\*
- Close-up photography\*
- Infrared observation
- Elastic Resistivity (Impedance analyzer)
- P-wave velocity (hard rock)

***\*Also applied to cuttings***

### **1. Downhole measurements**

- Formation temperature (APCT-3)