

IODP<sup>3</sup> scientific ocean drilling expeditions are supported by carrying out a set of standard measurements on all materials drilled/cored and recovered, during offshore and onshore operations. If required by the Expedition Science Team, these may be supplemented with additional measurements during the IODP<sup>3</sup> moratorium period.

## IODP<sup>3</sup> Standard Measurements Policy



**INTERNATIONAL  
OCEAN DRILLING  
PROGRAMME**

# IODP<sup>3</sup> Standard Measurements Policy

## 1. Standard Measurements

IODP<sup>3</sup> standard measurements are those that should be made on all scientific ocean drilling expeditions if practical for the material being drilled or recovered and within the budgetary constraints. Data from standard measurements are critical to long-term legacy of the scientific drilling programs, 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 ECORD Science Operator or MarE3 as operator of the Chikyu, drilling provider and/or platform provider may require additional measurements to meet safety requirements and protocols.

### 1.1. Core Characterisation Measurements

	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Core orientation (APC only)	✓		
Gas sniffer (qualitative detection of H <sub>2</sub> S and C1-C5 hydrocarbons: Methane, Ethane, Propane, Butanes and Pentanes).	✓		✓
Headspace gas sample acquisition (sediments)	✓		✓
Void gas analysis			✓
Pore water chemistry (e.g., pH, alkalinity, ammonia, sulfide (for biochemical zonation if data affect drilling decisions), chloride*, sulfate*, nutrients*, major and trace elements*)	✓	✓	✓
Borehole depth scale	✓		✓
Thermal conductivity (on whole core rounds in soft sediments and on the split surface on rock core)		✓	✓

\*during ESO Onshore Operations

## 1.2. Core Logging

		MSP Operations		Chikyu Operations
		Offshore	Onshore	
Whole Round Cores	X-ray CT scanning		see Section 2	✓
	Natural gamma ray	✓		✓
	Gamma ray attenuation			✓
	Magnetic susceptibility	✓		✓
	<i>P</i> -wave velocity	✓		✓
	Non-contact Resistivity	✓		✓*
Split core surfaces	Digital imaging		✓	✓
	Reflectance spectroscopy & colorimetry		✓	✓
	Visual core description		✓	✓
Samples	Moisture and density/porosity (discrete samples)		✓	✓
	<i>P</i> -wave velocity (discrete samples)		✓	✓
	Natural remanent magnetism (NRM) with step-wise demagnetization (discrete samples)		✓	✓
	Biostratigraphy	✓ (CC)	✓	see Section 2
	Smear slides and/or thin sections		✓	✓
	Carbonate analyses (sediments)		✓	✓
	Bulk carbon-hydrogen-nitrogen-sulfur (CHNS) analyses		✓	✓
	Whole rock major and trace elements		✓	✓ (hardrock)
X-ray diffraction (XRD)		✓	✓	

\*A data processing method with the new measurement device is under consideration. Reliable electric resistivity values cannot be produced at this time.

### 1.3. Downhole Logging

		MSP Operations		Chikyu Operations
		Offshore	Onshore	
Logging while drilling (Chikyu only)	Total and spectral gamma ray			✓
	Formation resistivity			✓
	Borehole resistivity image			✓
	Caliper (resistivity)			✓
	Acoustic velocity			✓
	Annular pressure			✓
Wireline Logging	Total and spectral gamma ray	✓		✓
	Formation resistivity	✓		✓
	Sonic	✓		✓
	Oriented acoustic and/or optical image (includes telemetry)	✓		✓
	Borehole diameter with 3-arm caliper for acoustic images	✓		✓
	Magnetic susceptibility	✓		✓
	Borehole fluid temperature and conductivity	✓		✓

### 1.4. Cuttings measurements (Riser drilling only)

	MSP Operations		Chikyu Operations
	Offshore	Onshore	
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			✓
X-ray diffraction (XRD)			✓

## 1.5. Mud Gas Monitoring (Riser drilling only)

	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Methane carbon isotopes			✓
Whole gas mass spectrometry			✓
Hydrocarbon and natural gas analysis			✓

## 1.6. Drilling Mud Measurements (Riser drilling only)

Data are mainly collected by the mud engineer (service company), and available upon request	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Mud component			✓
Specific gravity (s.g.)			✓
Acidity or alkalinity (pH)			✓
Mud filtration test (cake thickness and filtrate volume)			✓
Mud rheology			✓

## 1.7. Rig Floor Measurements

* Chikyu riser drilling only	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Driller 's depth	✓		✓
Heave compensation	✓		✓
Weight on bit	✓		✓
Rate of penetration (ROP)	✓		✓
Rotation per minute rate (RPM)	✓		✓
Torque	✓		✓
Standpipe pressure	✓		✓
Pump rate	✓		✓
Mud logging *			✓
Leak off test (LOT)*			✓

## 2. Supplemental Measurements

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

### 2.1. Core Characterisation

	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Anhyseretic Remanent Magnetization (ARM) and Isothermal Remanent Magnetization (IRM) with step-wise acquisition and demagnetization			✓
Natural remanent magnetism (NRM) with stepwise demagnetization		✓	✓
Shear strength (shear vane and fall cone)		✓	✓
Cell counts	✓	✓	✓
Contamination testing	✓		✓
Microbial activity measurements using radiotracers	✓		✓
Whole rock major and trace elements (sediments)		see Section 1	✓
X-ray diffraction		see Section 1	see Section 1
Micro-imaging		✓	✓
X-ray CT scanning		✓	see Section 1
Hyperspectral scanning (MSPs)		✓	
Biostratigraphy	see Section 1	see Section 1	✓
Micro-imaging (Scanning Electron Microscope)		✓	✓
Particle size analysis			✓
Infrared observation			✓
Close-up photography		✓	✓
Elastic Resistivity (Impedance analyzer)			✓
S-wave velocity			✓

## 2.2. Downhole Logging and Measurements

* Chikyu riser drilling only	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Downhole Measurements:			
Vertical seismic profile or check-shot (requires permitting)	✓		✓
Magnetic field			✓
Formation pressure			✓
Formation temperature (e.g., APCT-3)			✓
Packer tests 2			✓
Sampling:			
Formation fluid sampling			✓
Sidewall coring			✓
Pressurized fluid/gas sampling			✓
Wireline Logging / LWD / MWD:			
Spectral gamma ray (MWD)			✓
Nuclear magnetic resonance	✓		✓
Neutron porosity			✓
Equivalent circulating density*			✓
Borehole trajectory			✓

## 2.3. Rig Floor Measurements

* Chikyu riser drilling only	MSP Operations		Chikyu Operations
	Offshore	Onshore	
Extended leak off test (XLOT)*			✓