IODP Measurements Document
Revised February, 2008.

Categories of IODP Measurements

- Minimum measurements
- Standard measurements
- Supplemental measurements
- Safety measurements
- Measurements that affect drilling decisions:
    - Specific Site
    - Specific Expedition

This document provides an overview of IODP measurements that each IO is fully responsible for collecting during IODP operation.

The list of measurements as posted was reviewed by SAS in January 2006 and updated in February of 2008. It is subject to change and updates responding to technological developments and SAS review.

HISTORICAL

Minimum Measurements:

Defined as measurements that shall be conducted in all boreholes and on all cores in IODP. This statement does not preclude the taking of whole-round core samples on an as-needed basis to achieve specific science objectives and/or obtain legacy samples.

Biostratigraphic
Visual core description
Smear slides Thin sections
Split-core digital photography (section line-scan and/or table layout)
Core logging: • natural gamma ray • gamma ray attenuation • magnetic susceptibility
Temperature profile
Moisture and density/porosity (discrete samples)
Downhole logging: • natural gamma ray • spectral gamma • density • porosity • resistivity • sonic • borehole imaging
Borehole depth scale

IODP Standard Measurements:

Defined as standard measurements that shall, whenever practicable and appropriate, be carried out across all platforms and/or shore-based labs).

Core Petrophysics:

Natural remnant magnetism (NRM) with step-wise demagnetization
Core logging: P-wave velocity
P-wave velocity (on split cores)
P-wave velocity (discrete samples)
Thermal conductivity (both whole core and pieces)
X-ray CT scanning
Whole round core digital surface photography
Color reflectance
Close-up and micro-imaging
Core orientation and structural measurements

HISTORICAL

Downhole Petrophysics:

Vertical seismic profile or checkshot
Downhole pressure
Open-hole temperature
Caliper
Magnetic susceptibility
Magnetic field

Note: For MSPs, downhole minimum/standard measurements may be dependent on the size of the borehole.

Microbiology and Geochemistry:

Pore Water Chemistry (e.g., nutrients, pH, alkalinity, sulfate, chloride, major and trace elements)
Whole rock major and trace elements
Microbiology (Cell counts on fixed samples)
Bulk carbon-hydrogen-nitrogen-sulfur (CHNS) analyses
Contamination testing
Carbonate analyses

Rig Floor

Weight on bit
Penetration rate
Mud pressure
Mud density
Mud logging (including gas analysis)
Driller depth
Pumping rate
Rotation rate
Heave compensation

HISTORICAL

IODP Supplemental Measurements:
Defined as measurements that if are needed to satisfy expedition objectives should be made available to IODP. Some of these techniques will undoubtedly be 3rd party tools or require single expedition leasing of a tool.

Downhole Petrophysics:

Logging While Drilling and Measurements While Drilling
Logging While Coring
Permeability through packer tests
High-resolution gamma
Nuclear magnetic resonance
Formation testing
Pressurized core sampling
Downhole sidewall sampling
Pressurized fluid/gas sampling
Spontaneous potential (SP)

Core Petrophysics:

Anhysteretic Remanent Magnetization (ARM) and Isothermal Remanent Magnetization (IRM) with step-wise acquisition and demagnetization (step-wise acquisition and demagnetization)
Permeability on discrete samples
Vp and Vs, anisotropy and attenuation
Vs
Thermal imaging of core with infrared
Nuclear magnetic resonance
Particle size analyzer
Shear strength (i.e., miniature vane method)
Non-contact resistivity
XRF scanner

Geochemistry and Microbiology:

Laser ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS)
DNA, biomarker, and Phospholipid microbiological analysis
Microbial activity measurements using radiotracers

Measurements for safety:

Expedition specific as implemented by IOs with advice from Environmental Protection and Safety Panel (EPSP)

HISTORICAL

Measurements that Affect Drilling Decisions

The following a measurements that could affect drilling decisions while an expedition is underway. There are two categories of measurements – those that could affect drilling at a specific site and those that could affect drilling during a specific expedition.

Specific Site

Safety Measurements
Minimum Measurements:
Biostratigraphy
Visual Core Description
Smear Slides Thin Sections
Moisture and density/porosity (discrete samples)
Core logging: natural gamma ray gamma ray attenuation magnetic susceptibility
Standard Measurements:
X-ray CT scanning
Pore Water Chemistry (e.g., nutrients, pH, alkalinity, sulfate, chloride, major and trace elements)
Whole rock major and trace elements
Penetration rate
Mud pressure
Mud logging (including gas analysis)
Driller depth
Pumping rate
Cell counts on fixed samples
Supplemental Measurements:
Logging While Drilling and Measurements While Drilling

HISTORICAL

Measurements that Affect Drilling Decisions (continued)

Specific Expedition

Minimum Measurements:
Temperature profile
Downhole logging: natural gamma ray spectral gamma density porosity resistivity sonic borehole imaging
Standard Measurements:
Natural remnant magnetism (NRM) with step-wise demagnetization
Core logging: P-wave velocity
Vertical seismic profile or checkshot
Caliper
Downhole Magnetic susceptibility
Whole rock major and trace elements
Cell counts on fixed samples
Supplemental Measurements:
High-resolution gamma
Formation testing

HISTORICAL