

SciMP Core Description WG Report: IODP Standard for Core Descriptions

SciMP Core Description Working Group

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1. Overview

Core description is a basic and essential component in drilling projects. Especially, visual description by the “naked eye”, combined with scientist’s theoretical and empirical knowledge, is indispensable to the core processing flow.

An integrated data management system is recommended to provide an effective and efficient environment for visual core description. The integrated data management system may include 1) advanced core-imaging facilities, 2) real-time browsing of images and non-destructive measurement data and 3) data input/editing/summarizing/integrating system for core description.

Mission Specific Platforms have special requirements based on the platform capacity and limitation.

2. Core processing flow

2.1. Core splitting

Cores are typically split into two halves after whole round core measurements and sampling. One half is used for visual core description and archiving (archiving half). The other half is used for routine analyses and sampling by approved requesters (working half).

Development of precise split technique is recommended. Roughness of split surfaces is less than 1 mm for non-destructive measurements (especially for data quality control of XRF core logger). Individual hard rock pieces also require precise split technique more careful than in ODP.

<p>Recommendation 1: Core Description WG recommends the development of precise splitting techniques of cores to provide maximum quality of surfaces to be described.</p>

2.2. Archive halves

Archive halves are typically measured and archived routinely by following order.

- Image scanning
- XRF Core Logger (option)
- Color reflectance logger
- Visual descriptions
- Refrigerating at 3-4°C onboard
- Additional standard measurements and archiving in IODP Core Repositories

Measurement intervals are decided on a project basis. High-resolution measurements could be conducted at on-land facilities. Most of the measurements may be conducted on land, following constraints for MSP projects.

Digital imagery issues regarding, standards, calibration, archival, and implementation across all drilling platforms and on-land facilities need to be reviewed by SciMP (Action Item 03-02-07).

2.3. Working halves

Working halves are typically measured and archived routinely by following order. Sampling strategy is decided by each project. Most of the measurements may be conducted on land for MSPs.

- Split core MSCL (Multi-Sensor Core Logger)
- Sampling/Measurements for routine measurements (sedimentology, petrology, physical property, rock magnetism, chemistry, paleontology, microbiology etc.)
- Sampling for accepted post-expedition research projects
- Refrigerating at 3-4°C onboard
- Additional standard measurements and archiving at IODP Core Repositories

3. Data management system

3.1. Multi-data browsing system and data integration

"Multi-data browsing system" is recommended to refer core images and non-destructive measurement data as early as visual description by sedimentologists and petrologists. Images and data may include:

- Whole core X-ray CT images
- Whole core MSCL data
- Whole core scanning images
- Image scanning data
- Color reflection data
- XRF Core Logger data (option)
- Any available logging data

<p>Recommendation 2: Core Description WG recommends the integration of core images in a multi-data browsing system so as to integrate imagery and non-destructive measurements for core</p>
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description.

3.2. Core description using “electronic barrel sheet”

All descriptive information required to be stored in the database using an “electronic barrel sheet”. “Real-time annotation” on the core image is recommended for descriptive and sampling documentation purposes.

Guidelines for core description and training are required for each drilling project (see Action Item 03-02-08). This management will initialize/customize the "electronic barrel sheet" for each drilling project through dialogue with co-chief scientists and the science objectives for each expedition.

3.3. Smear slides and thin sections

Integrated database should store petrographic descriptions with point-counts of modal abundances, photomicrographs, and scanned images of both smear slides and thin sections. Common reference collections should be prepared for all drilling platforms and on-land facilities. A reference smear slide database should be developed for quality control and constancy of smear slide descriptions. A reference collection of polished thin sections containing opaque minerals should also be developed - important for igneous/metamorphic rocks as well as paleomagnetic studies.

Recommendation 3: Core Description WG recommends the preparation and creation of reference smear and thin section collections common to all platforms and on-land facilities.

4. Hard rock core description for drilling decisions

Lithological characterizations are essential because it can affect drilling decisions during the expeditions. The following procedure is recommended for hard rock observation:

- Representative samples for each lithounit should be chosen for thin section.
- Each thin section should be scanned in a systematic manner.
- Digital photomicrographs of important and/or representative textures and minerals should be taken.

The following equipment should be required for all drilling projects:

- Tools for making thin sections
- Polarizing (transmitted and reflected) microscope with digital camera for photomicrographs with point counting capabilities
- Stereoscopic microscopes with polarizing system
- XRD (X-ray powder diffraction)
- XRF (recommended for high precision major elements analyses) or ICP-MS/-AES (Atomic Emission Spectrometry) with preparation facilities

Detailed discussion and recommendations on hard rock description were well

documented in the Report of the Hard Rock Working Group, JOIDES SciMP.

ANNEX: Archiving strategy and policy

Core samples recovered during IODP expeditions shall be archived for the purpose of achieving the IODP science plan.

Recommendation 4: Core Description WG recommends an adequate core archiving strategy for all core samples recovered during IODP expeditions to insure post project description and sampling requirements.

Recommendation 5: Core Description WG recommends an adequate archiving strategy for drill cuttings, when available.

HISTORICAL