Responsibilities of Shipboard Scientists

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General Responsibilities

Overview

Each scientist participating in an IODP expedition has a number of general responsibilities with respect to contributing to the overall objectives of the expedition as summarized below. In addition, details about specific job assignments are addressed in the subsequent section.

Expedition Objectives

Each participant is required to familiarize himself/herself with the scientific objectives and operational strategies of the expedition as outlined in the *Scientific Prospectus* (see IODP-MI web site; http://www.iodp.org/scientific-publications/).

Pre-expedition Sample and Data Request

Each participant is required to submit a sample and/or data request two months before the expedition (this is a general rule, in some cases such as multiple, linked expeditions, complex drilling projects and etc, sample/data request submissions may not follow the two month deadline) with an outline of their proposed post-expedition research. This request/proposal will be used to allocate core samples and data, and coordinate post-expedition research.

Special Lab Needs

Scientists are requested to contact Expedition Project Manager (EPM) as early as possible if special equipment, supplies, lab space, etc., are needed. Additional details about specific labs and shipboard instrumentation can be found at: http://www.jamstec.go.jp/chikyu/eng/Expedition/laboratories/index.html.

Data Collection

Shipboard scientists collect, analyze and compile data conforming to IODP procedures

and format established for each laboratory station and job description. Work shifts typically are 12 hours a day. All data collected during an expedition are the property of the entire shipboard party (or science party in case of multiple linked expeditions) for one year, after which time these datapublic.

Reports

Shipboard scientists produce scientific reports in the form of site chapters for the Preliminary Report volume and present their findings to the other participants in shipboard science meetings. They also assist the co-chiefs in writing summary reports such as the Weekly Report, Site Summary Report, and expedition summary chapter for the Preliminary Report. Authorship of Preliminary Report is collective; individuals contribute according to their job assignment and scientific expertise.

Sampling

During the expedition, scientists are assigned cores/cuttings-sampling shifts (2 hours/day in general) during their normal work shift. When cores/cuttings are ready for sampling, the assigned sampling shift takes all the samples designated for shipboard sampling by the Sample Allocation Committee (SAC), under guidance of the shipboard curator. For high recovery expeditions when sampling cannot be fully completed onboard, participants are also strongly encouraged to take part in post-expedition sampling parties, if travel funding is available.

Expedition Evaluations

At the end of the expedition, all shipboard scientists are encouraged to complete expedition evaluations. These evaluations guide IODP in upgrading laboratory equipment and procedures and in improving life on board ship.

Scientific Publications

After the expedition, scientists are responsible for analyzing samples as proposed in their sample request and expedition application and publishing data and results. Obligations are outlined in the IODP Sample, Data, and Obligations Policy (see http://www.iodp.org/program-policies/).

Scientist Job Descriptions

Overview

Participants are invited to serve in particular jobs that need to be completed to ensure scientific success of the expedition. The optimal mix of expertise is determined by the expedition objectives and by the Co-chief Scientists, the EPM. An individual's scientific expertise is taken into account as much as possible during job assignments. However, a one-to-one relationship between an individual's expertise and objectives and the required job may not always exist. In such cases, shipboard scientists should be aware that they first serve the overall expedition objectives as outlined in the prospectus in the most effective way possible before they pursue their individual scientific interests during the expedition.

Core/cuttings Description

Core/cuttings describers may have expertise in a wide variety of fields including sedimentology, petrography, petrology, or structural geology. Core/cuttings description can involve the following tasks:

- macroscopic visual description of split cores and/or cuttings are entered in a description database that generates standard reports (sediments), or are collected in more detailed graphic templates (hard rocks);
- microscopic observations from smear slides and/or thin sections, entered in spreadsheet databases and, in some cases, added to the macroscopic description forms;
- description and measurement of deformation structures;
- acquisition and initial quality control of MSCL data, including digital images, diffuse color reflectance, and magnetic susceptibility. In some cases, this may also be done by individuals in the physical properties position;
- preliminary interpretation of depositional, diagenetic, or deformation processes;
- selection of samples, in consultation with other scientists, for shipboard carbonate, XRD, or chemical (ICP) analysis.
- analysis of XRD and/or ICP data, if the appropriate expertise exists, this may also be done by one of the inorganic geochemists.

Stratigraphic Correlation

This position is essential on expeditions where complete stratigraphic sections are a

primary expedition objective by coring multiple holes at a site. Completion of a “meters composite depth” (mcd) depth scale in near-real time guides coring operations and ensures complete recovery of the sediment section. A spliced section typically is created and used for sampling. For maximum efficiency, two correlators are needed to cover 24 hours and to guarantee feedback within hours or minutes. Pre-expedition training is required for inexperienced correlators. The job typically includes operation of the multi-sensor core logger (MSCL) because the main data sets used are magnetic susceptibility, natural gamma radiation, and gamma-ray attenuation density from whole-core logging. Other data may be needed to improve correlation such as color reflectance logs, macroscopic descriptions from split cores, or even biostratigraphic information.

Biostratigraphy

Micropaleontologists provide age data and a biostratigraphic age model for each site. This mainly is done using core-catcher samples and/or unwashed cuttings soon after the cores/cuttings are recovered. Additional samples may be examined to provide as complete biostratigraphic characterization of the cored section, or of critical intervals, if possible within the time available. Full assemblage analysis is not required on the ship; rather, identification of useful microfossil data for constructing age-depth plots and sedimentation/accumulation rate curves is the primary emphasis. Paleoenvironmental or bathymetric data, principally from benthic foraminifers, may also be important on certain expeditions. Slides, mounting media, and maceration chemicals are available for all major microfossil groups.

A reference library with texts, journals, and reprints is available to help shipboard paleontologists identify microfossils. Because of limited shipboard space, the library is not comprehensive and micropaleontologists should check with EPM before the expedition to confirm reference availability.

Micropaleontology Reference Collections from DSDP, ODP, and IODP cores/cuttings are available at a number of institutions worldwide. Scientists may visit these collections before sailing. See iodp.tamu.edu/curation/mrc.html for collection and contact information.

Magnetostratigraphy

Paleomagnetists conduct paleomagnetic measurements and reduction of data to intensities and direction of magnetization. Paleomagnetists also provide absolute

orientation data for orientation of deformational structures measured in the core, if appropriate. Some additional rock magnetic properties can be acquired on the ship, which is particularly useful for ephemeral magnetic properties(post-recovery dissolution, reduction, or oxidation of magnetic minerals).

Physical Properties

Scientists assigned to this job usually determine the following properties:

- moisture content and grain density on core/cuttings samples
- P-wave velocity on split cores and/or discrete core samples
- thermal conductivity on whole cores or split cores, if appropriate
- acquisition, analysis, and presentation of downhole temperature (and pressure, if possible) measurements;
- shear strength on split cores if warranted by the expedition objectives.

On expeditions where no stratigraphic correlators are required, physical property scientists operate the MSCL as well. In addition, they oversee and document the overall physical properties measurement program in consultation with other scientists, including the full-core and split-core logging systems. They also ensure that calibrations and control measurements are carried out according to protocol to ensure data quality control.

Geochemistry

The primary responsibility of organic geochemists is to monitor cores for hydrocarbon content (only in riserless drilling). The results may need to alert the Operation Super Intendant (OSI) through EPM when hydrocarbon levels in cores may constitute a potential safety or pollution hazard. They also provide data concerning organic matter characterization, elemental composition of organic matter, and carbonate carbon content.

Inorganic geochemists conduct chemical analyses on interstitial water (for cores), and/or solid sediment, or rock samples (cores and cuttings). Inorganic geochemists also have initial quality control and data interpretation of mud gas logging in collaboration with CDEX Operation Geologist (OPG) (in riser drilling).

Downhole Measurements/ Logging/ Geophysics

This position includes the following:

・ work closely with the CDEX Logging Staff Scientist (LSS) in designing, implementing, and interpreting the logging program which includes vertical or offset seismic profiling;

. acquisition, analysis, and presentation of downhole temperature/pressure measurements;

・ construction of synthetic seismic profiles, participate in integration of core-log-seismic data through interacting with core/cuttings physical properties specialists and geophysicists.

Details about borehole logging can be found at www.jemstec.go.jp/chikyu/eng/Expedition/logging.html.

Microbiology

Major responsibilities of the shipboard microbiologist include the following:

・ conduct onsite contamination tests by adding highly sensitive tracers (perfluorocarbons and/or fluorescent microspheres) to the drilling fluid or core barrel to evaluate extent of contamination of cores/cuttings by the drilling process;

・ conduct sampling for shipboard and shore-based microbiological analyses;

・ analyze thin sections of sediments or rocks for preliminary interpretations on contamination and bacterial activity;

・ start cultures and incubation of samples using different media;

・ may participate in the chemical analysis of interstitial waters and drilling mud (in riser drilling).

Other

On occasion, specialists may sail to perform more specialized duties, which may include:

・ downhole hydrologic (packer) or other geotechnical experiments;

・ installation of borehole instruments (e.g., CORKs, seismometers).