Scientific Report for IODP Expedition 386

Japan Trench Paleoseismology

Weekly Report

21st February to 27th February 2022

1. Location

D/V Chikyu, Shimizu Port, Japan

Onshore Science Party (OSP)

2. Activity Summary

The participants of the OSP have made good progress throughout Week 2, and are adjusting to the unusual circumstances and challenges of a hybrid OSP. Normal 12-hr shift working has continued for the participants on board *Chikyu*, with virtual participants lending as much time as they can to review, interpret, and enter data, and to write content for the Expedition Report.

Zoom, Slack and e-mail are the main online tools being used by the OSP, with participants making every effort to maintain the team spirit normally found at an in-person OSP.

On 21 February, splitting, scanning, and sampling work continued on Hole M0083D, and the *Chikyu* team processed 17 holes and 251 m of core throughout the week (see table below). The *Chikyu* team took a break on 23 February and were given a tour of the ship. On 24 February, a shipboard seminar was given by Takuya Itaki, who presented an overview of radiolarian studies and the development of an automatic system for species identification. On 25 February, a lab safety meeting was held to discuss and share information on hazards and preventative measures while working in the Core Lab. On 26 February, a lecture was given by Toshiya Kanamatsu to introduce his paleomagnetic studies. On 27 February a ship safety drill was conducted.

Data continues to flow from the *Chikyu* to ESO in Europe and remote scientists worldwide for quality assessment and data entry, before being shared with the Science Party. The Science Party are also feeding back their observations and comments to the operators and the *Chikyu* team.

The first OSP samples (P-Wave, Sed GC) were received by the BCR/MARUM team this week, who will forward a subset of samples to the EPC team in Leicester. Both teams will shortly begin sample analysis on behalf of the OSP.

By 2400hrs JST on Sunday 27 February, the team aboard the *Chikyu* had split, scanned, described and paleomagnetically analysed 251m of core up to hole M0085D. The remote Science Party had further described 78 core sections from M0082 A, B, C and D and M0083 A and B, and entered the final descriptions into the DIS. The remote physical properties team have continued working with the penetrometer, MAD, colour spectrometer and RGB data, whilst the remote geochemists have continued to work on data gathered from offshore sampling.

3. Activities for Next Week (28th February to 6th March)

The *Chikyu* team will continue splitting, scanning, describing and sampling cores from holes M0091A and M0091B, along with further paleomagnetic measurements. Remote participants and ESO staff will continue to update offshore VCD descriptions, analyse offshore and OSP data, and continue Expedition reporting. OSP geochemistry and physical properties measurements will begin at BCR/MARUM and EPC Leicester.

4. Current Status

Hole	Total Core Length (m)	Split Core Described (m)	No. Samples Collected
M0083D	36.89	24.89	70
M0083E	0.92	0.92	4
M0083F	36.61	36.61	166
M0089A	1.43	1.43	5
M0089B	18.01	18.01	44
M0089C	0.71	0.71	4
M0089D	36.9	36.9	90
M0084A	0.95	0.95	Data not yet available
M0084B	19.94	19.94	Data not yet available
M0084C	0.46	0.46	Data not yet available
M0084D	35.43	35.43	Data not yet available
M0084E	0.5	0.5	Data not yet available
M0084F	38.77	38.77	Data not yet available
M0085A	0.72	0.72	Data not yet available
M0085B	18.31	18.31	Data not yet available
M0085C	0.43	0.43	Data not yet available
M0085D	33.69	16.1	Data not yet available

5. Preliminary Scientific Assessment

Onboard *Chikyu* visual core description, smear slide description, penetrometer-strength, moisture and density and paleomagnetic measurements are already completed for all cores recovered from the three main focus areas located in three trench fill-basins in the very south, the central part and in the northern-most part of the Japan Trench (Sites M0081A-F, M0082A-D; M0083A-F, M0089A-D; and M0084A-F, M0085A-D). Preliminary scientific assessment and comparison between these three focus areas reveal significant differences in the thickness of event beds, comprising few meters thick event beds in the central focus basin (M0083D,F) and an up to ~10m thick "megabed" in the northern focus basin (M0084D,F). The respective thickness of these beds is significantly thinner in the adjacent coupled sites recovered from topographic highs within these basins (M0089D and M0085D, respectively).

The hydroacoustics group has compiled bathymetric maps and sections from the new multibeam and high-resolution subbottom profiler (SBP) data acquired from each basin during the offshore phase onboard RV/Kaimei. Exact hole location and corrected depths

are integrated into the sub-bottom profiles for each site and will allow for detailed core-to-SBP integration.

The remote lithostratigraphy team has studied all holes from Site M0081, integrating the observations reported from the *Chikyu*-based sedimentology team and detailed observations of line-scan images and X-ray computed tomography data. We find exciting sedimentation patterns that can be observed in all holes. M0081A, C, and E show an oxygenated top in the upper 2 cm, and an interval of color bands in the upper 30-50 cm. For M0081B, D, F the team is excited to report that there are distinct intervals in all three Holes. The upper ~9 -11 m are characterized by abundant laminae and parallel laminae composed of silt, fine sand and v.f. sand. There is a 5 m interval of clay in all three holes that can be verified by all proxies used. The lower part of the Holes contains laminated and parallel laminae pattern with silt, fine sand and v.f. sand laminae and parallel laminae, as in the upper part of the Holes.

The tephra specialist onboard *Chikyu* has collected total 21 tephra samples from sites M0081, -82, -83, -84, -85 and -89. Based on smear slide observations, tephra beds with pumiceous glass shards are dominant. Abundance of hornblende as dominant heavy minerals is another characteristic feature.

Chikyu-based processing of radiolarian samples for preliminary radiolarian biostratigraphy, reveals that the giant piston cores recovered from both condensed sites M0089 and M0085, in the central and northern focus area, respectively, comprise a stratigraphic succession spanning the entire Holocene and reaching well back into the Late Pleistocene. Samples have also arrived in the “remote” home lab of the foraminifera specialist and were processed for sites M0081 and M0081 (southern focus area). Most samples contain foraminifers at very low numbers, only few samples are barren. Most foraminifers are well-preserved, even the thin-walled taxa. An interesting observation in two samples is the occurrence of orange-stained benthic and planktic foraminifers.

The geochemical results of the available interstitial water (IW) data indicate that the South Basin sites (M0081 and M0082) have similar IW profiles, suggesting comparable rates of biogeochemical processes at both sites. Similarly, the Central Basin sites (M0089 and M0083) show comparable IW trends, although Site M0083 shows slight non-steady state signals. In contrast, the North Basin sites (M0084 and M0085) display outliers in terms of organic matter degradation and diagenetic processes, and likely much higher sedimentation rates at Site M0084 than at Site M0085.

The physical properties group has focused their work this week on analyzing new moisture and density (MAD), pocket penetrometer shear strength, and color spectrometry. These new data have been generated for Sites M0081, M0082, M0083, M0084, M0089. These new results have also been integrated with offshore data from the multi-sensor core logger (MSCL) to make initial comparisons and initial results. In addition, the group continues to analyze and present the offshore-generated data for sites that have not yet been processed at the OSP. The group is also beginning to write site chapters and complete the first draft of the Methods sections.

Paleomagnetic inclination, declination, and intensity data of sites M0083 and M0089 (central focus area) were investigated. It is found that inclination and intensity profiles show good agreement among the holes, and declination needs to correct persistent linear trends. The characteristic paleomagnetic signals of secular variation will be compared between sites after removing the data of thick event intervals.

6. Figures

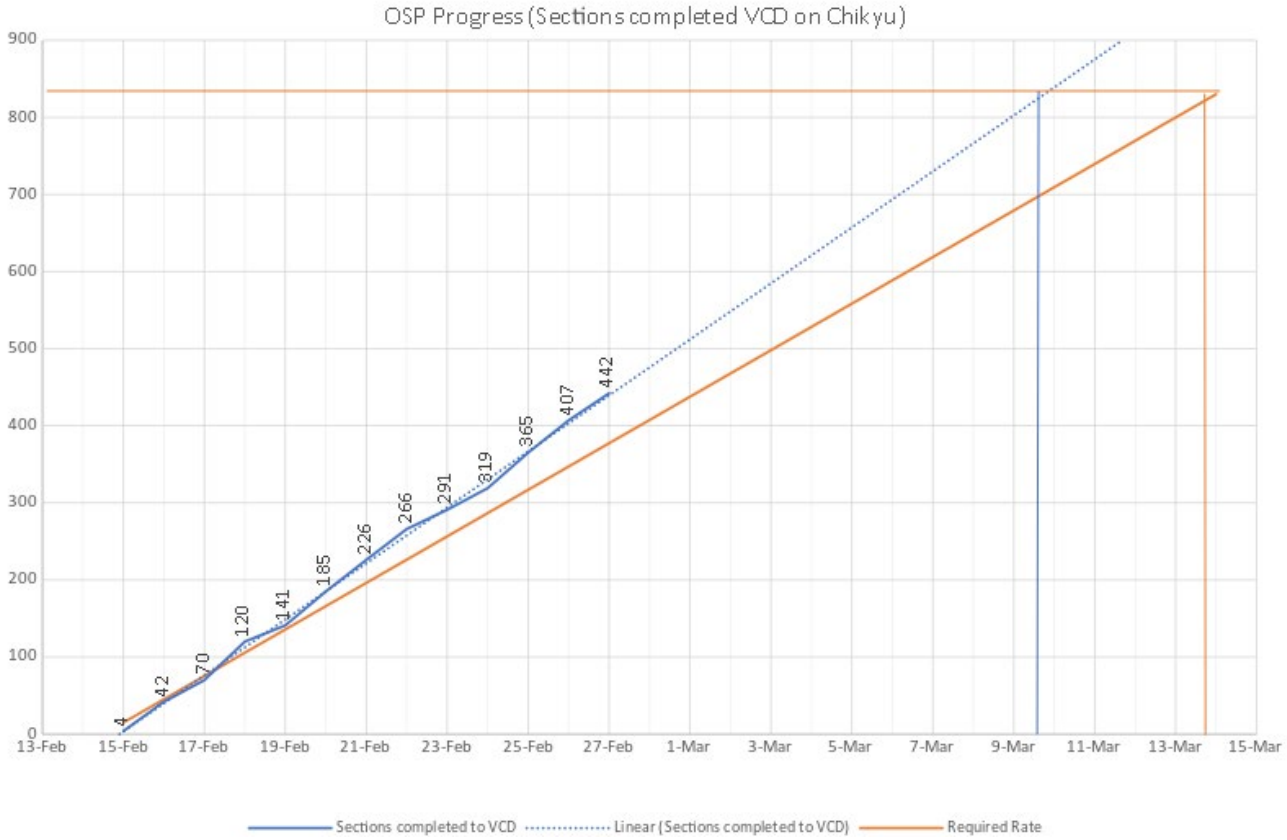
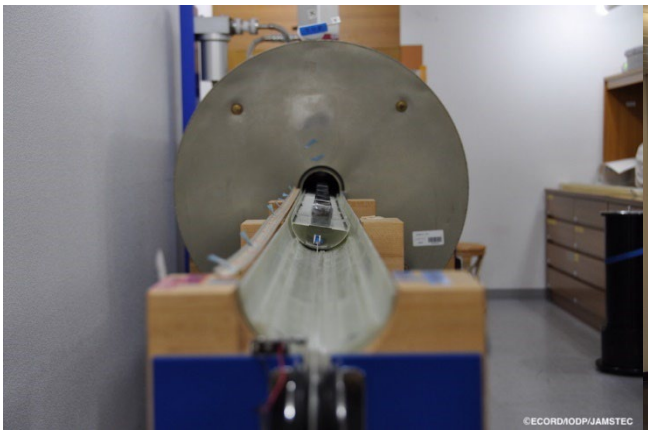


Figure 1: Number of core sections split, scanned and described aboard the Chikyu.

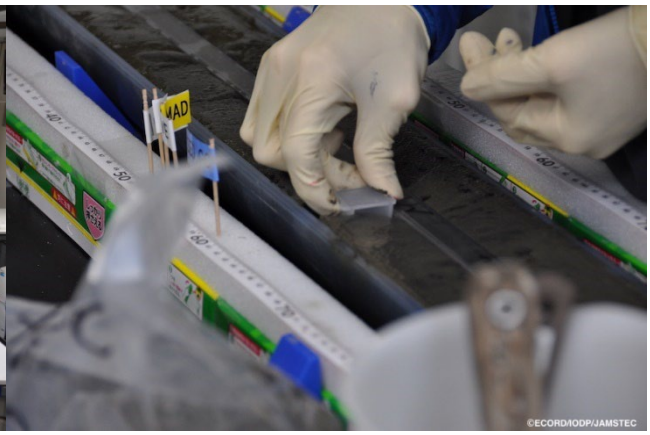
7. Photographs



A

B

C



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A: An Expedition 386 U-channel entering the magnetometer; B: Lecture by Toshiya Kanamatsu to introduce his paleomagnetic studies; C: Overview of the Chikyu Core Lab; D: GC-SED sampling.