



DSSV Pressure Drop: Descriptive Report

Pacific Ocean Transit Leg June-July 2019

Report developed for Five Deeps Expedition by Cassie Bongiovanni
Internal Use Only



Introduction

DSSV *Pressure Drop* left port in Tonga on June 11th heading east toward the Panama Canal in transit for the Five Deeps Expedition. The transit to the canal lasted from June 11th to July 5th. The total transit time was twenty-four days. The Kongsberg EM 124 multibeam echosounder system (MBES) installed onboard was operated to acquire bathymetric, backscatter and water column data throughout the transit leg by on the bridge officers – the originally planned mappers couldn't make it to the ship due to a last-minute port change. As such, minimal operator interference and rough seas resulted in mediocre data quality – but better than nothing at all.

This document serves as the metadata and descriptive report of the Solomon Trench Transit Leg's data acquisition, processing and interpretation.

Survey Details

Vessel : DSSV *Pressure Drop*
 Survey Dates : 11 June – 5 July 2019

Data Acquisition and Processing System

- Hardware
 - MBES : Kongsberg EM 124
 - Positioning : Seapath 380, stand-alone
 - Motion Sensor : Kongsberg Seatex MRU 5+
 - Sound Speed : Teledyne Reson SVP70 (at transducer)
- Software
 - Acquisition : SIS v5.1.1.153 Build date 2018-12-06
 Sound Speed Manager v2018.1.50 for Sound Speed Profile
 - Processing : QPS Qimera v1.7.4
 QPS FM Midwater v7.8.6
 KMALL to ALL Datagram Converter

Survey Parameters

Survey Speed : 9 – 11 knots
 Swath Angle (Sector) : ranging from 40 – 65 degrees each side (port and starboard)
 Beam Spacing : Equidistance
 Dual Swath Mode : ON

Data Coverage and Statistics

Total area covered	: 85,790 km ²	Total number of lines	: 1,353
Depth range	: 586 – 6,852 m	Data formats included	: *kmall, *all, *gsf
Average Swath Width	: 8,000 m	Northwest Lat/Long	: 06.917° N, 173.0236° W
Average Uncertainty	: ± 12.4 m	Southeast Lat/Long	: 20.950° S, 80.073° W

Mapper

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 Erlend Currie – Columbia Ship Management (UK)



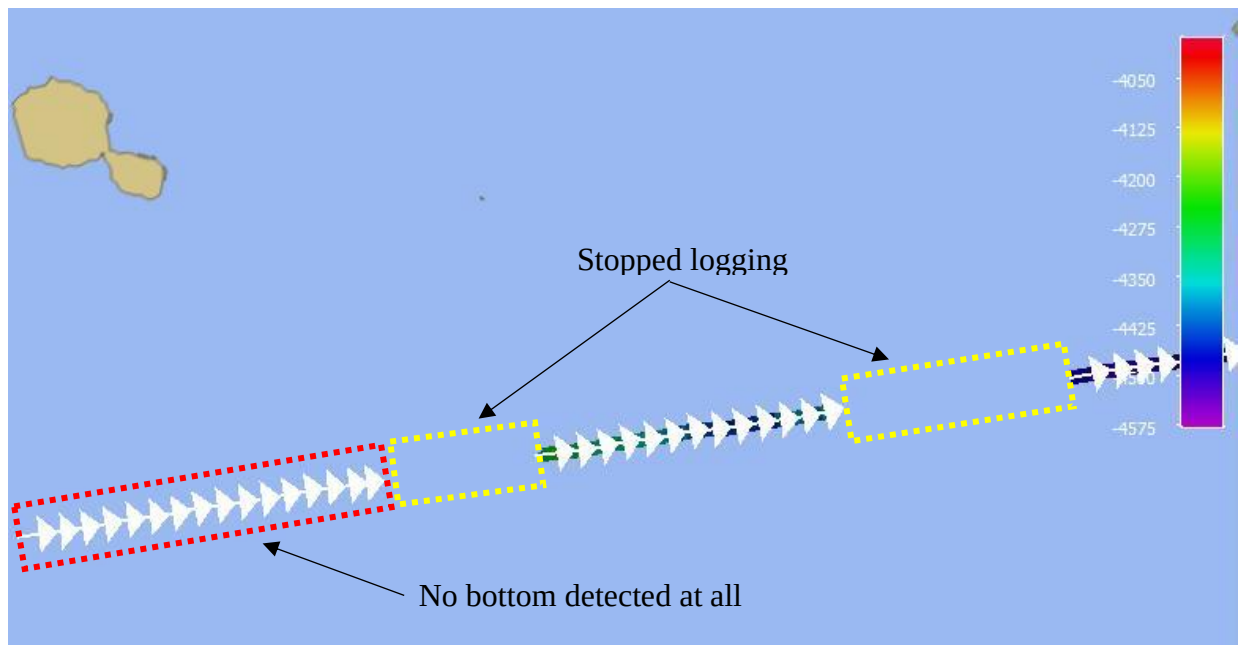
Data Acquisition Notes

1. Sound Speed Profile

The mapping team used sound speed profile from the Sound Speed Manager tool which is based on the World Ocean Atlas 2009 for the entire transit.

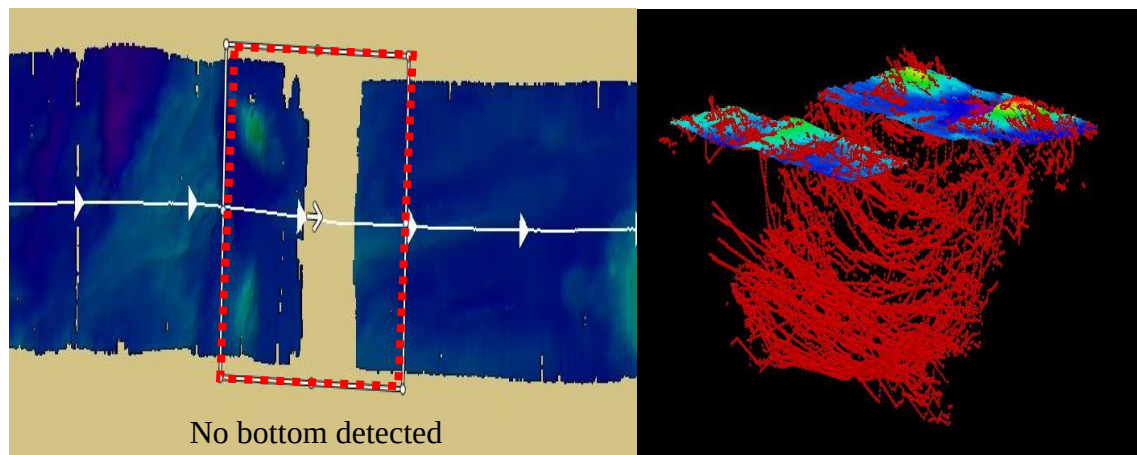
2. Sea State and Vessel Movement

The sea state was high for most of the transit – not ideal for surveying. However, some usable data were collected.



3. SIS Errors and Troubleshooting

There were instances when SIS crashed, couldn't find bottom, not responding and PU encountered errors that SIS and/or the PU needed to be restarted – leaving gap/holidays in the coverage.





Data Processing Notes

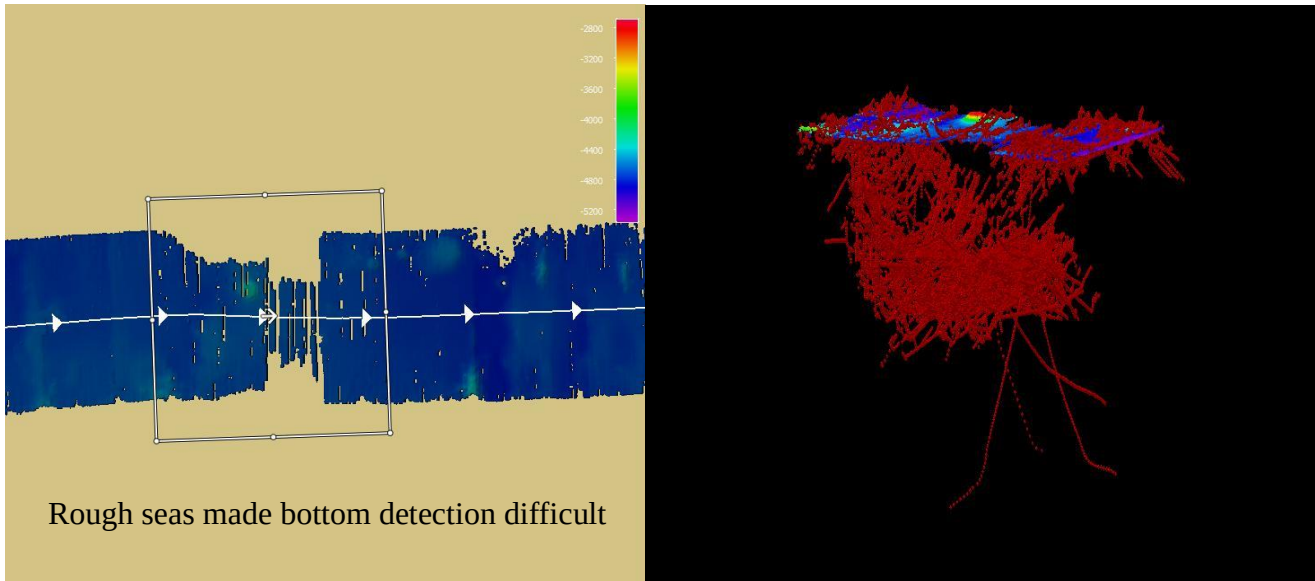
1. Qimera Project Parameters

Coordinate System : FP_WGS_84_World_Mercator

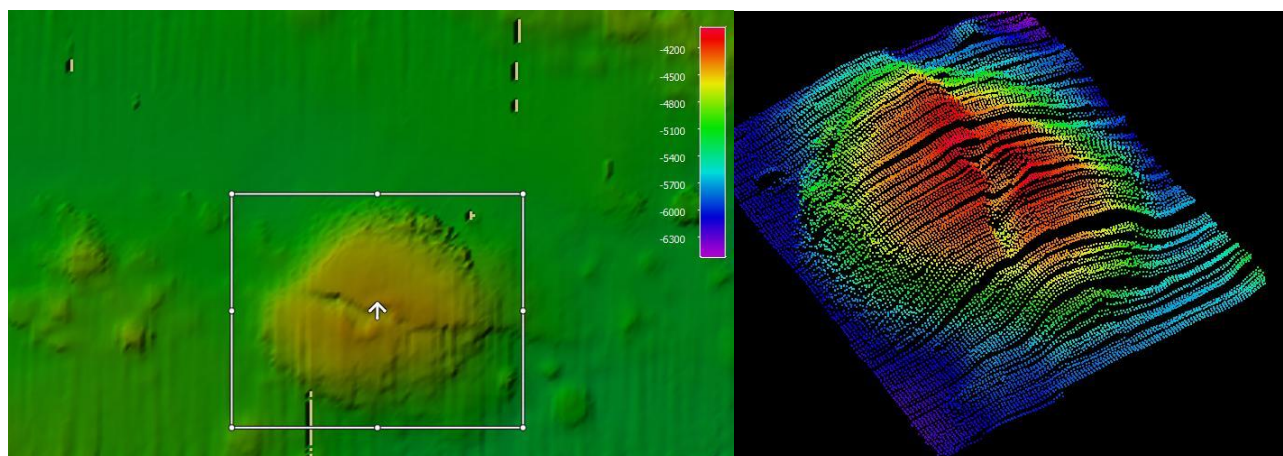
(Horizontal Datum: WGS 84, Projection: Mercator_1SP)

Dynamic Surface : CUBE at 75m resolution with Hypothesis Resolution Algorithm:
Number of Samples + Neighborhood

2. Rough seas posed a problem for bottom detection, resulting in extensive cleaning.



3. Good data were still collected.

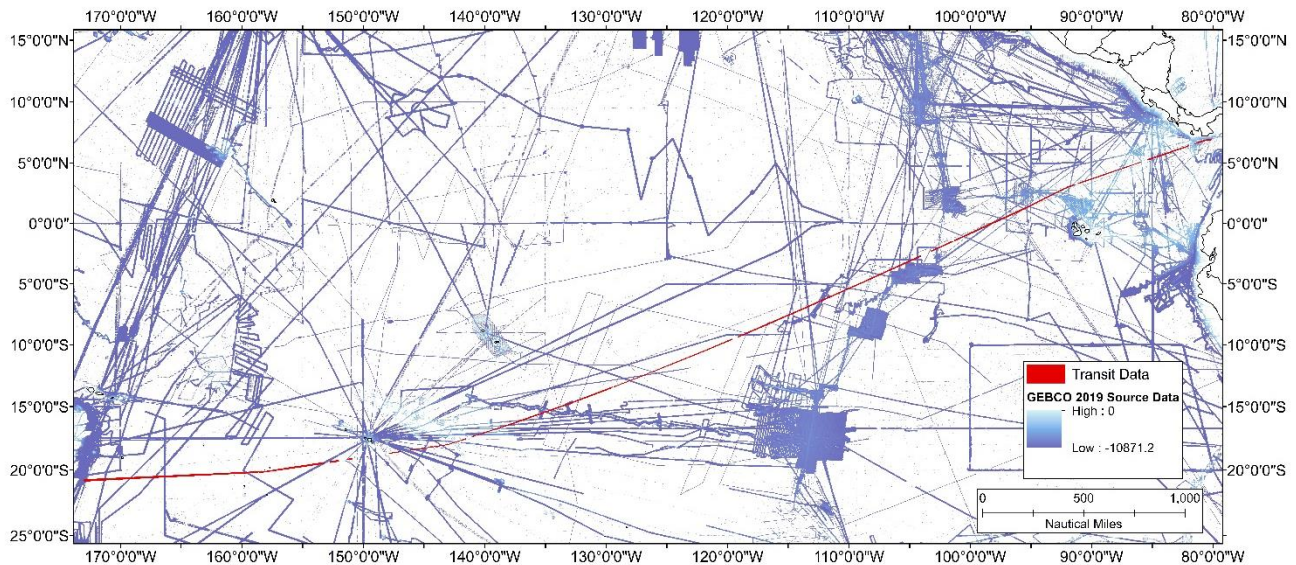




Comparison with publicly available base surface

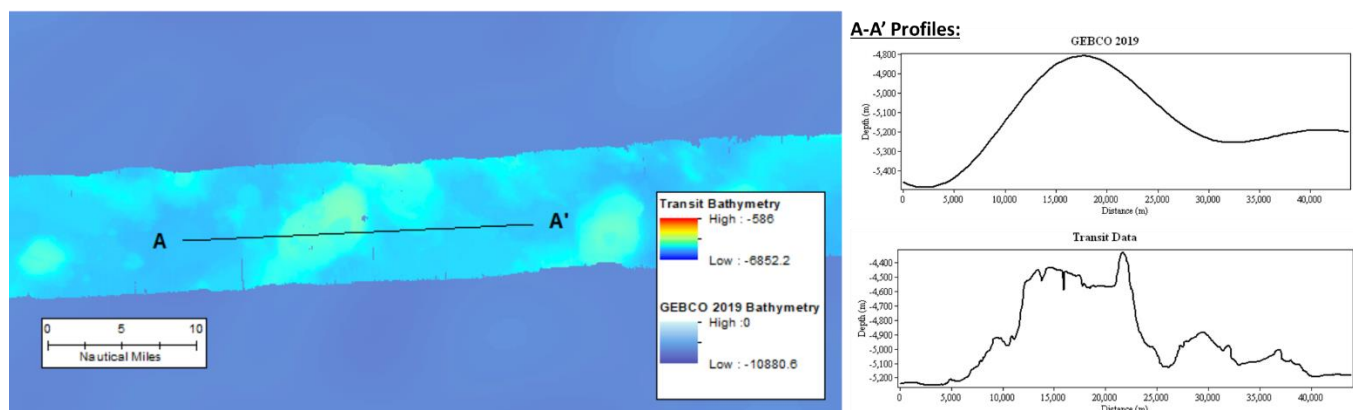
A bathymetric grid was extracted from the GEBCO 2014 30 arc-second compilation grid and was used as the base surface while the vessel is transiting and collecting data. However, since their collection the GEBCO 2019 came out and is used in this report for the most up-to-date comparisons.

The map below illustrates the transit data coverage and the data sources of GEBCO2019 grid.



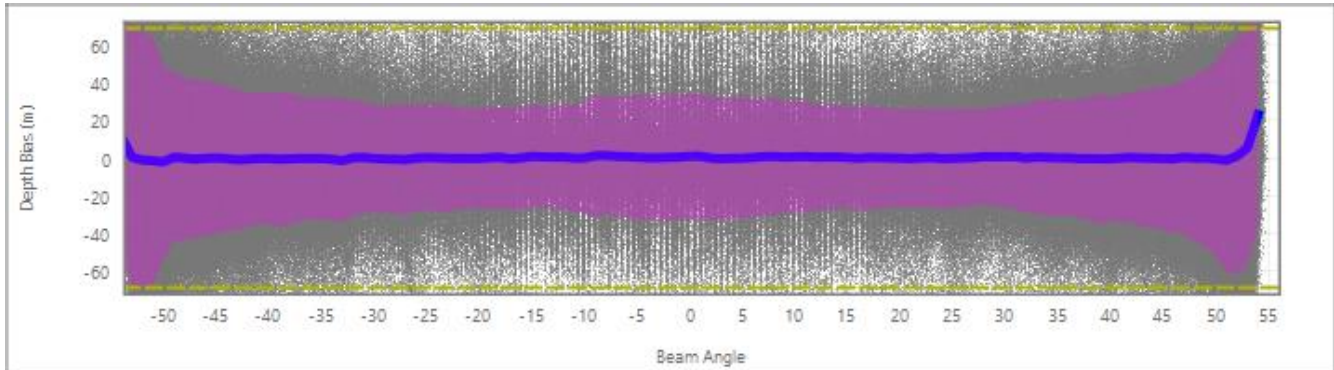
Majority of the transit data did not intersect sounding data from multibeam and single beam. Specifically, 80% of these transit data covered interpolated areas and are new data to the world. Only 20% covering previously collected transit datasets already included in the GEBCO 2019 grid.

The figure below shows the transit data coverage over a feature with the GEBCO2019 grid on the background. The profiles on the right illustrate the difference between the two surfaces. There is clearly a feature there, but the GEBCO2019 profile lacks complete the definition of the feature.





These data meet IHO Order 1 specifications and are anticipated to supersede any data.

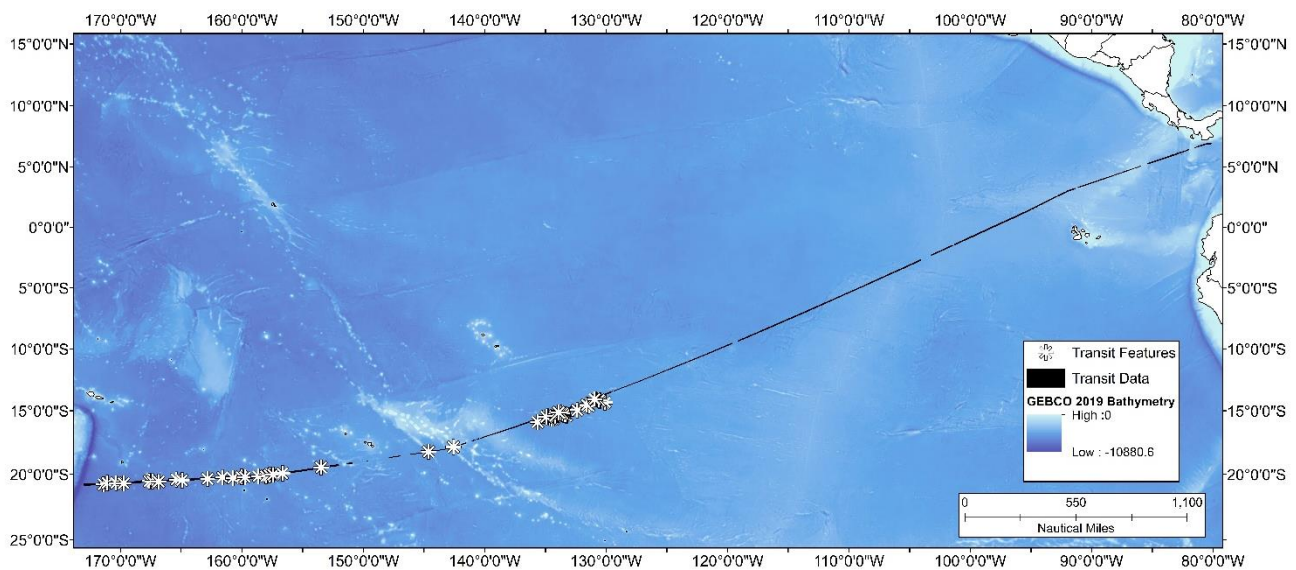


The yellow-dashed line is the IHO Order 1 uncertainty requirements in comparison to the transit data in purple, thus proving these data meet the quality requirements.

Features

There are eighty-one undersea geological features that were covered by the transit data, either partially or totally. It has already been suggested that name proposals be made and submitted to the GEBCO Sub-Committee on Undersea Feature Naming (SCUFN).

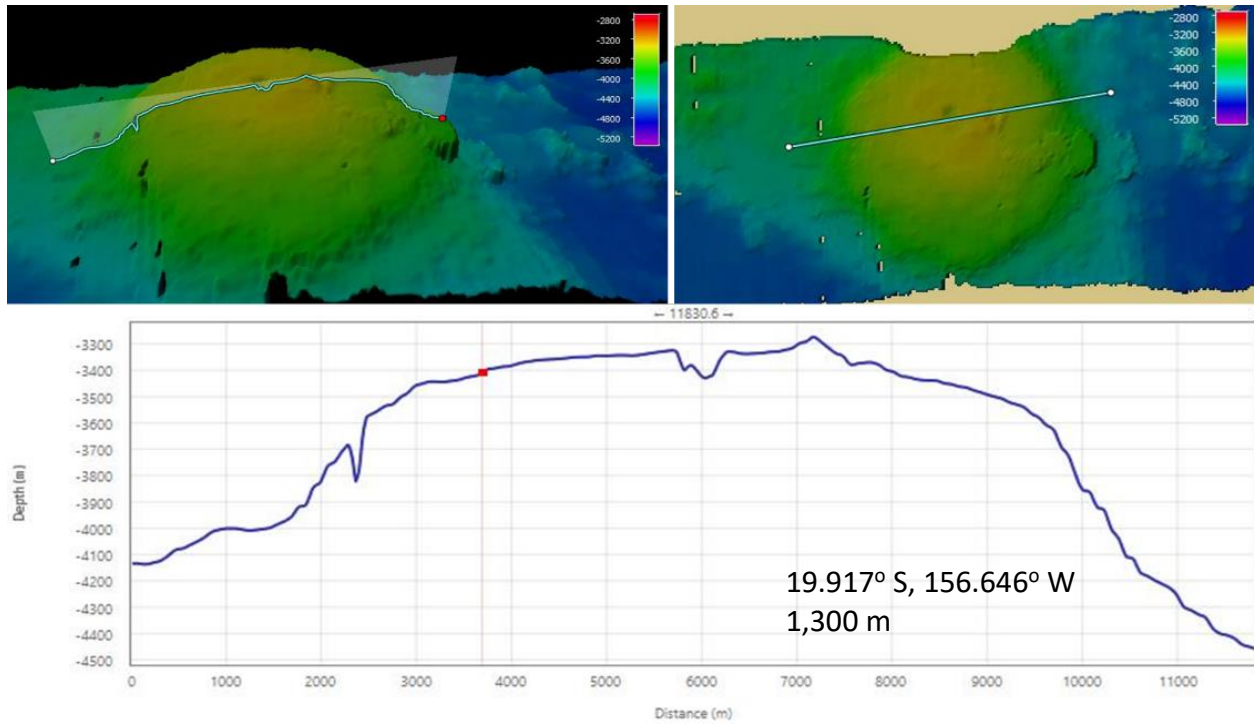
Below are images of the some of the features found.



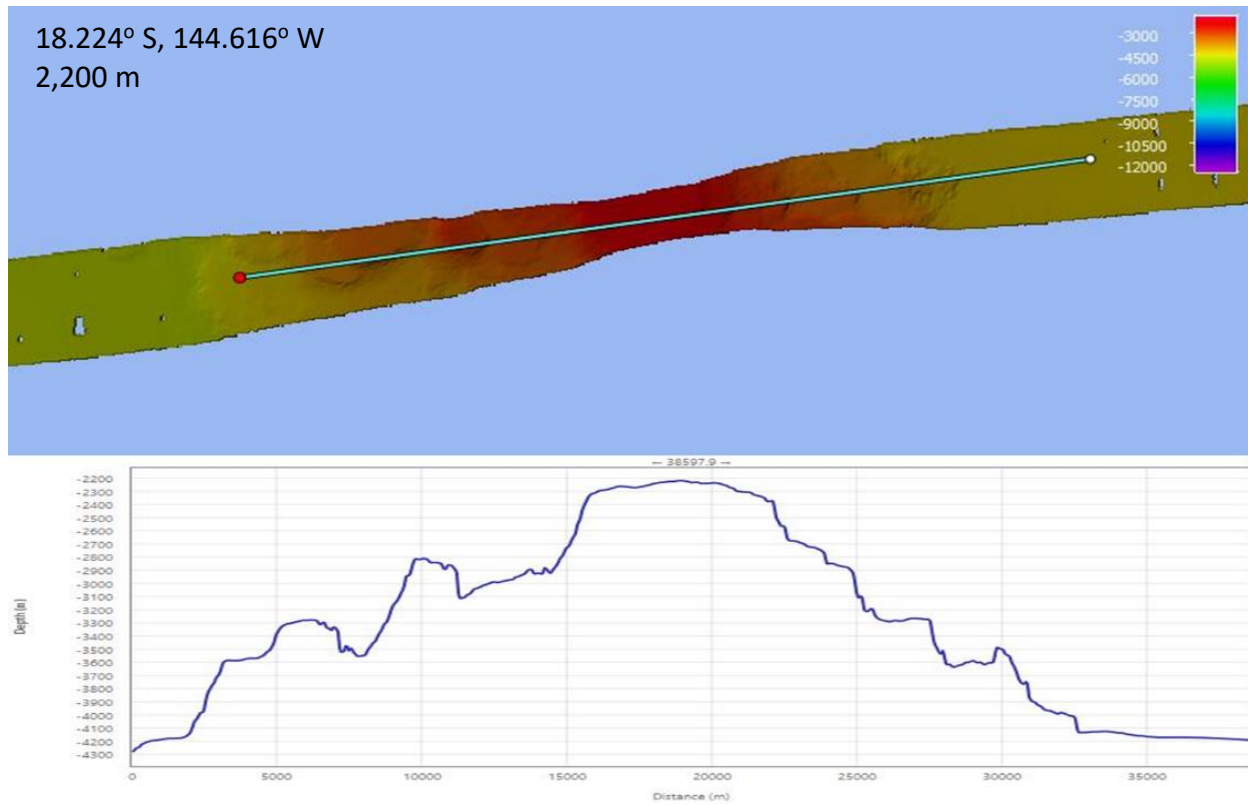
Features were only found at the beginning of the transit leg.



1. Guyot

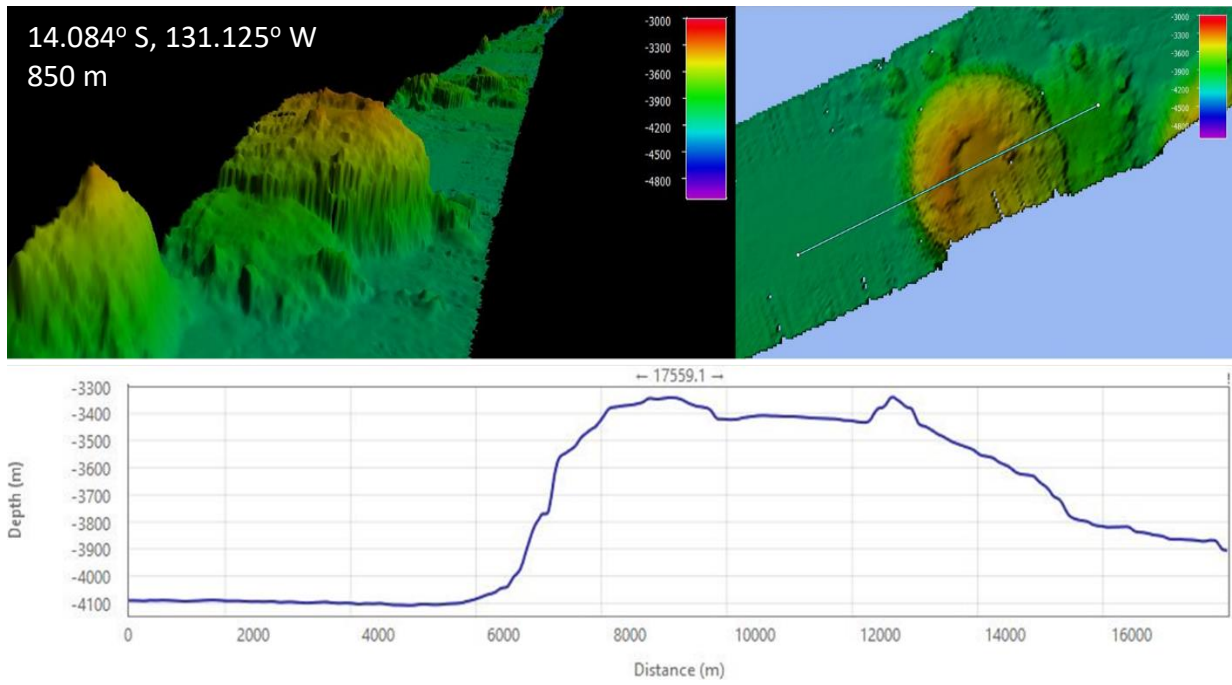


2. Seamount





3. Caldera



4. Knoll

