

VE = 58x

5550 **—** 

## Broad seafloor depressions and new seamounts revealed in shipboard geophysical data FUTZTOWN from the Early Cretaceous – Middle Jurassic seafloor, Central-Western Pacific

OS51E-1929

**Acknowledgements**: We would like to thank the Captain and Crew of cruise TN272 on the Thomas G.

data from the NGDC (http://www.ngdc.noaa.gov/). This research was funded by NSF-ODC Grant #1029965.

Thompson. Chris Bochicchio provided essential Linux and GMT guidance. Maps were created using GMT with

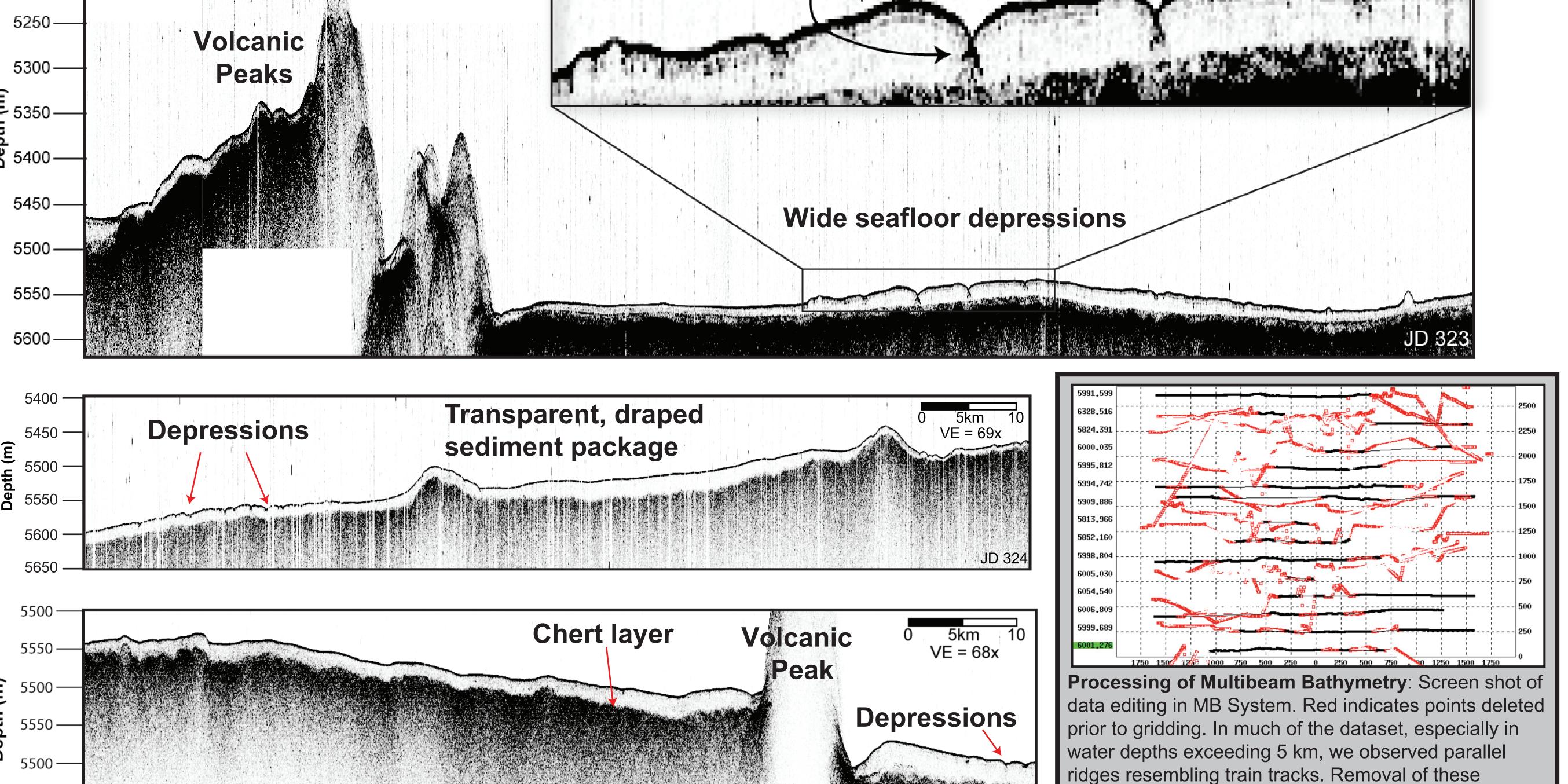
Adrienne Oakley, Nick Mathews\* nmath864@live.kutztown.edu, Masako Tominaga, Maurice Tivey, William Sager, Daniel Lizarralde, and the TN272 Science Party

## Abstract

We conducted a marine geophysical survey of the Central-Western Pacific seafloor in November-December 2011. Here we present initial interpretations of the shipboard geophysical data from a region of sparse data. During our 42-day cruise on the R/V Thomas G. Thompson (TN272) we obtained nearly 12,000 kilometers of multibeam bathymetry and backscatter (EM300 system) and Chirp sonar (3.5 kHz) data. Our survey included (1) a transect from Hawaii, crossing Necker Ridge, to the Early Cretaceous portion of the Hawaiian magnetic lineations (28N, 170E), (2) several subparallel track lines across the Middle Jurassic - Early Cretaceous seafloor, specifically a corridor within the Mesozoic Hawaiian magnetic lineations (Jurassic Quiet Zone), and 3) a transect from the south end of the Pigafetta Basin westward across the Mariana Trench to Guam. In all three regions both Chirp and bathymetry data revealed the occurrence of submarine volcanic activity (e.g. seamounts and smaller volcanic peaks) not previously resolved or mapped by satellite-based predicted bathymetry, despite the limitations of using the Thompson's EM300 MB system in greater than 5 km of water. The Chirp data imaged a 30-50 m thick transparent sediment layer which uniformly overlies a strongly reflecting horizon observed at depths ranging from 4400-5900 meters. The subbottom system did not resolve features below this horizon. We interpret the transparent layer to be abyssal clay ubiquitous in the central-western Pacific and the strong reflection to be a chert layer based on core data from ODP Site 801C. Near the volcanic peaks in the Chirp sonar profiles, we observed stratified sediment-filled basins. Volcaniclastic sediments as well as intrusions likely contribute to the layering. We identified at least three broad, anomalous depressions in the Chirp data that are located in water depths of approximately 5530-5545 meters. These features appear as funnel-shaped, hyperbolic depressions with a wide opening tapering to a narrow base, differing from the concave seafloor depressions typical of the rest of the data set. The largest of these features is 25 m deep and 2 km across at the seafloor. These depressions are not identifiable in the EM300 MB data and further investigation may be needed to discover their origin. Our initial observations remind us that we have only scratched the surface of the deep Pacific. Many details, and indeed surprises remain to be discovered, and it is clear that shipboard surveys continue to be an important component in marine

## EM300 Multibeam and 3.5 kHz Chirp Data

[2 JQZ] On JD 323 we observed wide seafloor depressions in the Chirp data that resembled large pock marks ranging from 10-25 m deep and 1-2 km wide. We observed similar depressions on JD 324 and JD 336 that were less defined. These smaller depressions are 5-15 m deep and ~1 km wide. Each of these funnel-shaped, hyperbolic depressions are located at the top of a ~10-40 m thick transparent sediment package that overlays a strongly reflecting horizon which we interpret to be a chert layer. These wide seafloor depressions are not identifiable in the satellite-based predicted bathymetry or the shipboard multibeam bathymetry. They differ in morphology from concave seafloor depressions and fault-bounded basins visible throughout the dataset.



JD 336

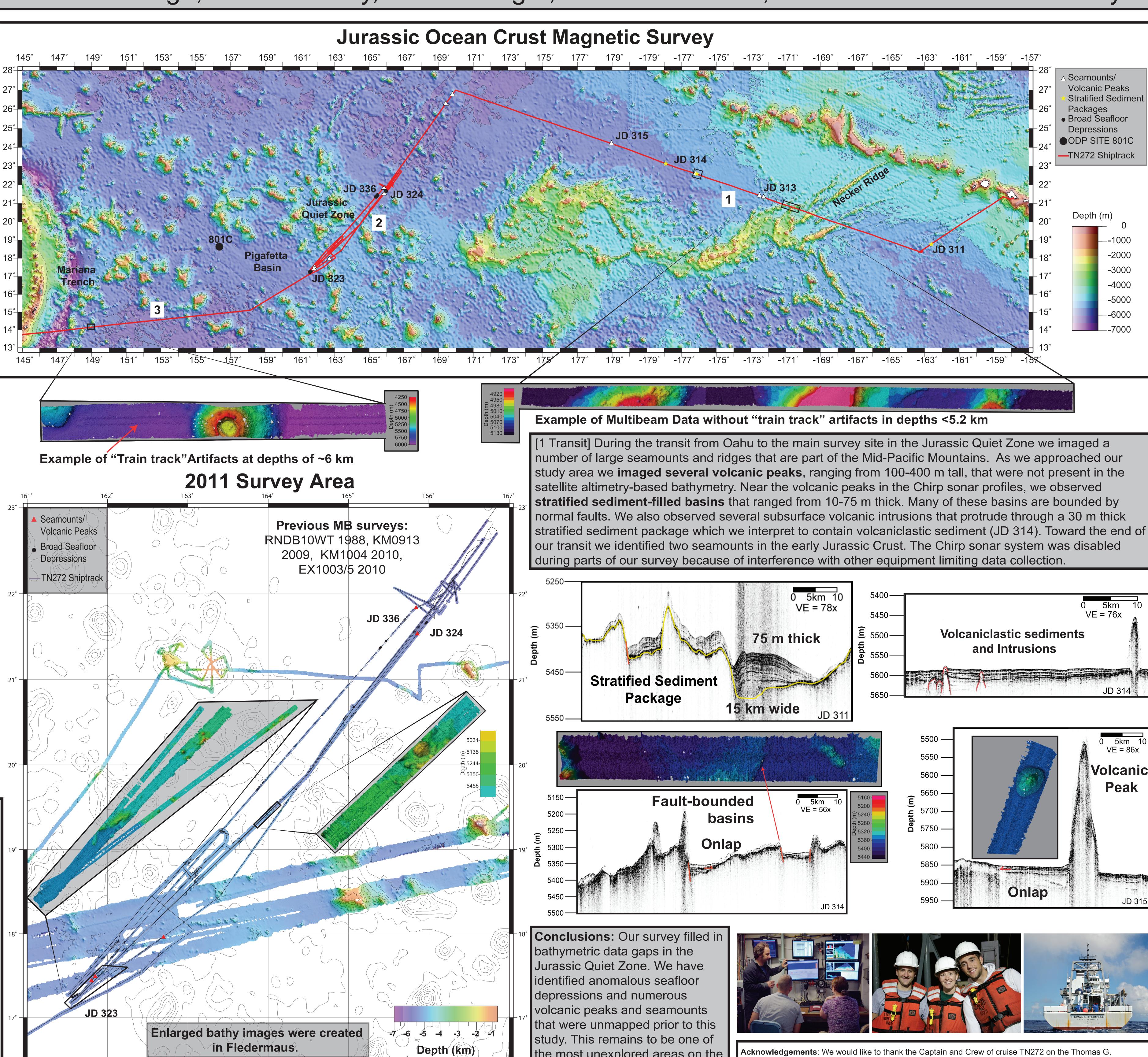
erroneous points resulted large data gaps and therefore

they were retained in most of the gridded data. Overall

multibeam data quality was limited by significant ocean

depths (>5 km), high ship speed (>12 knots), and

inclement weather.



the most unexplored areas on the

planet and warrants further study.