



## FK171224 30-day Post Cruise Report

1. **Ship name:** Falkor
2. **Cruise Dates - Day Departed:** 12/23/2017
3. **Cruise Dates - Day Returned:** 1/9/2017
4. **Cruise Number:** FK171224
5. **Departure Port:** Apia, Samoa
6. **Arrival Port:** Honolulu, HI, USA
7. **Mid-Cruise Port Call (if any):** None
8. **Mid-Cruise Port Call (if any):** None
9. **Participating Organizations, Institutions, Foundations, Government Agencies, etc.:**  
SOEST, University of Hawaii
10. **Funding Sources:** SOEST, University of Hawaii
11. **Describe all of the geographical area(s) where the science occurred:** Ellice Basin, Kiribati (including PIPA) and Apia-Honolulu transit
12. **Name of Chief Scientist:** Brian Taylor  
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**Cruise Objectives:** The goal of this transcruise from Apia to Honolulu was to map the seafloor fabric of part of the eastern Ellice Basin to further test the hypothesis that Ellice Basin seafloor spreading during the Cretaceous magnetic quiet zone separated the formerly contiguous Ontong Java and Manahiki Plateaus (Taylor, 2006).

Since the Taylor, 2006, paper hypothesized that the Ellice Basin opened by approximately east-west seafloor spreading (orthogonal to prior interpretations)

additional swath bathymetry data collection has added support for this hypothesis (e.g., Chandler et al., 2012, 2015). A recent NSF-funded cruise (Wessel et al., unpublished) has provided further support in the central and western basin. Nevertheless, the majority of the Ellice Basin remains unmapped, and large gaps exist between the three regions of detailed surveys.

The additional mapping on this transcruise helped fill in the gap between the central and eastern survey areas in order, it was proposed, to (a) better interpolate the fracture zone and abyssal hill patterns that link the two, and (b) expand the surveyed area around an enigmatic “V”-shaped pattern of intersecting fracture zones in the eastern area to determine what this feature represents (e.g., a change in the basin pole of opening).

The results were unexpected and therefore very interesting. Rather than being able to simply link the fracture zones between the central and eastern parts of the basin, the new data revealed many fracture zone terminations and hence that the opening of the central and eastern parts of the basin were not contiguous. A more complex evolution, involving not just changes in the poles of opening but also jumps in the centers of spreading, is required by the new data.

13. **Cruise Summary:** The additional mapping on this transcruise helped fill in the gap between the central and eastern survey areas in order, it was proposed, to (a) better interpolate the fracture zone and abyssal hill patterns that link the two, and (b) expand the surveyed area around an enigmatic “V”-shaped pattern of intersecting fracture zones in the eastern area to determine what this feature represents (e.g., a change in the basin pole of opening).

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Multibeam mapping with the EM302 was conducted successfully in Kiribati waters (21,400 square km, including 17,240 square km in the Phoenix Islands Protected Area (PIPA)) – about 70% more than proposed – as well as during transit through US and international waters between Apia and the approach to Honolulu (ending at 18°50'N). XBTs were deployed as needed outside PIPA to collect sound velocity profiles (SVPs); inside PIPA we used SVPs from CTD casts made in October on FK171005. The EM302 raw files were all edited using Qimera, and cleaned gsf files were prepared and archived.

14. Did you collect Measurements or Samples, including biological specimens? No
15. Did you deploy and/or recover any Moorings, Bottom Mounted Gear, or Drifting Systems? No
16. Equipment Used: N/A
17. Station Plots:

