MAPPIN' THE FLOOR

A SCIENTIFIC HIGH-SEAS ADVENTURE

LUCY BELLWOOD
This comic was produced at sea during a three-week research transit from Guam to Honolulu, in partnership with the Schmidt Ocean Institute.
HI THERE! I'M LUCY BELLWOOD, ADVENTURE CARTOONIST.

I'M VISITING RESEARCH VESSEL FALKOR TO EXPLORE SOME OF THE SCIENCE BEING DONE ABOARD THIS STATE-OF-THE-ART FACILITY.

WITH A BACKGROUND IN TALL SHIP SAILING, I'M NO STRANGER TO THE OCEAN,

BUT THE RESEARCH BEING DONE HERE IS ALL NEW TO ME.

SO LET'S DIVE IN AND LEARN ABOUT IT TOGETHER!
Named after the Luckdragon in Michael Ende's The Neverending Story, Falkor was originally built in Germany in 1981.

Since her refit as a research vessel in 2012, Falkor has conducted science cruises all around the world.

As a privately-owned ship, Falkor is often outfitted with the latest technology & equipment—not to mention some of the best researchers in the field. Here's a tour of some highlights:

1. The ship's own remotely operated underwater vehicle, just launched in 2016.
2. Hydraulic lifts help with loading and deploying equipment.
3. Twin diesel engines allow the vessel to reach a maximum speed of 17 knots (19.56 MPH).
4. Inflatable structures deploy in abandon ship scenarios. Safety is taken very seriously by everyone aboard.
5. Two antennae housed in large, fiberglass domes provide unmatched, high-speed internet at sea, with real-time data streaming online from all the ship's missions.
6. High-tech sensors capture everything from wind speed to water salinity to atmospheric pressure to vessel location.

**Ship Stats**

Length: 82.9m  Beam: 13m  Draft: 5.8m  Berths: 42
The control room’s wall of monitors allows the team to track stats all over the ship (and below the surface).

Belowdecks, Falkor is a scientist’s dream.

The wet lab is for examining specimens, checking equipment, and collecting and analyzing samples from the sea.

Highly-trained marine technicians stand ready to assist with data acquisition and processing.

A transducer (a device designed to send and receive sonar signals) mounted to a gondola on the keel enables mapping of the ocean floor.

A high-performance cloud computing system allows data storage and processing abilities never before available to scientists at sea.

This obscure location helps reduce interference from bubbles.
FALKOR offers a truly unique opportunity for our collaborators.

Carlie Wiener
Communications Manager

We give scientists free access to FALKOR in exchange for open communication about our data and results.

Everywhere we learn aboard FALKOR goes into the public domain free of charge.

Ocean Currents
Meteorological Data
Navigational Readings
Fluorescence (Levels of bioluminescent plankton in the water)

This data can help inform future areas of research and boost our knowledge of the oceans.

Julianna Diehl
Marine Tech Intern

I got here by submitting a research proposal to join FALKOR on this cruise across the Pacific, which brings us to our current mission...

John Smith
Chief Scientist
The Johnston Atoll unit (or JAU) lies within the recently-expanded Pacific Remote Islands Marine National Monument.

A former US military base, Johnston is the closest land to Hawai’i—719 nautical miles away from Honolulu.

Uh, Tree? What is an atoll?

I’m so glad you asked!

Whoa!
Coral colonies grow* up around the edges of subsiding volcanic islands in what’s known as a fringing reef.

*Very slowly, over tens of thousands of years.

As the central island erodes and the corals grow higher a lagoon forms, making a barrier reef.*

Coral growth

Lagoon

*This stage can take as long as 100,000 years to form. Subsidence

Eventually, the island erodes below sea level and the lagoon covers it.

The remaining circular formation is called an atoll!*

* Time: 30 million years!

I already mapped Johnston Atoll proper back in 2006.

Okay, well I guess we’ll map some seamounts* near the atoll!

See? Here they are.

Ooh.

*A seamount is any formation greater than 1,000ft above the seafloor.
If you’ve used Google Earth, you’ve probably seen that we already have some idea of the seafloor in these remote areas.

But the ocean is huge! How did we know they were here in the first place? Satellites!

Using radar altimetry, satellites can detect miniscule bulges in the ocean’s surface that follow the topography of the seafloor.

The bulges are a result of seamounts’ mass, which causes water to actually pile up atop them.

This gives us a rough idea of what lies beneath the vast expanse of blue at the surface.

*From Latin alti-, meaning “high” and Greek -metria, meaning “measuring.”

Satellite mapping can be like looking at a chair under a blanket—you know there’s something there, but not much about it.

But with multibeam...
It's a whole new level of detail!

I've been working with multibeam since it first came on the scene in the late seventies.

Queen of Multibeam

So here's what I've learned: multibeam uses a sonar array to provide us with massive quantities of data about the contours of the seafloor.

1. The transmitter in the gondola sends out a ping—a fan of 423 beams that cover a swath of terrain.

2. The echo of that ping bounces off the seafloor, returns to the receiver, and gets turned into data.

3. As the ship tracks back and forth, it gathers a seamless data set.

4. The science team then collects and cleans up the data, taking out rogue pings and filling holes.

5. Finally, the data is used to generate a three-dimensional visualization of the seafloor!

This area of study is called bathymetry.

Bathus is not, in fact, an ancient Greek term for bathtub, but an adjective meaning deep (or profound).
Much of the Jau has not yet been mapped or explored—but the region is a hotbed of biodiversity.

Our data will help future teams plan more focused dive missions with ROVs like SuBastian.

Our total mapping goal is 70,000 km², which means the science team will be standing watch around the clock.

Watch rotation:

00:00-08:00
08:00-16:00
16:00-24:00

(Ships operate on 24-hour time.)

Fact Sheet:

Danger Alert!

The Jau lies within the prime crust zone (PCZ).

The PCZ is an area of very rich cobalt crust formations.

Cobalt crusts are rich in rare-earth minerals, used in disk drives, fluorescent lamps, and rechargeable batteries, which could make these areas a target for mining in the future.

Similar mining efforts may go after manganese nodules.

These small, hamburger-like structures are also rich in rare-earth minerals.

They form in vast, underwater fields in an adjacent region of the North Pacific known as the Clarion-Clipperton Zone.

I also keep one in my fridge!
Once it’s processed, all our data goes into the public domain.

This gives scientists and casual Google Earth users alike a more detailed view of the region.

So our research literally changes the way people see the world.

We want everyone to know more about these extraordinary environments.

Exactly.

And awareness is the first step toward conservation.
TO LEARN MORE ABOUT WHAT WE FOUND AT THE JOHNSTON ATOLL UNIT, LOG ON TO SCHMIDTOCEAN.ORG/CRIUSES THERE'S A WORLD OF INFORMATION WAITING FOR YOU THERE.
ABOUT THE AUTHOR

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