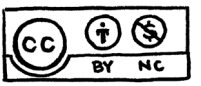
MAPPIN' THE FLOOR

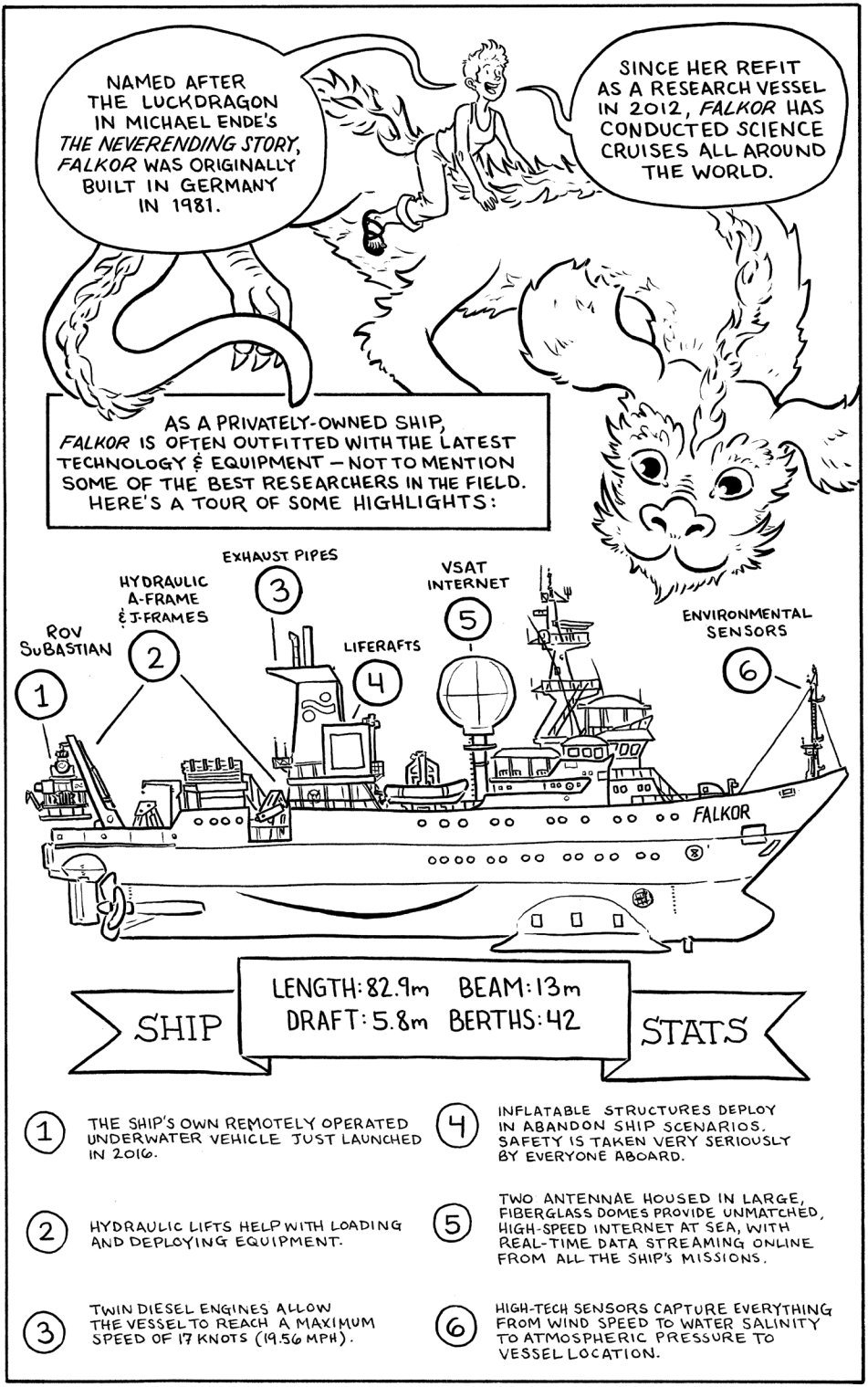
A SCIENTIFIC HIGH-SEAS ADVENTURE

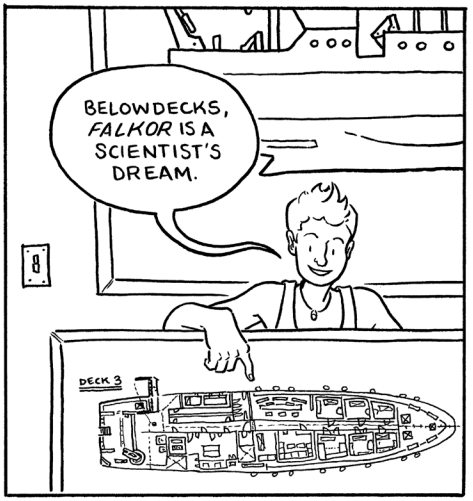
LUCY BELLWOOD

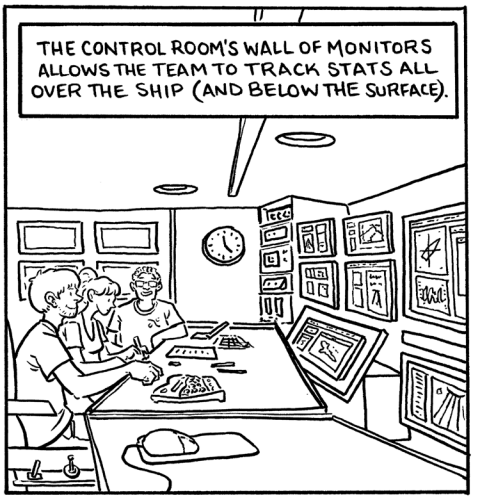
THIS COMIC WAS PRODUCED AT SEA DURING A THREE-WEEK RESEARCH TRANSIT FROM GUAM TO HONOLULU, IN PARTNERSHIP WITH THE SCHMIDT OCEAN INSTITUTE.

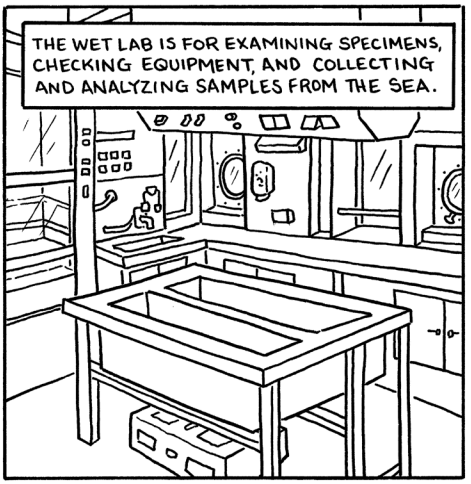


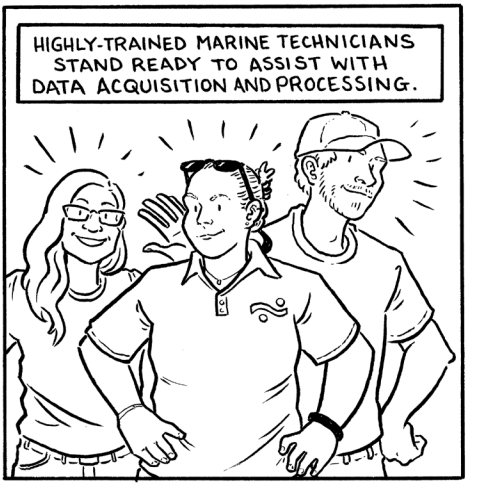

HI THERE! I'M LUCY BELLWOOD, ADVENTURE CARTOONIST.
I'M VISITING RESEARCH VESSEL *FALKOR* TO EXPLORE SOME OF THE SCIENCE BEING DONE ABOARD THIS STATE-OF-THE-ART FACILITY.
WITH A BACKGROUND IN TALL SHIP SAILING, I'M NO STRANGER TO THE OCEAN,
BUT THE RESEARCH BEING DONE HERE IS ALL NEW TO ME.
SO LET'S DIVE IN AND LEARN ABOUT IT TOGETHER!

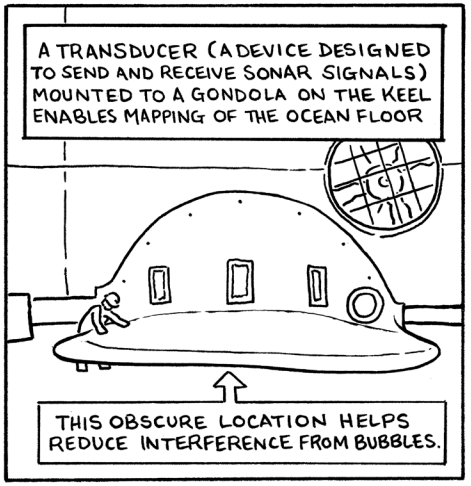

NAMED AFTER THE LUCKDRAGON IN MICHAEL ENDE'S *THE NEVERENDING STORY*, *FALKOR* WAS ORIGINALLY BUILT IN GERMANY IN 1981.
SINCE HER REFIT AS A RESEARCH VESSEL IN 2012, *FALKOR* HAS CONDUCTED SCIENCE CRUISES ALL AROUND THE WORLD.
AS A PRIVATELY-OWNED SHIP, *FALKOR* IS OFTEN OUTFITTED WITH THE LATEST TECHNOLOGY & EQUIPMENT — NOT TO MENTION SOME OF THE BEST RESEARCHERS IN THE FIELD. HERE'S A TOUR OF SOME HIGHLIGHTS:
ROV SUBASTIAN
1
HYDRAULIC A-FRAME & J-FRAMES
2
EXHAUST PIPES
3
LIFERAFTS
4
VSAT INTERNET
5
ENVIRONMENTAL SENSORS
6
FALKOR
SHIP STATS
LENGTH: 82.9m BEAM: 13m
DRAFT: 5.8m BERTHS: 42
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.

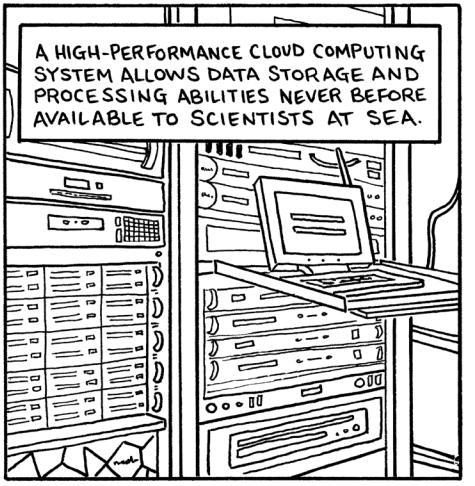

BELOWDECKS, *FALKOR* IS A SCIENTIST'S DREAM.
8
DECK 3


THE CONTROL ROOM'S WALL OF MONITORS ALLOWS THE TEAM TO TRACK STATS ALL OVER THE SHIP (AND BELOW THE SURFACE).


THE WET LAB IS FOR EXAMINING SPECIMENS, CHECKING EQUIPMENT, AND COLLECTING AND ANALYZING SAMPLES FROM THE SEA.

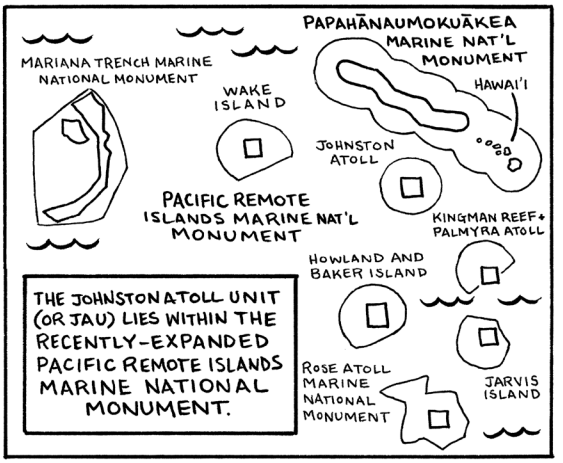

HIGHLY-TRAINED MARINE TECHNICIANS STAND READY TO ASSIST WITH DATA ACQUISITION AND PROCESSING.


A TRANSDUCER (A DEVICE DESIGNED TO SEND AND RECEIVE SONAR SIGNALS) MOUNTED TO A GONDOLA ON THE KEEL ENABLES MAPPING OF THE OCEAN FLOOR
THIS OBSCURE LOCATION HELPS REDUCE INTERFERENCE FROM BUBBLES.


A HIGH-PERFORMANCE CLOUD COMPUTING SYSTEM ALLOWS DATA STORAGE AND PROCESSING ABILITIES NEVER BEFORE AVAILABLE TO SCIENTISTS AT SEA.


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.
FALKOR
EVERYTHING WE LEARN ABOARD FALKOR GOES INTO THE PUBLIC DOMAIN FREE OF CHARGE.
COLLEEN PETERS
LEAD TECHNICIAN
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

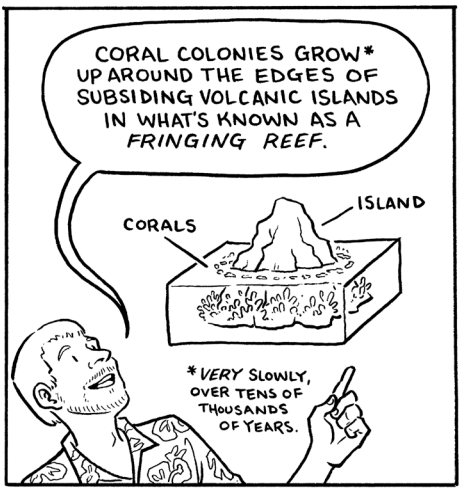

JOYCE MILLER, MAPPING SPECIALIST
MAPPING THE JOHNSTON ATOLL!
JONATHAN TREE, MARINE GEOLOGIST
JOHN SMITH, CHIEF SCIENTIST
THIS EXPEDITION'S SCIENCE TEAM IS USING MULTIBEAM MAPPING TO EXAMINE THE SEAFLOOR IN THE JOHNSTON ATOLL.

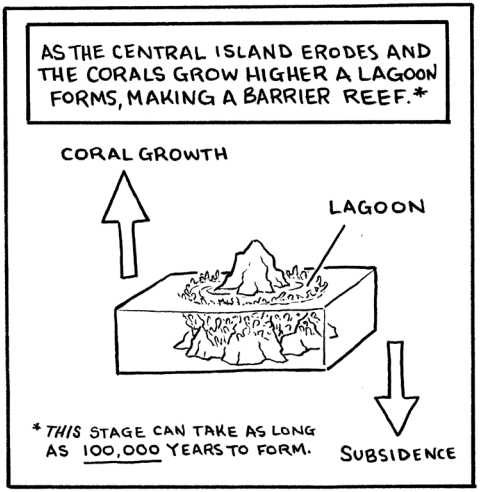

MARIANA TRENCH MARINE NATIONAL MONUMENT
WAKE ISLAND
PAPAHĀNAUMOKUĀKEA MARINE NAT'L MONUMENT
HAWAI'I
JOHNSTON ATOLL
PACIFIC REMOTE ISLANDS MARINE NAT'L MONUMENT
KINGMAN REEF + PALMYRA ATOLL
HOWLAND AND BAKER ISLAND
ROSE ATOLL MARINE NATIONAL MONUMENT
JARVIS ISLAND
THE JOHNSTON ATOLL UNIT (OR JAU) LIES WITHIN THE RECENTLY-EXPANDED PACIFIC REMOTE ISLANDS MARINE NATIONAL MONUMENT.


A FORMER U.S. MILITARY BASE JOHNSTON IS THE CLOSEST LAND TO HAWAI'I—717 NAUTICAL MILES AWAY FROM HONOLULU.


UH, TREE? WHAT IS AN ATOLL?

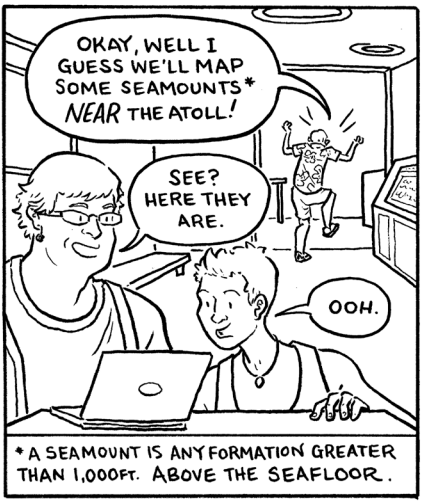

I'M SO GLAD YOU ASKED!
WHOA!

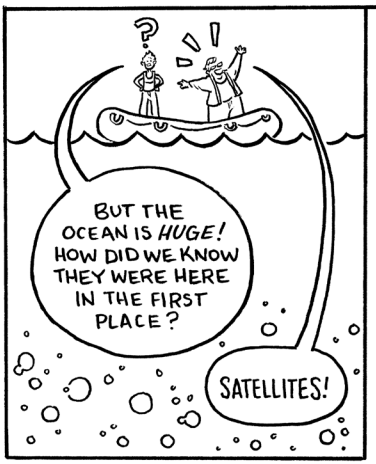

CORAL COLONIES GROW* UP AROUND THE EDGES OF SUBSIDING VOLCANIC ISLANDS IN WHAT'S KNOWN AS A *FRINGING REEF.*
CORALS
ISLAND
* *VERY* SLOWLY, OVER TENS OF THOUSANDS OF YEARS.

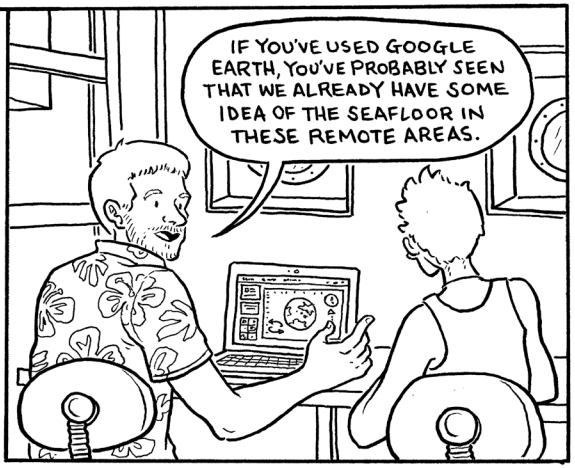

AS THE CENTRAL ISLAND ERODES AND THE CORALS GROW HIGHER A LAGOON FORMS, MAKING A BARRIER REEF.*
CORAL GROWTH
LAGOON
SUBSIDENCE
* *THIS* STAGE CAN TAKE AS LONG AS 100,000 YEARS TO FORM.

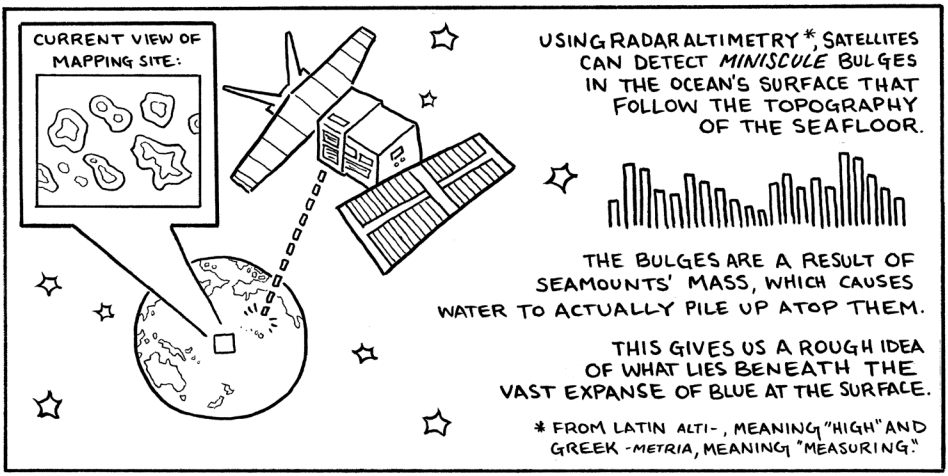

EVENTUALLY, THE ISLAND ERODES BELOW SEA LEVEL AND THE LAGOON COVERS IT.
THE REMAINING CIRCULAR FORMATION IS CALLED AN *ATOLL!**
EH-HEM.
* TIME: 30 *MILLION* YEARS!

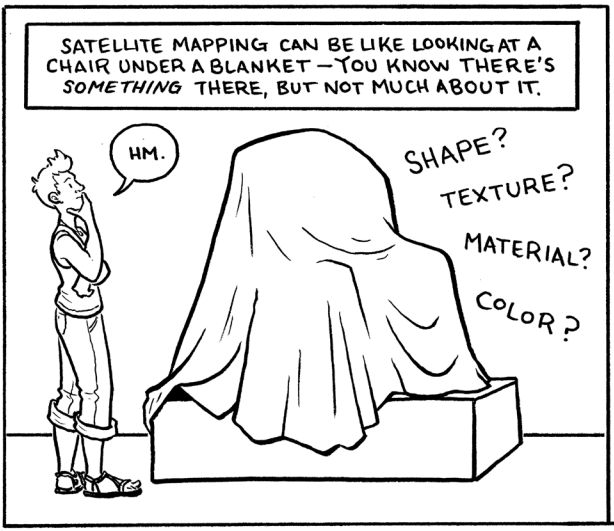

I ALREADY MAPPED JOHNSTON ATOLL PROPER BACK IN 2006.


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.


?
BUT THE OCEAN IS *HUGE!* HOW DID WE KNOW THEY WERE HERE IN THE FIRST PLACE?
SATELLITES!


IF YOU'VE USED GOOGLE EARTH, YOU'VE PROBABLY SEEN THAT WE ALREADY HAVE SOME IDEA OF THE SEAFLOOR IN THESE REMOTE AREAS.

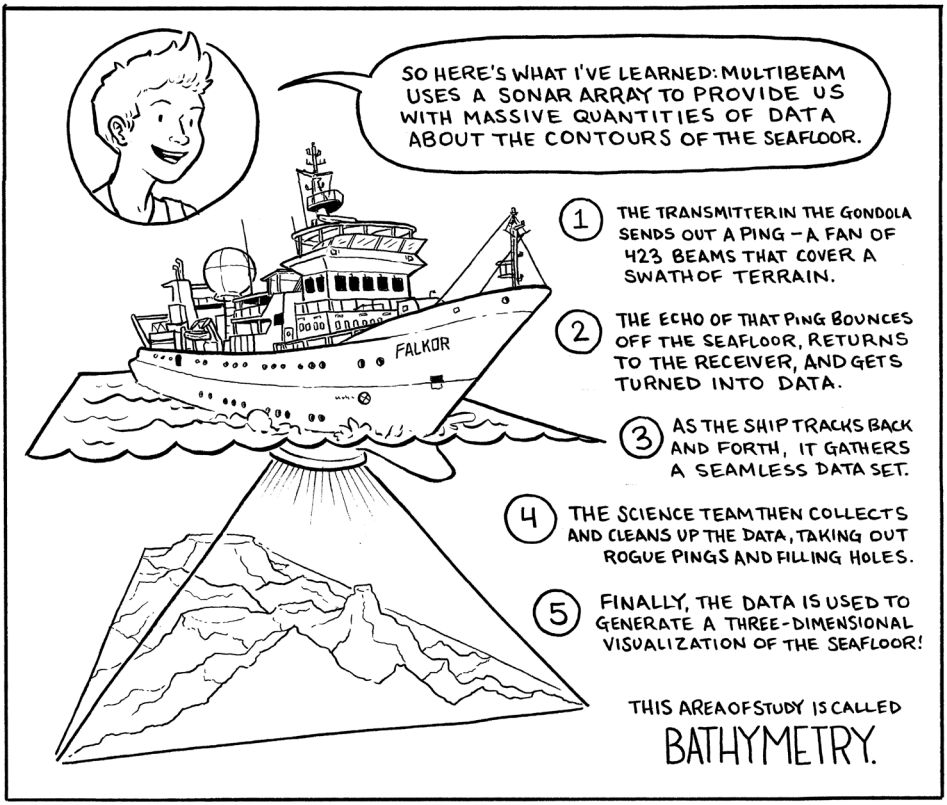

CURRENT VIEW OF MAPPING SITE:
USING RADAR ALTIMETRY *, SATELLITES CAN DETECT *MINISCULE* BULGES IN THE OCEAN'S SURFACE THAT FOLLOW THE TOPOGRAPHY OF THE SEAFLOOR.
THE BULGES ARE A RESULT OF SEAMOUNTS' MASS, WHICH CAUSES WATER TO ACTUALLY PILE UP ATOP THEM.
THIS GIVES US A ROUGH IDEA OF WHAT LIES BENEATH 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.
HM.
SHAPE?
TEXTURE?
MATERIAL?
COLOR?


BUT WITH *MULTIBEAM* . . .
TUG!

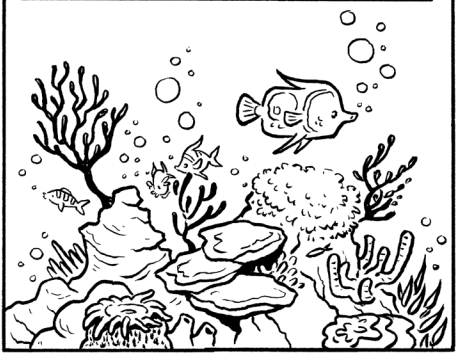

IT'S A WHOLE NEW LEVEL OF DETAIL!

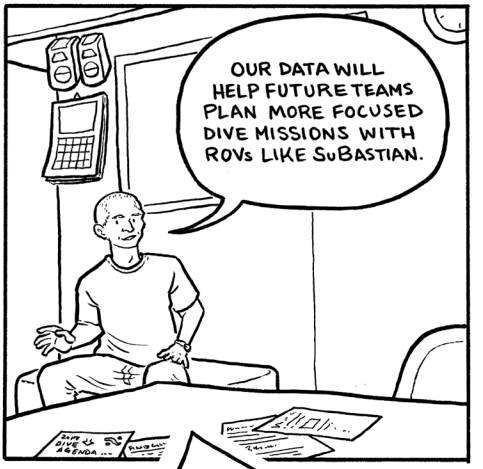

I'VE BEEN WORKING WITH MULTIBEAM SINCE IT FIRST CAME ON THE SCENE IN THE LATE SEVENTIES.
QUEEN OF MULTIBEAM


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.
FALKOR
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 TOTAL MAPPING GOAL IS 7000KM², WHICH MEANS THE SCIENCE TEAM WILL BE STANDING WATCH AROUND THE CLOCK.

WATCH ROTATION!

00:00 - 08:00

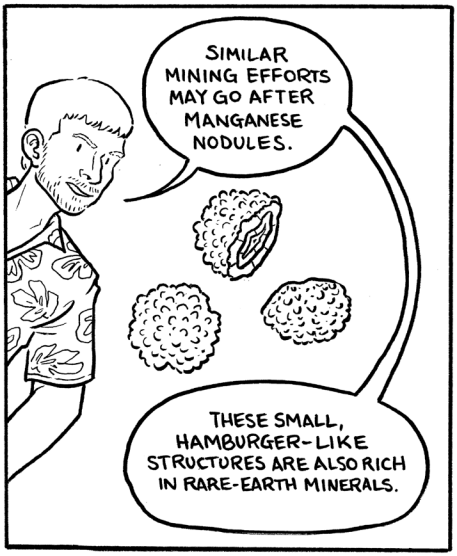
08:00 - 16:00

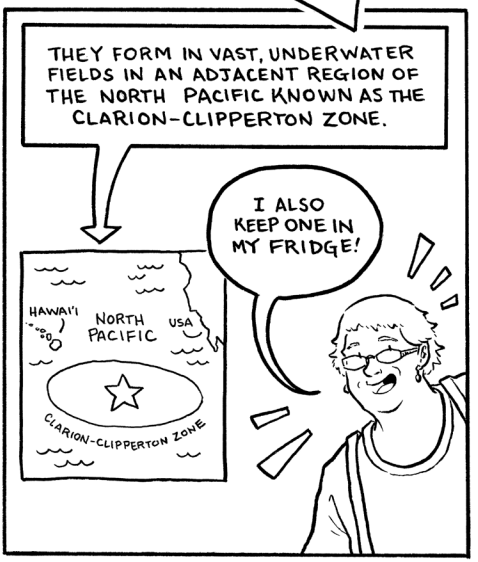
16:00 - 24:00

(SHIPS OPERATE ON 24-HOUR TIME.)

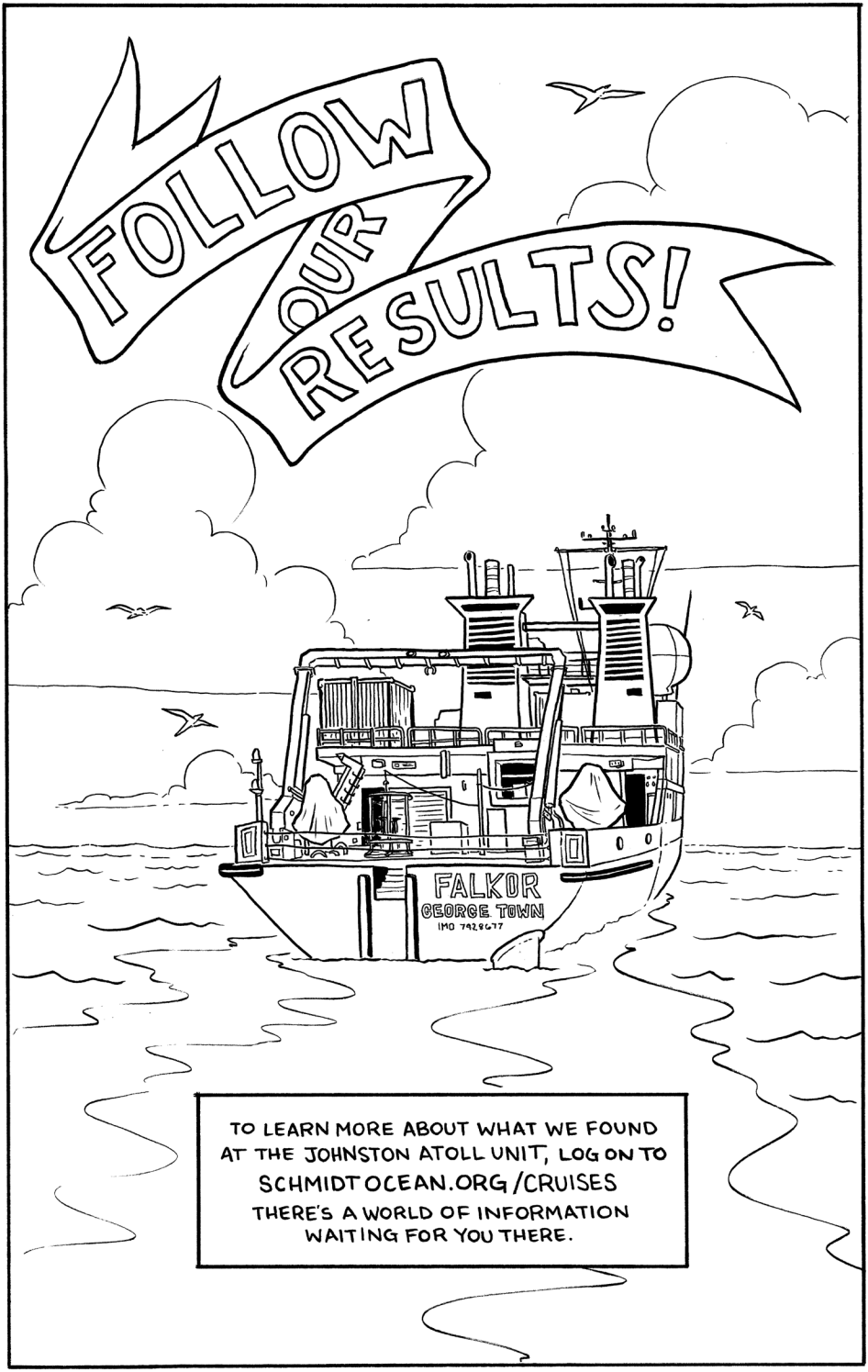
FACT SHEET: DANGER ALERT!

- 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, FLOURESCENT LAMPS, AND RECHARGEABLE BATTERIES, WHICH COULD MAKE THESE AREAS A TARGET FOR MINING IN THE FUTURE.






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!
EXACTLY.
WE WANT EVERYONE TO KNOW MORE ABOUT THESE EXTRAORDINARY ENVIRONMENTS.
AND AWARENESS IS THE FIRST STEP TOWARD CONSERVATION.


FOLLOW OUR RESULTS!
FALKOR
GEORGE TOWN
IMO 7428677
TO LEARN MORE ABOUT WHAT WE FOUND AT THE JOHNSTON ATOLL UNIT, LOG ON TO
SCHMIDTOCEAN.ORG/CRUISES
THERE'S A WORLD OF INFORMATION WAITING FOR YOU THERE.

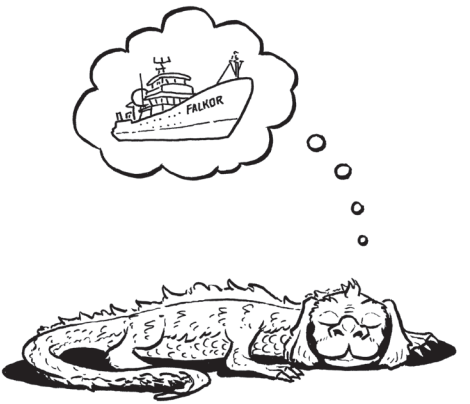
ABOUT THE AUTHOR

LUCY BELLWOOD
IS A PROFESSIONAL
ADVENTURE CARTOONIST
OPERATING OUT OF THE
PACIFIC NORTHWEST.

FIND MORE OF HER WORK ONLINE AT
LUCYBELLWOOD.COM

OR ON SOCIAL MEDIA AS
@LuBellWoo

TO LEARN MORE ABOUT
THE SCHMIDT OCEAN INSTITUTE'S
ARTIST-AT-SEA RESIDENCY, VISIT
SCHMIDTOCEAN.ORG/APPLY


FALKOR