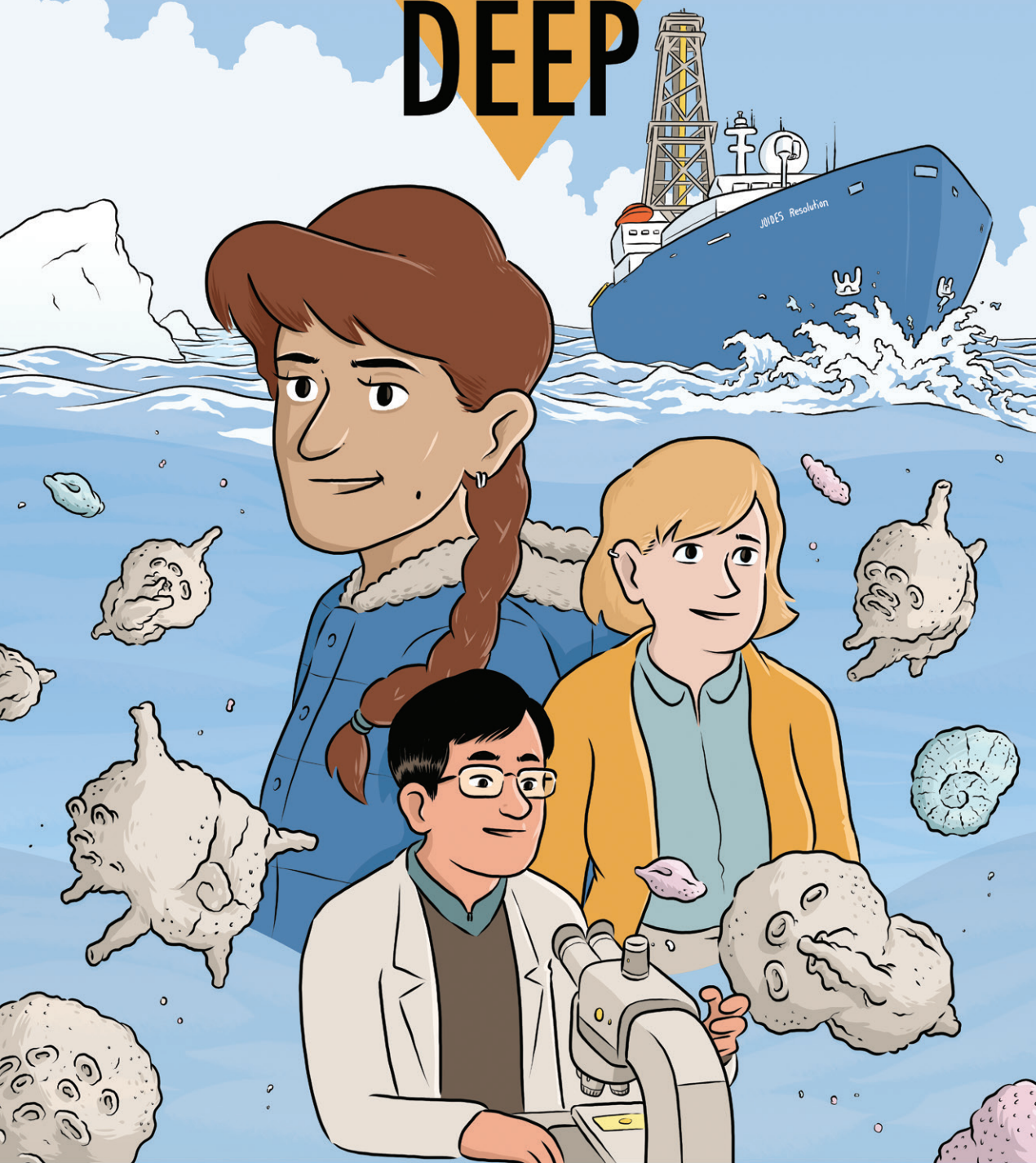


MYSTERIES *of the* DEEP



Discovering Earth's History at the Bottom of the Ocean.

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A comic written by Tom Dunkley Jones and Edward Ross. Illustrated by Edward Ross.

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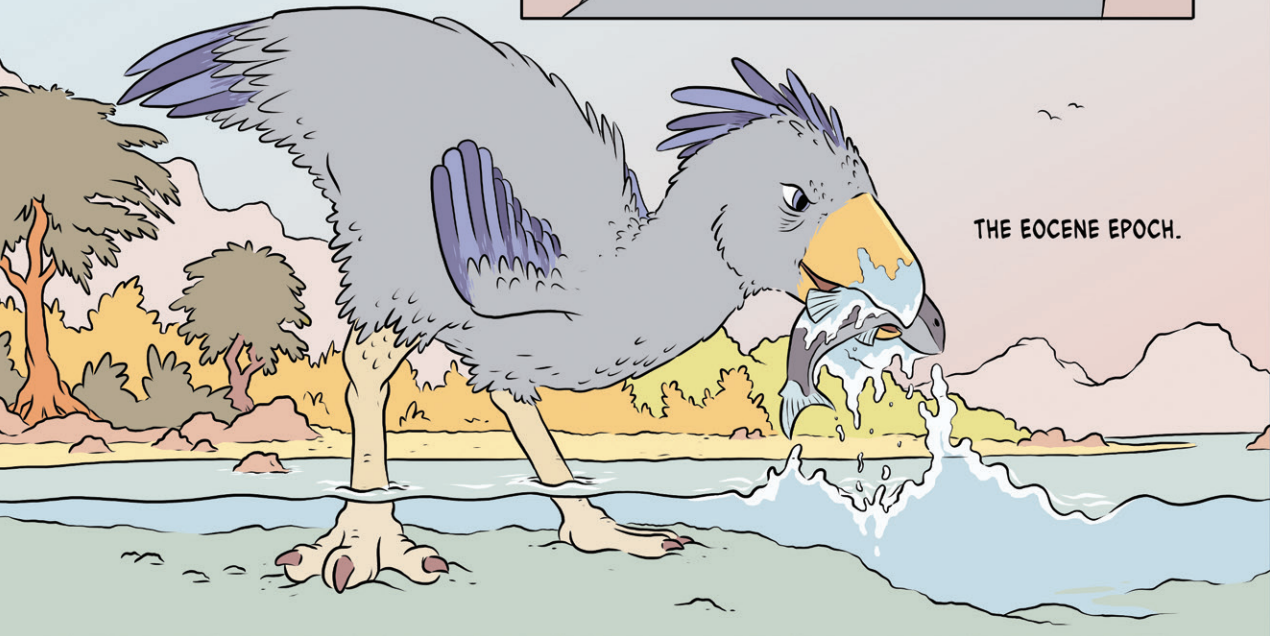
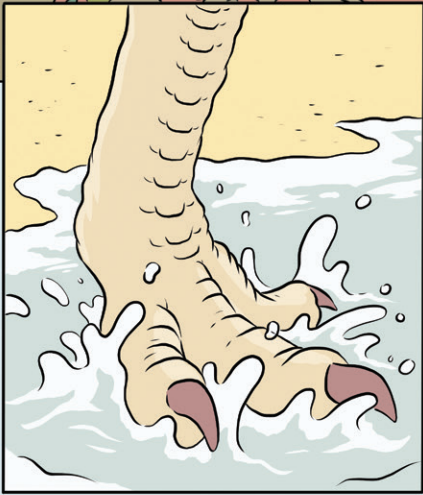
SCHOOL OF GEOGRAPHY,
EARTH AND ENVIRONMENTAL
SCIENCES

MYSTERIES *of the* DEEP

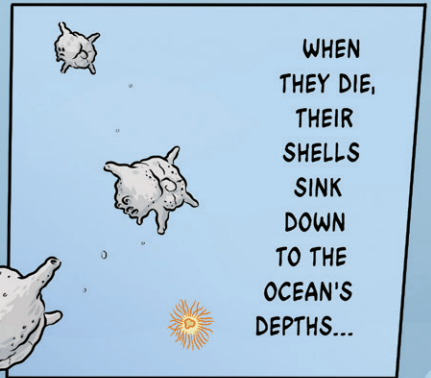
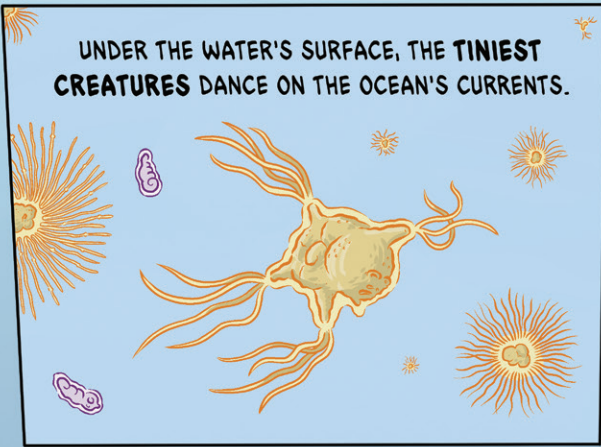
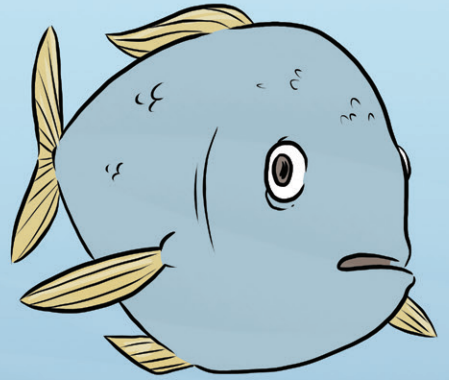
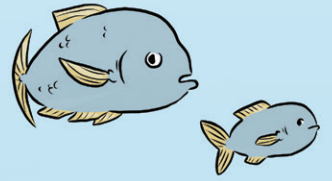
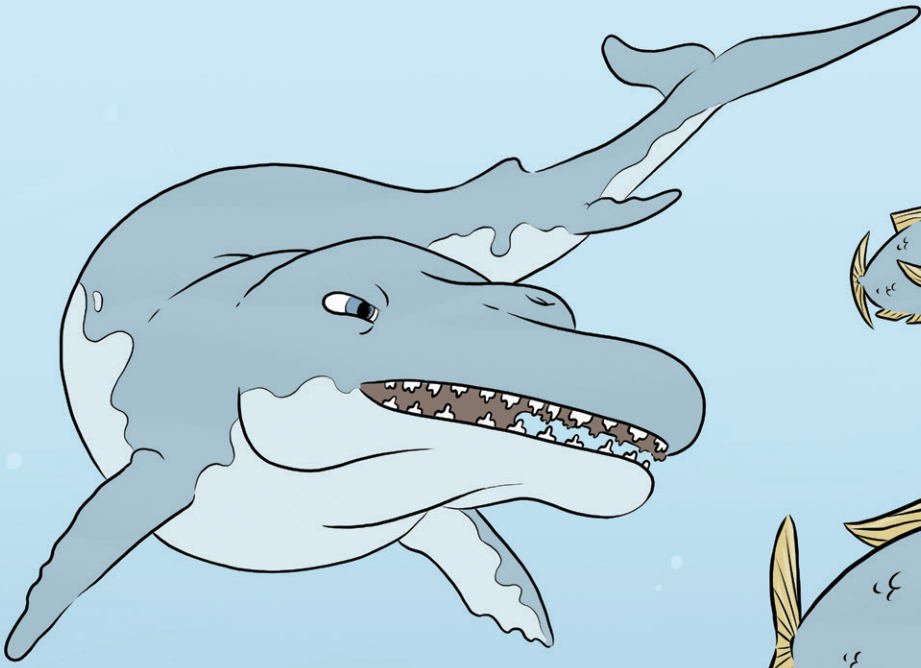
*Discovering Earth's History
at the Bottom of the Ocean.*

Illustrated by Edward Ross

50 MILLION YEARS AGO.



THE EOCENE EPOCH.



TODAY.



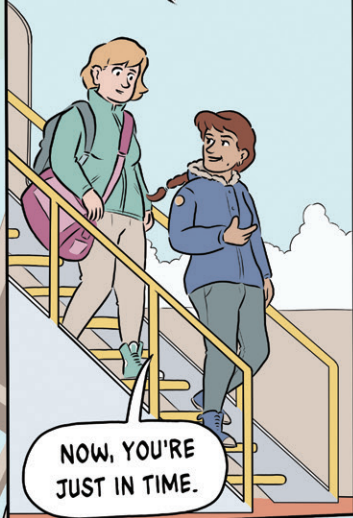
THE ATLANTIC OCEAN.

WELCOME TO THE JOIDES RESOLUTION!
HOW ARE YOU SETTLING IN?



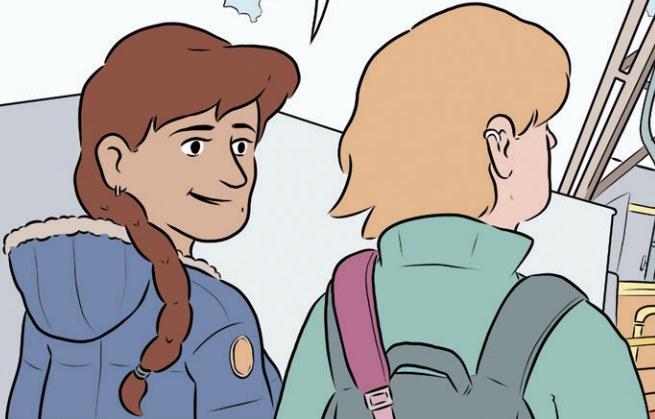
ALRIGHT. STILL FEELING
A BIT SEA SICK...

DON'T WORRY. YOU'LL GET
USED TO IT SOON ENOUGH.



NOW, YOU'RE
JUST IN TIME.

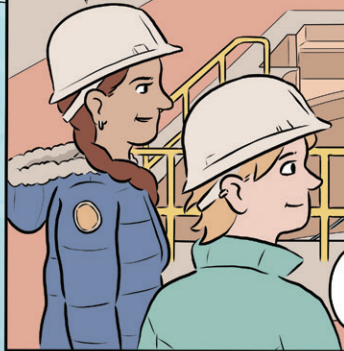
WE'RE GETTING
READY TO BRING UP
A CORE SAMPLE.



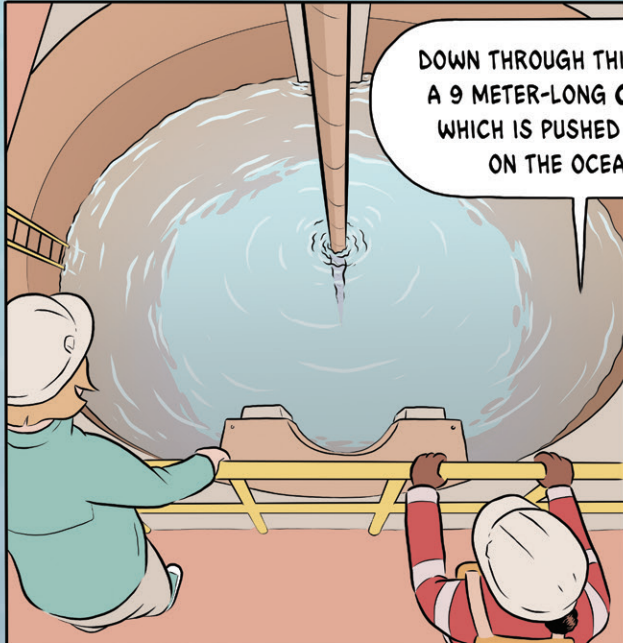


MEET TRICIA, SHE'S ONE OF THE DRILLERS ONBOARD...

THIS IS THE **MOON POOL**, A HOLE IN THE BOTTOM OF THE SHIP THAT ALLOWS US TO SEND A DRILL PIPE DOWN TO THE BOTTOM OF THE OCEAN.



THIS PIPE CAN BE UP TO **5 KILOMETERS LONG**.

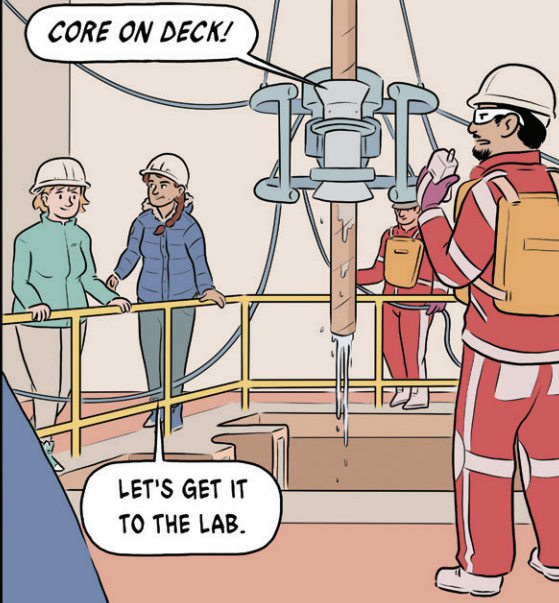


DOWN THROUGH THIS PIPE WE SEND A **9 METER-LONG CORE BARREL**, WHICH IS PUSHED INTO THE MUD ON THE OCEAN FLOOR.



WHEN THE BARREL IS FULL OF SEDIMENTS, WE WINCH IT BACK UP.

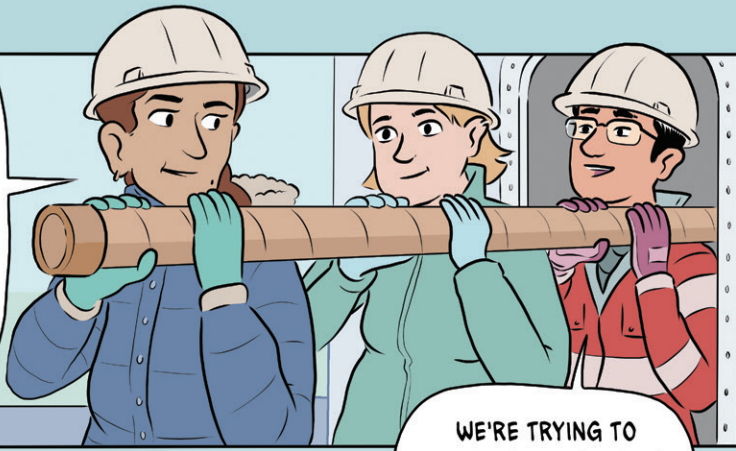
ONE'S HERE NOW!



CORE ON DECK!

LET'S GET IT TO THE LAB.

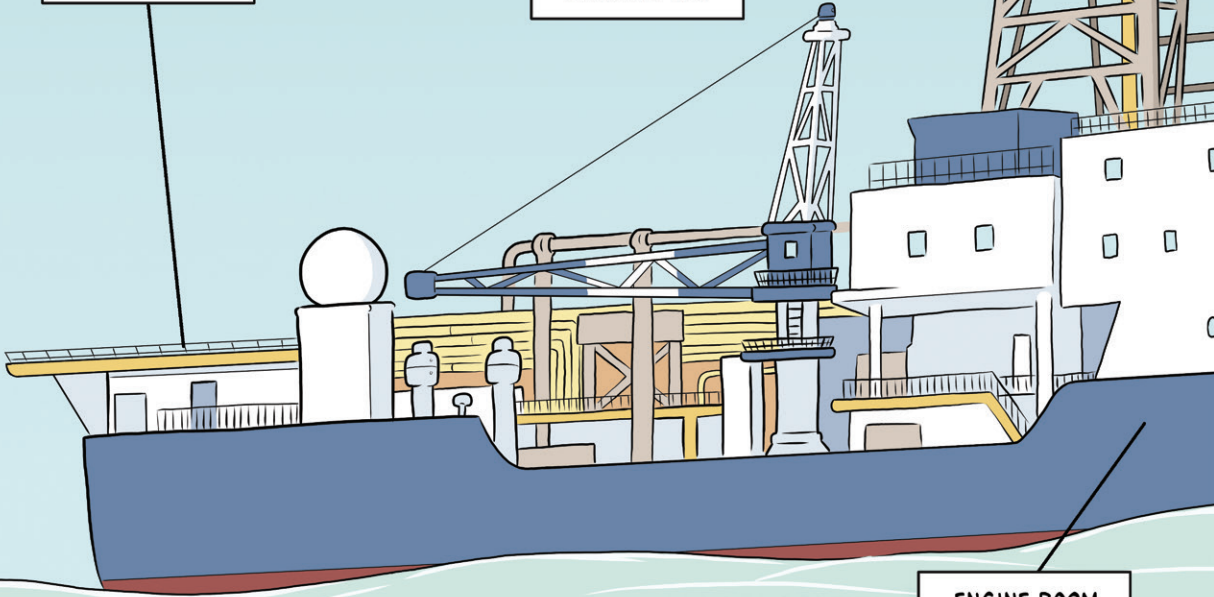
THE JOIDES
RESOLUTION HAS
BEEN SAILING THE
WORLD'S OCEANS
SINCE 1984 AS
PART OF THE
INTERNATIONAL
OCEAN
DISCOVERY
PROGRAM.



WE'RE TRYING TO
UNCOVER THE SECRETS
HELD AT THE BOTTOM
OF THE OCEAN.

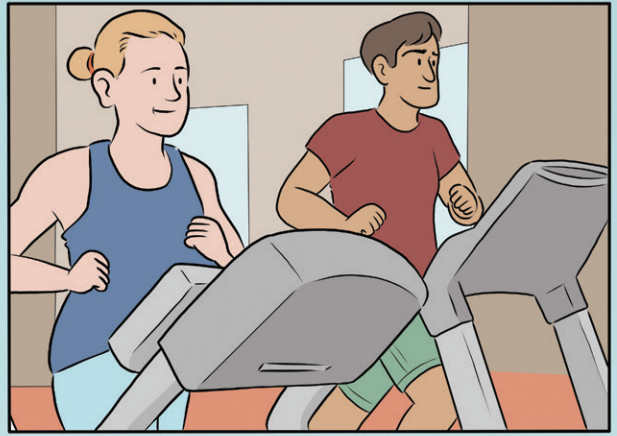
HELICOPTER PAD

DRILLING RIG



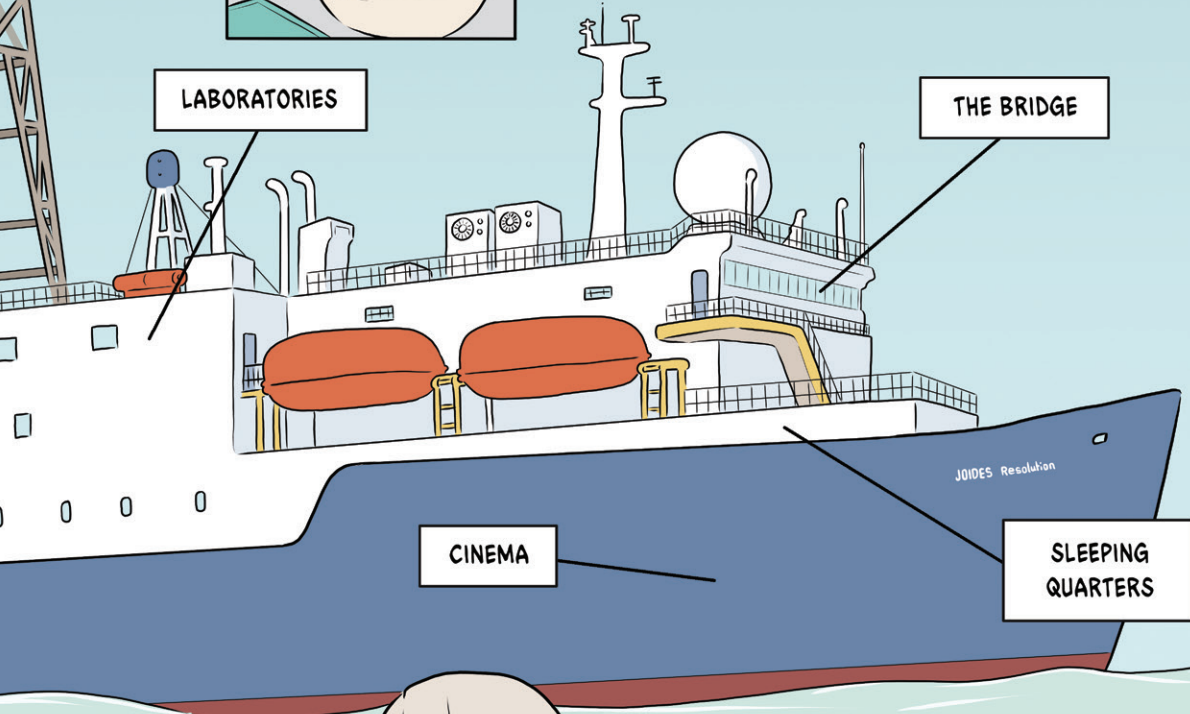
ENGINE ROOM





LABORATORIES

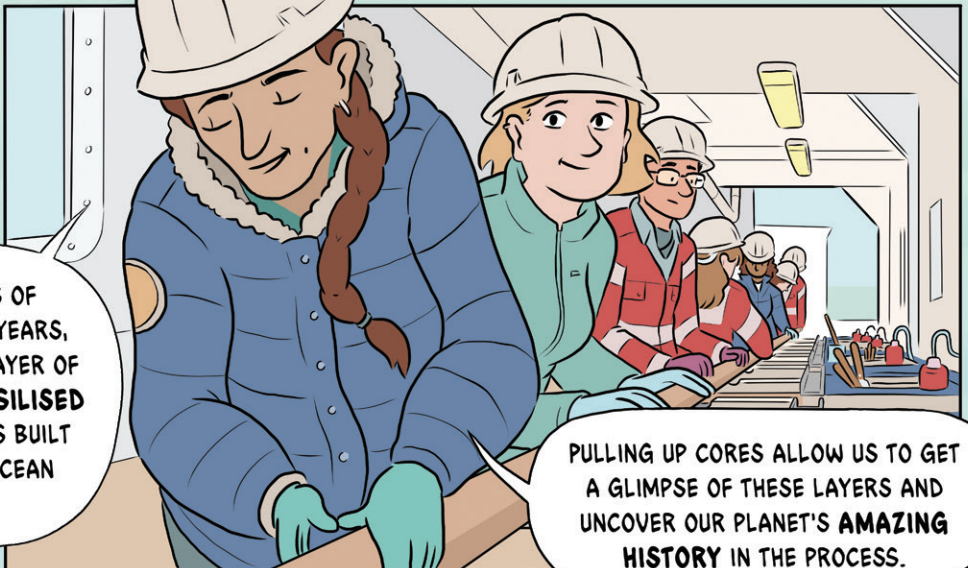
THE BRIDGE



CINEMA

SLEEPING QUARTERS

OVER TENS OF MILLIONS OF YEARS, LAYER UPON LAYER OF MUD AND FOSSILISED SEA LIFE HAS BUILT UP ON THE OCEAN FLOOR.



PULLING UP CORES ALLOW US TO GET A GLIMPSE OF THESE LAYERS AND UNCOVER OUR PLANET'S **AMAZING HISTORY** IN THE PROCESS.

SO WHAT DO THESE CORES TELL US?

THE DEEPER THE CORES GO, THE FURTHER BACK IN TIME WE TRAVEL.

THE FIRST HUMANS

THE EOCENE EPOCH

THE EXTINCTION OF THE DINOSAURS

IN THESE SAMPLES WE CAN SEE EVIDENCE OF DIFFERENT EVENTS IN EARTH'S HISTORY - SIGNS OF MAJOR VOLCANIC ERUPTIONS, METEOR IMPACTS AND SO ON.



BUT THAT ONLY TELLS A PART OF THE STORY.

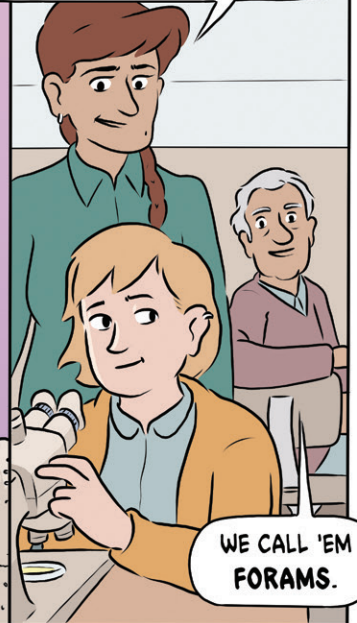


WE TAKE A SAMPLE, SIEVE IT UNDER RUNNING WATER TO WASH AWAY THE FINE MUD...

IT LOOKS JUST LIKE SAND!

BUT LOOKING AT THESE GRAINS UNDER THE MICROSCOPE WE SEE THAT THEY ARE **TINY FOSSILS** CALLED FORAMINIFERA.

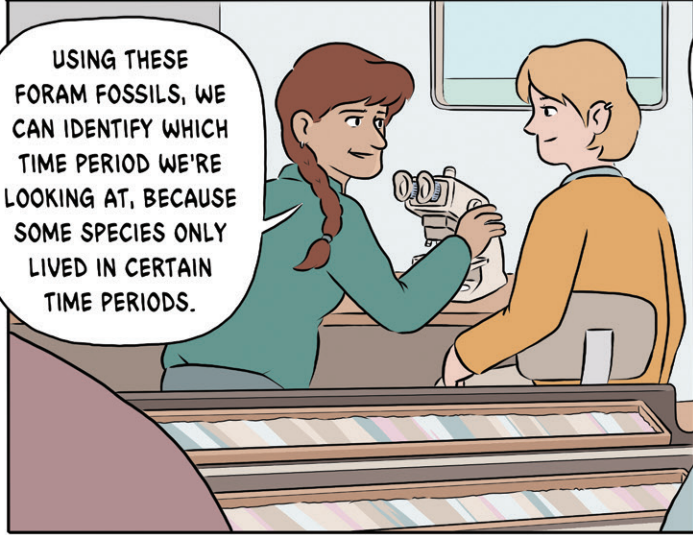
THESE BEAUTIFUL CREATURES HAVE LIVED SINCE THE TIME OF THE DINOSAURS, BUT ARE STILL ONE OF THE MOST COMMON LIFE FORMS IN THE OCEANS TODAY.



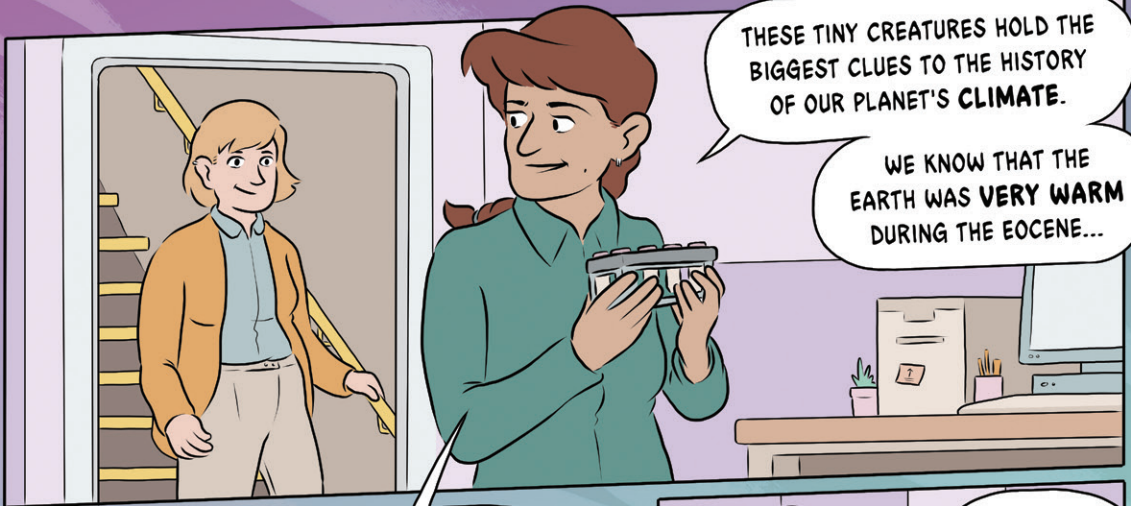
WE CALL 'EM **FORAMS**.

USING THESE FORAM FOSSILS, WE CAN IDENTIFY WHICH TIME PERIOD WE'RE LOOKING AT, BECAUSE SOME SPECIES ONLY LIVED IN CERTAIN TIME PERIODS.

AH PERFECT! THIS SAMPLE IS FROM THE **EOCENE EPOCH**. IT'S THE TIME WE'RE REALLY INTERESTED IN.



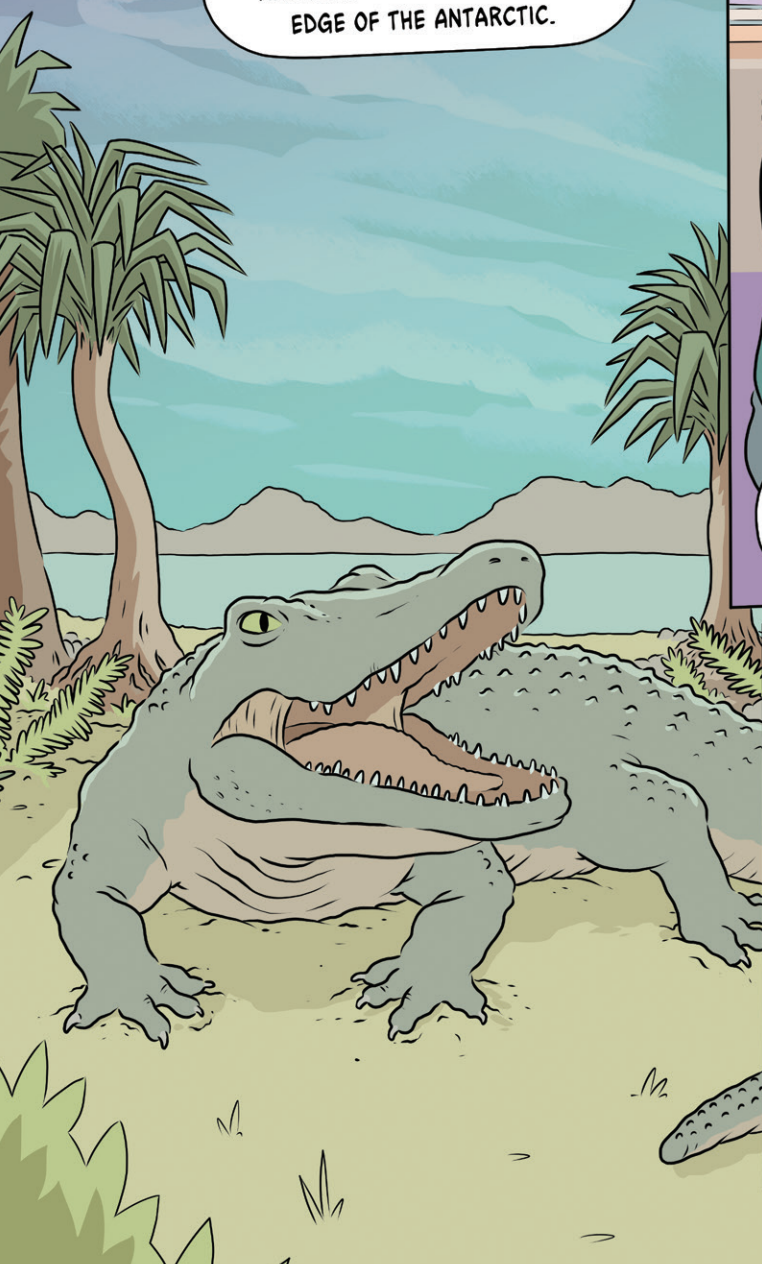
LET'S TAKE THIS SAMPLE TO THE **CHEMISTRY LAB**.



THESE TINY CREATURES HOLD THE BIGGEST CLUES TO THE HISTORY OF OUR PLANET'S CLIMATE.

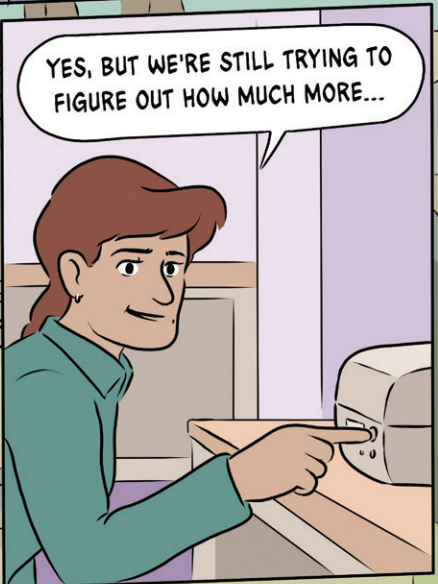
WE KNOW THAT THE EARTH WAS **VERY WARM** DURING THE EOCENE...

CROCODILES LIVED IN THE ARCTIC AND PALM TREES GREW ON THE EDGE OF THE ANTARCTIC.



BUT THE QUESTION, THEN, IS **WHY** WAS THE PLANET SO WARM?

THERE WAS MORE **CARBON DIOXIDE** IN THE ATMOSPHERE, RIGHT?

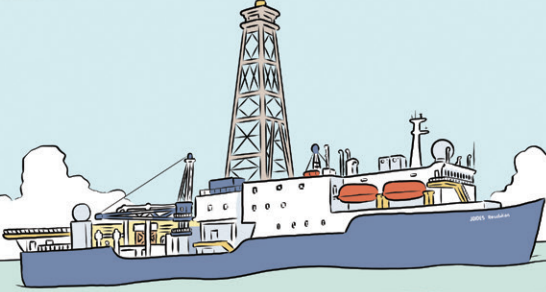


YES, BUT WE'RE STILL TRYING TO FIGURE OUT HOW MUCH MORE...



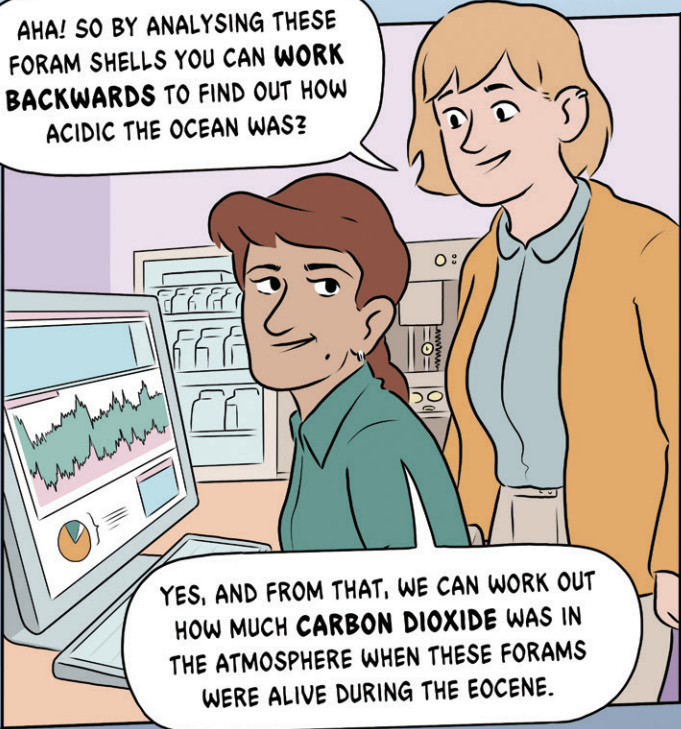
LIKE ANY CREATURE THESE FORAMS WERE AFFECTED BY THE ENVIRONMENT THEY LIVED IN.

WHEN THERE'S MORE CARBON DIOXIDE IN THE ATMOSPHERE...



MORE OF IT DISSOLVES INTO THE OCEANS, MAKING THE OCEANS MORE ACIDIC.

AND ANY CHANGE IN THE CHEMISTRY OF THE OCEANS WOULD ALSO CHANGE THE CHEMISTRY OF THE FORAM SHELLS.



AHA! SO BY ANALYSING THESE FORAM SHELLS YOU CAN WORK BACKWARDS TO FIND OUT HOW ACIDIC THE OCEAN WAS?

YES, AND FROM THAT, WE CAN WORK OUT HOW MUCH CARBON DIOXIDE WAS IN THE ATMOSPHERE WHEN THESE FORAMS WERE ALIVE DURING THE EOCENE.

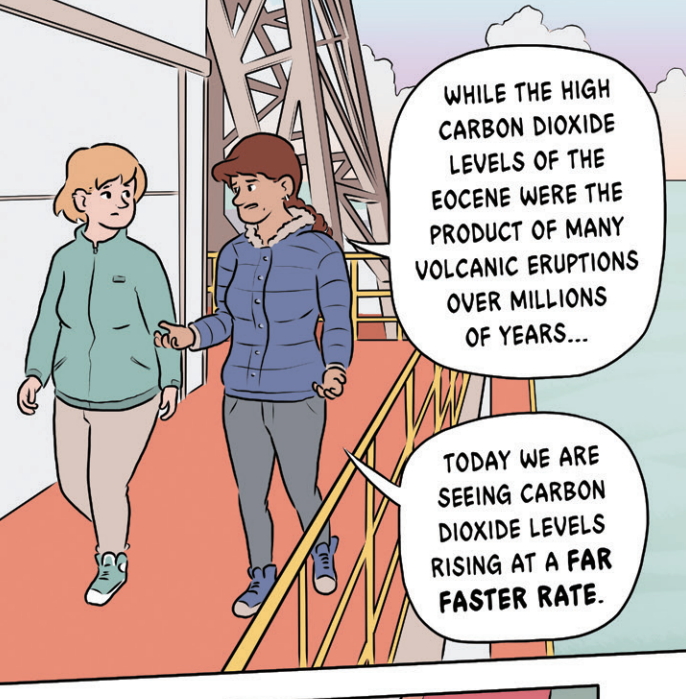
WITH OTHER TESTS WE CAN CALCULATE THE TEMPERATURE OF THE OCEAN THE FORAMS GREW IN, AND EVEN THE SIZE OF THE POLAR ICE CAPS!



TRULY THE WORLD IN A GRAIN OF SAND!



BUT IT'S NOT JUST THE PAST
WE'RE INTERESTED IN...




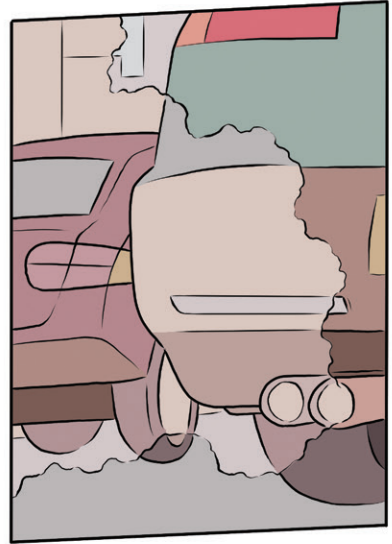
WHILE THE HIGH
CARBON DIOXIDE
LEVELS OF THE
EOCENE WERE THE
PRODUCT OF MANY
VOLCANIC ERUPTIONS
OVER MILLIONS
OF YEARS...

TODAY WE ARE
SEEING CARBON
DIOXIDE LEVELS
RISING AT A FAR
FASTER RATE.




OUR BURNING OF
FOSSIL FUELS LIKE
OIL AND COAL IS
RELEASING ANCIENT
CARBON BACK INTO
THE ATMOSPHERE.

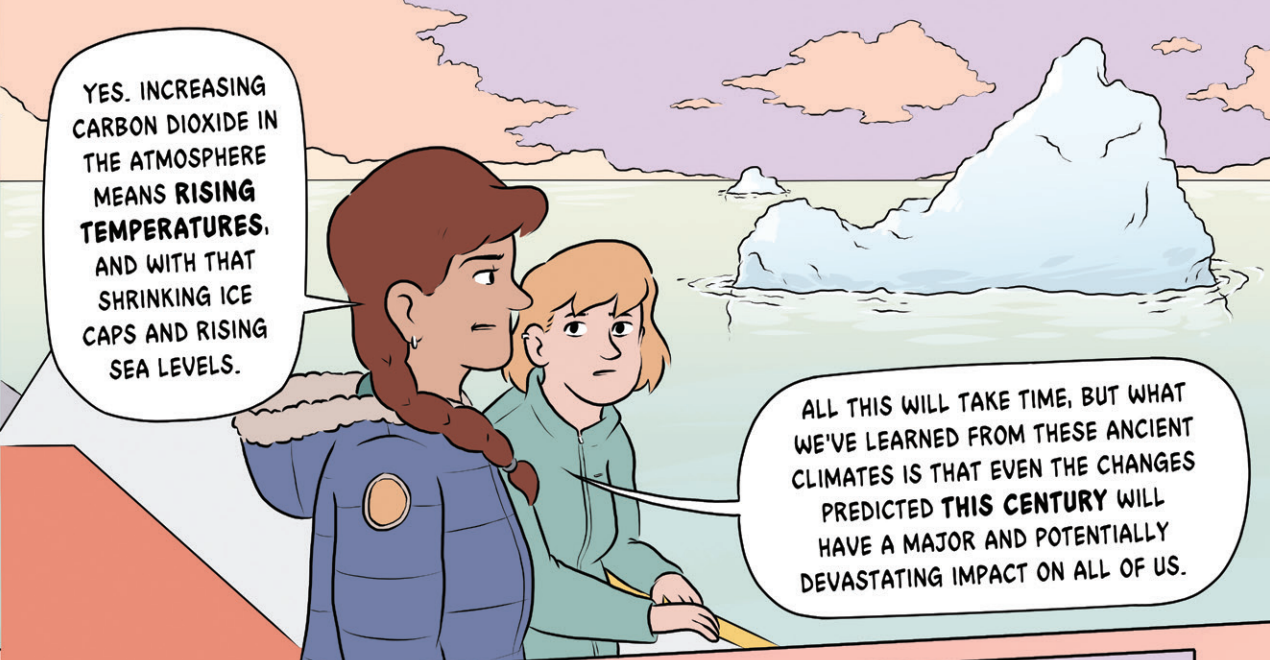
BECAUSE OF THIS
THERE IS MORE
CARBON DIOXIDE IN
THE ATMOSPHERE
TODAY THAN AT ANY
OTHER POINT IN
HUMAN HISTORY.



THE FACT IS THAT TODAY
WE ARE PUSHING CARBON
DIOXIDE BACK UP TOWARDS
EOCENE LEVELS.



TO A TIME WHEN
THE ARCTIC WAS
WARM ENOUGH
FOR CROCODILES?

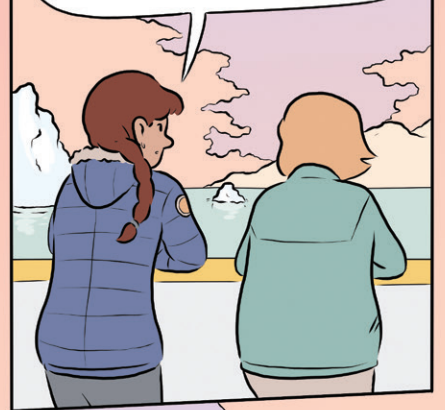


YES. INCREASING CARBON DIOXIDE IN THE ATMOSPHERE MEANS RISING TEMPERATURES, AND WITH THAT SHRINKING ICE CAPS AND RISING SEA LEVELS.

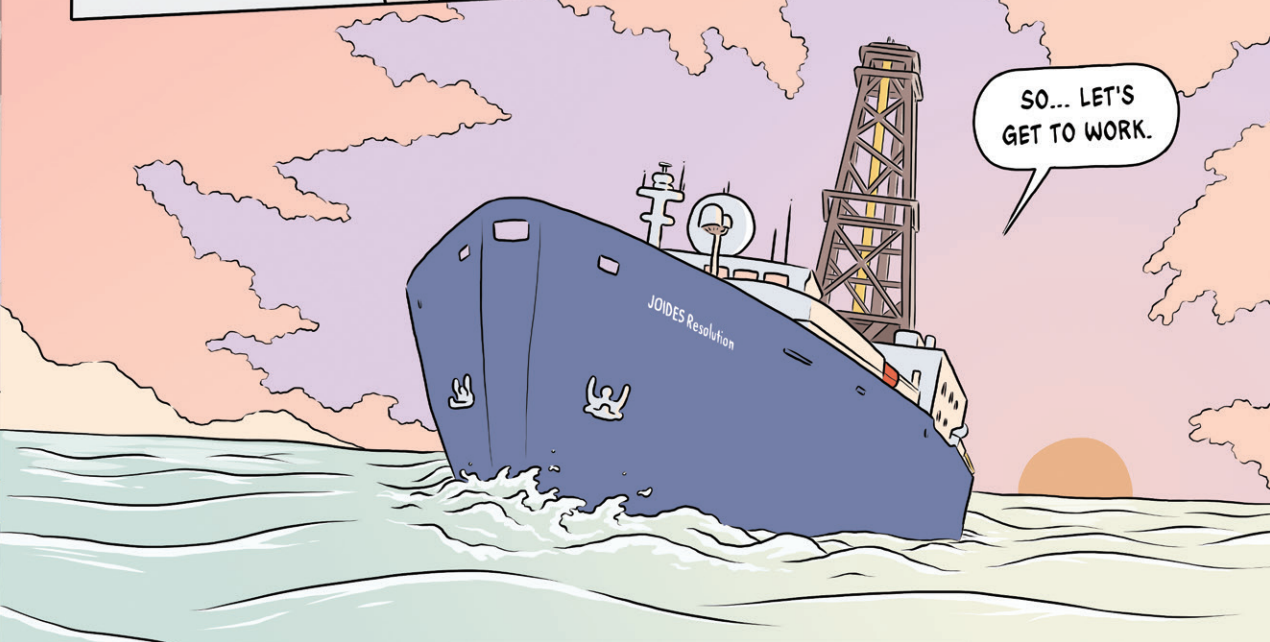
ALL THIS WILL TAKE TIME, BUT WHAT WE'VE LEARNED FROM THESE ANCIENT CLIMATES IS THAT EVEN THE CHANGES PREDICTED **THIS CENTURY** WILL HAVE A MAJOR AND POTENTIALLY DEVASTATING IMPACT ON ALL OF US.



THE RESEARCH DONE ON THIS SHIP OVER THE LAST THIRTY YEARS HAS PLAYED A **CRUCIAL ROLE** IN UNDERSTANDING THE HISTORY OF OUR PLANET, AND ITS FUTURE.



BUT THERE'S STILL SO MUCH MORE WE WANT TO UNDERSTAND AND KNOWING HOW CARBON DIOXIDE AFFECTS OUR PLANET HAS NEVER BEEN MORE IMPORTANT.



SO... LET'S GET TO WORK.

THE TINIEST FOSSILS THE BIGGEST CLUES

Join the crew of the JOIDES Resolution, as it pulls core samples from the sea floor in search of the secrets buried in the depths of the ocean.

In these core samples, the tiniest fossils reveal the biggest clues to our planet's history, and the future climates we may face.



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