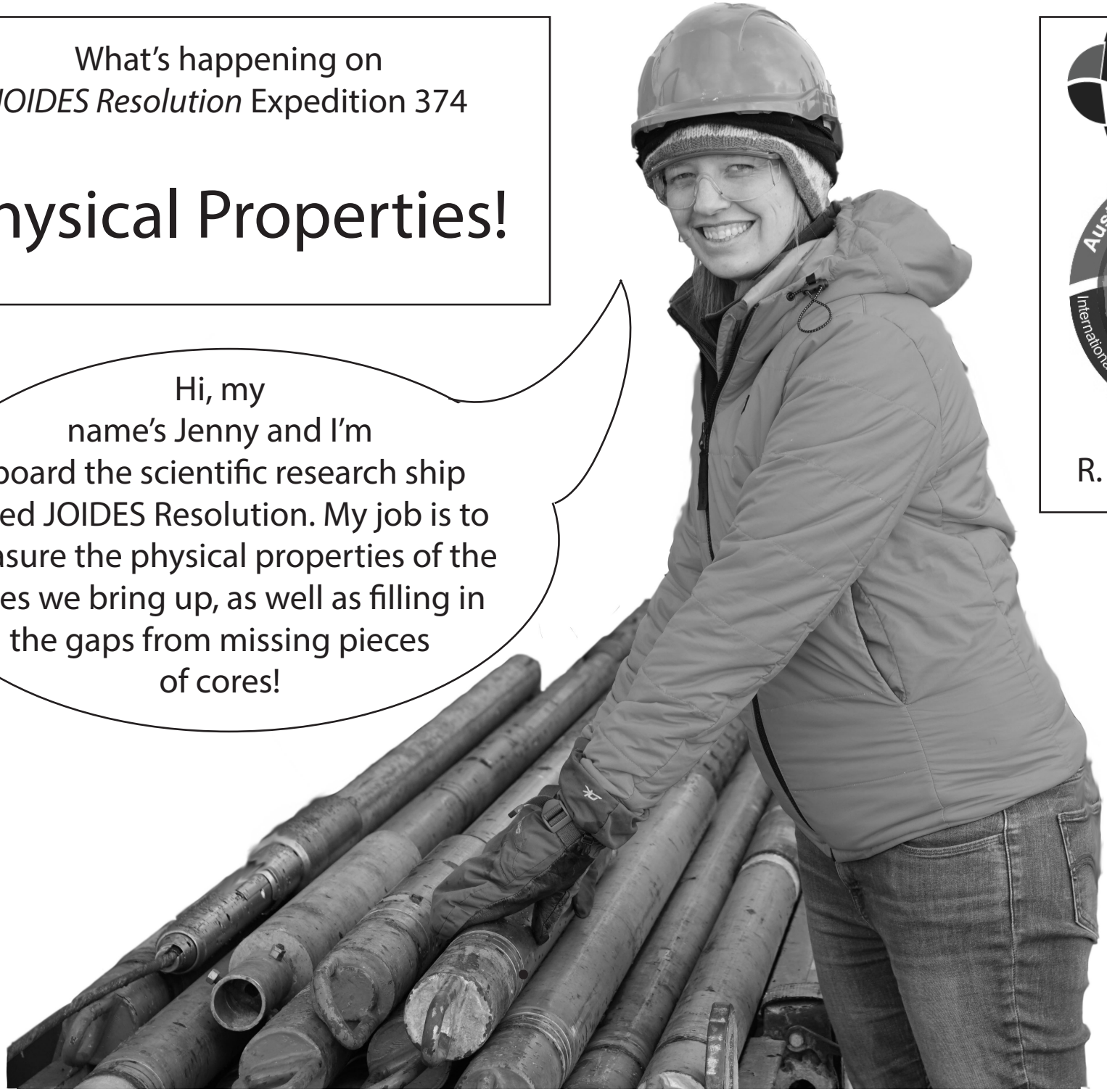
What's happening on
JOIDES Resolution Expedition 374

Physical Properties!



Hi, my name's Jenny and I'm aboard the scientific research ship called JOIDES Resolution. My job is to measure the physical properties of the cores we bring up, as well as filling in the gaps from missing pieces of cores!

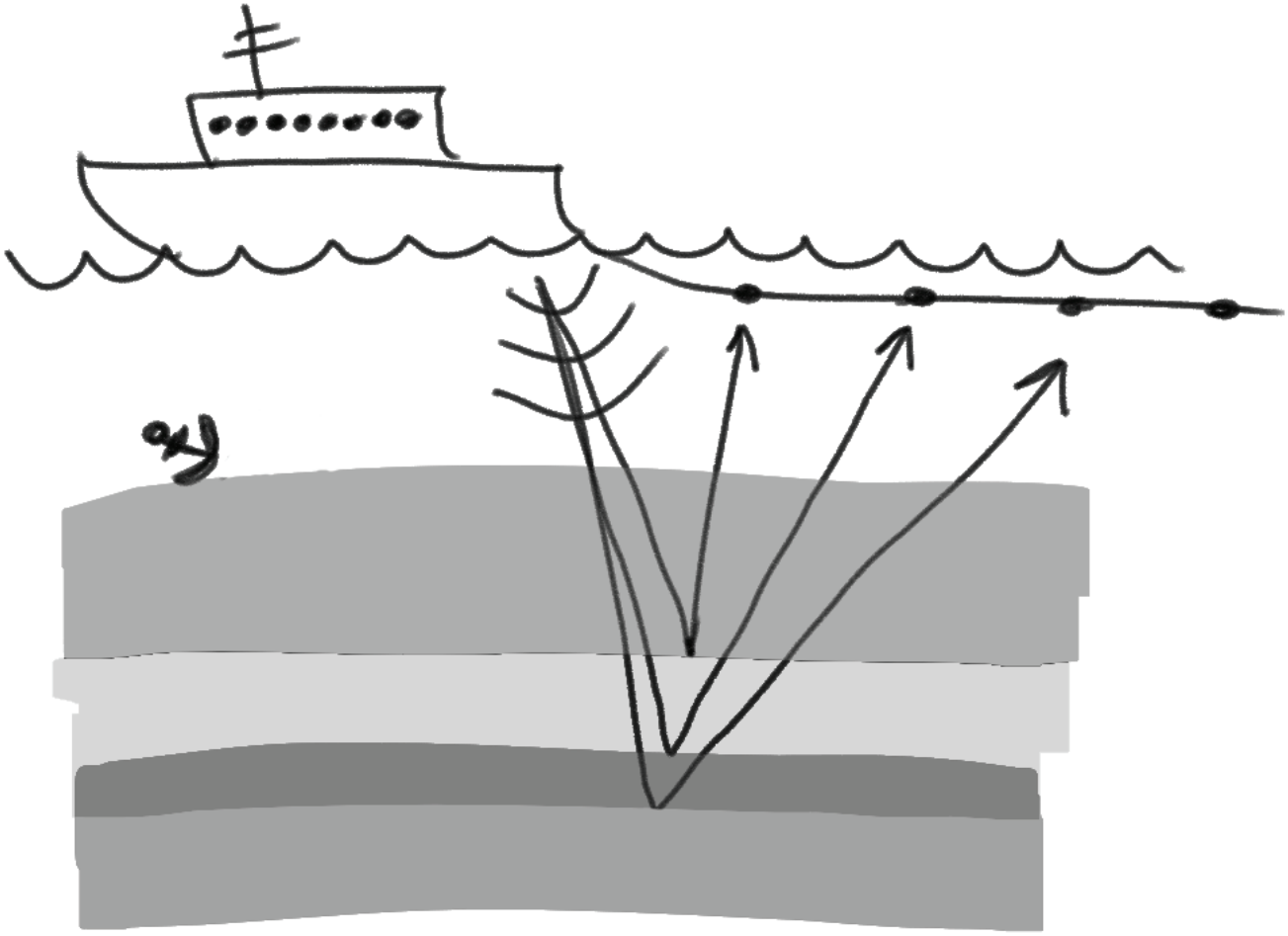
IODP
INTERNATIONAL OCEAN DISCOVERY PROGRAM

Australian and New Zealand International Ocean Discovery Program Consortium

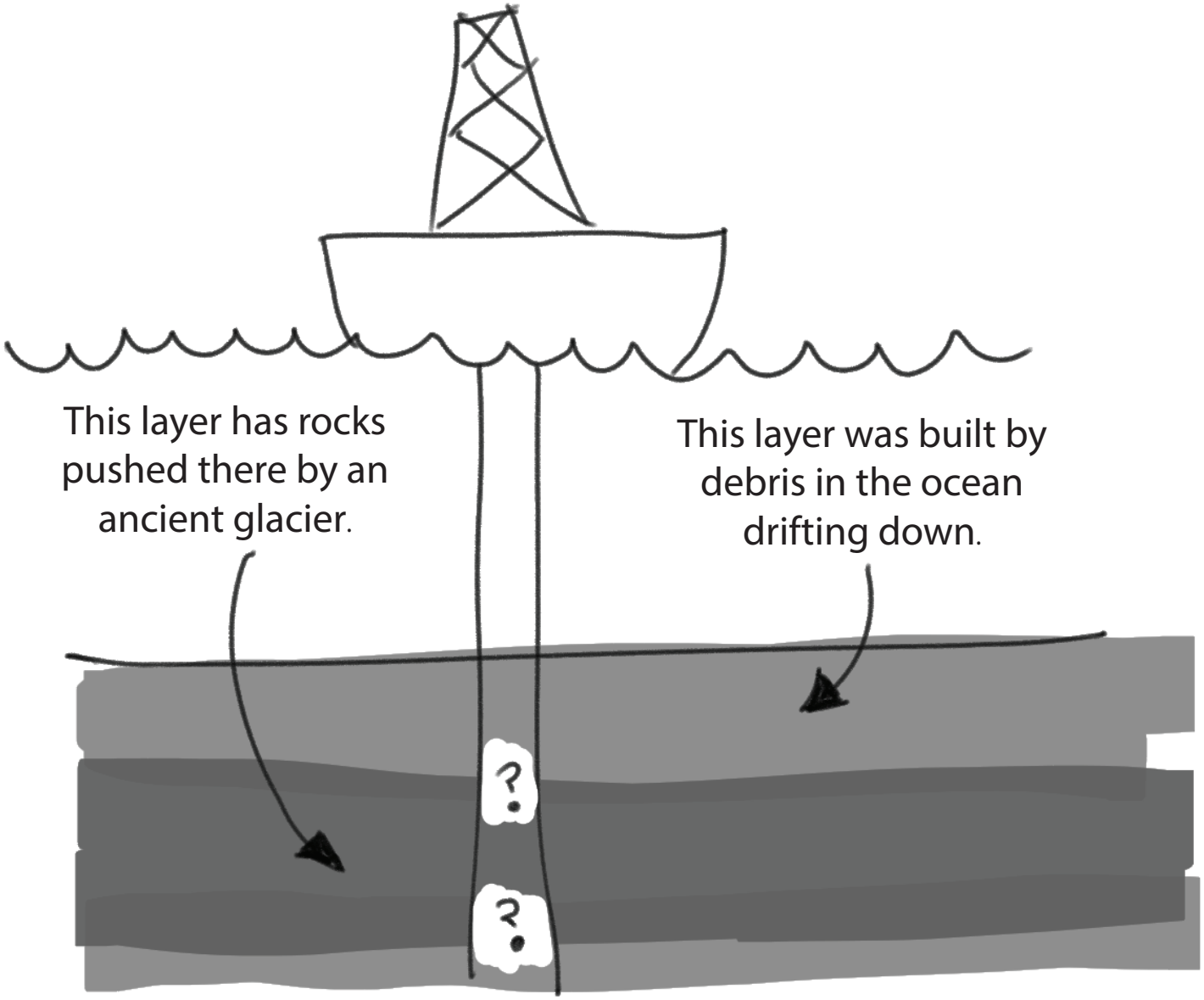
R. Hughes-Currie

I decided to become a scientist studying the bottom of the ocean because it's the last place on Earth that's still mostly unexplored. When we take measurements from below the sea floor, we're the first people to ever see stuff that's millions of years old! It's very exciting because when we bring up a core, we never know exactly what we will find.

Jenny has been on another expedition to Antarctica, to collect seismic stratigraphy data. Jenny helped build a picture of the layers or mud, sand and rock under the sea floor by sending out sound waves into the ocean and measuring the amount of time that the sound takes to travel back. The ship had a long string of microphones trailing in the sea behind it, listening for the sound wave to bounce back. The way it works is the same as an echo. The sound waves bounced off the different layers, and the sound took longer to get back up to the surface if it had travelled from deeper down.



Now Jenny is on the *JOIDES Resolution* to drill into the sea floor and see the layers in real life.



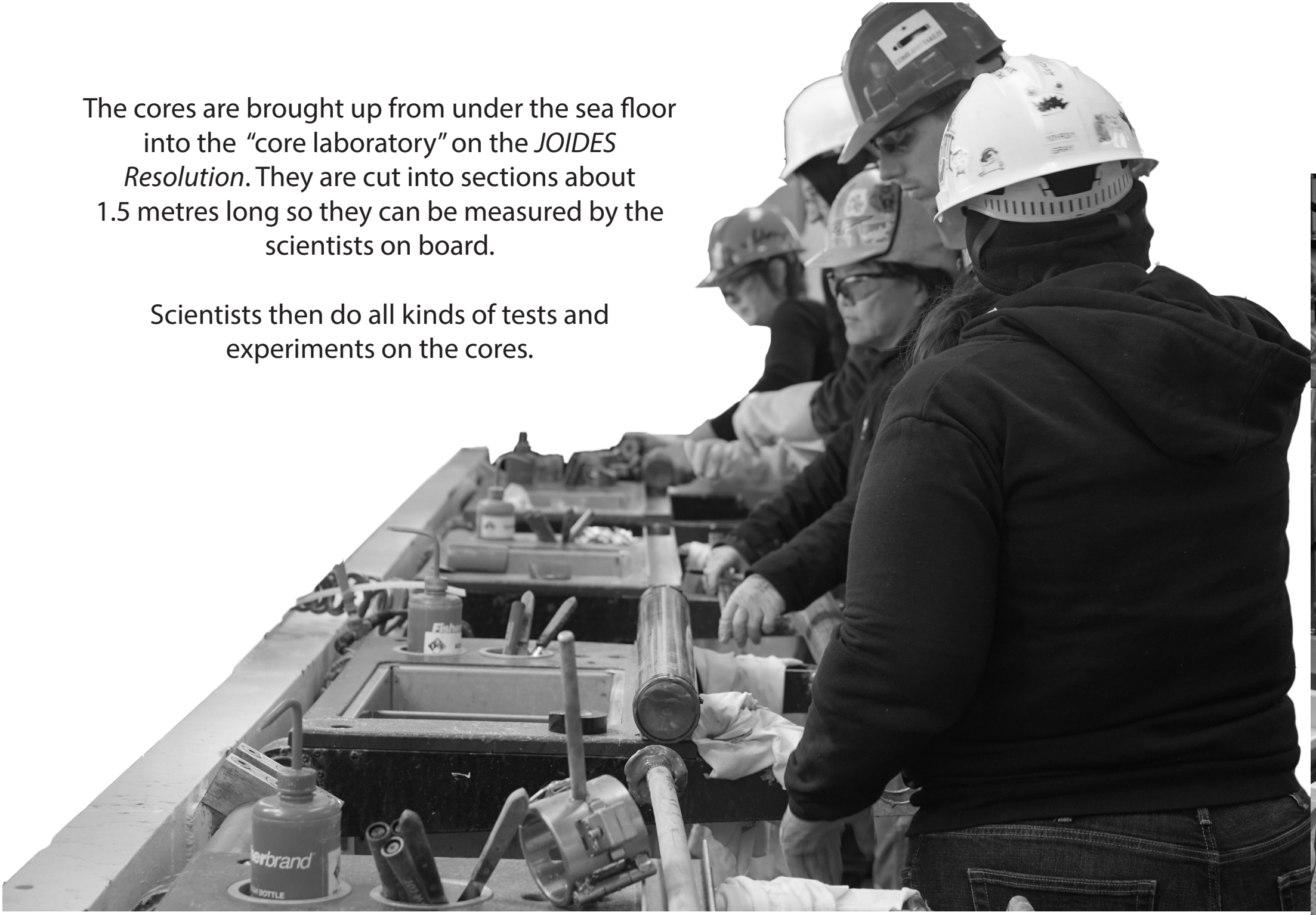
When the *JOIDES Resolution* brings cores of mud, sand and rocks to the surface, there are usually gaps where the mud and sand escaped out of the sides and bottom of the hole.

This is a big problem for the scientists, because they are trying to understand what happened in each layer. It's like doing a jigsaw when some of the pieces are missing.

Jenny has to help the other scientists to figure out what would have been in those gaps.

The cores are brought up from under the sea floor into the "core laboratory" on the *JOIDES Resolution*. They are cut into sections about 1.5 metres long so they can be measured by the scientists on board.

Scientists then do all kinds of tests and experiments on the cores.



Jenny can measure the speed that sound travels through the cores of sediment using a p-wave analyser. The p in p-wave stands for pressure, because sound waves are caused by pressure. That's why if you tap on a desk, you produce a sound wave.

The p-wave analyser taps on the core, which shoots sound waves through the sediment. By measuring how long the tapping vibrations takes to get to the other side of the core, Jenny can work out the speed that pressure waves (like sound) will travel through the core.

By knowing how fast sound travels through something, you can know how dense it is. This is because dense materials are made of particles which are closer together. You can imagine the particles like little gossiping people: The closer together they are, the more quickly the sound of the gossip travels.

If the particles are very far apart, that means the material is not very dense. It will weigh less, and sounds will travel more slowly through it.

After the ship has drilled a long thin hole into the ocean floor and brought all the core up, Jenny helps lower microphones into the hole that the cores came from. She then fires sound waves into the ocean. She records how long the sound takes to travel from the surface of the ocean to microphones in the hole. This way she can figure out more about the missing stuff from the gaps which didn't get collected in the cores.

People watch out for whales and other marine life which may get disturbed by the sonic pulse. If they see any, they stop the sound waves.