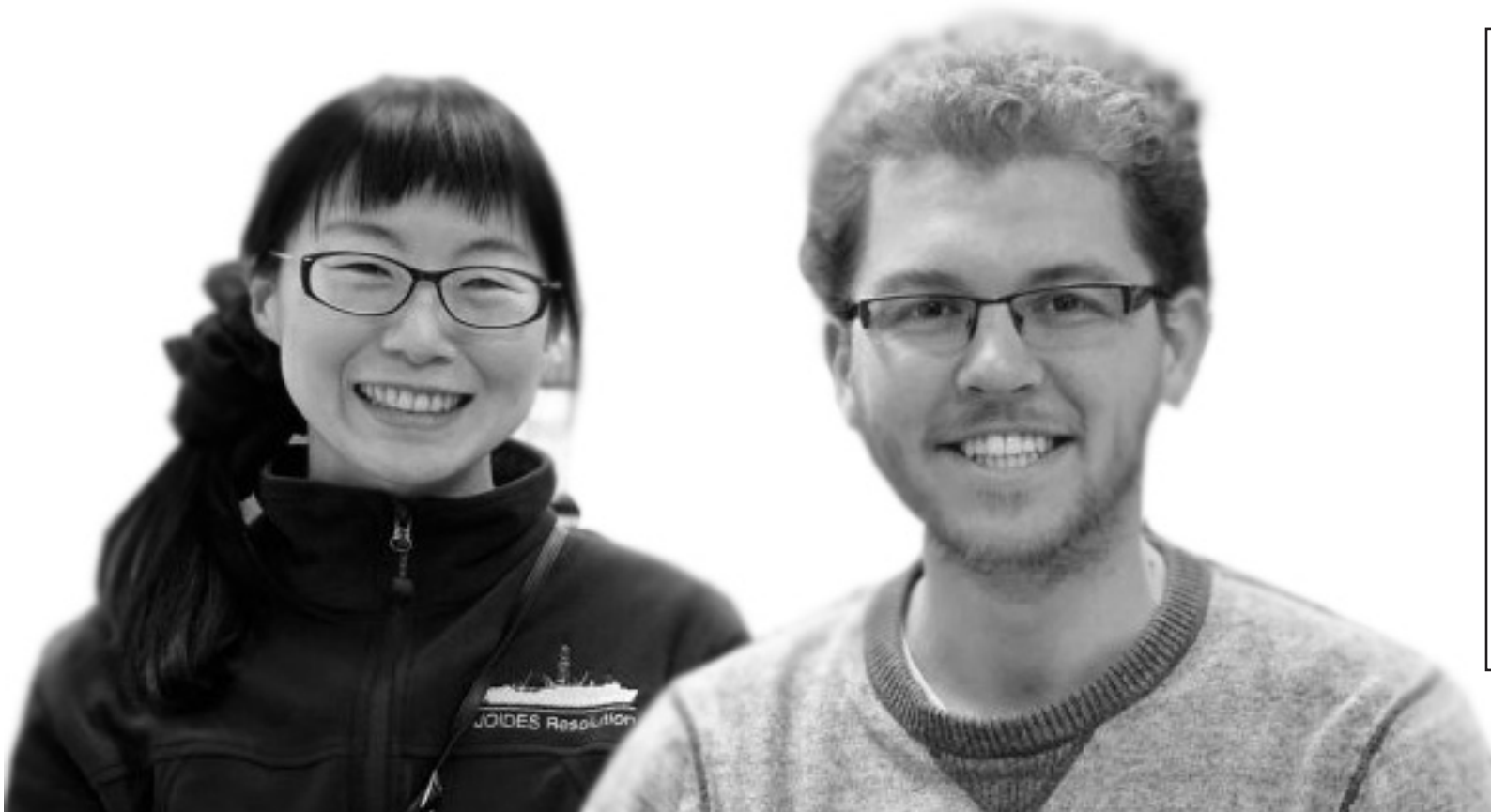


What's happening on
JOIDES Resolution Expedition 374

Paleomagnetism!

Hi! We're Saiko and Tim, and we are paleomagnetists. We study the magnetic field of the Earth in the distant past, and we're on board the *JOIDES Resolution* to help figure out how old the cores are.



R. Hughes-Currie

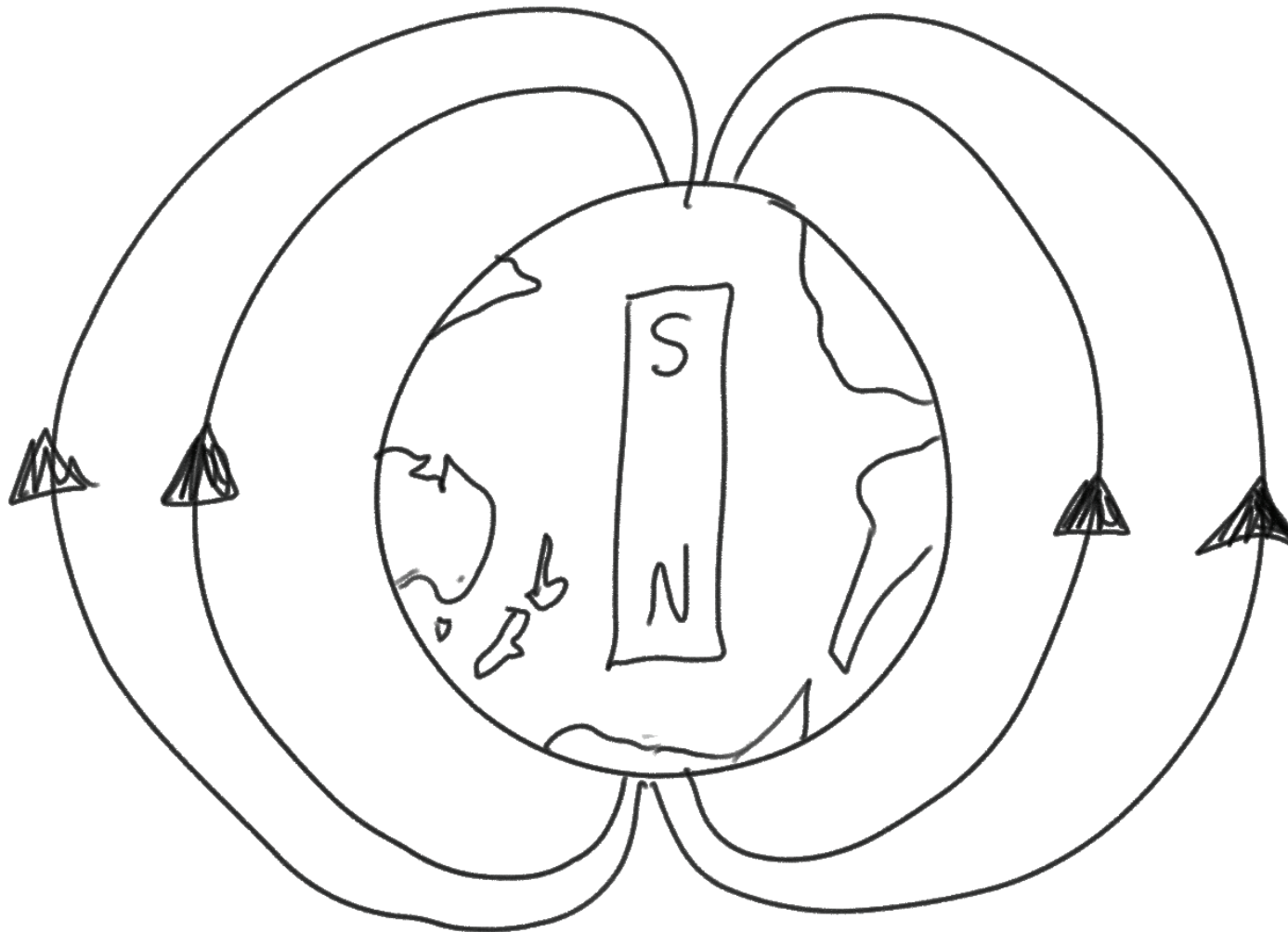


The first time I sailed on the JOIDES Resolution, I wanted to look at the types of sediment in the cores. I didn't know anything about magnetic stuff! But I had to help with the paleomagnetism because there weren't enough scientists on the ship who knew about it.

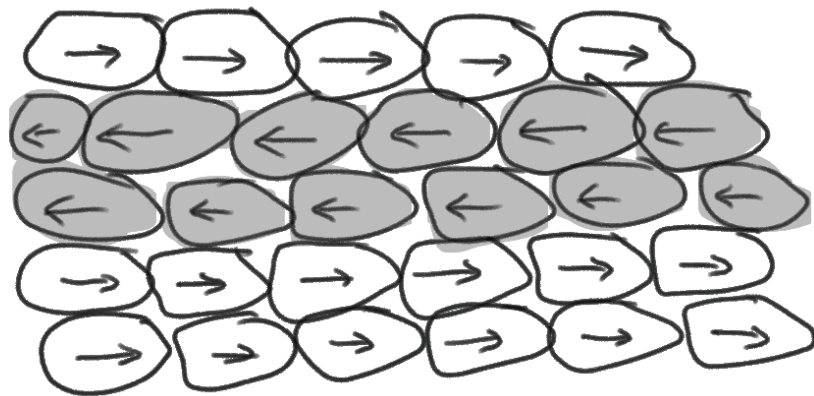
I grew to love paleomagnetism so much that after the expedition I went and worked with the expert who had taught me on the ship!

What I really like is how it works together with the other science happening on the ship. By looking at all the different clues, we build up a picture of the past world.

The Earth has a magnetic field, as if it had a giant magnet inside. Opposites attract, so the north end of a compass points towards the south end of a magnet. If we imagine a giant magnet inside the earth, the arctic, or the “north pole” is actually where the south end of the magnet would be, because compass needles point towards the north pole.



Many animals can sense the Earth's magnetic field. For example this kuaka (godwit) migrates from Alaska to New Zealand every summer using the Earth's magnetic field to help guide it. Hens, bats, mice and many types of birds also use the Earth's magnetic field to help them find their direction.



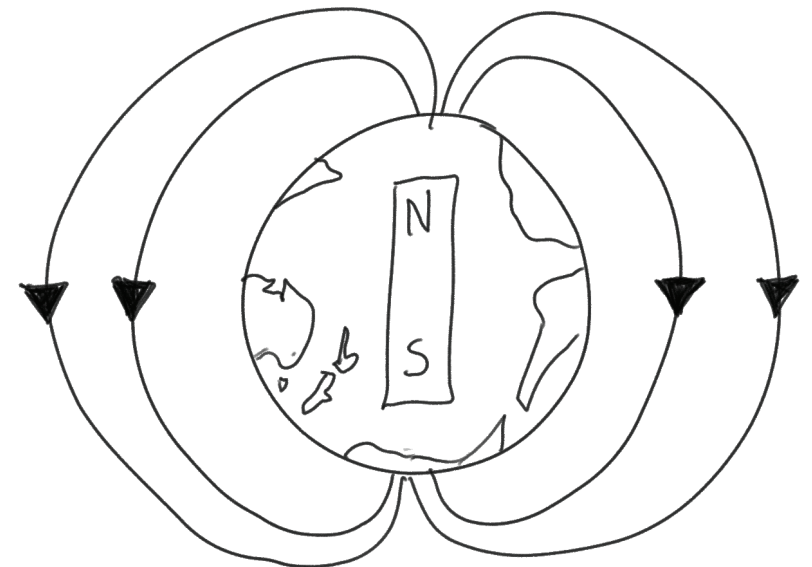
Saiko and Tim use the Earth's magnetic field to help them understand the history of the Earth. They study the magnetic minerals in the mud and rocks below the surface of the sea, which tend to line up with the Earth's magnetic field.



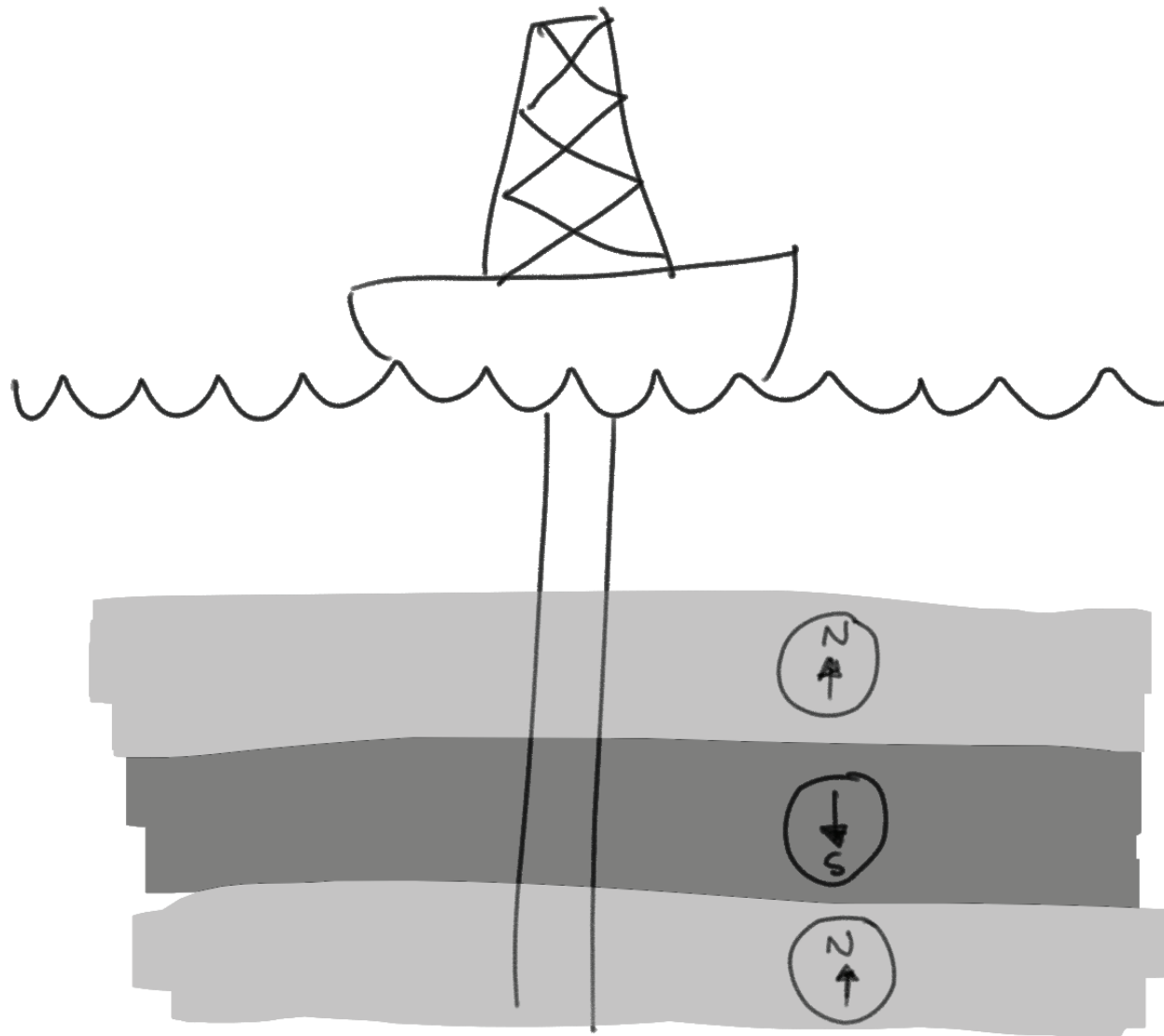
We don't know what will happen when the Earth's magnetic field flips. Some birds may get confused about where to fly for the summer, and there may be other effects we don't know about.

The Earth's magnetic field has actually changed directions many times in the past. If you went back in time eight hundred thousand years ago, your compass would point towards Antarctica rather than the Arctic. That's because the magnetic field of the Earth flipped!

No-one is sure why the magnetic field of the Earth flips sometimes. It doesn't seem to follow a pattern, so we can't be sure when it will happen next.



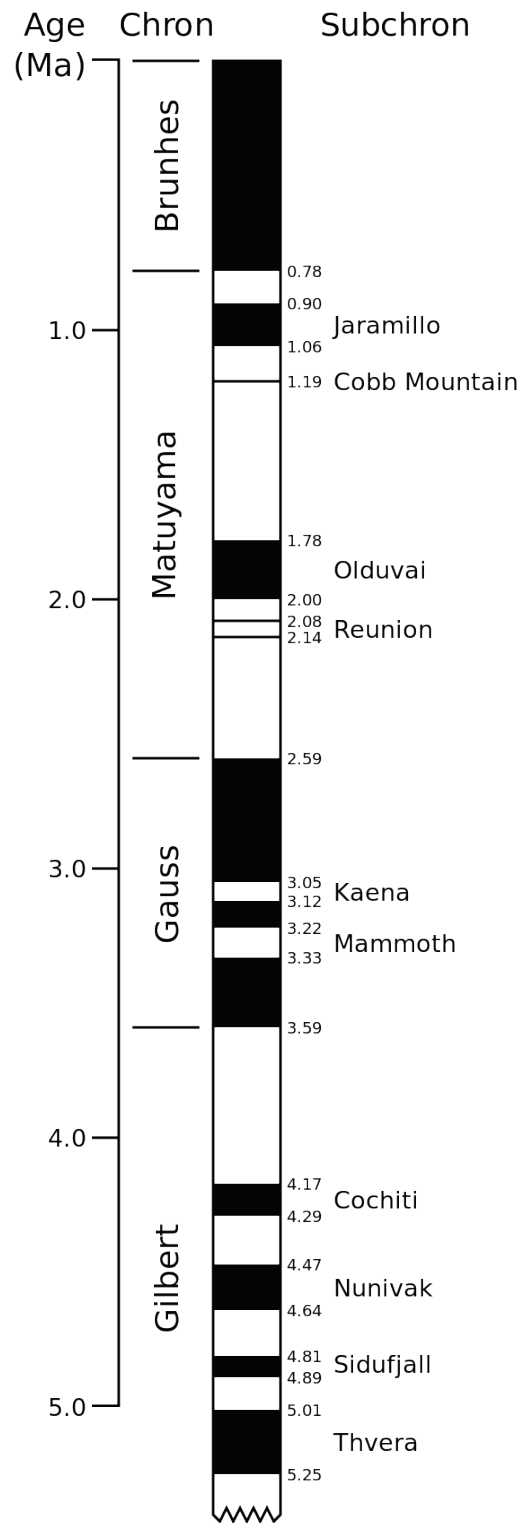
The research ship *JOIDES Resolution* collects a long thin core of mud, sand and stone from beneath the sea. As the drill goes down into the Earth it collects stuff from further back in time. The magnetic minerals change the direction they are pointing every time the Earth's magnetic field flipped from north to south in the past. Scientists call the time when the field points the same direction as now "normal" and times when it points in the opposite way "reversed."





Saiko puts the lengths of cores that the *JOIDES Resolution* collects from under the sea floor into a machine called a magnetometer.

The magnetometer uses the magnetic minerals in the mud and stone to figure out which direction the magnetic field was pointing when that mud and stone was layered on the bottom of the ocean.



This is a picture showing the magnetic field over the last 5 million years. The black parts are when the magnetic field was “normal” like today, and the white parts when it flipped to pointing south, so “reversed”.

“Chron” and “subchron” are the names of very long periods of time.

Each core has a kind of barcode, showing the reversals in the magnetic field. By matching the barcode of the core to the changes in magnetic field over millions of years, Saiko and Tim can figure out the age of the cores.

This is very difficult for them to do when there are gaps in the cores, and then Saiko and Tim need help from other scientists who figure out the age of the cores using tiny fossils of ancient creatures.

By working together and using several different ways of discovering the age of the rocks, sand, and mud, the scientists learn a lot about what happened on Earth millions of years