Transcript of author and illustrator, Marlo Garnsworthy, reading her book Iceberg of Antarctica, 2019.

Guiding questions: Where do icebergs come from? What can we learn from them?

Cover

Iceberg of Antarctica, written and illustrated by Marlo Garnsworthy,

It starts with snow…

and snow…

and snow…

and snow…

Snow compacts,
and crystals grow,
becoming sugary granular ice,
then hard, crunchy firn,
then dense, clear glacial ice,
over thousands of years…
covering Antarctica in a great, icy sheet.

Picture caption: Antarctica is covered in a massive layer of ice call the Antarctic Ice Sheet. On average, it is 2 km/1.3 miles thick.

Such ice is heavy, so it flows downwards
And outwards in glaciers and ice streams.

Picture caption: A glaciers and ice streams grind across the land, they pick up rocks and mud and carry them far from their origin.

It picks up rocks and mud, pebbles and stones.
And still the ice flows…
Until some ice reaches the sea.

Picture caption: The ice flows out into the sea and floats as ice shelves. Antarctic ice shelves have a vital role in holding back the ice flowing behind them.

Warmer water melts ice shelves from below.
Cracks expand, and the ice shelf grows thinner
and weaker, until…
CRACK! SPLASH!

An iceberg is born.

Picture caption: Icebergs break off the edge of the ice sheet. This process is called "calving".

It carries debris,
its rocks and mud,
pebbles and stones…

floating and drifting, wandering and melting,
carved by wind and waves, calving smaller icebergs, dwindling
until it is gone…
…leaving only rocks and mud,
pebbles and stones,
sinking to the deep seafloor…

Picture caption: As an iceberg melts, it drops its iceberg-rafted debris. These rocks – known as "dropstones" – sink to the seafloor. A dropstone can tell scientists which part of Antarctica the iceberg that carried it came from.

…for the JOIDES Resolution to core.

Picture shows: diatoms, silicoflagellates, radiolarians, foram and dinoflagellate cyst.

Picture caption: The remains of microscopic plants such as diatoms and animals such as radiolarians also sink through the ocean. Together with iceberg-rafted debris and dust, they accumulate on the seafloor over time to create thick layers of mud.
As they are deposited, the minerals in the mud align with Earth's magnetic field, creating a record of shifts in Earth's magnetic field over time.
Together, these microfossils and magnetic records act like a history book of changes over time and help scientists establish the age of the mud.

JOIDES Resolution Expedition 382

The JOIDES Resolution is a scientific drilling ship operated by the International Ocean Discovery Program (IODP). On each expedition, an international team of scientists works together toward a common goal.

The JR drills deep into the seafloor to retrieve long cylinders of mud called cores. These provide a history of Earth's climate and geology.

Our expedition explored changes in the Antarctic Ice Sheet over long time periods by studying sediment deposited by icebergs and changes in sea ice, ocean currents, and winds. We purposefully sailed into a part of the Antarctic known as Iceberg Alley…

Iceberg Alley

Our Expedition 382 drilling sites were in the region where most icebergs melt, known as Iceberg Alley. Here the JR drilled Hundreds of meters into the sediment.

We retrieved cores containing iceberg-rafted debris and other material, such as the tiny fossils of plants and animals that lived when the iceberg was melting.

Antarctica & Icebergs

Today, some parts of the Antarctic Ice Shelf are melting, and when the ice sheet melts, sea level rises around the world.

Polar scientists predict that global sea level will rise about 1m (~3.2 ft) by 2100, mostly due to Antarctic melting. But there are uncertainties. How much will sea level rise and how fast?

We want to understand what happened to the ice sheet in the past so we can better predict how melting will affect sea level rise in the future. We are reconstructing the history of past melting by looking at the material Antarctic icebergs deposited over long periods of time.

What can our sediment cores tell us?

Analyzing the properties of this sediment – including the iceberg rafted debris- can tell us when more icebergs were calving and even which parts of Antarctica were melting. At times when more debris was deposited, we know the ice sheet was less stable.

Material from our drilling sites allows us to:

*see a continuous record of climatic and ice sheet changes
*see changes over small time periods, from hundreds to thousands of years
*extend the 800,000-year climatic record obtained from Antarctic ice cores to a couple of million years

Dedicated to the scientists of Exp. 382

The illustrations in this book were created using watercolor and watercolor collage.

NSF (National Science Foundation)
IODP (International Ocean Discovery Program)
U.S. Science Support Program