NATIONAL SCIENCE EDUCATION STANDARDS

A. Science as Inquiry

Abilities necessary to do scientific inquiry
Understanding about scientific inquiry

D. Earth and Space Science

K–4

Properties of earth materials

- Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time.

Changes in earth and sky

- The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

5–8

Structure of the earth system

- The solid earth is layered with a lithosphere; hot, convecting mantle; and dense, metallic core.
- Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions.

Earth's history

- The earth processes we see today, including erosion, movement of lithospheric plates, and changes in atmospheric composition, are similar to those that have occurred in the past.

Written by Maria Gill

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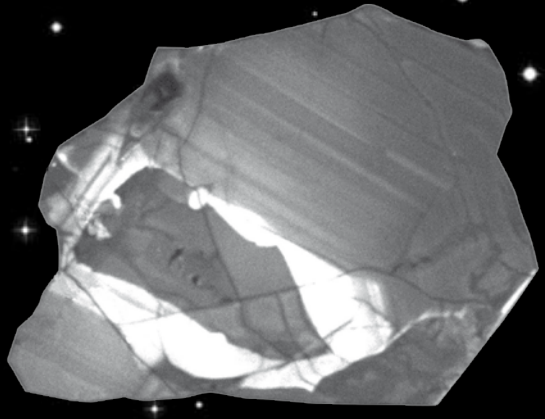
A CHANGING PLANET

If you tried to walk to China or Europe from the United States, you wouldn't be able to do it. There are oceans in the way! In the past, land bridges existed between these continents when sea levels fell during ice ages. But 350 million years ago, *all* of the continents were joined into one huge supercontinent that we call Pangaea (pronounced *Pan-jee-uh*).

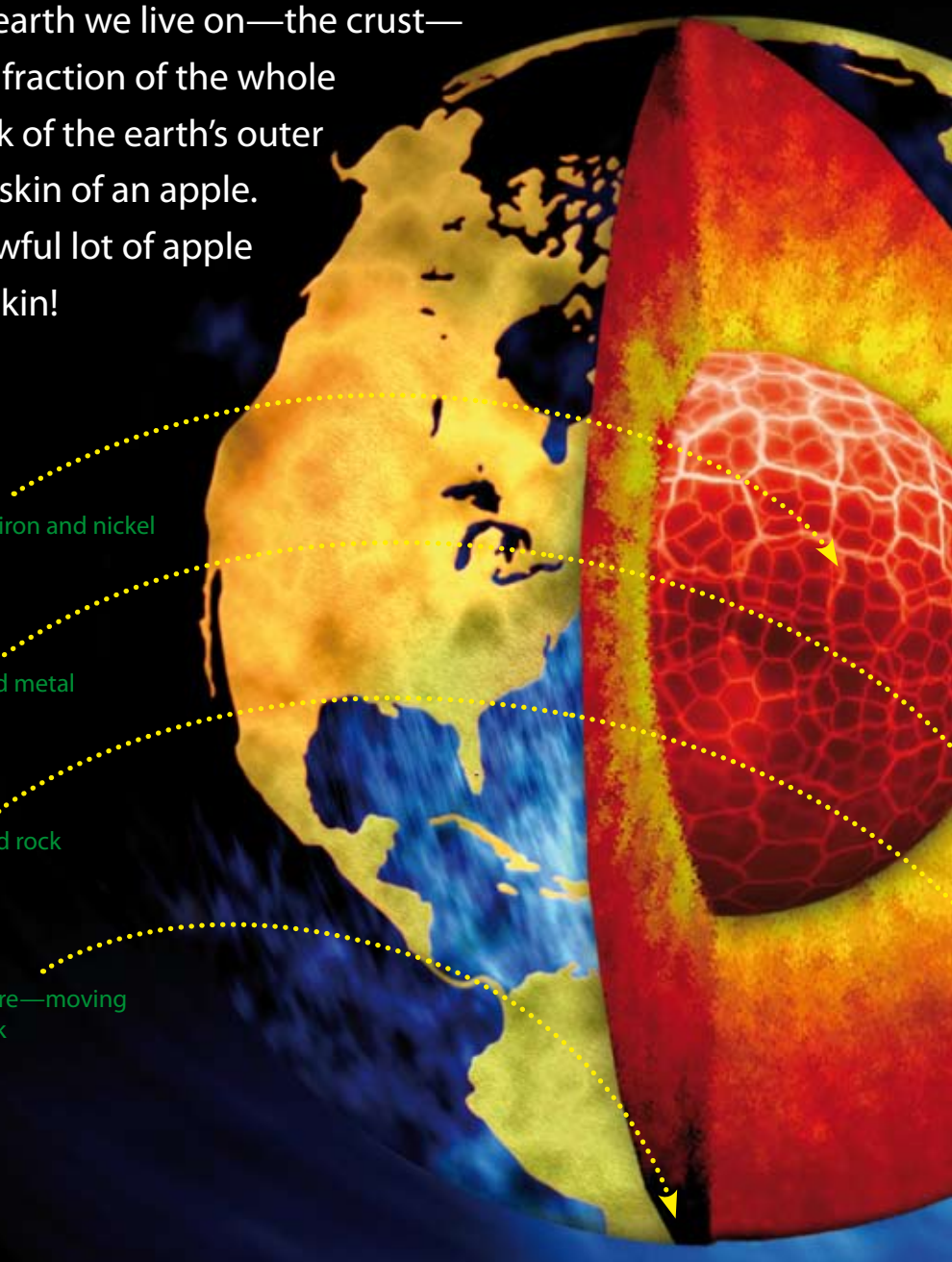


Researchers at the University of Wisconsin-Madison estimate this zircon crystal to be 4.4 billion years old.

Scientists estimate that the earth is about 4.5 billion years old, so 350 million years is not all that long ago—in **planetary time**!

INSIDE THE EARTH

The part of earth we live on—the crust—is just a tiny fraction of the whole planet. Think of the earth's outer crust as the skin of an apple. There's an awful lot of apple under that skin!



Reassemble the Continents

See if you can reassemble the continents to make Laurasia, Gondwana, and Pangaea.

You will need:

- tracing paper
- a pencil
- scissors

What to do:

1. Using pages 8–9 in this book, trace the shapes of the continents.
2. Cut out the shapes. Cut India off the bottom of Asia.
3. Rearrange the shapes of India and the continents like a puzzle, until you get them to look roughly like Laurasia and Gondwana. Check your continents against the map on page 11. This is how the earth looked about 200 million years ago.
4. Now go back in time another 150 million years. Join Laurasia and Gondwana together to make Pangaea. Check your continents against the map on page 3.

Share your results with a friend:

Show your results to a friend. Your friend is going to want to know how continents can move around like this. It is partly because of convection.

HOT SPOTS

Though magma usually comes up through the earth's crust at a plate boundary, it sometimes comes to the surface even though there are no plate boundaries nearby. These places are called hot spots. Hot spots stay in the same place and the earth's crust slowly moves over them over millions of years.

Do you think that Mount Everest is the tallest mountain in the world? Actually, measured from its base on the seafloor, Hawaii's volcanic mountain Mauna Kea is taller! It formed over a hot spot.

Mauna Kea