BJU CURRICULUM
8TH GRADE

5-20 The new world after the Flood was a strange, devastated, and empty place.

LIFE CONNECTION — The Flood, the Ark, and Species Today

What was the world like before the Flood? No one knows for sure. But we see fossilized tropical and temperate plants all over the world, including in the rocks of Antarctica. So pre-Flood weather probably involved seasons that were mild-to-tropical. This makes sense in a "very good" world.

But conditions have changed quite a bit since then. The earth now has freezing ice caps and broiling deserts, with surface temperatures ranging from nearly −100 °F to 130 °F! Such different climates would have threatened the survival of some animal kinds that came off Noah's Ark. In His wisdom, God created mechanisms in the original kinds of animals and plants so that they or their offspring could change in order to live in different conditions. These changes produced the species we see today within the same kinds of living things.

So, with all these changes, how did we end up with the huge variety of living things in the present world? Some creationary scientists believe that there could have been more than 10,000 animals on the Ark. (Of course, no one knows how many there actually were because the Bible doesn't tell us.) This means there could have been nearly 5000 or more "kinds" of animals, especially vertebrates. But there are lots more animal species in the world today than this.

How did the Ark's few members of the "frog kind" lead to the more than 120 species of toads and frogs seen today? Think about it—there's a big difference between a bright-golden spray toad (1/4 oz. and 3/4 in. long) and a cane toad (5.8 lb and 15 in. long)! Evolutionists claim that the variety of animals alive today came about through many tens of thousands of years of slow genetic changes. Young-earth creationists, on the other hand, believe that this variety developed since the Flood, as the animals reproduced and repopulated the earth.

From studying animals and plants, we know that God designed great variability into the genetic materials of their cells. We can see these variations in humans, plants, and animals. No two individuals are exactly alike. Breeders and plant scientists have known for centuries that animals and plants can be artificially bred to produce certain desirable characteristics. After the Flood, animals, plants, and humans spread out from the early centers of civilization. Variations best suited to survive in the new harsh conditions produced new species. This process, called *speciation*, happened many times in different locations in the world. It allowed the relatively few kinds of animals that left the Ark to become the wide variety of species that we see today—not more kinds, just more species. The ability of organisms to thrive after the Flood shows the amazing wisdom of God in His care for His creation.

6A Tectonic Forces

6.1 Early Earthquake Warnings

Countries like Japan, Turkey, and Mexico already have earthquake early warning systems in place. Here's how they work. A system of ***seismometers*** detects earthquake waves. The seismometer sends a message to a central government office. In Japan, the Japan Meteorological Service coordinates these messages. Then this agency sends out a warning message on radios, TVs, cell phones, and public intercoms. The farther someone is from the center of the earthquake, the more time he has to respond. At most, someone may have a full minute after the warning before large tremors reach him. But an early warning system isn't the same thing as predicting when an earthquake will happen. An earthquake has to occur to activate the system.

In earthquake-prone California, researchers are urgently working on developing a similar earthquake early warning system. Scientists from leading universities are pooling their knowledge to come up with a solution. One of the most important things to avoid is false alarms. The key to doing that is to have lots of sources of earthquake data.

One researcher, Elizabeth Cochran, has a novel idea. Her vision is to create a network of the motion sensors currently built into many newer computers. These sensors, or ***accelerometers***, measure changes in speed, such as the shakes produced by earthquakes. So every computer equipped with an accelerometer can become a seismic sensor.

For this network, scientists have developed a computer program that filters out all but the heaviest shakes sensed by the computer accelerometer. Users can purchase inexpensive plug-in accelerometers for computers that don't have one. The program minimizes false alarms from users bumping the computer or from the vibrations of heavy road traffic. It accepts data only when it detects similar shocks from computers in the same area.

This relatively low-tech network has several thousand participants, and is growing. Their computers are linked to a database by the Internet. Anyone with properly equipped computers can join the network voluntarily and free of charge. The system could eventually help warn people of earthquakes over a large area. Just think—average people like you and your family could have a part in saving lives through real-time earthquake alerts!

6A Section Objectives

After completing this section, you will be able to

- ✓ summarize how tectonic forces trigger earthquakes.
- ✓ show how certain kinds of tectonic processes are most likely the cause of earthquakes.
- ✓ identify the material properties of rocks that help cause earthquakes.

seismometer (size MAHM ih ter); an instrument that measures earth waves

accelerometer (ack SELL er AH meh ter)

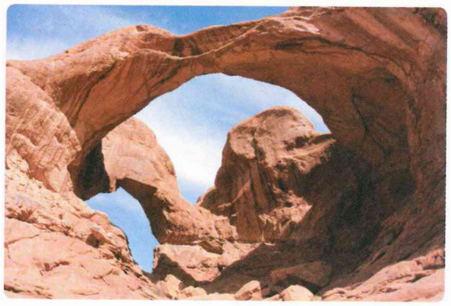
6-1 What difference could a few seconds have made?

Other Remnants of Erosion

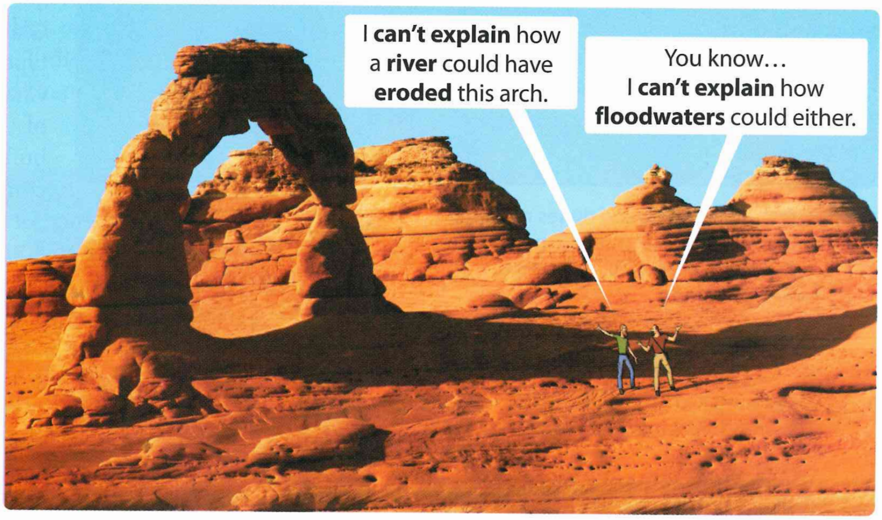
Flood geologists believe the Flood created many other interesting erosional landforms as it receded. Stone arches, natural bridges, solution caves, and volcanic necks are just a few.

Stone arches are often found along with fins and pinnacles. Geologists believe that water weakened a section of rock at the base of a fin, and some of the fin collapsed, leaving the arch. It is hard to imagine how these could have formed gradually! Fins and arches are clear evidence for rapid erosion.

Volcanic necks or *plugs* are all that remain of ancient volcanoes. In some ways, they are like monadnocks. As a volcano erupts and builds the mountain, the magma tube to the *crater* at the top grows longer. If the volcano goes extinct, the magma hardens in the tube. Over time, the rocks that make up the mountain erode away, leaving behind the hardened magma in the neck. It can stand like a tower above the surrounding landscape. In Chapter 8, you'll explore more about volcanoes and their features.



7-22 Stone arches were likely created by rapidly flowing water eroding soft rock.



7-23 Sometimes no scientific model can explain exactly how something formed when no human was there to observe it.

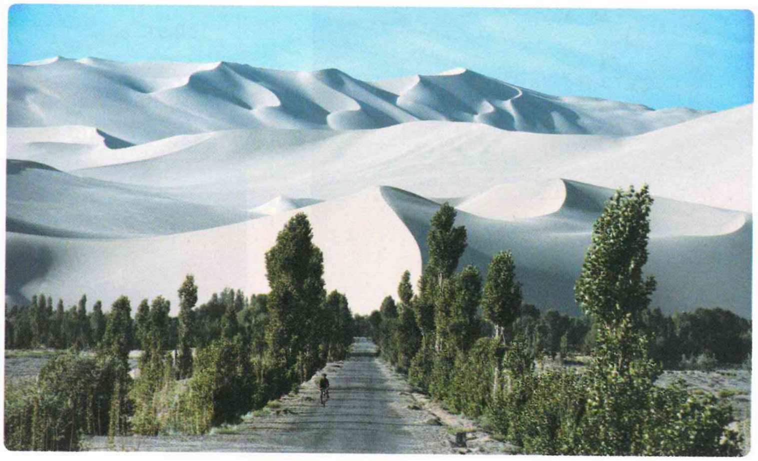
7.15 Depositional Hills and Mountains

When sediments build up on land, they can form **depositional mountains** and other landforms. These sediments can be carried by wind or glaciers or deposited by volcanoes.

Wind-Formed

You've probably seen sand dunes at the beach or any other sandy place. *Sand dunes* are wind-deposited hills of sand. Sand and dust settle out when the wind slows down. Though sand dunes at the beach are small, others can be huge! Dunes in the Sahara Desert can be as high as 430 m (1400 ft) and may cover several square kilometers!

Some geologists believe that in the past wind may have deposited vast stretches of sand that later hardened into sandstone. However, these dunes often include large ripples,



7-24 Hongoryn Els dunes in the southern Gobi Desert of Mongolia. They are known as the Singing Sand Dunes for the sounds they create in high winds.

Chapter Review

Chapter Summary

- Good dominion of surface waters involves maximizing their usefulness while minimizing the harmful effects of such actions.
- Streams are any flow of surface water confined to a channel. They can vary from tiny trickles to mighty rivers.
- Most streams have a high gradient with fast flow near their sources. Farther on, streams become less steep. Near their base level, streambeds are nearly flat.
- Old-earth geologists often use a stream's gradient to estimate its age. This isn't valid because stream gradient can change dramatically along its course due to factors not related to its age.
- Stream cross-sections are related to their gradients and erosional power.
- Streams and their tributaries drain water from a drainage basin. This is called a stream system. A divide separates a stream system from other stream system drainage basins.
- Streams can have many common features, including rapids, waterfalls, bars, meanders, oxbow lakes, and deltas.
- Stream features create both opportunities and obstacles to dominion. We can often reduce the dangers and maximize the usefulness of streams for shipping, electricity, and farmland through well-designed engineering projects.
- Most streams are perennial. Other streams are intermittent, occasionally appearing in otherwise dry streambeds.
- Lakes are bodies of water entirely surrounded by land and cut off from the ocean.
- Lakes are important because they hold most of the liquid fresh water on the earth's surface.
- Limnology is the scientific study of all forms of surface and underground water, including rivers and lakes.
- Lakes are geologically young, no matter which story of Earth's history one considers. Young-earth geologists believe that no lake could have formed earlier than as floodwaters receded off the land. Many are much younger.
- Many unusual lakes have formed across the world. Some are salty, some occupy volcanic or meteorite craters. Some are intermittent lakes that form broad salt flats. And there are many whose origins are unknown.
- Most lakes, especially small lakes and ponds, go through a series of phases. They usually form quickly and then

In Terms of Limnology

20A Air Masses and Fronts

20.1 Why Predict the Weather?

Weather prediction is something that's become a vital part of our modern society. Keep in mind everything that happens when your school is cancelled due to stormy weather. The National Weather Service issues an advisory or warning based on approaching weather. Your local stations communicate this to your living area. Your principal monitors the reports to decide whether or not to cancel school. You get notified by phone, radio, TV, or the Internet. Meteorologists can even predict what time the storm will hit!

Think about the science and planning that goes into evacuating an area that will be hit by a strong hurricane. Do you evacuate or not? Officials must consider many serious factors before making this decision. Where will the storm actually hit? Which way should people flee? How do you locate and transport all the elderly or people with special needs? When do you turn the utilities off, and what will happen when you do that? How do you maintain security? You don't want to evacuate an area unnecessarily. Lives and the area's economy depend on accurate predictions and effective communications, no matter how severe the weather. So let's take a look at what creates weather and how weather forecasters make sense of it.

20A Section Objectives

After completing this section, you will be able to

- ✓ explain how air masses move with weather.
- ✓ identify air masses by their source regions.
- ✓ connect weather to the interaction of two or more air masses.
- ✓ describe processes that produce precipitation.

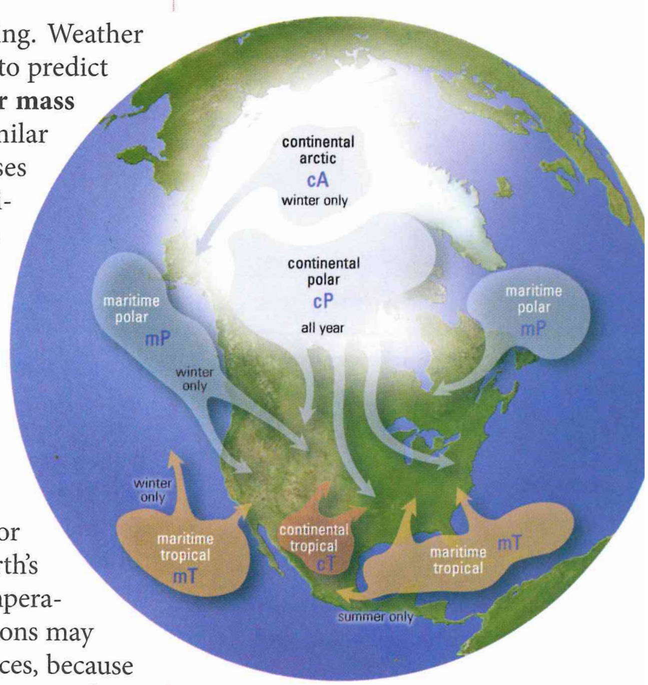
20-1 Weather prediction helps save lives and helps prepare for hazardous conditions.

20.2 Air Masses

Our weather changes because air is always moving. Weather forecasters watch air masses and their movement to predict and report the weather. To a meteorologist, an **air mass** is a huge body of air in the troposphere with similar temperature and humidity throughout. Air masses can cover hundreds or even thousands of square kilometers, and they can extend vertically to heights of several kilometers. Air masses are key to understanding weather. Within an air mass, the weather is generally similar, but when air masses meet, they don't usually mix, at least not right away. Instead, precipitation and storms can form where they collide.

Sources of Air Masses

An air mass gains its properties from the ground or sea beneath it as the air slowly moves over the earth's surface. The air mass takes on the humidity and temperature of areas that we call *source regions*. Source regions may be land or ocean. They are not normally windy places, because the air mass must remain in contact with the earth's surface long enough to take on its temperature and humidity.



20-2 Air masses affecting the United States form in these source regions and then flow over the country as shown by the arrows.