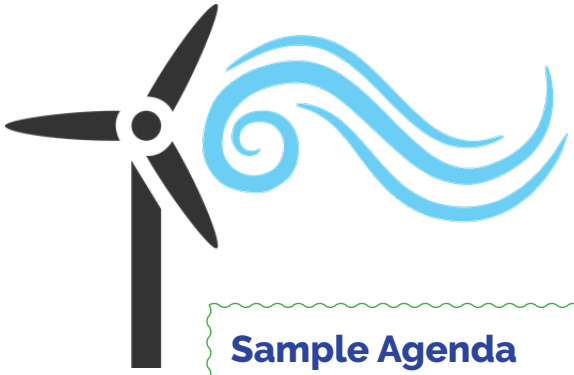
7. AIR, WIND, & CLIMATE



This Lesson's Goals

- *To become more alert to the global nature of air quality issues, particularly to the accumulation of greenhouse gases, methane and CO2*
- *To assert the value of all plants, and trees in particular, to the air cycle*
- *To know we are air and recognize our connection to atmosphere.*
- *To recognize the mythic connection of air and breath with movement of the Holy Spirit*

Sample Agenda

Posting a simple agenda can help both the teachers and the children stay on track. Pick out which activities work for you.

1. **Opening:** Silent Worship, Breathing Exercises, Song, Scripture
2. **Science Presentation**
3. **Small Group Activities** If your total program time is less than one hour, you may want to focus on two to four activities from those listed below, allowing for the age and size of your group, season and weather, and space and materials needed.
4. **Closing**
5. **Sharing of Take-Home Materials**

Opening [10-15 min.]

Invite the group to open with silent worship.

Share a few breathing exercises:

- *Inhale. Hold your breath. How long can we hold our breath?*
- *What does it feel like when we breathe on our hands?*
- *Close your eyes and breathe deeply into your lower abdomen/ stomach area. What do you notice?*
- *Pay attention to your breathing. As we become quiet, we breathe in a slow, calm way.*
- *Jump up and then jump up and down several times. Sit quickly. Now pay attention to breathing. How has it changed?*
- *What is it that we are breathing?*
- *Any guesses? Who/what else*
- *breathes?*
- *Do we need air to breathe?*

Songs

God of the Earth, the Sky, the Sea
Spirit of God in the Clear Running Water
My Roots Go Down
We Shall Not be Moved

Scripture

Psalm 33: 6
By the word of the Lord
the heavens were made,
and all their host
by the breath of his mouth.

Scripture Sharing

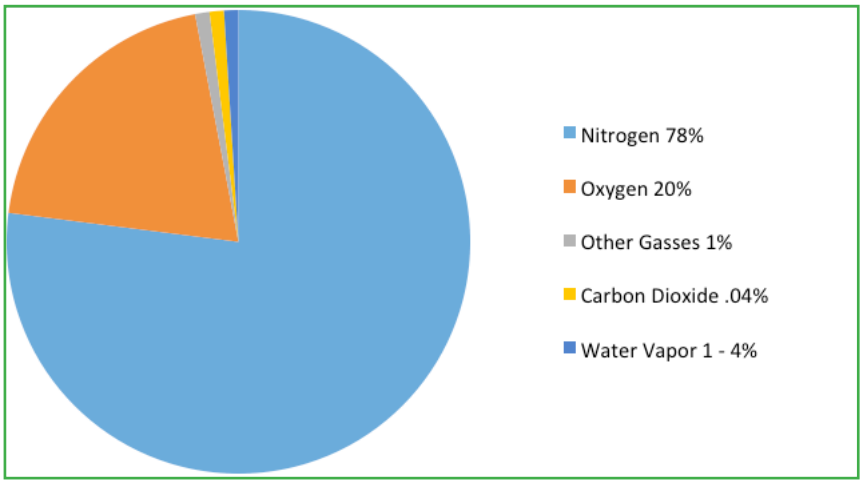
What do you think this passage is saying? Think about/ imagine how with each breath we exhale, we are adding the air that came from us into the air that is in the room. And with each inhalation, we take in some of the other people in the room. We are all connected through air.

Science Presentation

The science presentation on air can be done with the whole group or the small groups.

Air is mainly nitrogen and oxygen, with small amounts of argon, carbon dioxide, helium, hydrogen, methane, neon, and other gases.

All animals - including us! - breathe in oxygen, O_2, and use it to digest food and to power their bodies. They exhale carbon dioxide, CO_2. Most forms of fire use oxygen to burn fuel and give off carbon dioxide; especially the engines in cars and trucks.



Plants do the reverse: they use CO_2 in the process of photosynthesis and give off O_2. Up until the last 100 years, plants have kept in balance with the oxygen needs of animals, fires, and machines, by using CO_2 and giving back O_2. The small amount of CO_2 [.04%] that is present helps to capture the warmth of the sun within the Earth's atmosphere. Without it, the Earth would be a lot colder and less livable.

Now this balance is being changed by three factors. First, more people are using a great many more machines and producing a lot more CO_2. Also, other gases are given off by industrial production. Second, fewer plants are available to absorb the CO_2,

because we've polluted the ocean, where plankton live, and we've cut down forests all around the Earth. Tiny plankton and large trees are the two most important plants for replenishing the air with O2. The major forests that remain include parts of the northern pine and fir forests and the tropical rain forests. Third, more cattle are being raised to feed people. These cattle give off measurable amounts of methane, another "greenhouse gas."

If too much CO2, methane, and other gases are given off by people, machines, and cattle, the atmosphere changes so that less heat leaves the Earth. This is called the greenhouse effect and it is causing global warming. You might think being warmer would be good, but the changes don't happen evenly around the world. Some places turn into deserts while others receive excessive rains, causing floods. More heat also means more energy to drive winds and turbulent weather. Ice at the North and South poles is melting, reducing habitats for polar bears and penguins, and putting more water into the oceans. Land close to sea level is becoming more prone to flooding, When people began using fossil fuels to run their machines, they didn't know what a serious problem throwing off the CO2 balance would be. We now understand better and more and more people are working to transition away from the fossils fuels we have been using (oil, coal and gas) and using wind and solar power instead.

See *We are the Weathermakers* by Tim Flannery for the history of climate science supporting this outcome.

Today, we will learn more about how good air is important for the lives of all of God's creatures. We can do something together that will help.

» *Explore what the children understand about the challenges to the earth's atmosphere and the greenhouse effect.*
» *Calculate personal impacts and compare with others at Ecological Footprint Quiz <myfootprint.org> and here: <botany.org/PlantTalkingPoints/CO2andTrees.php>*

Small Group Activities

Select three or four activities from those listed, giving consideration to the age and size of your group and the availability of the materials. For the demonstrations with water you may want towels, aprons, or plastic table covers. You might consider a trip to a working greenhouse as an additional lesson in this chapter.

1. Playing with our breath [10-15]

Materials: Nine inch latex balloons. Check ahead for any latex allergies.

Give one balloon each person. Stretch them to prepare. Then take a big breath and fill the balloon as much as you can. It is a measure of your lung capacity. Blow the balloon up and count the breaths. You will have captured your breaths!

Let the air out little by little, making squeaks through the narrow opening. "Talk" to the

people near you with only the sounds from the balloons. This is how our voice works too - with air passing over the vocal cords and vibrating.

Feel your throat as you hum. Our voices travel to the ears of others through vibrations in air. Hum and feel the vibrations. Put your hand in front of your mouth and say Pow. Feel the air? Now fill your balloon again and let it go. Notice the powerful wind that shoots out and the how the balloon shoots forward. Be sure to get yours back. Blow it up again and tie a knot in it.

Our game now is to keep all of the balloons in the air and not let any touch the floor/ground. It is hard to keep everything in the air at once.

Sit back down and pay attention to the breathing in the group. Silently listen to all of the breathing and remember we are sharing the breath of life.

Snack Ideas

Many foods come from plants and all plants need air. You might consider focusing on snacks that come from trees. Enjoy apples, almonds, oranges, walnuts, bananas, etc. If possible, choose a place by a tree to eat your snack. Talk about that tree. Name it. Do birds live in it? Are there any insects on it? How old is it? Does it produce seeds? Fruit? Nuts? Are there any trees on or around your Special Plot? Shading it? Compare grasses and trees as oxygen producers.

2. How Much Wind? [5-10]

Invite the children to ask how they might measure the wind. Why would people want to measure the wind? Why would that be useful?

In 1805, an Englishman, named Sir. Francis Beaufort developed a way to measure wind speed. Even though it is based on observations anyone can do without any special equipment, it is the most common measurement used even today. Print and distribute copies of Beaufort's Wind scale and practice measuring wind speed.

- *Make pinwheels, fans or kites: <janbrett.com/piggybacks/piggybacks_the_hat_pinact.htm and <wikihow.com/Make-an-Easy-Kite>*
- *Visit: <wiki.kidzsearch.com/wiki/Beaufort_scalegmail>*

3. Our Atmosphere

Materials: Inflatable globe and a piece of tissue paper.

Use the globe and tissue paper to represent the air, the atmosphere that surrounds Earth.

Share the photos in the back of this section that highlight the atmosphere. What do the children notice? Note how thin and fragile it is.

4. Finding Balance [15]

Read the Abenaki story of Gluskabi and the Wind Eagle (<firstpeople.us/FP-Html-Legends/GluscabiandtheWindEagle-Abenaki.html> or in the book/CD *The Singing Sack*).

Discuss what Gluskabi learned. Why was the wind important? What made life difficult when the wind couldn't do its job? Consider how this relates to our situation with fossil fuel energy use throwing our atmosphere out of balance.

Smile, breathe and go slowly.

– Thích Nht Hnh

5. Wind as energy [15]

God's gift of air to breathe and the movement of air (wind) to maintain a healthy place to live for all of us, is also a form of energy. It is a clean, infinite, non-polluting energy that has been used for years by farmers and millers. Now it can be used to produce electricity and help us turn the lights on and drive our cars.

How did one young man turn this free gift of the wind into a resource for his community? Share the story of *The Boy Who Harnessed the Wind* by William Kamkwamba, Bryan Mealer, Elizabeth Zunon.

6. Parachute Games and Global Warming [10-15]

Materials: Bring a parachute large enough for everyone to hold onto the edge at once.

Raise and lower the parachute in unison and feel the air flow. Note how the parachute catches air and fills up.

Going Inside. Raise the parachute together. Then have everyone take a step toward the center and bring the edge of the parachute down behind them and sit on the edge. You now have a nice circle of folks inside a parachute "dome."

Talk about what you experienced today. Sing a song. After a few minutes you may notice that the air inside the parachute has become warmer than outside air. Ask how that happens. Heat from the sun and our bodies is trapped inside by the parachute the way greenhouse gases trap heat on the planet.

7. Helping the Air [10-15]

Materials: Magazines to cut photos, scissors, paper, glue, markers.

Draw or clip and paste pictures of people helping the air.

Include such ideas as:

- *conservation of energy*
- *use of non-combustion power*
- *reducing travel*
- *planting trees*
- *protecting forests*
- *shopping at local farmers markets*
- *protecting oceans and rivers*
- *eating less meat*
- *using fewer toxics*
- *recycling*
- *consuming less*
- *having smaller families*

8. Tree Breath Meditation [10-15]

Use the guided imagery meditation at the end of the chapter to invite the children to experience our interconnection with other life and breath filled beings. It is an invitation to understand our interdependence and connection specifically with trees and the source of the life energy we breathe in through the air.

9. Tree Seedlings [10-15 + long term]

Materials: Two-liter beverage bottles, soil mixture, water, scissors.

Trees are one way for all of us to help solve the problem of greenhouse gases changing the global temperature. Why might that be? Forests, both natural and urban, help to improve our air quality. Heat from the earth is trapped in the atmosphere due to high levels of carbon dioxide (CO_2) and other heat-trapping gases that prohibit it from releasing the heat into space (the "greenhouse effect). Trees help by removing (sequestering) CO_2 from the atmosphere during photosynthesis to form carbohydrates that are used in plant structure/function and return oxygen back into the atmosphere as a byproduct. Roughly half of the greenhouse effect is caused by CO_2. Therefore, trees act as carbon sinks, alleviating the greenhouse effect.

Wangari Maathai said that a typical human being uses the oxygen output of ten trees

in a lifetime. Find out why her tree-planting work in Kenya was recognized with the 2004 Nobel Peace Prize. You may want to share Wangari's story of transforming her community with tree planting: <www.greenbeltmovement.org/wangari-maathai>

Seek advice about what types of trees are native to your area that will grow from seeds and secure some of those seeds. Collecting seeds in the field could limit this activity to fall. Save two-liter beverage bottles. Cut off the tops, poke drain holes in the bottoms, fill with appropriate soil mixture, and plant several seeds in each bottle. You can thin later.

Question:What in the world is so important that you could not live without it, even for five minutes? Yet it is nearly invisible! Sometimes we act as if it is nothing, yet it is everything.

Answer: AIR.

Label each bottle and put the bottles where they can get the water, warmth, and light they need. Germination of tree seeds takes longer than beans, so plan on this being a project of several months. Seedlings can be given away, taken home, or planted at the meetinghouse.

10. Juice Lid Wind Chimes [10-15]

Materials: five lids from juice cans [one small, if possible, and four large] for each person, twine or nylon fishing line, and an ice pick.

- *With the ice pick, an adult punches holes near the rims of the lids: four in the small spacer and one in each large chime disk.*
- *Cut four twenty-inch lengths of line, and tie one to each chime. Run each line up through a hole in the spacer and tie off so the chimes hang three to six inches below the spacer.*
- *Gather all four lines above the spacer and tie them in a knot so the spacer is level. Then make a loop above the knot so the chimes may be hung in a favorite tree.*
- *What does a wind chime tell about air? Why has wind often been associated with the Holy Spirit?*

Younger children may need help tying knots. Chime disks can be decorated with stickers. What other wind chimes can you make using mostly natural or recycled materials?

When we look into the sky it seems to us to be endless. We breathe without thinking about it, as is natural. We think without consideration about the boundless ocean of air, and then you sit aboard a spacecraft, you tear away from Earth, and within ten minutes you have been carried straight through the layer of air, and beyond there is nothing!

Beyond the air there is only coldness, emptiness, darkness. The "boundless" blue sky, the ocean which gives us breath and protects us from the endless black and death, is but an infinitesimally thin film.

Closing [5-10]

Tree and Wind Appreciation

Stand in a circle around a tree. Consider doing one or more of the following:

- *Sing songs from the opening.*
- *Each one tells something about that tree or a tree known from home.*
- *Think of the value trees have for us.*
- *Listen to the wind in the trees.*
- *Hang a wind chime in the tree.*
- *Water the tree.*
- *Read aloud one of the quotes in this chapter and ask each child to finish the sentence "Today I learned..." and close with silent worship.*
- *Give out the Take-Home Page.*

An Iroquois Prayer of Thanksgiving

We return thanks to our mother, the Earth, which sustains us.
We return thanks to the rivers, which supply us with water.
We return thanks to the herbs, which give medicines to cure diseases.
We return thanks to the corn, and to her sisters, the beans and squashes, which give us life.
We return thanks to the wind, which blows away diseases.
We return thanks to the moon and stars, which give us their light when the sun is gone.
We return thanks to the sun, which looks kindly upon the Earth.
Lastly, we return thanks to the great Spirit, in whom is embodied all goodness, and who directs all things for the good of its children.

Word Search

Circle the words from the list that you can find in the grid. Tell someone how each word is related to our earth and what we've been studying.

H	A	M	N	O	S	T	G	R	E	A	T	M	Y
G	R	E	E	N	H	O	U	S	E	D	Y	A	N
W	I	T	W	H	I	U	L	T	Z	A	P	K	O
S	C	H	A	I	R	B	R	E	A	T	H	E	S
O	E	A	C	H	N	E	R	R	R	X	O	Y	I
X	C	N	R	I	D	D	E	E	I	A	O	T	P
Y	A	E	E	B	I	X	W	F	E	C	N	O	N
G	P	O	G	L	O	B	A	L	L	Z	A	R	T
E	S	P	I	N	X	N	R	E	Q	O	E	N	F
N	S	P	I	R	I	T	M	C	U	U	O	A	E
F	O	L	D	E	D	A	I	U	A	L	G	D	E
Y	B	T	R	E	E	S	N	N	I	L	E	o	R
S	M	E	L	T	I	N	G	S	R	Y	M	T	D

GLOBAL WARMING
CARBON DIOXIDE
GREENHOUSE
HURRICANE
TORNADO

BREATHE
MELTING
ICECAPS
METHANE

BREEZE
FLOOD
TYPHOON
OXYGEN

CALM
AIR
WIND
SPIRIT
TREES

Tree Breath Meditation

"Sit on an arm chair in a quiet place; forearms rest on arm rests, back resting on backrest, feet side by side resting on the floor and bottom resting comfortably on the seat. Close your eyes and breathe in and out. Allow breath and body to slow and relax.

Imagine that you are sitting beneath a large and great tree on a warm day. There is soft breeze rustling the canopy of leaves above you. There is lush green grass under your feet and extending as far as the eye can see. A small creek can be seen running alongside a sloping hillside nearby. There are trees and shrubs dotting the landscape both far and near. The sky is a lovely blue padded by fluffy white clouds. In the treetops of some trees nearby birds are occasionally singing.

You bring your attention to your feet resting in the grass, you feel your legs and hips quietly relaxing, your spine is long, and breaths are long and slow.

You are aware of the great and majestic tree behind you rising from the earth with tremendous power. Its grand branches extending above and you are able to sense an energy moving through the branches to endless leaves at their tips. Just as you are breathing in and breathing out, so also is the great tree drawing in heavy air and releasing lighter air; the kind of air you can use to vitalize your entire being with. It as if when you breathe out the tree absorbs all that you no longer need, and as the grand tree releases air you receive it into your lungs and through your whole body.

Your mind and body are vitalized and clarity comes vividly as you breathe. The majestic tree is vitalized by what you release, taking what it needs to grow and energize itself. Just like the great tree you also are revitalized by the air you receive, your body creates energy to grow, to heal to enliven all the functions for your fullest life experience. You and the magnificent tree breathe in and out, in and out.

The breeze whispers its presence as it brushes softly across your checks carrying light air from the many trees and green plants all around you. You are surrounded by all that you need in this moment. You feel alive and fulfilled.

The grand tree and all the other green plant life near and far breathe with you day and night, night and day. You feel peace knowing that wherever you go the green landscapes around you breathes as you do; both you and all plant life are mutually nourished and strengthened by the presence of each other. You know now that no matter what happens in life you can always stay with your breath and feel simultaneously grounded and wondrously free.

You give thanks to this real awareness within. You feel peace knowing you will automatically receive air and give air without any need to think about it. The great tree also has this experience.

It is time now to return to your usual routine of life; it is time to return where you sit on your arm chair. You can be happy in the knowledge that this vision of you sitting beneath the great tree is now yours and it will be with you always. You feel your head, neck and shoulders, your arms resting on the armrests, your back leaning on the backrest. You are aware of your hips sitting on the seat, your legs bent at the knee and feet planted on the ground. You are back in the quiet place where you came to sit. You are about to count down from 5 to 1 and then you are going to open your eyes. Five, four, three, two, one.

Take a moment to stretch after a meditation as you have been still for a time. Invite the children to reflect on their experience.

Source: <meditation.hotforyoga.tv/tree-breath-meditation>

Calm and Turbulence

by Sandra M. Farley

It is wise to seek shelter from the storm.
But the blowing wind may blow blessings which we need.
Sailors who have been becalmed
pray for a wind, any wind, by which to sail.

Picture the world beneath the sea.
See how turbulence brings vital nutrients
up from the bottom of the ocean to the zone of light,
where the plankton thrive and the fishes swim.
The winds on the surface eventually stir the deep.

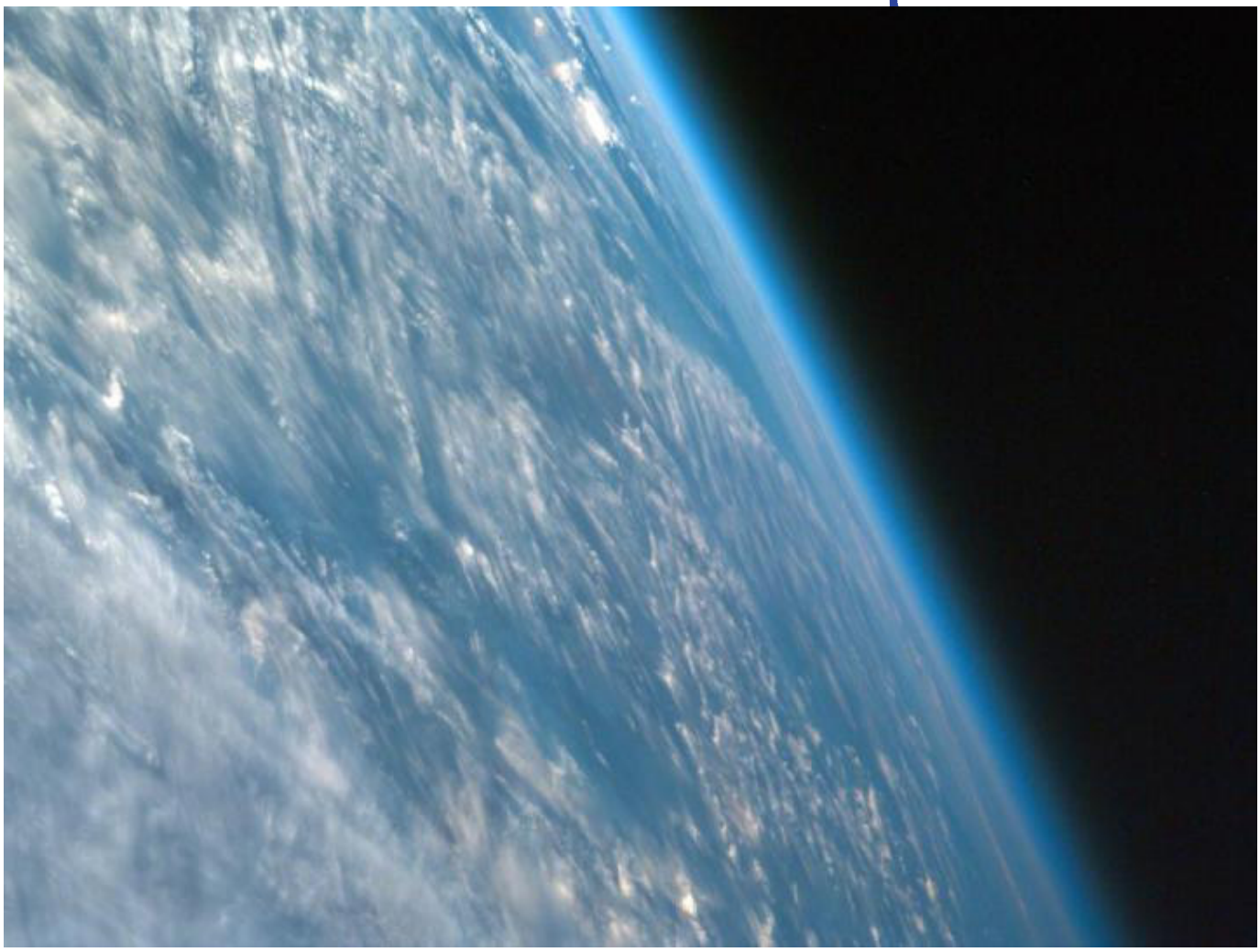
The turbulent dance of a creek over the rocks
bubbles oxygen into the stream,
where it nourishes the trout
and the other inhabitants of the watercourse.
There seems to be a purpose served
in most natural turbulence.

Our lives may also benefit from occasional bouts of turbulence.
Family upheaval or natural disasters can shake up our world.
When the patterns of our daily existence fall apart,
we get to face our priorities
and see what is really important.
It is tempting to complain about the upsets
and beg for calm.

Calm is needed, too. Time to sort it all out,
to listen to the "still small voice."
But let's not forget all the gifts of turbulence.

Consider: When have you observed turbulence in the natural world? Was it frightening, pleasant, or exciting? What human-made devices foster turbulence in order to function well? A blender is one example. What parts of your life are calm? When is your life full of turbulence? Do you think you need more of one or the other?

The Earth's Atmosphere



"The Earth's atmosphere is an extremely thin sheet of air extending from the surface of the Earth to the edge of space. The Earth is a sphere with a roughly 8000 mile diameter; the thickness of the atmosphere is about 60 miles. In this picture, taken from a spacecraft orbiting at 200 miles above the surface, we can see the atmosphere as the thin blue band between the surface and the blackness of space. If the Earth were the size of a basketball, the thickness of the atmosphere could be modeled by a thin sheet of plastic wrapped around the ball. Gravity holds the atmosphere to the Earth's surface. Within the atmosphere, very complex chemical, thermodynamic, and fluid dynamics effects occur. The atmosphere is not uniform; fluid properties are constantly changing with time and location. We call this change the weather."

<grc.nasa.gov/WWW/K-12/airplane/atmosphere.html>