



# **Weather Review**

**Seasons and our Earth**

**Winds around the world**

**Our Atmosphere**

**Ocean Currents**

**Water Cycles**

**Earths Energy**

A scenic landscape featuring green mountains with waterfalls, a lake, and a cloudy sky. The text is overlaid on the image.

# Key Points

## Heat Transference And causes of wind

Seasons and our Earth

Winds around the world

Our Atmosphere

Ocean Currents

Water Cycles

Earths Energy

# **Earth's Energy & The Seasons**

## **You must understand this...**

- **Why is it important that we understand energy and heat transfer?**
- **The topics you have studied are related to the transfer of energy. Weather fronts transfer energy. Wind transfers energy. The Sun transfers energy. Water transfers energy. Our atmosphere stores energy.**

# Earth's Energy & The Seasons

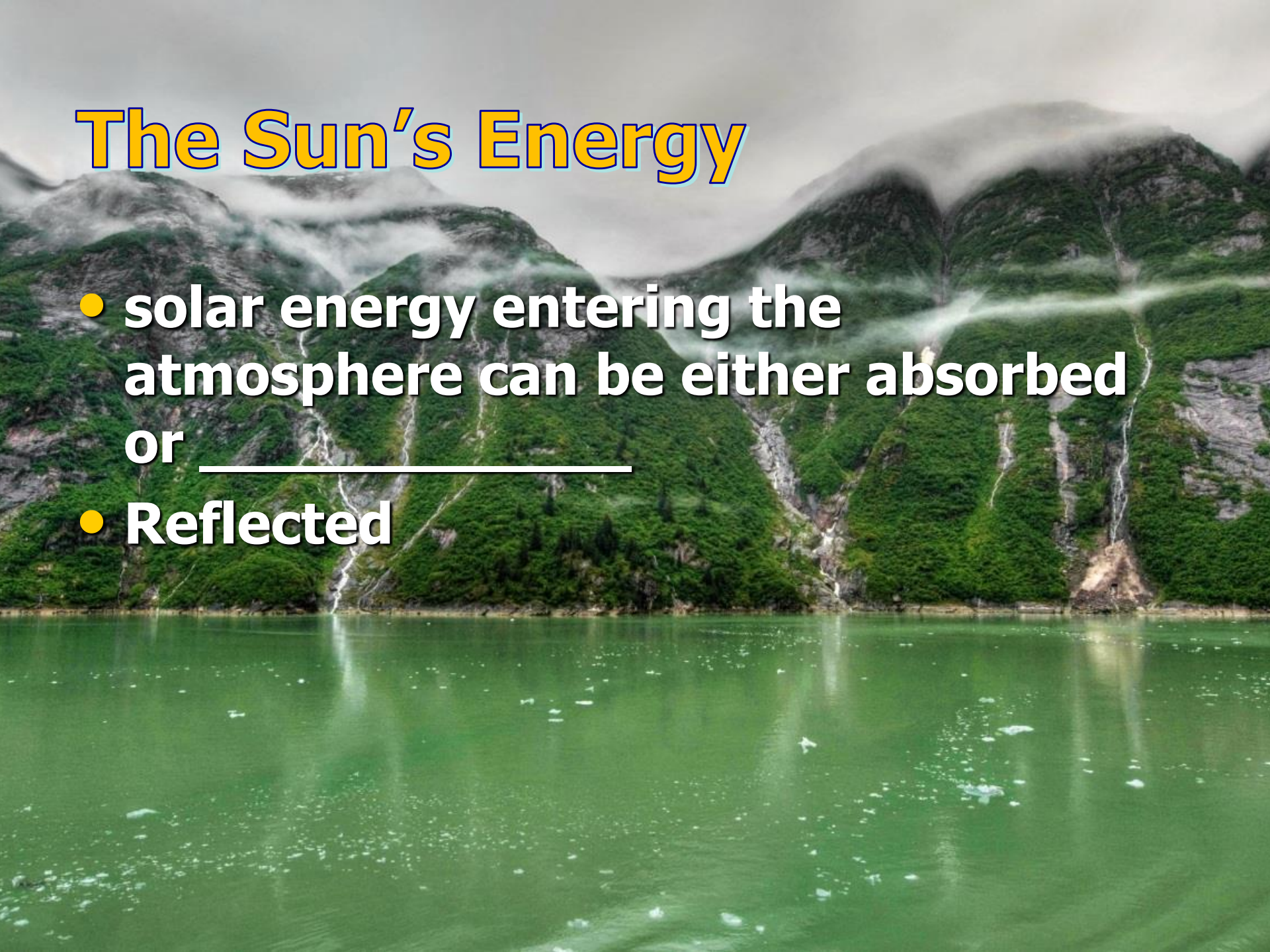
- We need to understand the transfer of energy to better understand how our planet operates under optimal conditions.
- In other words, we have to understand how we may have an impact on the heat transferred in our own environment.

# Earth's Energy (HEAT)

- **HEAT - All things are made up of molecules**
- **When things get heated, they absorb heat energy**
- **With more energy, molecules are able to move faster**
- **When molecules move faster, the temperature rises**

# The Sun's Energy

- solar energy entering the atmosphere can be either absorbed or \_\_\_\_\_
- Reflected





# **Albedo: What has the highest albedo, ice or sand**

**Whiter objects reflect more of the sun's energy. Albedo is the measure of reflection in a material**

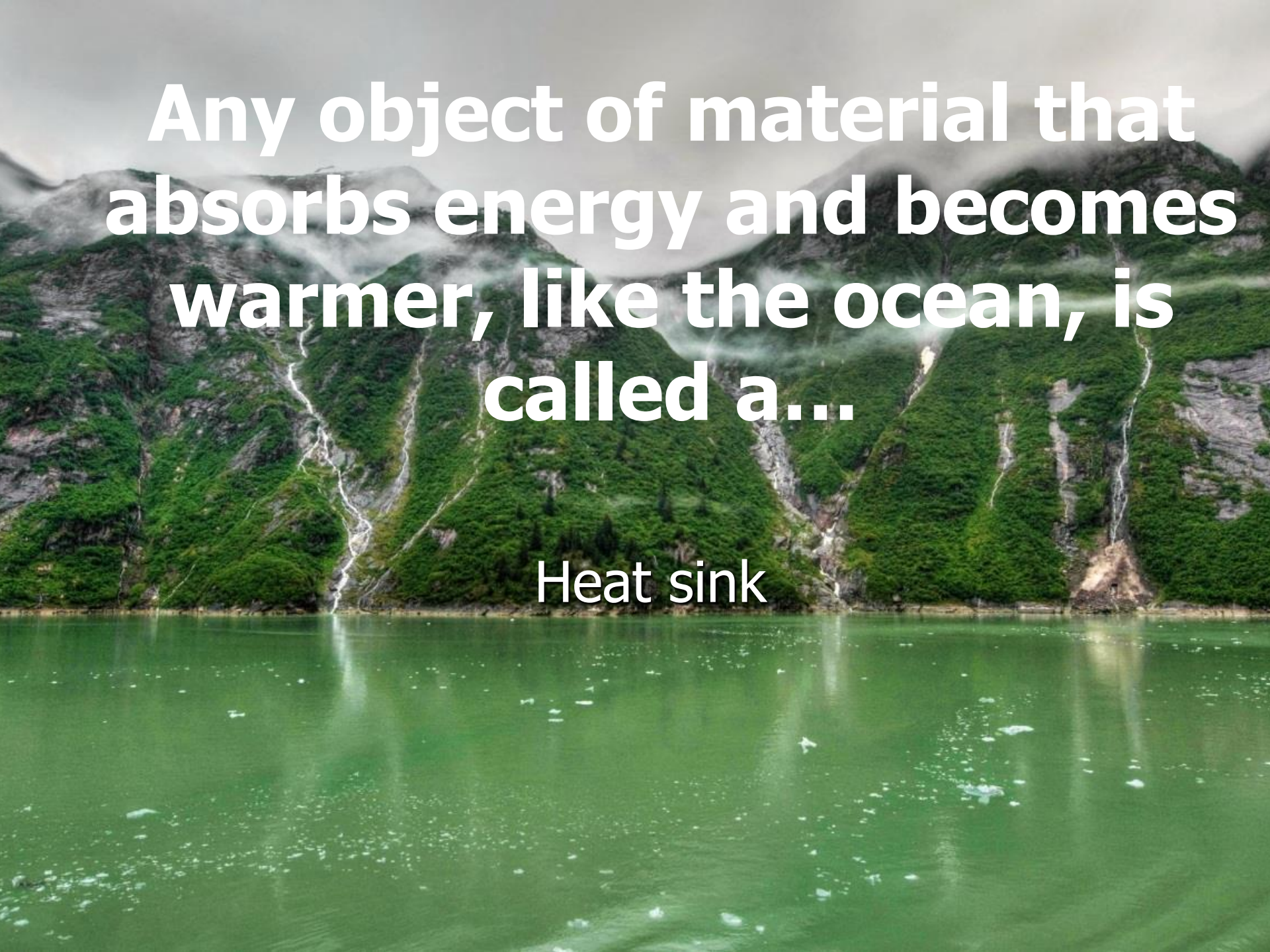
**Ice**

**Water**

**Sand**

**Rocks**

**Grass and trees**

A scenic view of a fjord with steep, forested mountains and waterfalls. The water is a deep green color, and the sky is overcast. The text is overlaid on the image.

**Any object of material that  
absorbs energy and becomes  
warmer, like the ocean, is  
called a...**

Heat sink



Heat is about molecules moving faster = HEAT

# How much of the Sun's energy is captured by the Earth?

- About 50%
- About 20% is taken up in the atmosphere before it ever reaches the ground

A scenic landscape featuring a large body of green water in the foreground, likely a fjord or lake. The water is dotted with small white ice floes. In the background, there are steep, green mountains with several waterfalls cascading down their slopes. The sky is overcast and grey, with some mist or low clouds hanging between the mountain peaks.

# **\*\*\*What are the three forms of heat transference on Earth?**

- **Radiation**
- **Convection**
- **Conduction**

Heat is about molecules moving faster = HEAT

# **Explain heat transference from radiation**

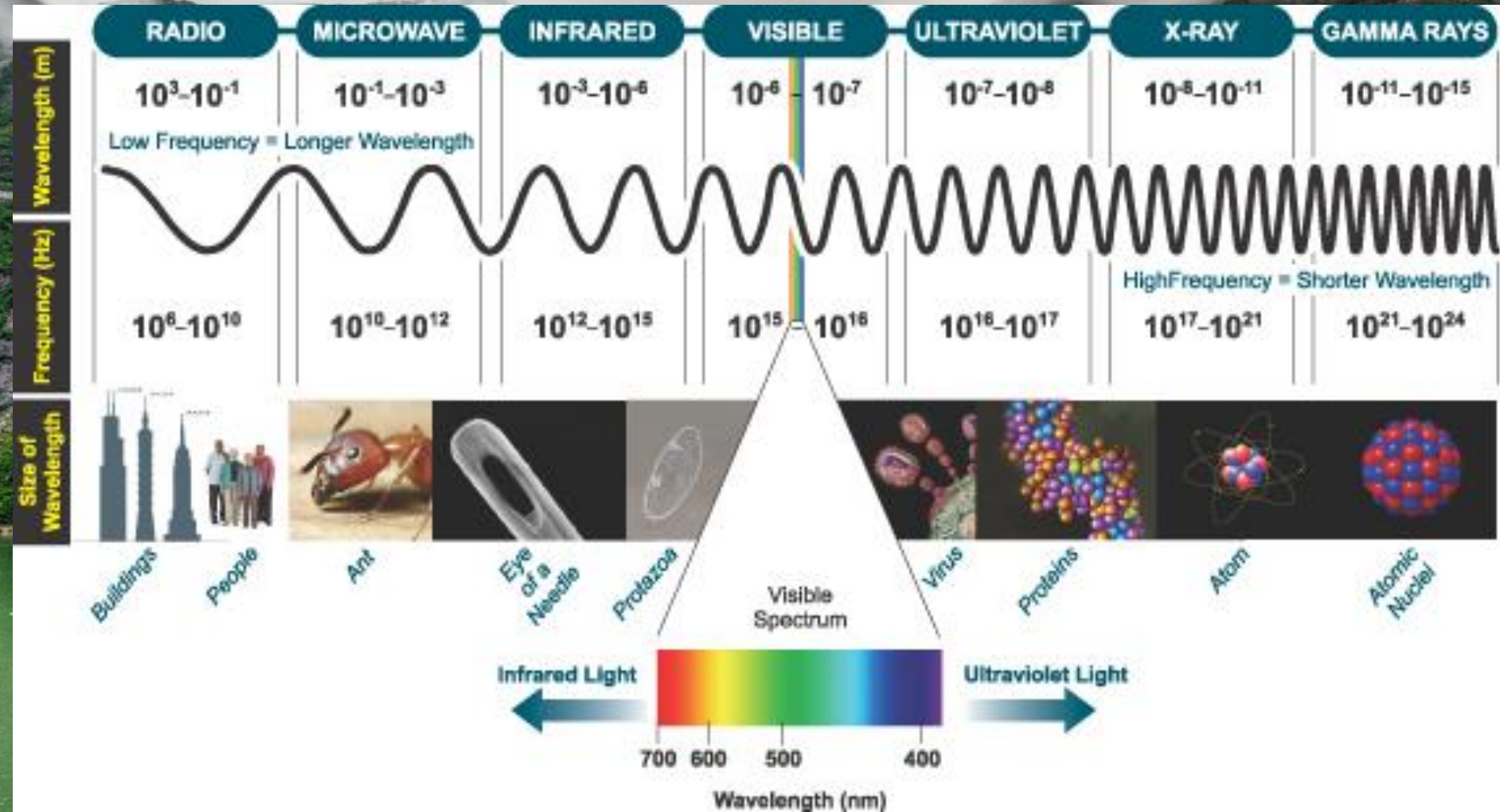
- **Radiation emits from the Sun in the form of waves**
- **Waves can be found on the electromagnetic spectrum**

Heat is about molecules moving faster = HEAT

# **What is the electromagnetic spectrum and name 4 parts**

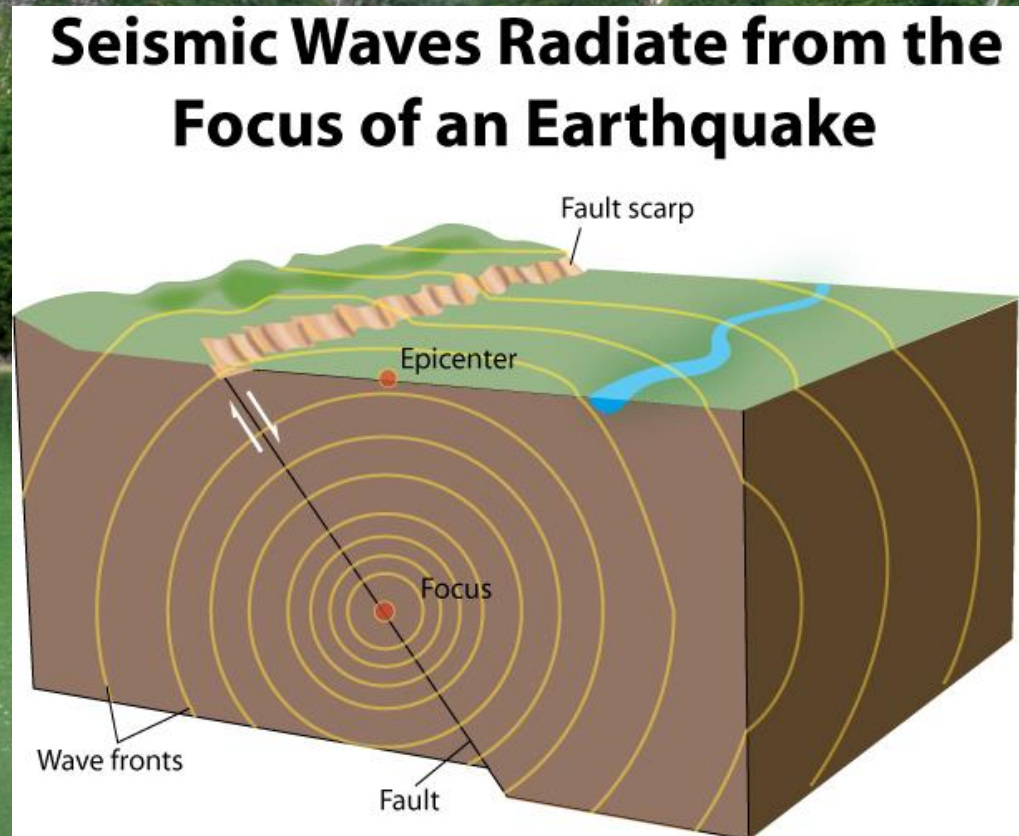
- energy which travels in waves of different energy levels**
- the visible spectrum (the part of the suns energy which we can see as light) is only a small range of the energy released by the sun**

Heat is about molecules moving faster = HEAT



# What waves require a medium?

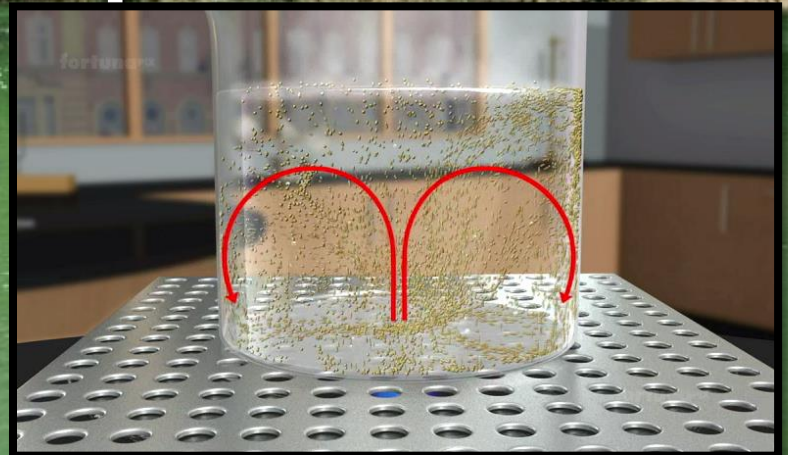
Water, sound, seismic waves



Heat is about molecules moving faster = HEAT

# Explain heat transference from convection

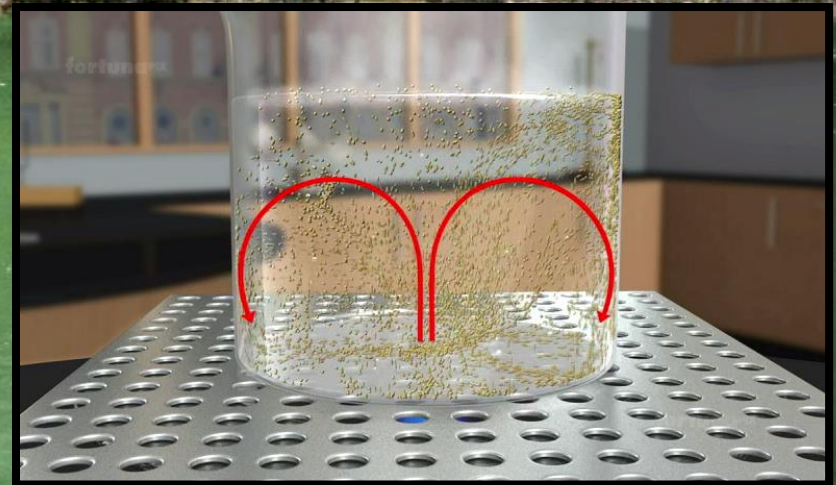
- Convection is the transfer of energy by movement of particles in a fluid (liquid/gas)
- Evaporation is an example of convection



Heat is about molecules moving faster = HEAT

# Question: Can convection occur in space?

- Convection requires gravity to pull downward on water when it becomes more dense from cooling. Without gravity there is no convection

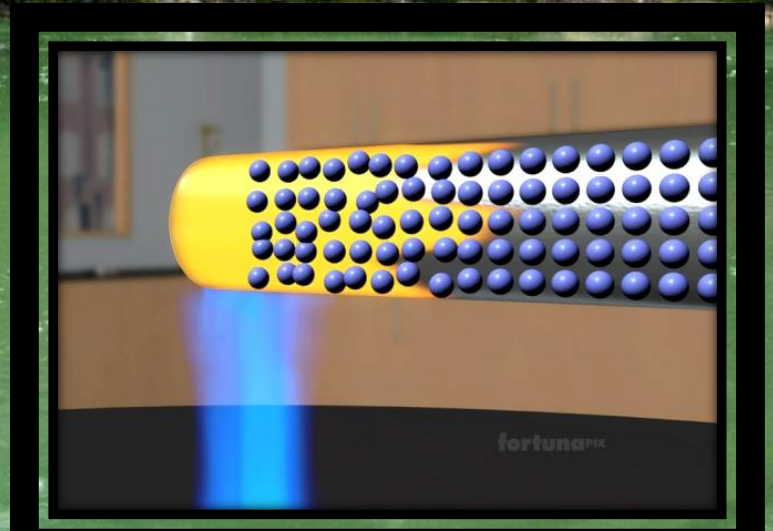




Heat is about molecules moving faster = HEAT

# Explain heat transference from conduction

- transfer of energy occurs when a particle with high energy hits a particle with lower energy
- energy is passed through an object from atom to atom
- Only occurs in solids



Heat is about molecules moving faster = HEAT

# Heat is about Molecules

- **Radiation = waves from the Sun**
- **Convection =**
  - heat transferred in liquids and gas
  - water currents, water molecules
  - Movement...of molecules when heated
- **Conduction =**
  - Direct transfer by touch, atom to atom
  - Only solids

Heat is about molecules moving faster = HEAT

# Describe heat capacity

The measure of how much heat is required to increase the temperature of the object.

Heat is about molecules moving faster = HEAT

# How can a sandy beach be used to describe heat capacity?

On a sandy beach, the sand has a low heat capacity and therefore absorbs energy quickly changing temperature. The water on the other hand takes much longer to absorb energy and change temperature.

A scenic view of a fjord with steep, green mountains and a body of water. The mountains are covered in dense green vegetation and have several waterfalls cascading down their sides. The water is a deep green color, reflecting the surrounding landscape. The sky is overcast and grey.

# Does metal have a high or low Heat Capacity

Metal has a low heat capacity compared to water which takes longer to heat and cool

A scenic view of a fjord with steep, forested mountains and waterfalls. The water is a deep green color, and the sky is overcast with grey clouds. The mountains are covered in dense green forest, and several waterfalls are visible cascading down the slopes. The overall atmosphere is misty and dramatic.

What percentage of the Earth is covered by Water?

70 percent

A scenic view of a fjord with steep, green mountains and a cloudy sky. The mountains are covered in lush green vegetation and have several waterfalls cascading down their sides. The sky is overcast with grey clouds, and some mist or low clouds are visible near the mountain peaks. The water in the foreground is a deep green color with some white foam or ice floating on the surface.

# The Seasons

- You need to know what causes the the seasons. Earths tilt and the revolution of the Sun is responsible for seasons

A scenic landscape featuring green mountains, waterfalls, and a lake. The mountains are covered in lush green vegetation and have several waterfalls cascading down their slopes. The sky is overcast and grey, and the water in the foreground is a vibrant green color with some white foam or ice floating on it.

# **What is the difference between rotation and revolution?**

**Rotation involves one complete 360 degree turn of a body**

**A revolution is one full circle or orbit around another object**



A scenic view of a fjord with steep, green mountains and waterfalls. The water is a milky green color, and the sky is overcast. The text is overlaid on the image.

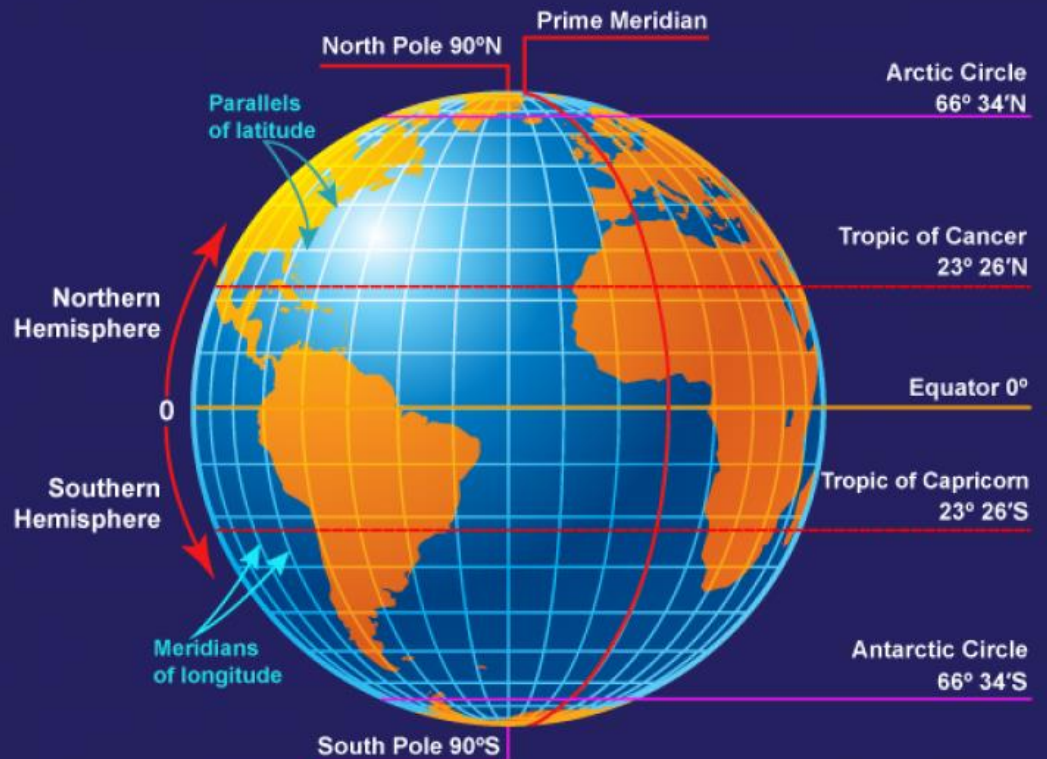
**Does the Earth rotate east to west or west to east?**

**Eastward so West to East**

# Does latitude run up and down or right to left across the globe?



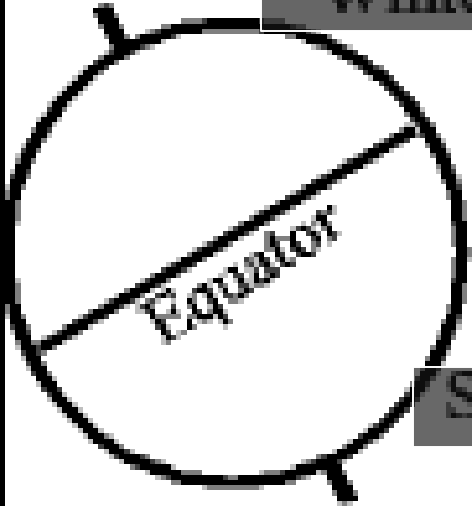
## Longitude and Latitude



**The Earth rotates on a \_\_\_\_\_**

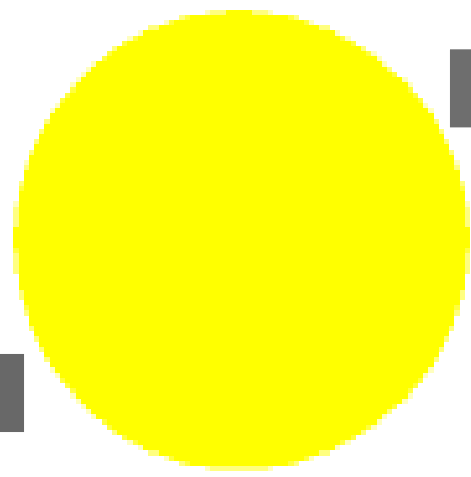
**23.5**

Winter



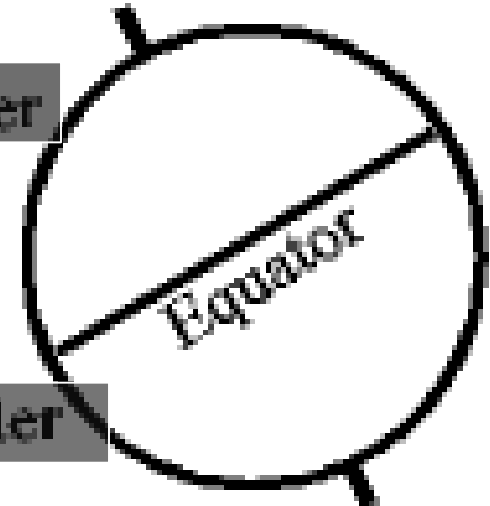
Summer

Position of Earth  
in December



Sun

Summer



Winter

Position of Earth  
in June

How long does it take the earth to orbit or revolve around the sun once?

- 365  $\frac{1}{4}$  days



a blanket of moisture-filled air  
that surrounds the earth

- The Atmosphere



A scenic view of a fjord with steep, green mountains and a body of water. The mountains are covered in dense green vegetation and have several waterfalls cascading down their sides. The water in the foreground is a deep green color, reflecting the surrounding landscape. The sky is overcast and grey.

Located in the upper layers of the atmosphere and absorbs harmful UV rays from the sun

- Ozone

# The Layer of the atmosphere where we see the Northern Lights

- Ionosphere





# The Farthest layer of our atmosphere?

- Exosphere



# Atmospheric Pressure & Wind

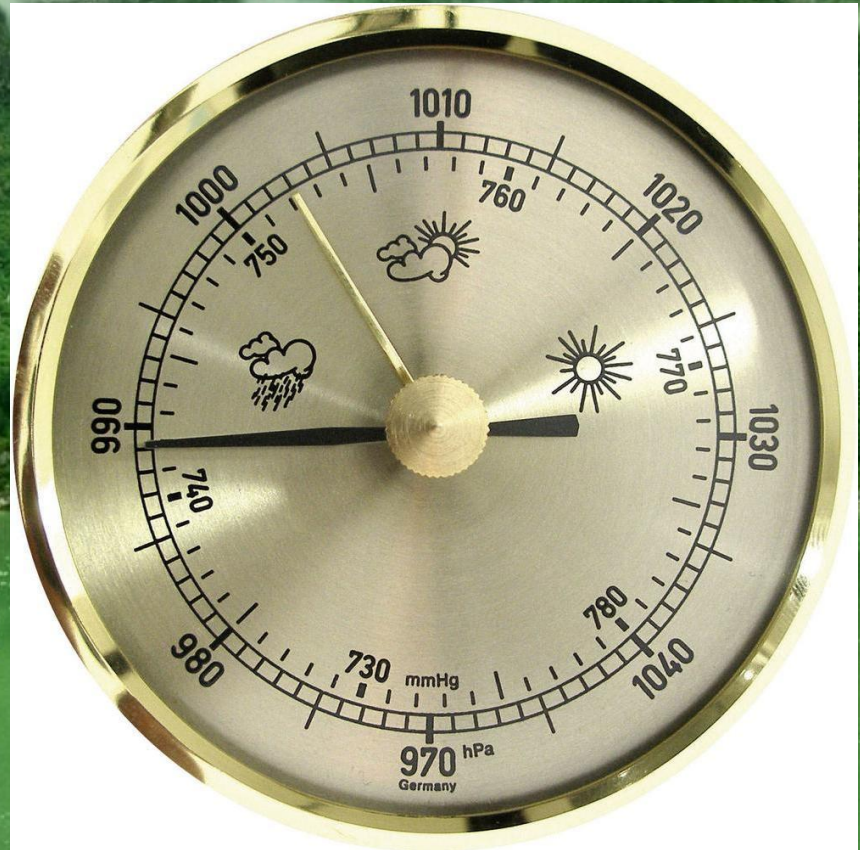
The image shows a wide, deep fjord with greenish water, likely due to glacial silt. The surrounding mountains are steep and covered in dense green forests. Several waterfalls are visible, cascading down the rocky slopes. The sky is overcast and grey, with some mist or low clouds hanging over the peaks of the mountains. The overall atmosphere is dramatic and somewhat somber due to the weather.

# Explain where wind comes from and what creates a situation for more wind

- Wind is a movement of air in the atmosphere. **Air has density so it can be felt when it moves**
- Some winds are **localized**, and some are **prevailing winds** which affect large areas and are created from the Earth's rotation
- At the Earth's surface, wind always blows from areas of **high pressure to areas of low pressure**. The greater the difference in pressures the greater the wind felt

# Which instrument measures air pressure?

- barometer

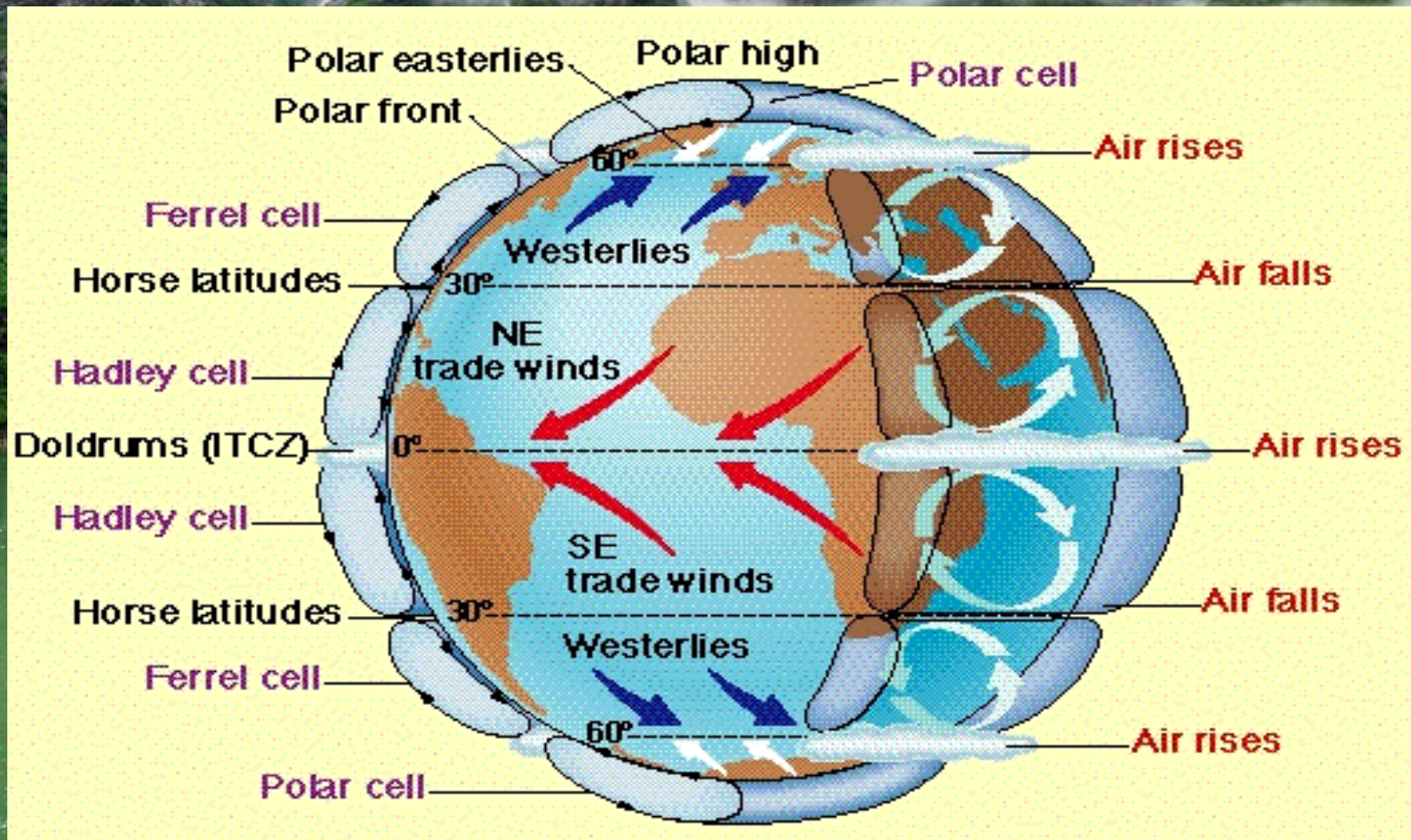


A scenic view of a fjord with steep, green mountains and waterfalls. The water is a milky green color, and the sky is overcast with grey clouds. The mountains are covered in dense green vegetation, and several waterfalls are visible cascading down the slopes. The overall atmosphere is misty and dramatic.

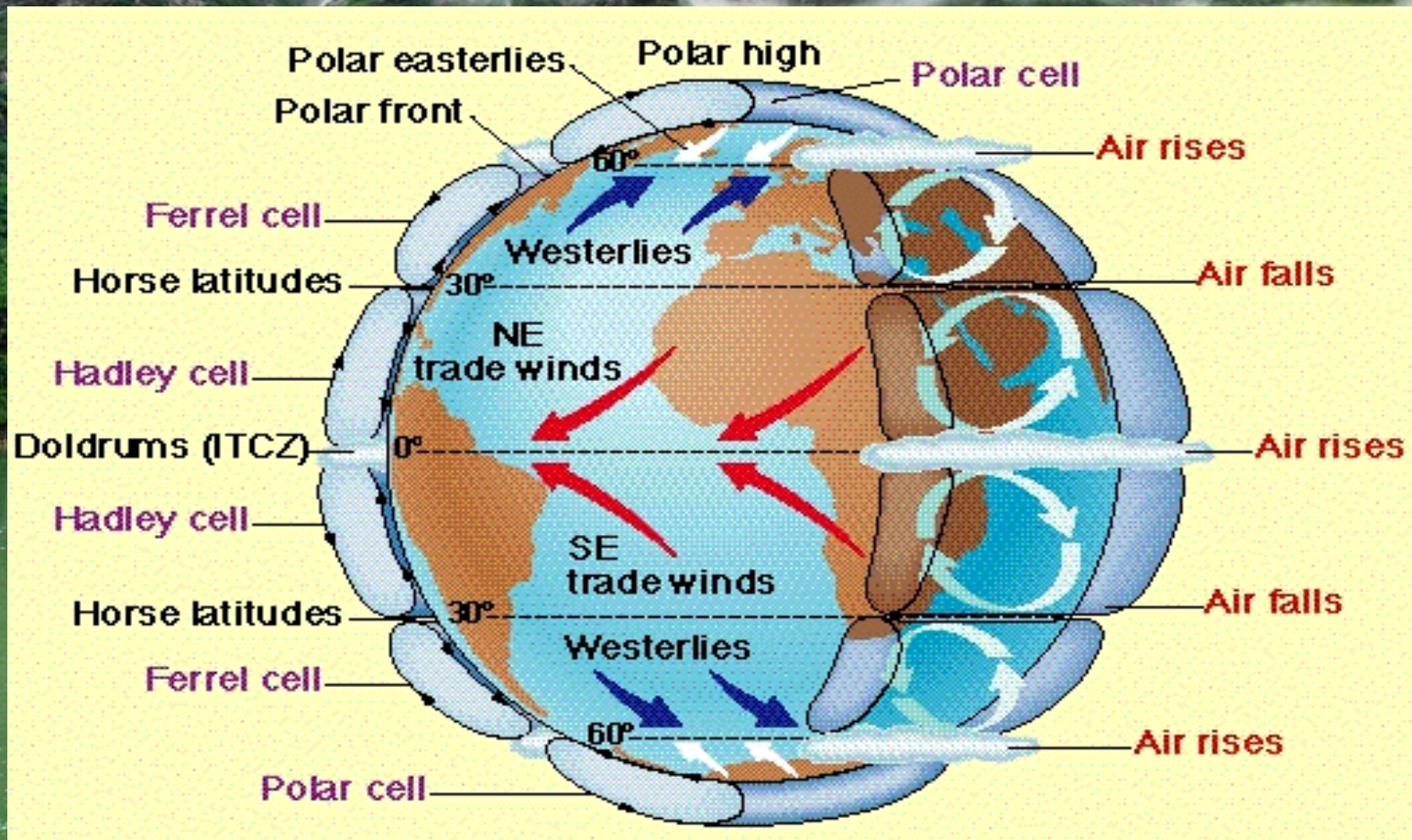
**the force of the air pressing  
down on the earth's surface**

Atmospheric Pressure

Based on the image below, where do the winds in the range of 30 degrees to 60 degrees latitude originate?



Based on the image below, where do the winds in the range of 60 degrees to the poles originate?



A scenic view of a fjord with steep, green mountains and waterfalls. The water is a deep green color, and the sky is overcast. The text is overlaid on the image.

# What causes a low pressure area and why is it significant?

Low pressure areas are caused by localized heating. Warm air rises making the air at the ground less dense...low pressure



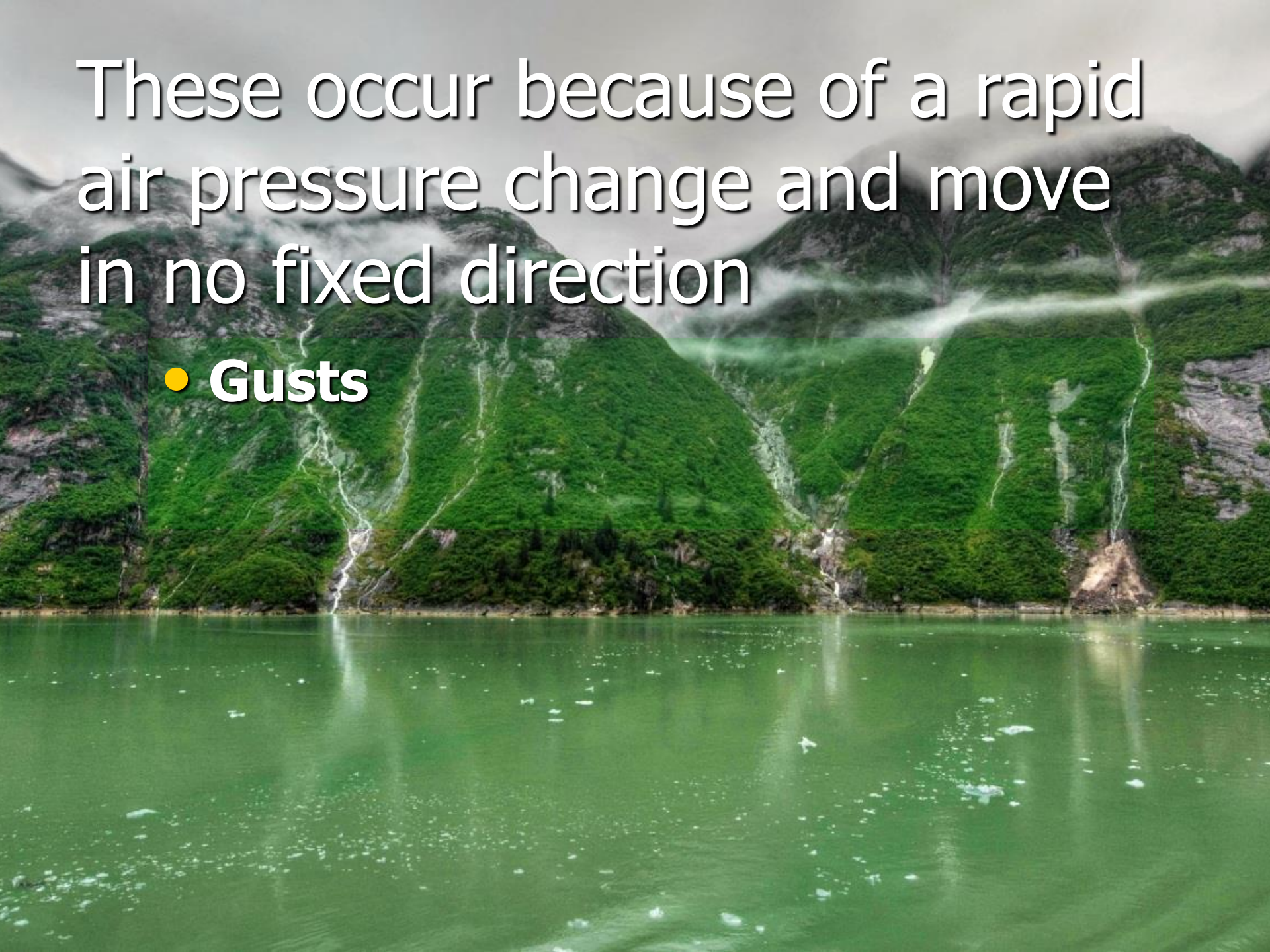
# gusts accompanied by rain

- Squalls –



These occur because of a rapid air pressure change and move in no fixed direction

- **Gusts**



# Which instrument measures the speed of the wind?

- Anemometer



# A tool used to detect the direction of wind

- weather vane



# The Hydrologic Cycle

- Is also known as the \_\_\_\_\_
- Water Cycle



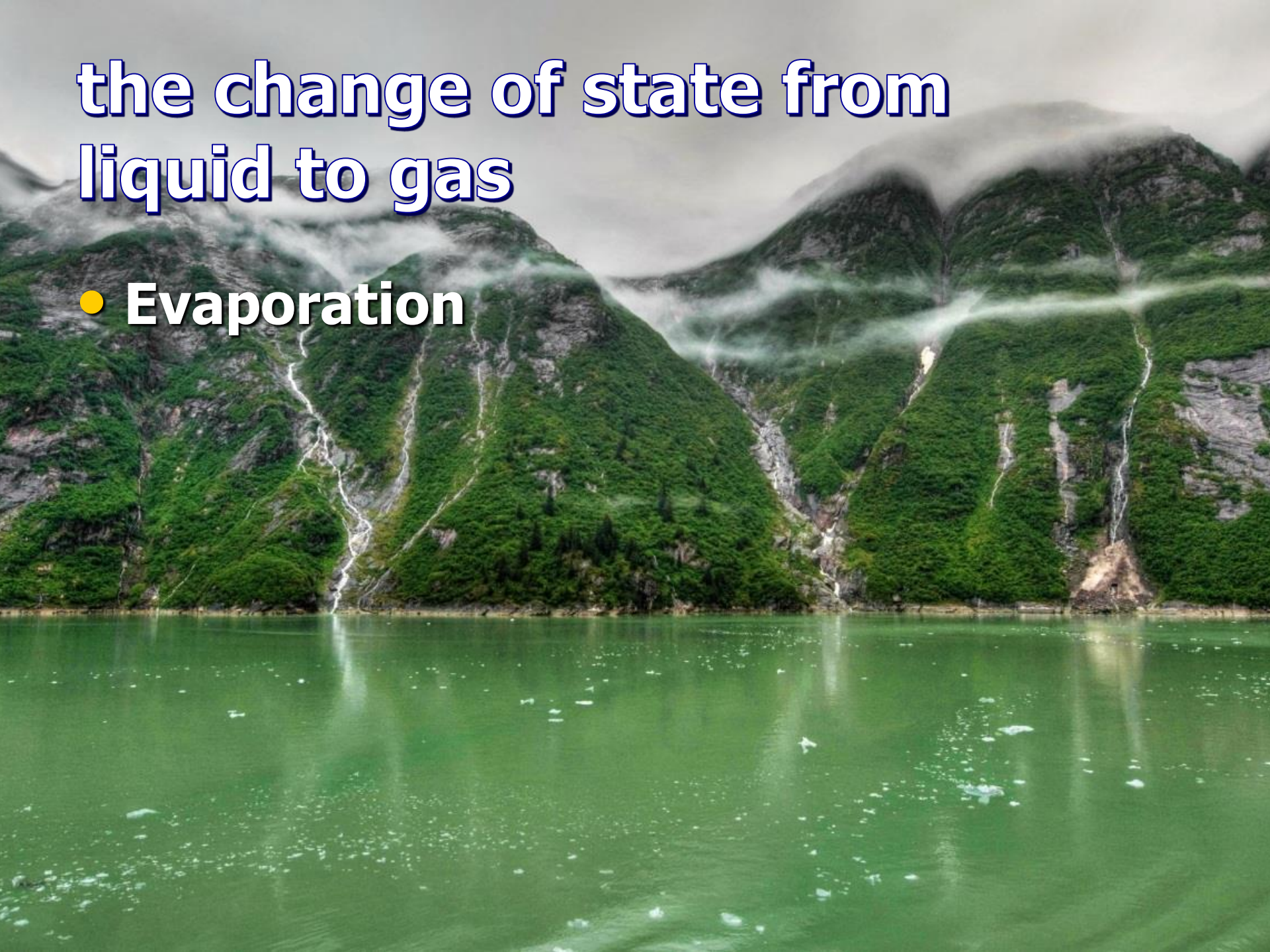
# What are the states of Water?

- The Earth's water is continually recycled, simply changing states:
  - Gas (water vapor)
  - Liquid (water)
  - Solid (ice)



# the change of state from liquid to gas

- **Evaporation**



# Relative Humidity

- The relative humidity tells us how “full” the air is at the time of measurement.

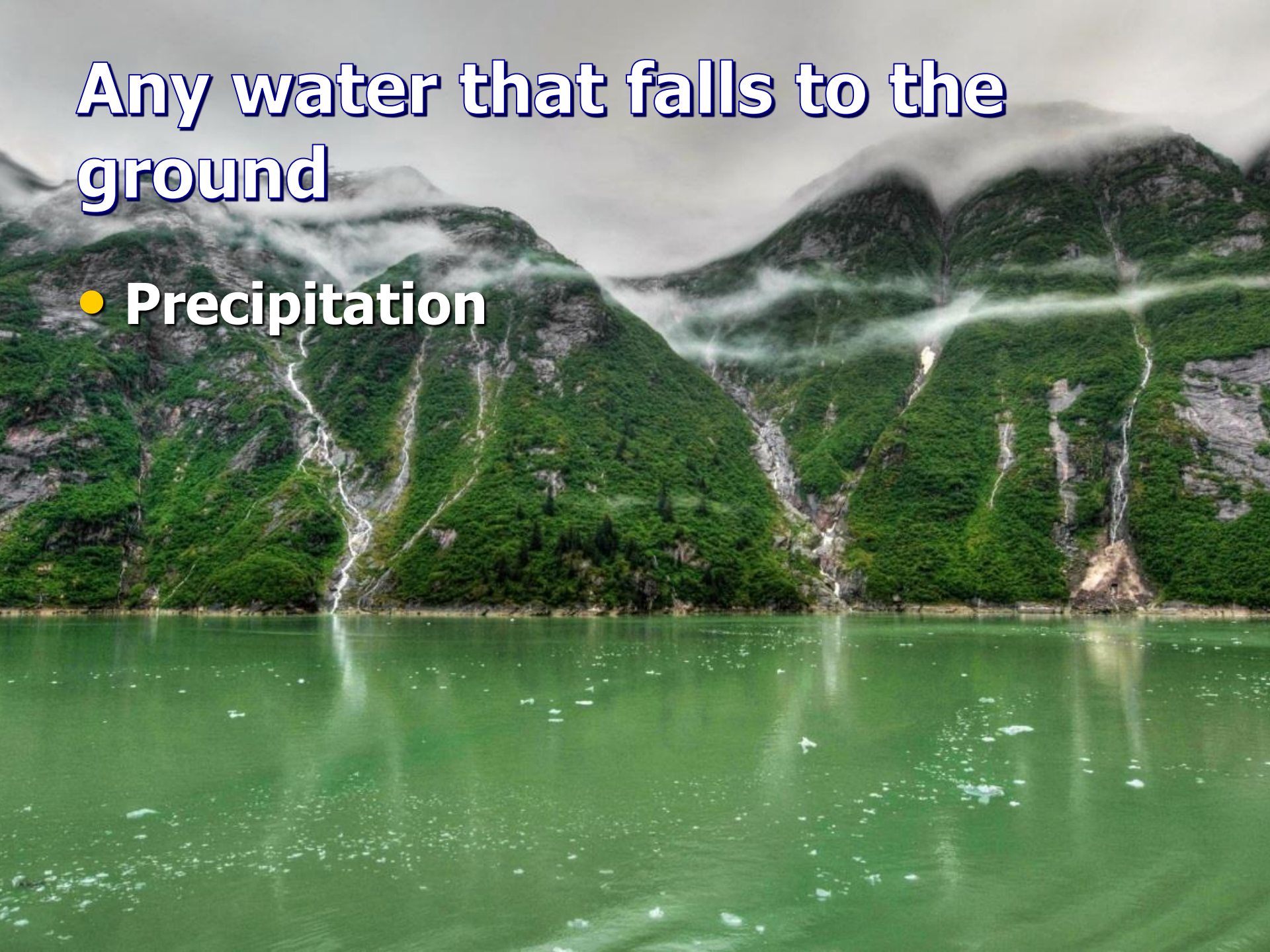


- For example, 90% relative humidity means that at that moment the air is holding 90% of the maximum amount of water it could.



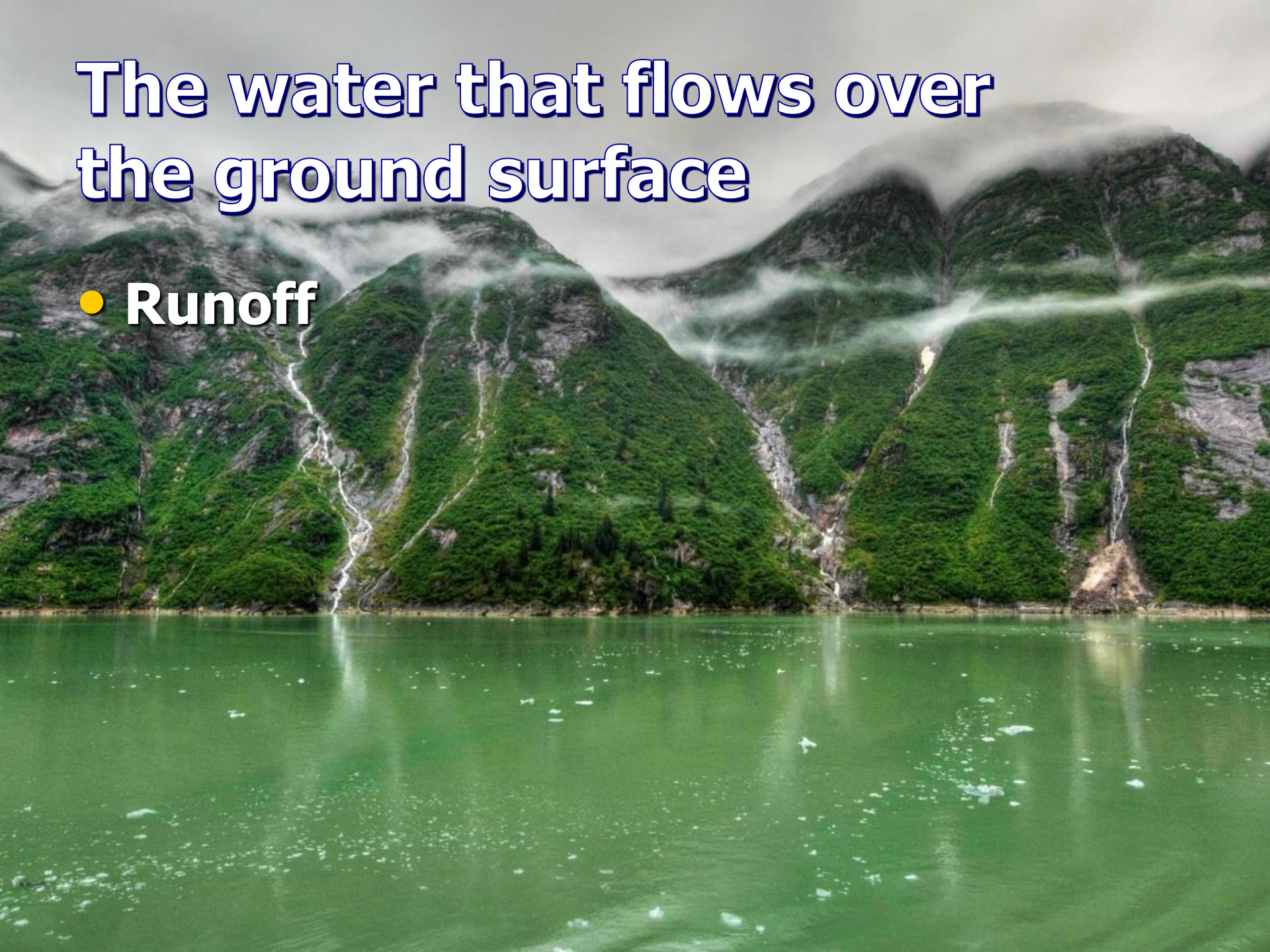
# Any water that falls to the ground

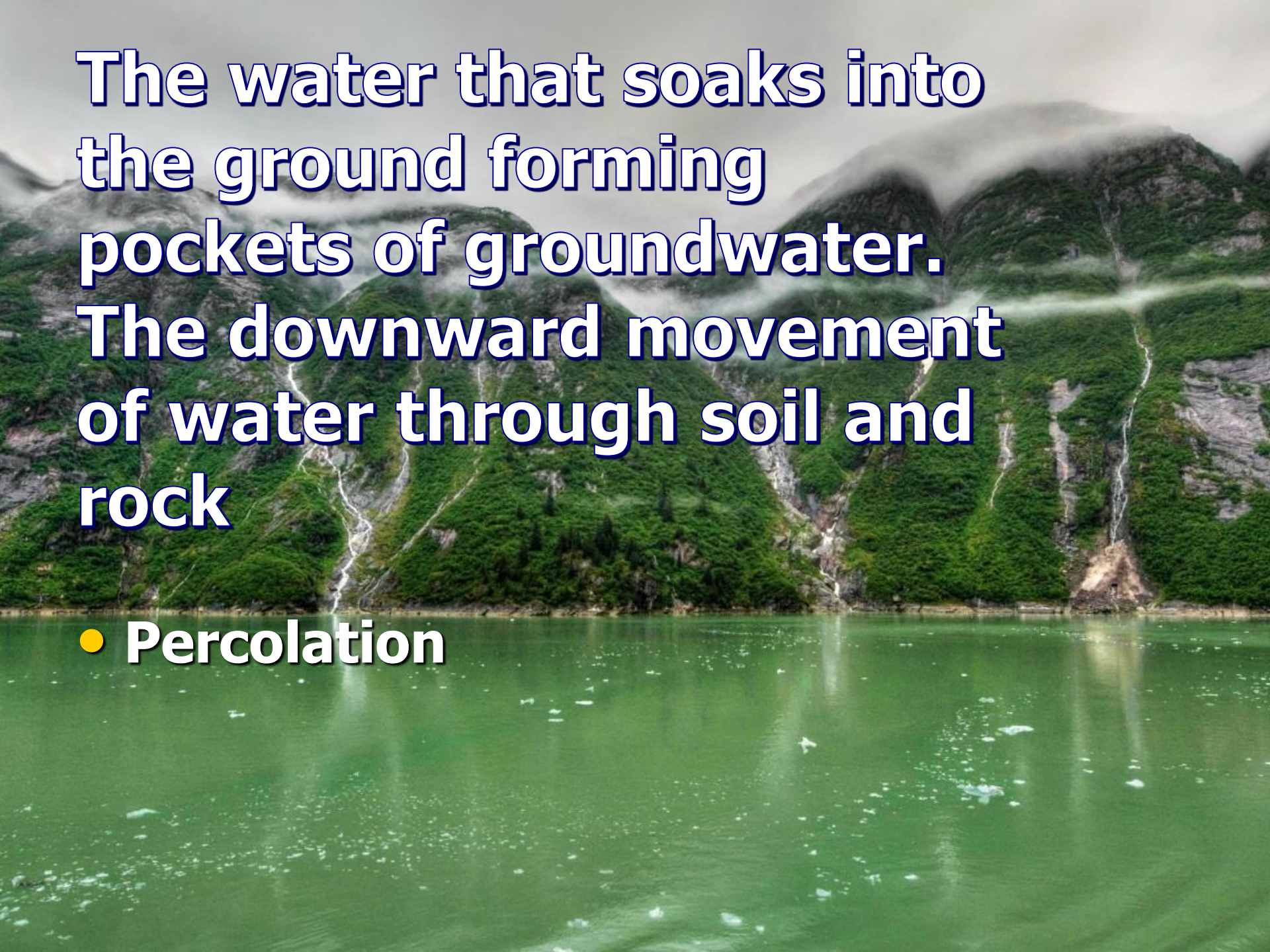
- **Precipitation**



# The water that flows over the ground surface

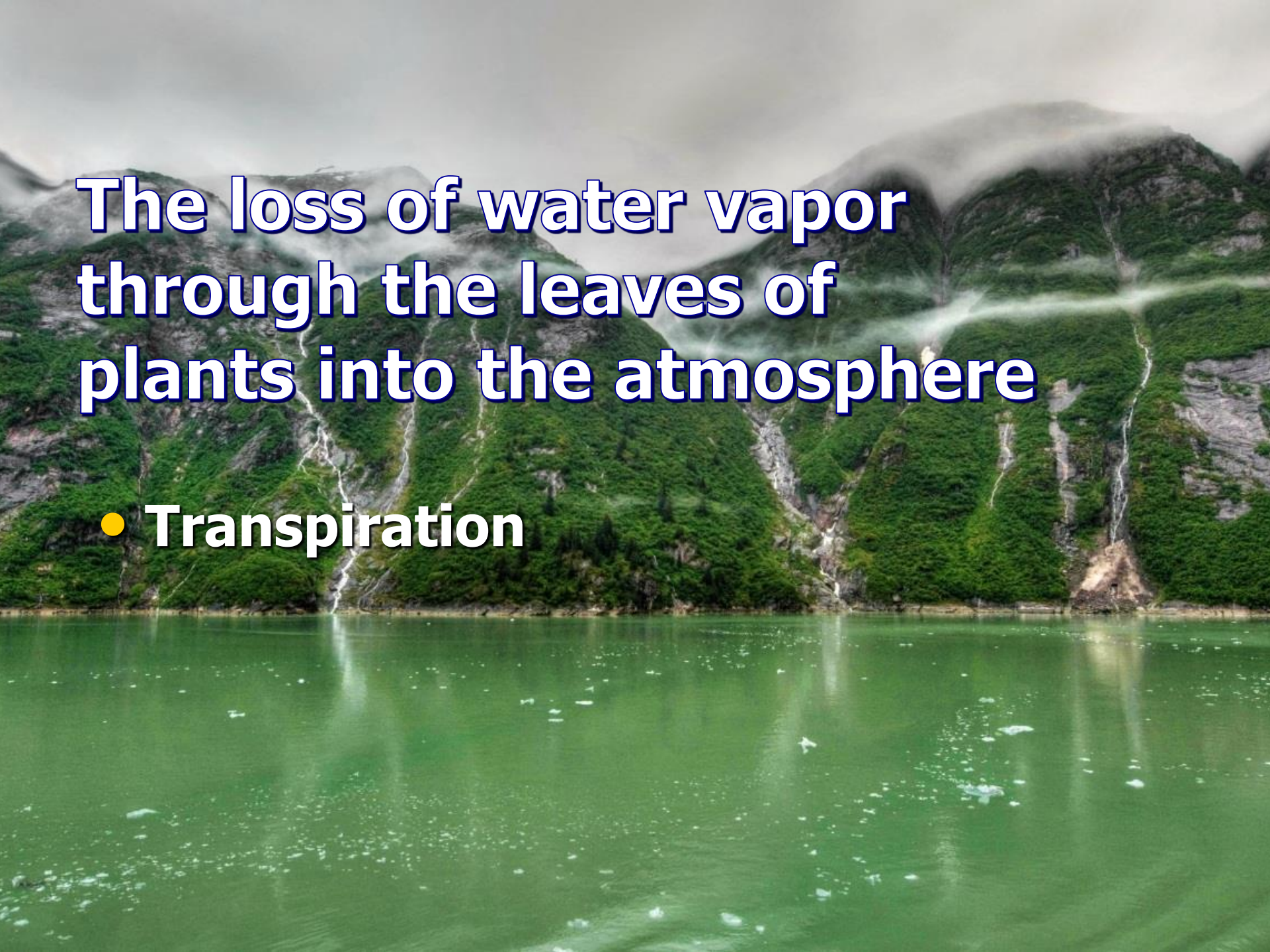
- **Runoff**



A scenic view of a fjord with steep, green mountains and waterfalls. The water is a vibrant green color, and the mountains are covered in dense vegetation. The sky is overcast and grey.

**The water that soaks into the ground forming pockets of groundwater. The downward movement of water through soil and rock**

- **Percolation**

A scenic landscape featuring a large body of green water in the foreground, likely a fjord or lake. The background consists of steep, green mountains with several waterfalls cascading down their slopes. The sky is overcast and grey, with some mist or low clouds hanging over the peaks. The overall atmosphere is serene and natural.

**The loss of water vapor  
through the leaves of  
plants into the atmosphere**

- **Transpiration**

# Explain the Hydrologic Cycle

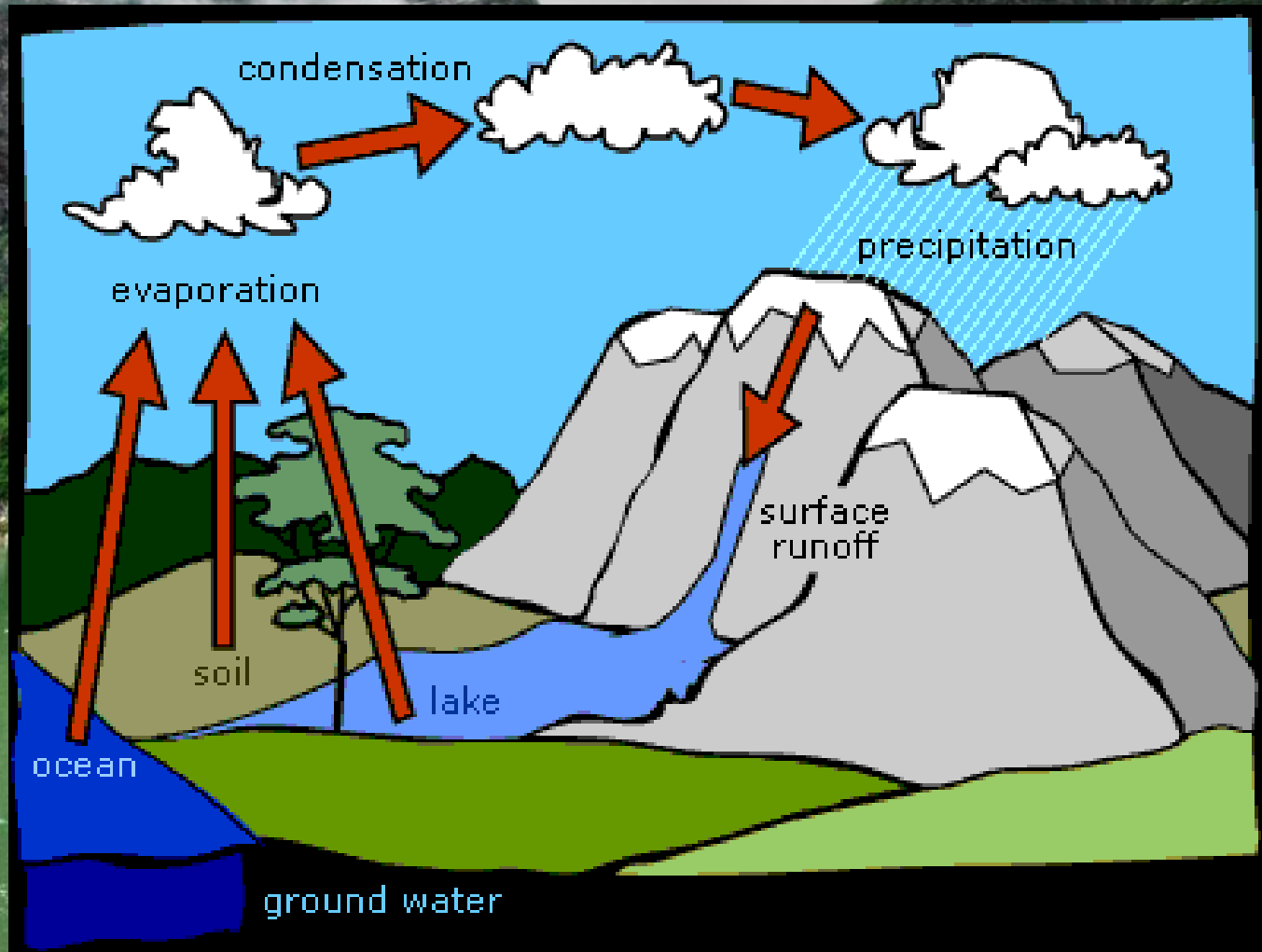
A scenic landscape featuring a river flowing through a lush green valley, with a large lake in the foreground. The background shows misty, rocky mountains under a cloudy sky. The overall scene is vibrant and natural.

- Start with how water gets to the atmosphere:
  - Through Evaporation
  - Through Transpiration
- Condensation - Water in a gas state then condenses as it cools (dewpoint) to form clouds.
- When clouds collect enough condensed water it will fall as precipitation

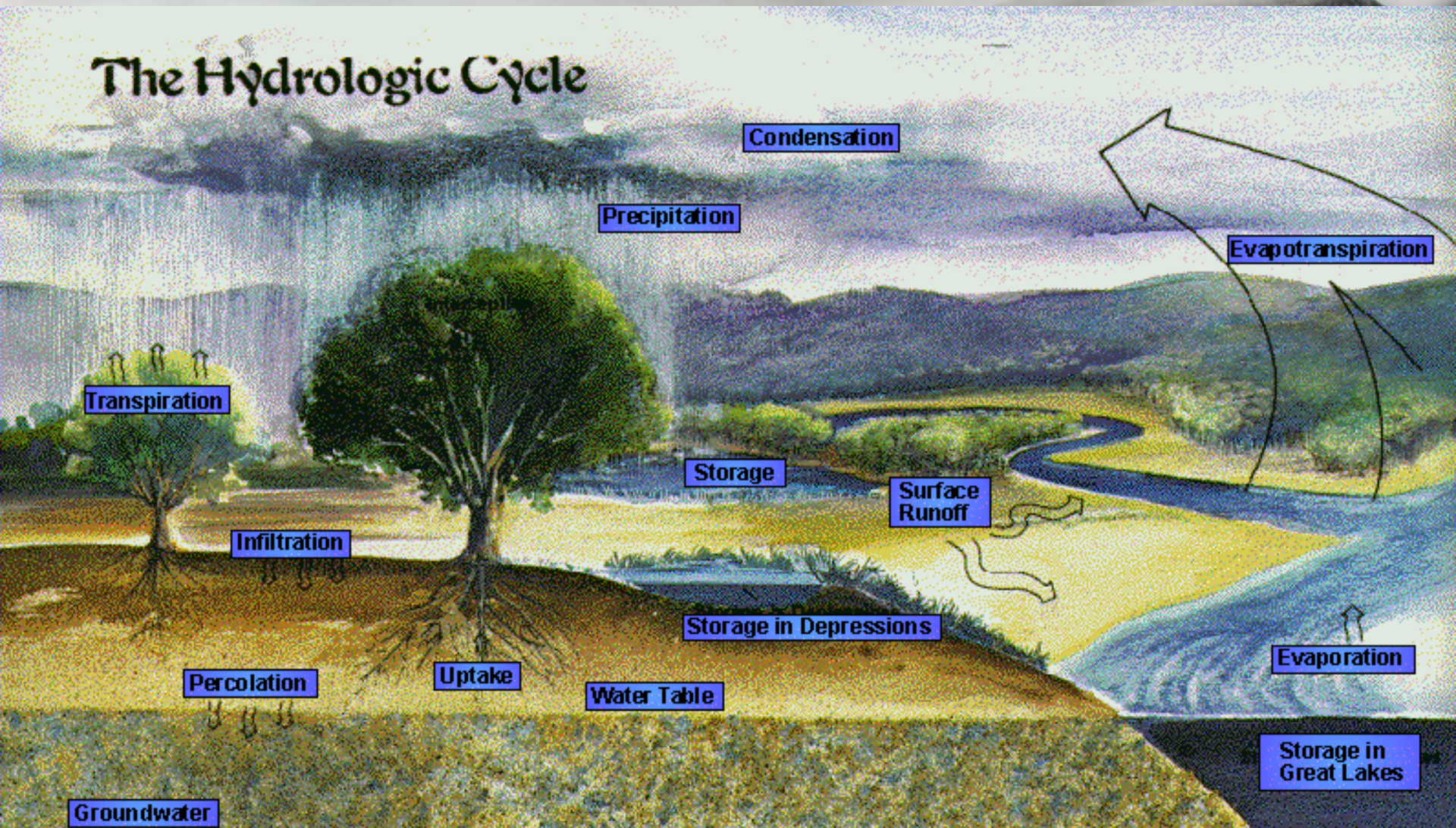
# Explain the Hydrologic Cycle

- Precipitation will fall to the ground and runoff into lakes and streams. Some will be stored
- Precipitation will fall to the ground to be used by plants (uptake)
- Some water will percolate and diffuse into the ground to remain as ground water

# Hydrologic Cycle = Water Cycle



# The Hydrologic Cycle

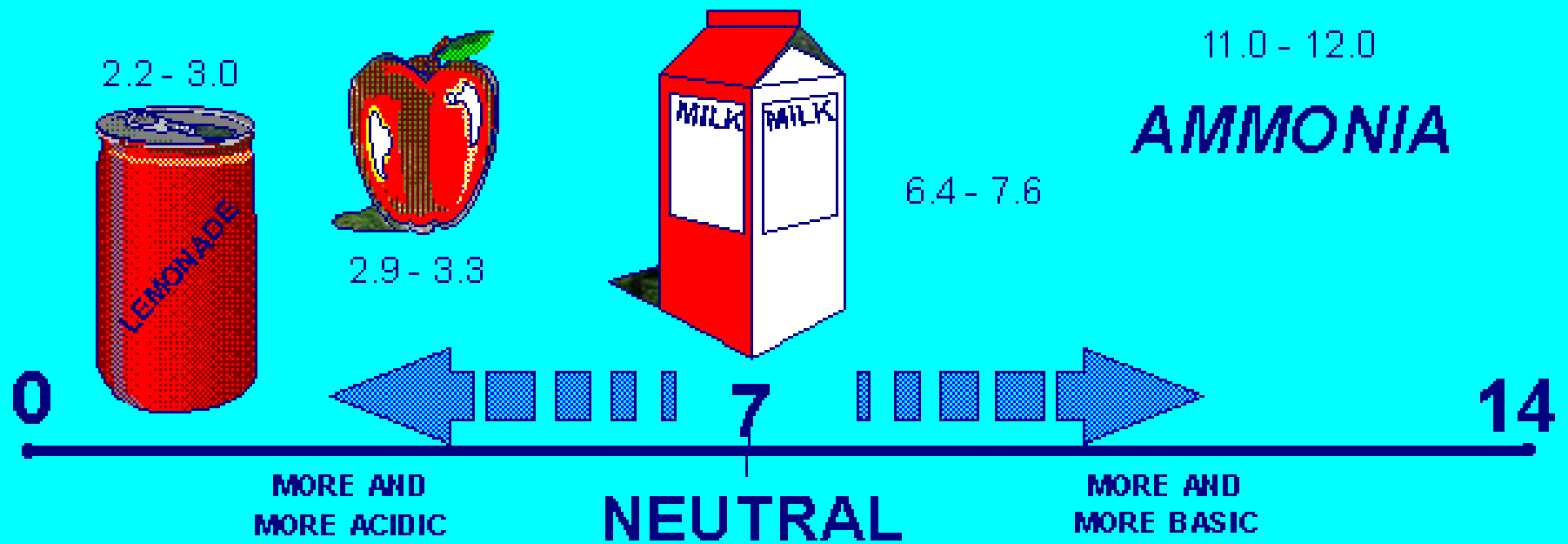




# Acid Rain

- **Acid rain is formed primarily when pollutants that rise up into the air combine with water droplets**
- **Remember pH**
  - **A measure of the acidity or alkalinity (basic) in the solution**
  - **Measured using a pH meter**
  - **pH ranges from 0 to 14**
    - **Acidity – solution with a pH of less than 7.0**
    - **Neutral – pH 7.0**
    - **Basic – solution with a pH of greater than 7.0**

# THE pH SCALE



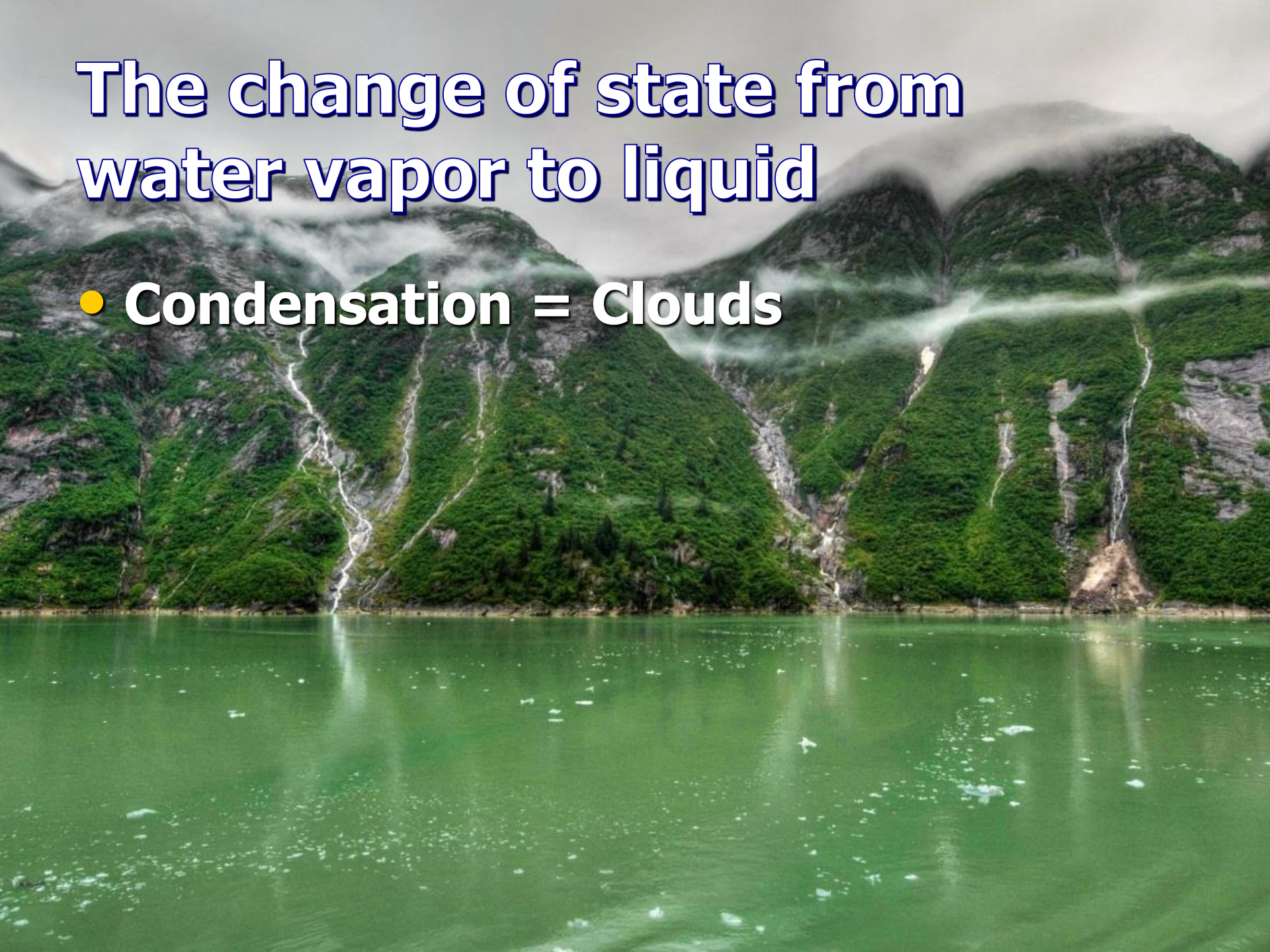


# Clouds



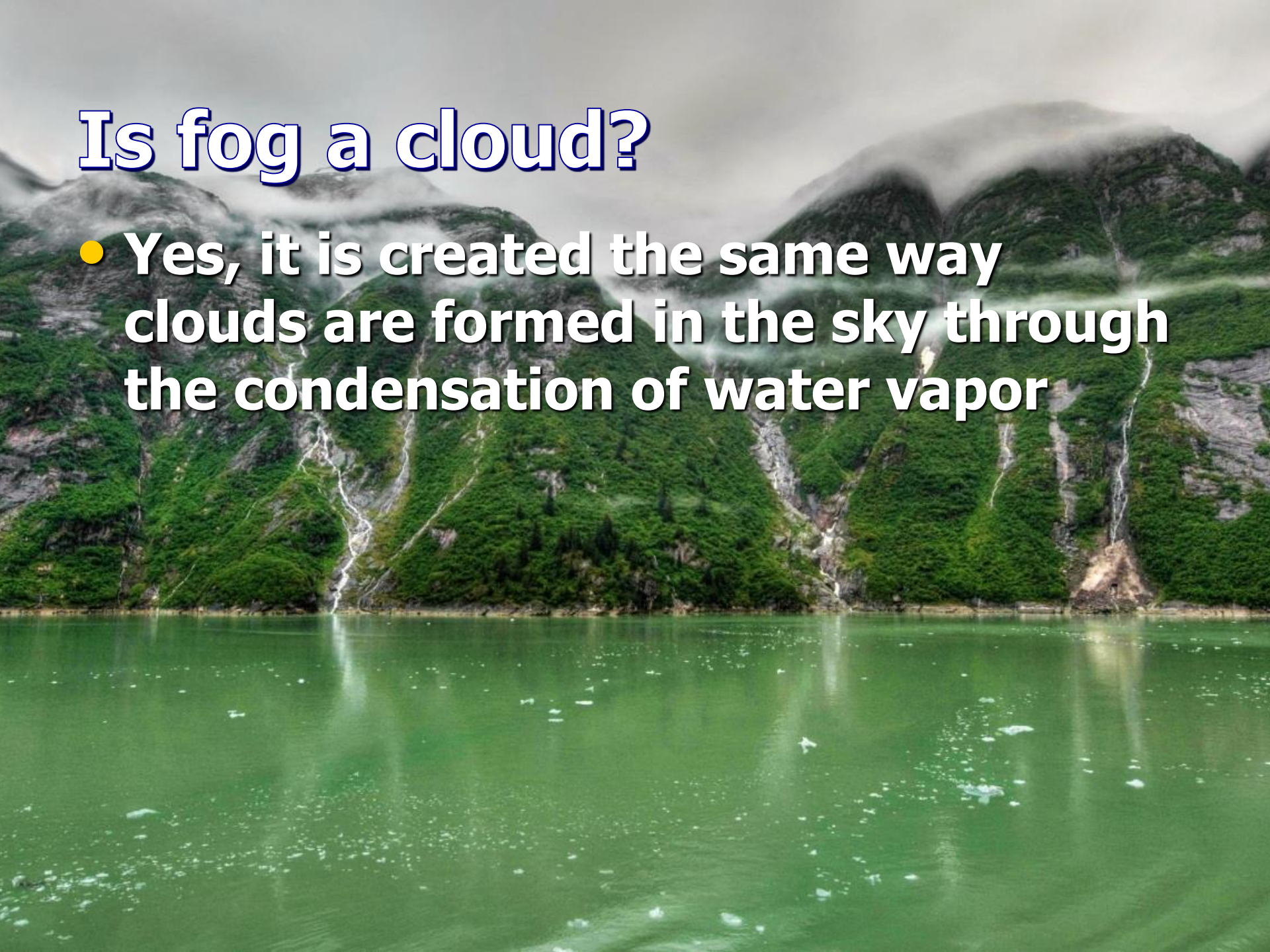
# The change of state from water vapor to liquid

- Condensation = Clouds



# Is fog a cloud?

- Yes, it is created the same way clouds are formed in the sky through the condensation of water vapor



# Describe two of the three ways clouds are formed

- You know how clouds are primarily formed. It is through heating and evaporation. As the evaporated water condenses in the cooler atmosphere clouds are created
- This process is termed Convective cloud formation

# Describe two of the three ways clouds are formed

- Another situation that can create clouds is the collision of an air mass with another that has a different temperature. This warm air mass and colder air mass can condense air into a cloud
- This process is termed frontal cloud formation



# Describe two of the three ways clouds are formed

- The third way clouds can be formed is when land masses force air up into the atmosphere like a mountain. The forced air becomes cooled and condenses into a cloud
- This process is termed orographic cloud formation

# The Layers of the Atmosphere

- Earth
- Troposphere
  - Jet stream winds occur here
  - All weather takes place here
  - Includes Tropopause absorbs UV rays and contains ozone
- Stratosphere – highest level of ozone
- Mesosphere
- Thermosphere
- Exosphere

# These transport energy through the waters of the globe

- Ocean currents transport heat energy to colder regions at the poles
- The Gulf stream is responsible for bringing warm equatorial waters to Atlantic Canada and Europe