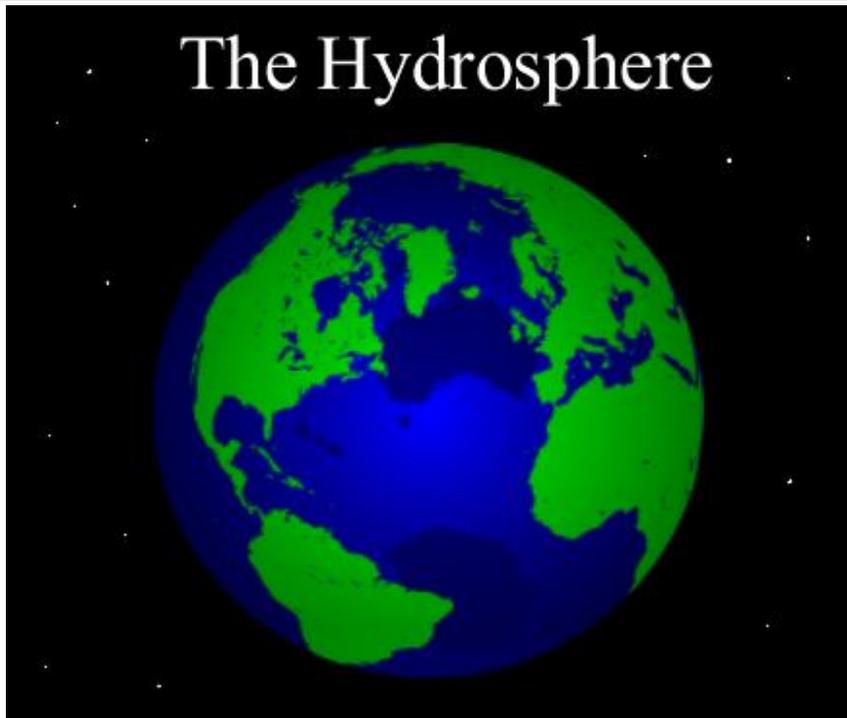


M05 Lecture - verified!, VT:T

Thursday, July 15, 2010
9:14 PM

VoiceThread <http://voicethread.com/share/1432767/>

Slides



Notes

Beautiful blue marble - Earth is the only planet in our solar system with liquid water. If we were 2% closer or further away from the sun, the water wouldn't be in liquid form and life wouldn't exist here.

71% oceans, lakes, rivers, streams, ponds

But also clouds, groundwater

All together is called the Hydrosphere

Definition - The mass of water on a planet.

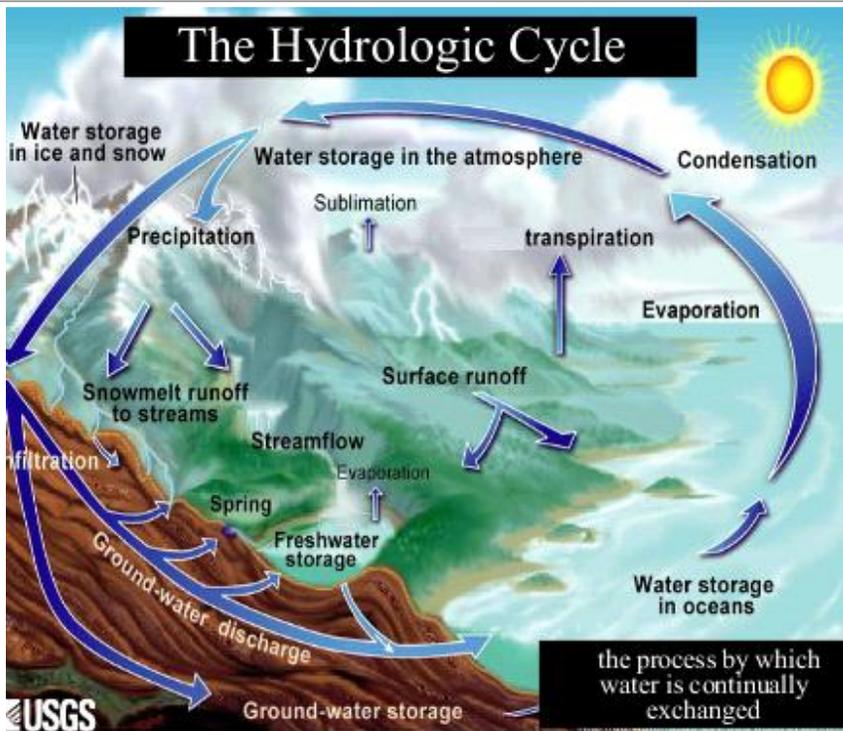
When the well runs dry,
we know the worth of water.

Benjamin Franklin

| <u>Water Source</u> | <u>Type of Water</u> | <u>% of Hydro-sphere</u> |
|-----------------------|----------------------|--------------------------|
| Oceans | satwater | 97.250% |
| Glaciers and icebergs | fresh | 2.050% |
| Groundwater | fresh | 0.685% |
| Surface Water | mostly fresh | 0.009% |
| Soil Moisture | fresh | 0.005% |
| Atm. Moisture | fresh | 0.001% |

1. The vast majority of water is saltwater in the oceans
2. The vast majority of freshwater is in glaciers/icebergs
3. The largest source of frshwater is groundwater.

Each part is not isolated from the other.
The interaction is called ...



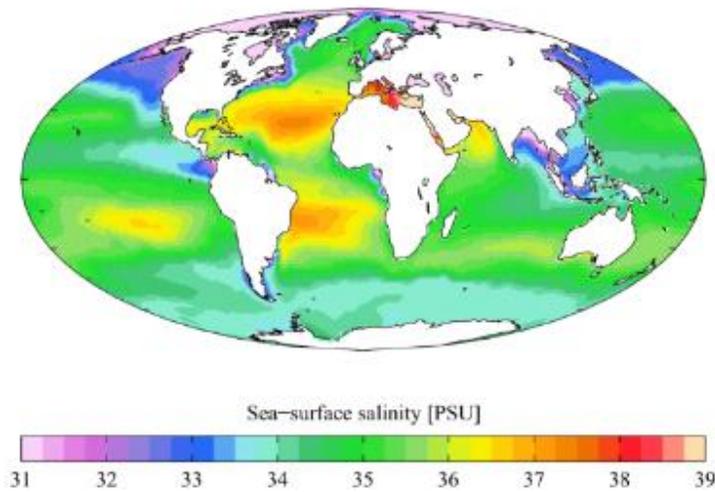
Condensation
Precipitation
Surface runoff
River flow to the ocean

Residence time - The average time a given water molecule will stay in a given water source

- Ocean 4,000 yrs
- Glaciers/icebergs - 1,000 yrs
- River - 2wks
- Soil moisture - 2 wks to 1 yr
- Atmosphere - 10 days
- Lakes 10 yrs
- River 2 wks
- Swamps 1-10 yrs

Evaporation and link to distillation process

The Oceans and Salinity



Mostly table salt - NaCl
But also many other types of salts

Salinity - A measure of the quantity of dissolved salt in water.

35 g salt/1,000 g water for the average

Why salty?

The earth isn't as old as scientists think - We know how much should be deposited each year and how much gets used up.

Calculations - If oceans were pure freshwater in the beginning, then just over 1 million yrs to get to the salt levels of today using the system of salt depositing we understand today. Ocean creatures indicate that it wasn't fresh water to begin with and we also consider that salt deposition should have gradually slowed over time.

Glaciers and Icebergs



Every iceberg starts as a glacier which is snow that has packed and slid slowly down the mountain.

Firn - A dense, icy pack of snow

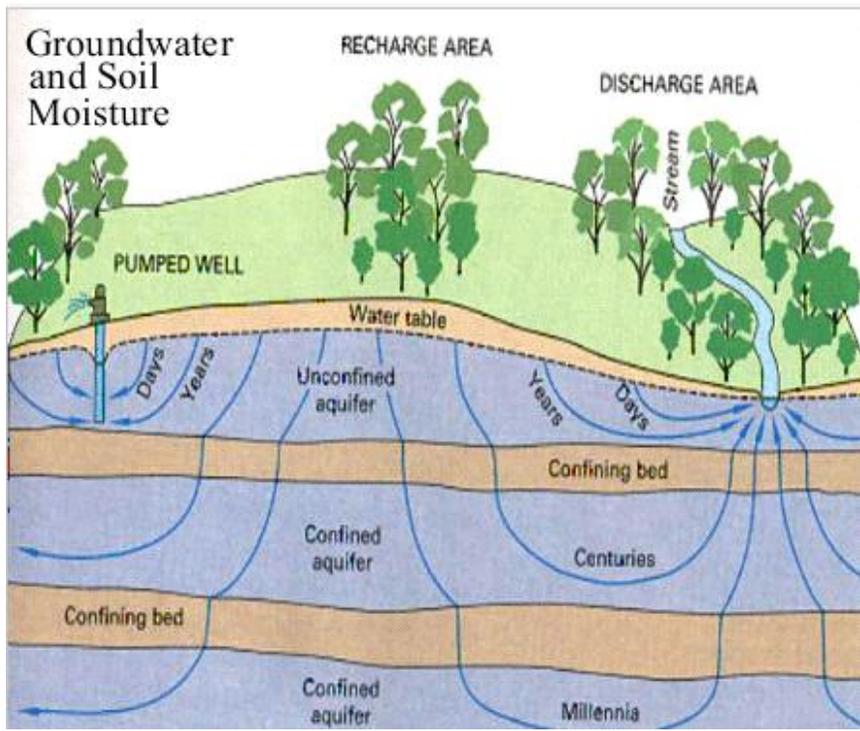
Flow is about 1 meter (a bit over 3 ft) per day.

Greenland - almost entirely made up of two glaciers

Antarctic - 5 million square miles of glacier.

Icebergs are when glaciers get to water deeper than they are thick and they then begin to float. Typically, you only see about 10% of it on the surface.

Ice Shelf - when they do not break up into individual icebergs - The Ross Ice Shelf is the size of Texas.



Some water soaks in to the ground.

Water saturated soil is lower.

Water table - The imaginary line between non-saturated and saturated soil.

Percolation - The process by which water passes from water above the water table to water below it.

95% of all water used in the US is groundwater supplied accessed by wells or by water sources above ground that are fed by groundwater (springs for instance)



Lakes, streams, rivers, creeks, ponds, etc.

The Dead Sea



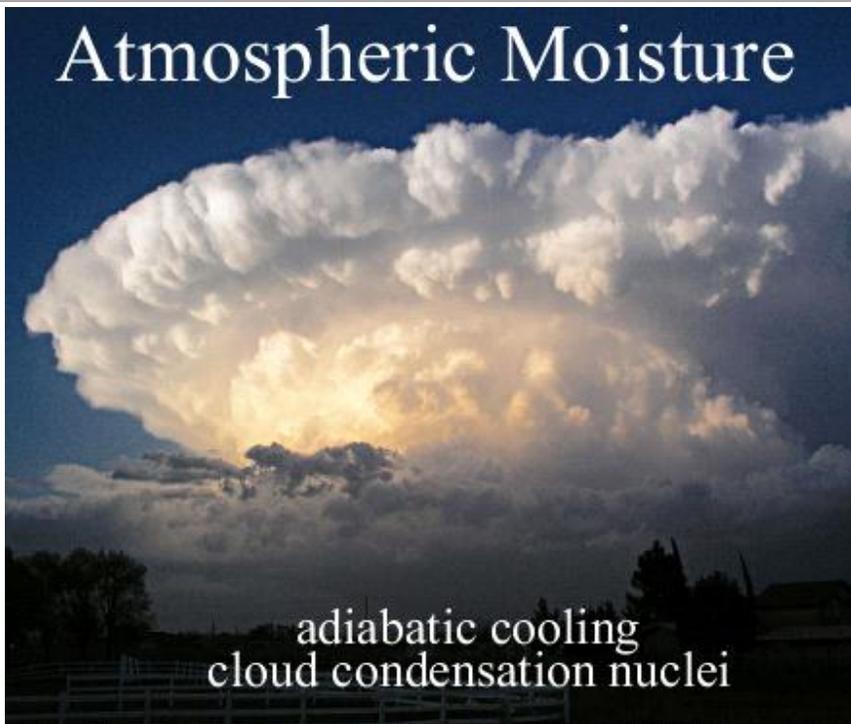
Some lakes have very high salinity such as the Dead Sea and the Salt Lakes in Utah.

Incoming water but no outgoing water.

Dead Sea is the lowest body of water in the world. The arid climate causes rapid evaporation. 240 grams/1000 grams. Compare that to the ocean at 35 g salt/1,000 g water for the average

Only a rare few species survives in it.

Atmospheric Moisture



adiabatic cooling
cloud condensation nuclei

Water vapor - humidity
or
Clouds

Adiabatic cooling -

Fog



Cloud that has formed on the ground.

Humidity is high and temp near the ground is low causing rapid cooling.

Smog



Thick fog brought on by lots of dust, dirt, and pollutants in the air. London, in the early industrial revolution was famous for it. When it is caused by pollution, we call it photochemical smog.



The Oceans and Salinity Map
WAOA05 sea-surf SAL AYool by Plumbago

http://commons.wikimedia.org/wiki/File:WAOA05_sea-surf_SAL_AYool.png

Glaciers and Icebergs
Grosser Aletshgletscher 3178 by Derk Beyer

http://commons.wikimedia.org/wiki/File:Grosser_Aletschgletscher_3178.JPG

Groundwater and Soil Moisture
Groundwater Flow by Mjbt

http://commons.wikimedia.org/wiki/File:Groundwater_flow.png

Atmospheric Moisture

http://commons.wikimedia.org/wiki/File:Chaparral_Supercell_2.JPG

Fog - Rimtaage by Marlene Thyen

<http://commons.wikimedia.org/wiki/File:Rimtaage.jpg>

Smog - Santiago20std by Michael Ertel

<http://commons.wikimedia.org/wiki/File:Santiago30std.jpg>



Waikiki sewage by KeithH

http://commons.wikimedia.org/wiki/File:20060402_waikiki_sewage.jpg

2011-12 Quiz link: <http://www.virtualhomeschoolgroup.com/mod/quiz/view.php?id=17628>