Breakout 5B

Essential Principle: Solar energy drives many atmospheric processes.

Welcome bloggers! Today's task is to find fundamental concepts associated with the above EP. Be sure to refresh your browser every 30 to 60 seconds by clicking on the F5 button.

Facilitator: Becca Hatheway; Online Participant Liaison: Rob Payo; Recorders: Ted Willard and Nicole LaDue

Participants in Attendance: Nicole LaDue, David Anderson, Deke Arndt, Ted Willard, Jack Williams, Peter Tuddenham, Mariam Lund, Mark McCaffrey, Janelle Albarez, Ann Coren,

Conservation of energy matter

Transfer of energy

water cycle

the atm interacts w/other spheres

solar energy drives the transfer of material

Photosynthesis

Variations in solar energy occurs on different time scales

Top down approach of addressing this: ionosphere

EM spectrum

Greenhouse effect: The greenhouse effect is necessary for life to exist on Earth

Solar energy vs energy transfer...solar as a source of energy: is this a fundamental concept or an EP?

Over inclusion is best at this stage since all these will be refined at a later date

Many atm processes caused by solar energy:

- Ionization
- photosyn
- respiration of the earth
- longitudinal variation of heat from the equator to the poles--Hadley cells
- Energy absorbed by the earth is reradiated as long wave infrared

Conduction, convection, radiation

EM radiation...do we take a more expansive take on light and what it means, make the distinction

Ted Willard (project 2061): Heat energy can be misleading, grouping this into a general point about heat energy can make that confusing to students, in Project 2061 we found that it was not in our best interest to use that term of heat energy in this context

use heat as a term appropriately as a means of transfer, this would serve students better rather than avoid it, to address this and use the term approriately

Jack Williams: Every talks about heat, so understanding the property of heat would be important.

Ted Willard: Working on the Literacy Maps, terminology is often used incorrectly, alot of care needs to be taken in what language is used.

David Anderson: Remember, we are addressing what the general public needs to know...need to keep that in mind

David: Unequal heating of the earth drives weather and circulation

Revised: Unequal heating o fthe earth drives wind and ocean currents

Transformations of energy is a good point with this

Planets balance the amount of energy received with the amt of energy given off; balance of energies

Misconceptions about the pot on the stove gaining more energy is an analogy about how temperature gain and loss happens and how that relates to atm

Gases and particles in the atm effect the sunlight received

Ted: Reading from the 2061 map about knowledge concepts around greenhouse gas:

Ann: Solar energy drives the chemical processes of the atm; we need to balance what is found scientifically and what is needed to be known

David: Those things that cross science disciplines, moving towards a more Earth System oriented thinking should be our filter

Mark: Looking at current issues, one thing that people have misconceptions about is that the ozone hole causes global warming...looking at those concepts that relate

Solar energy causes chemical reactions including photosyn, formation of smog, ozone alerts, sunburn, cancer, destruxn of ozone layer

Balance what is known scientifically with what's knowable by the public

Must be put into context to make it meaningful, include these examples to understand this

Deke: The Earth's tilt relative to the sun causes unequal heating of the earth's surface

Deke tried to pack and summarize this into a working statement: As the earth orbits the sun, the tilt of the earth relative to the sun causes the poles to alternatively point slightly away from and toward the sun causing the seasons we experience. Over the course of a year, the equatorial region receives the most solar energy which makes it warmer than the polar regions.

Mark: reading the benchmark from climate literacy EP and FC work related to the above statement, aligned to Project 2061

Becca: We have 25 minutes...assess brainstorm, what's left to discuss so that we can move to deciding and refining.

Janelle: Time scales: addressing the distinction of long term and short term phenomena

Jack: The amount of sun reaching the amt of the earth's surface depends on the seasons

Ted: The amt of sunlight a place receives is a primary factor on the temp

Deke: the variation of solar amt over long periods of time, variation of solar output sets up the second half of that: variations in the earth's orbit also regulate the amt of sunlight the planet receives.

Nicole: I will gather our ideas together in themes in order to capture some more overarching statements and move away from detail

- Variations in solar energy occurs on diff time scales. The tilt of the Earth's axis as it orbits the sun causes variations in the sunlight
- Greenhouse effect is necessary for life to exist on Earth
- The sun warms the Earth. The Earth cools by emitting long wave radiation. Unequal heating of the Earth drives winds and ocean currents.
- Solar energy drives chem reactions in the atm, incl photosyn, formation of smog, formation and destruc of ozone
- Solar energy enters the atm over the entire electromagnetic spectrum. Solar energy is transformed into other forms of energy

Discussion about the EP statement: Solar energy drives many atmospheric processes. Is the word "many" necessary?

Becca: should we look at this list and refine it and then put more examples if time. What is missing?

Mark: What about the human focus? how do we address this

Adding to the first statement: Variations in solar energy occurs on diff time scales. The tilt of the Earth's axis as it orbits the sun causes variations in the sunlight

Adding to second statement: The sun warms the Earth

Ann: What about addressing the layers of the atm, the effect of energy on the various layers

Discussion about the last statement and including the EM spectrum in that statement

Solar energy enters the atm over the entire EM spectrum. Planets balance the energy received with the energy radiated.

Jack: Energy is transformed in many processes incl weather

Add to third statement to address cooling

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