

Breakout 2E

Hello! Welcome to breakout 2E

Facilitators: Wendy Abshire (UCAR-COMET) and Lisa Gardiner (UCAR Education and Outreach) as OPL

Participants in this session: Deke Arndt (OK Climate), Susan (CO Governor's Energy Office), Julie Gustafson (NWF-Boulder, CO), Susan Gallagher (AAG), Ira Geer (AMS), Jack Williams (AMS), Susan Buhr (CIRES Education and Outreach), Kristy Garretts (7th grade science teacher WY), Miriam Lund (Dept of Ed), Dan Barstow (TERC Center for ESS)

The group is spending the next 10 minutes (11:00-11:10) brainstorming ideas individually on sticky notes (AKA Post-it notes) and then will come together with all the stickies and assess at that time. Stay tuned, online participants! If you'd like to brainstorm ideas in the comments field below, I will add your suggestions to the sticky notes and share them with the group at 11:10.

Yellow sticky notes full of no-doubt brilliant ideas are piling up around the table...

Susan (CO Energy) says it is important for people to understand the difference between climate and weather, the history of what we know about climate change through time, human impacts on the atmosphere and greenhouse gases, also general information about the atmosphere - layers, types of gases, etc.

Miriam notes that here sticky notes are pretty similar to Susan's. She also added the concept that we only have one atmosphere.

Deke notes that the distinction between climate and weather is also one of his important sticky note concepts.

Jack notes that he has laws of science and mathematics are really all that are needed for understanding the atmosphere and oceans (i.e., no magic needed). Plus, the complexity of the system raises real challenges to understanding it.

The group has started categorizing their numerous sticky notes to identify main themes. The walls are now peppered with notes. The major categories are:

- Energy/cycles
 - solar energy drives the atm and oceans,
 - uneven heating by sun drives wx/climate
 - water phase changes are key
 - The ES is externally impacted by solar energy
- What's the atmosphere
 - air is real, gases, layers
- human impacts/ human-atmosphere relationship
 - we have only one atmosphere
 - humans are able to live because of unique atmosphere
 - climate impacted by human activity
 - humans affect the atmosphere
 - informed decision making
 - changes in the atmosphere have impact on humans
- Climate and weather
 - what are the different concepts and timeframes
 - processes are on different scales
 - extremes and averages...
 - Deke: Do we break this into two essential principles? does this overlap with the "what is atmosphere" principle?
 - Lisa: should regional versus global climate be in here?
- weather and climate history - change with time
 - living and non living things have evolved as climate has changes through time
 - Jack: humans are changing the climate much more quickly than past changes
 - Susan G.: rate of change is the important part...the issue is not about whether or not there has been change but the high rate.
- Earth system: biosphere, atmosphere, ocean, land, space linked
 - what happens one place can impact others...
 - atmosphere links to all other parts of the ES
- process of science - how we study and test
 - lots of math and science can explain the earth system
 - data, records,
 - uncertainty and predictions
 - Dan: A couple of those relate to complexity. it seems like they deserve their own place...(group has decided to add those complexity and uncertainty items to the nonlinearity item below...)
 - Jack: The fundamental question that this is coming to is how do scientists know what they know.
 - Deke: Summarized as "How do we know what we know"
- atmosphere and life
 - all life depends on the atmosphere
 - atmosphere supports great diversity of life
 - Group is considering adding this one to the Earth system one...
- nonlinearity/complexity

Now the group is talking about these main groups, whether there is overlap, or extra divisions.

Ira: What about weather? We need a weather category.

We've added Rob's comment about the interdisciplinary nature of the science to the group of sticky notes about the process of science - that understanding the atmosphere requires all sorts of science. (Thanks, Rob at UMASS!)

Jack: Humans impacts can be put under climate change.

Susan Buhr disagrees. She says that it would give the impression that humans can't do anything about climate change.

Miriam agrees with Susan B.

Deke recommends having a connection with the past and present change.

So to sum up the concepts that the group has winnowed the post-it assemblage down to (in no particular order)....

1. Complexity
2. Linkages (Earth system)
3. Energy/Matter/Cycles
4. Human Impacts
5. Change
6. How do we know what we know
7. Atmosphere
8. Climate
9. Weather

Group is discussing whether we can further group these items. Can we combine weather and climate and atmosphere into one category? The difference between weather and climate is important. Santa Barbara participant comment about difference between weather forecasting and climate models.

We don't have the pithy statements yet, but the topics that those pithy statements will be about...

Group is going to lunch! Thanks for lurking online!

Online Viewers: Please use the "Add Comments" button below to add your comments and suggestions.