

# Breakout 7A

Essential Principle: The Earth is surrounded by a thin atmosphere that sustains life. (Second Chance)

**Group Participants: Sarah Wise (Facilitator), Kristin Conrad (OPL), Sadredin Moosavi, Marika Holland, Ben Suker, Mary Bathdeen, Mary, Janelle Alvarez, Christina Gerriets**

*Introduction: Hello, online participants. My name is Kristin Conrad, and I will serve you as group 7A's Online Participant Liason (OPL). I will both capture the gist of the discussion, and will relay selected comments from online participants, back to members of this breakout session. We hope that you will enjoy and participate in this important discussion.*

**NOTE: Please refresh your browser (PCs use F5 key; Macs use function+F5) every 30 - 60 seconds to view the most recent comments.**

## BEGIN BREAKOUT SESSION REPORTING

Sarah is reviewing the draft Fundamental Concepts from this morning's session. The group is reviewing and discussing these:

### **Draft Fundamental Concepts from morning session:**

1. Atmosphere is a mixture of gases with minute quantities of liquid and solid particles
2. Atmosphere has weight and is bound to Earth by gravity
3. The atmosphere is thin but has an ordered structure. (discussion - should not push the concept that atmosphere is composed of static, unchanging "layers"; should words like "structure" and "thin" be in here; should word "unique" be in here... This concept requires further effort)
  - ordered structure that varies in space and time
  - structure gives rise to dynamics
  - varies in composition from place-to-place and over time
  - changes vertically due to weight and gravity, most dense at bottom
  - varies both vertically and horizontally
  - variability and non-uniform nature of atmos.
4. The atmosphere's composition varies from place-to-place and time-to-time (variability concept)
5. Current atmosphere makes life on Earth inhabitable (life concept)
  - Reciprocal concept - life changes atmosphere and atmosphere affected by life
  - atmos. and life have co-evolved to make life
  - humans versus other life are a sub detail
  - ...makes regions of the Earth inhabitable...

### **Discussion of the above ...**

Discussion is around what "horizontal and vertical" mean and how they are useful to item 3. (Horizontal structures can be jet streams, Hadley cells, global winds, etc. ). The challenge is to think about the most fundamental and clear way to articulate this concept of "structure" (which is very complex and interactive).

This group does NOT like the use of the word "weight" in #2 - not accurate usage - should be changed to "mass".

## **QUIET REFLECTION TIME**

The group is now taking 10 minutes of quiet reflection on the items above. They are using sticky notes to write their own edited versions of the FCs that they wish to provide edits on. We will then put them into groups for discussion of suggested changes. Stay tuned...

## **WE'RE BACK**

Participants are posting their sticky notes with suggested changes under each of the 5 items. The items are long and are being read quickly, so I will summarize until the group starts to define actual revised statements.

### **#1. [Earth is a mixture...]**

- 2 commentors expanded this to include more detail on which gases are involved
- should we make clear that minute quantities of gases can have a big impact (alter) the system.
- students may think "Why should I care about minute quantities?"
- many students don't know oxygen is not the most prevalent gas...

**Revision: The atmosphere is a mixture of solids, liquids and gases, including oxygen (21%), Nitrogen (78%), and trace gases including carbon dioxide (.02%). Some trace gases have disproportionate effects on the physical and chemical properties of the atmosphere. For example, GHG5, CO2, O3, methane, and H2O vapor.**

**#2. [Atmosphere has weight and is bound to Earth by gravity...]**

- change "weight" to "mass"
- change to say, "The gases in the atmosphere have mass...?"

**Revision: The atmosphere has mass and is bound to Earth by gravity.**

**#3. [The atmosphere is thin...]**

- distinguish horizontal from vertical influences
- do we need another FC to separate our vertical from horizontal?
- vertical much larger than horizontal scale
- too much to explain keeping them combined
- thin relative to Earth's radius
- thin relative to other planets' atmospheres
- Why not mention the 4 vertical layers, even though a human construct?
- Does the word "layers" imply boundaries?
- Consensus is that the layers do need to be named so they can be discussed (e.g. where does weather take place)
- vertically layered by composition, density and temperature. The lowest 10km is called the "troposphere" and contains all weather.
- horizontal structure needs to be covered...
- some feel the word "horizontal" is misleading and should not be used. The horizontal discussion is really "transport" and belongs in another EP.

**Revision: The atmosphere is thin but has an ordered structure that is vertically layered by composition, density and temperature. The lowest 10km is called the "troposphere" and contains all weather. Horizontal structure varies over large areas. For example, areas of high and low pressure due to Earth's spin and unequal heating. (no agreement on removing discussion of "horizontal")**

**#4. [\*The atmosphere's composition.]\***

- Group agrees that this item should be removed as it overlaps #3 and is covered elsewhere. The NEW #4 will be the FC about "atmos. supporting life".

**New #4 [Atmosphere supports life...]**

- the atmosphere has evolved over time
- current atmos. is dependent on and because of what happened in the past
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**Revision to new #4 (still being edited): The current atmosphere exists because of life... interdependence... current atmos. evolved from past atmos. (group had little time for this one and this is not done). Over time the atmospheric composition has been greatly affected by products of life. Life is continually shaped by and is dependent on the atmosphere. Origin of life shaped by early atmosphere...**

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