Balancing the Radiation Budget

A Jigsaw Exploration of the Global Climate System

Name: _____

Synthesis Group (longitude/hemisphere): _____

Synthesis Group Work (Day 2)

Learning Goals:

By the end of this unit you should be able to:

- Estimate relative balance (balance, excess, deficit) from graphs of the major components of earth's radiation budget.
- Create concept sketches to effectively communicate spatial variation in earth's radiation balance and hypothesized physical causes.
- Explain how atmospheric circulation acts to balance the radiation budget.
- Generate hypotheses for the patterns of the global impacts of climate change using their understanding of the global climate system.

Task 1: Work with your synthesis group to graph the three components of the radiation balance for your assigned geographic region (longitude line/hemisphere).

- Begin by presenting each of your specialty maps to the group, explaining patterns and the processes that you infer to be responsible for creating these patterns.
- Next work together as a group to plot each radiation component vs. latitude for your assigned longitude line and hemisphere (*top of synthesis group worksheet*).
- *For class discussion: How would you determine the radiation balance (+ or -) from your graph?*

Task 2: Work with your group to annotate your graph and create a map to illustrate the radiation balance within your assigned region and clearly communicate your hypotheses regarding the physical causes for changes in the radiation balance.

- Estimate where the radiation balance is positive (excess), zero (in balance), or negative (deficit) from your graph. Annotate your plot to clearly illustrate these regions and to note hypotheses regarding the physical processes responsible for changes in the balance.
- Use the accompanying strip map (*bottom of synthesis group worksheet*) to illustrate how the balance varies throughout your assigned region. Pay special attention to changes that are not directly associated with latitude.
    - Illustrate regions of radiation excess, balance, and deficit.
    - Annotate your graph with hypotheses regarding the physical processes responsible for changes in the balance.
- *Be prepared to use your graph and map to explain the radiation balance in your assigned region and to explain and justify your hypotheses regarding the physical causes for spatial changes in the balance.*

Annotated graph/map rubric (Day 2)

Level of achievement	Content/Comprehension	Communication/Presentation
Exemplary	- Radiation data are plotted accurately - Regions of excess and deficit are correctly identified and boundaries are accurately located on graph and map - Underlying physical processes responsible for variations in the radiation balance are correctly identified and labeled on graph and map. (8 points)	- Graph and map are accurately drawn and clearly labeled (2 points)
Adequate	- Radiation data less precisely plotted (within ~10%) - Regions of excess/deficit correctly identified, but imprecisely located (within ~10%) - Major underlying physical processes labeled, but some features may be missing or incorrectly attributed. (6-7 points)	- Graph and/or map lack some detail or are not clearly labeled - (1 point)
Needs improvement	- Radiation data are imprecisely or inaccurately plotted - Regions of radiation excess and deficit are incorrectly identified - Underlying physical processes responsible for variations in the radiation balance are incorrectly identified/labeled. (5-0 points)	- Graph and map lack detail or are uninterpretable (0 points)