

**Earth's Atmosphere, ESS 55**  
Homework 2, due April 22

1. Describe how the measurement of radiative fluxes at the top of the atmosphere (TOA) can reveal the horizontal transport of heat by the climate system (atmosphere and ocean).

(What is actually measured at TOA? From what platforms?)

2. What additional measurements (and where) would reveal the partition of horizontal heat transport between the atmosphere and ocean?

3. Describe the role of clouds in the Earth's radiative budget.

(In your answer include a discussion of how clouds interact with radiation in the shortwave and in the longwave, depending on cloud type and location in the vertical.)

- 4a. What would be the result on the mean temperature at the surface of the Earth if all clouds were removed?

- 4b. What would be the result on the mean surface temperature in question 4a if we allowed clouds, but only cirrus.