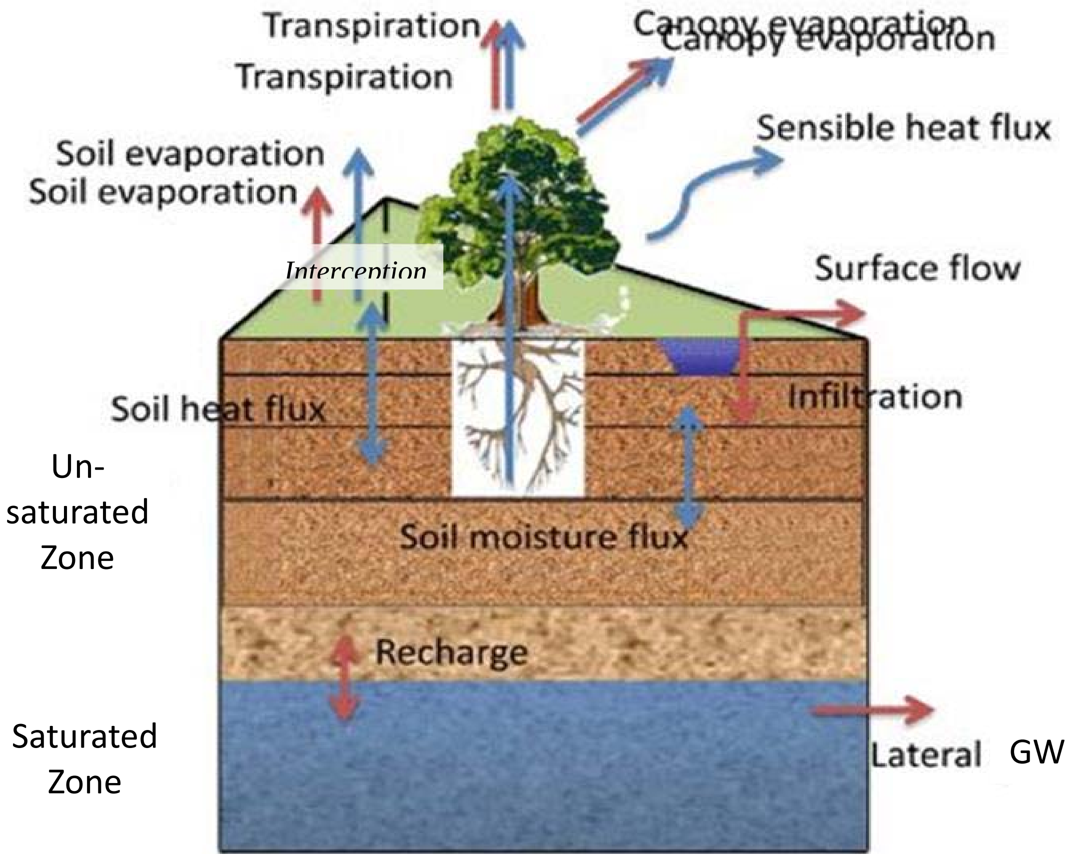
Goal: Examine a small set of energy flux graphs to better understand the relationships between these factors and speculate as to what factors actually control the relative fluxes.

Background: The energy balance states that Rn = H + LE + G. This exercise is designed to examine these relationships after a short lecture introducing these concepts. We will be examining data drawn from the Ameriflux Network , a collaborative effort among over 150 sites across the Americas to promote high-quality data, practices, and a common data format.

Introduction: The purpose of this exercise is for you to compare and contrast data from six Ameriflux measurement sites to discover and think about the causal or physical relationships among these variables. We will talk more about the measurement methods and data networks later in this unit. Note that not all these sites have the same kind of vegetation. This is real data, so expect a certain amount of ambiguity. What you need to do over the next 10-15 minutes is to get in small groups, read the handout and answer the discussion questions as a group. Be prepared to share observations and discuss you answers with the rest of the class later. Your primary task is to compare the relative magnitudes and timing of sensible and latent heat and to think about factors that might control these relationships. The bottom-line question we will be addressing throughout this unit is "What factors control the relative composition of these graphs?"



Source: http://criticalzone.org/shale-hills/models/conceptual-models-shale-hills/

Figure 1: Energy and water fluxes at a hill slope scale (PIHM model).
For some reason, energy fluxes are blue and water fluxes are red. Flux-PIHM model – SSH CZO

Description of the Data Plots:

Site, Location	Photo	Site, Location	Photo
Valles Caldera, NM 35.9 N, 106.6 W 2542 m Ponderosa Pine data from 2007 mlitvak@unm.edu (part of JBC CZO) NSF - active burned in 2013		Konza, KS 39.1 N, 96.9 W 443 m short-grass Prairie data form 2012 brunsell@ku.edu NSF - active	
Walker Branch, TN 36.0 N, 84.3 W 343 m Deciduous Broadleaf Forest data from 2001 tilden.meyers@noaa.gov DOE TCP - inactive		Manitoba, Canada 55.9 N, 98.5 W 254 m Evergreen Needleleaf Forest data from 2004 mgoulden@uci.edu DOE TCP -inactive	
Metolius , OR 44.5 N, 121.6 W 1253 m Young Pine Forest central OR – semi-arid Data from 2007 DOE-TCP - active		Tapajos, Brazil 3.0 S, 55.0 W 100 m Cleared Tropical Forest data from 2003 NASA-LBA - inactive	

Image notes: Pictures of each site above was found under the site description of each station on the old Ameriflux web site (http://ameriflux.ornl.gov/). Image credit belongs to the primary investigators listed.

Graph notes: These graphs plot monthly averages derived from 30 minute data. The horizontal grid is roughly every 2 months. The scales on each graph are fixed to facilitate comparing different sites. The way a stacked bar graph behaves, if the H flux starts below the zero line, that implies there was a negative soil heat flux for that month.

Set-up: Break the class into groups of two or four students. Pass out a set of 6 graphs (1 pg) to each person.

Names: ____

<u>Discussion Questions</u>

Directions: Each group should address the following questions and be prepared to discuss them with the rest of the class. Turn in this sheet at the end of class.

1) Are deviations from a smooth trend due to bad data? How would you verify? Give example. (3 pts)

2) What general patterns do you see? (3 pts)

3) What controls the partitioning of energy to sensible vs. latent heat? (3 pts)

4) Choose one example and describe/explain the evolution in fluxes with time? (3 pts)

5) What other ecosystems might be interesting to explore using these diagrams and what patterns might you expect to see? Give at least one detailed example. (3 pts)