Questions Raised by Our Analyses of Data in Lab Activities #1, 2, 4, 6, 7, and 11

- [Lab #1] Why do temperatures over land outside the tropics vary so much over the course of the year compared to ocean temperatures?

- [Labs #2 and #4] Why do surface temperature maxima and minima lag behind the maxima and minima in solar insolation (by a month or so), both in globally averaged data and in continent-scale averages (at midlatitudes)?

- [Lab #4] Given the large imbalances between annual average absorbed solar radiation and emitted LWIR radiation at low and high latitudes, why don't temperatures there change dramatically from one year to the next?

- [Lab #4] Why do zonally averaged spacebound radiation fluxes have a local minimum near the equator, where it tends to be warmer than anywhere else? And something similar appeared in the zonally averaged absorbed solar radiation data!

- [Lab #4] Why is the surface radiative emission flux (leaving the earth's surface) so much greater than the spacebound emission flux (leaving the planet)? Where does all that energy go? (Correspondingly, why is the surface so much warmer than the planet as a whole, as "seen" from space?)

- [Lab #6] In several My World data sets, including annual average albedo, annual average greenhouse effect, and annual average precipitable water, we see "wing" patterns in the Pacific and Atlantic Ocean, in which "wings" of slightly higher values extend from the western equatorial oceans southeastward and (in the North Atlantic Ocean) northeastward. Why? We also see a narrow strip of relatively high values of all three of these quantities near the equator, especially in the Pacific and Atlantic Oceans. Why?

- [Lab #7] Averaged over the low latitudes for a year, the earth gains more heat by absorption of solar radiation than it loses be emission of LWIR radiation to space, while in the midlatitudes, absorption of solar radiation and emission of LWIR radiation approximately balance. However, ocean currents in large gyres in the five largest ocean basins transport more heat from low to middle latitudes than in the other direction (that is, there is a net transport of heat from low to middle latitudes by ocean currents). This balances the radiative imbalance at low latitudes but unbalances the budget at midlatitudes. Since the annual average temperature at midlatitude changes only a little from one year to the next, there must be one or more sinks of heat at midlatitudes to balance its budget. What is it (or them)? [The radiative source and sink at high latitudes are also unbalanced; what source(s) might balance the budget there?]

- [Lab #11] Why does the timing of the maximum and minimum monthly average surface temperatures averaged over the midlatitudes oceans, lag behind the corresponding times of maximum and minimum temperatures over land? (In the My World data sets for 1987, the lag is about one month.)