

BACKGROUND HANDOUT

G-8 Biotic Responses to the Effects of Global Climate Change

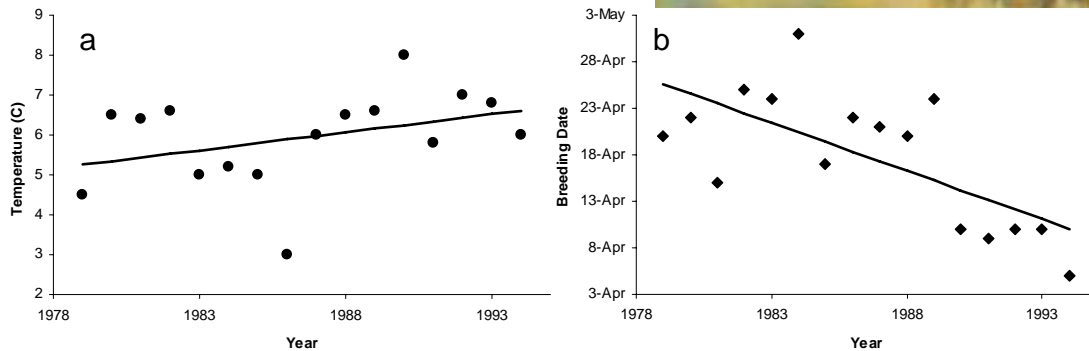
Global Warming Fingerprints = Events that are direct manifestations of a widespread and long-term trend toward warmer global temperatures as projected by models of a changing climate (e.g., heat waves & periods of unusually warm weather, ocean warming, sea-level rise and coastal flooding, glaciers melting, Arctic and Antarctic warming)

Harbingers of Climate Change = Events that foreshadow the types of impacts likely to become more frequent and widespread with continued warming (e.g. spreading disease; earlier spring arrival; plant & animal range shifts & population changes; coral reef bleaching; downpours, heavy snowfalls, and flooding; droughts and fires.)

Natterjack Toad

Part I

The two graphs below show (a) the average temperature for central England during the months February-April for the years 1978-1994 and (b) the breeding dates of the natterjack toad for the corresponding years (Beebee 1995, *Science* 374:219-220).



1. For each graph, decide whether it represents a **fingerprint** or a **harbinger** of global climate change and **why**.

Graph a: Fingerprint Harbinger (circle one)
Reasoning:

Graph b: Fingerprint Harbinger (circle one)
Reasoning:

2. These graphs, by themselves, do not show an effect of global climate change on breeding times of the natterjack toad. On the blank graph at right label the axes and draw a line on the graph that you would expect to find if increases in temperature have lead to earlier breeding times in the natterjack toad (you do not need to plot actual points, but (a) label the Y-axis, (b) label the X-axis, and (c) draw the expected trend line):

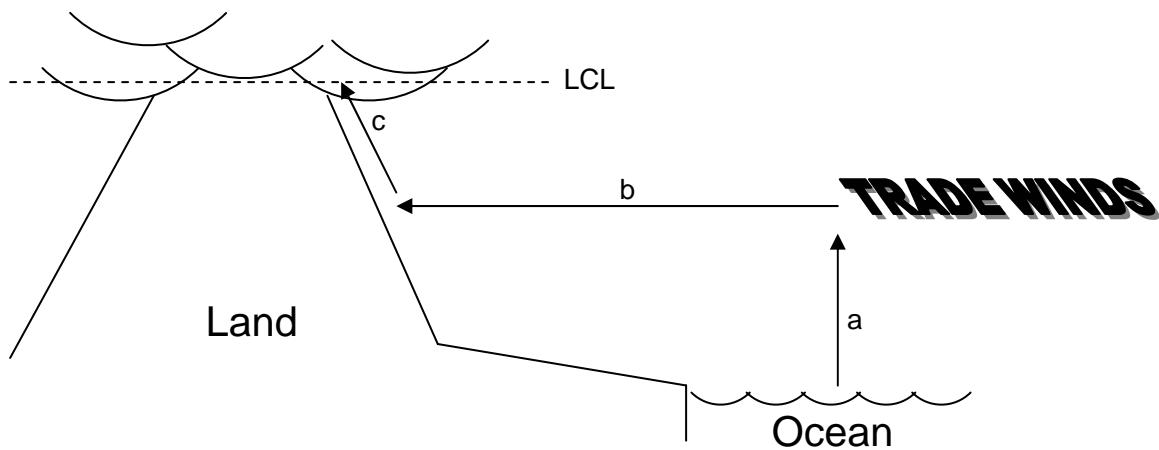


Part II

Tropical cloud forests form where the trade winds blow parcels of moist air from the oceans (a) over the land surface (b). As these parcels continue to move, they encounter mountains, and rise.

Eventually, the parcels reach an altitude high enough for the water vapor to condense, and form clouds (c). These clouds provide water in the form of “horizontal precipitation,” which is critical to the plants and animals that live in the cloud forest; many of these species could not survive outside of the cloud forests.

The elevation at which the clouds form (the lifting condensation level, or LCL), is affected by temperature: as temperature increases, the height of the LCL increases.



1. How would a global increase in temperature affect the elevation of the cloud forests?

2. Why is this effect particularly hazardous for plants and animal species that live in cloud forests on the tops of mountains?

