Window 5.2 Changing mid-latitude vegetation in a warmer world

Increasing temperatures created by the enhanced greenhouse effect may have profound effects on the vegetation of mid-latitude vegetation belts. For example, the figure shows predicted changes in the northern and southern boundaries of boreal forest in response to climate warming associated with a doubling of atmospheric carbon-dioxide levels. Note how the southern boundary moves from the southern tip of Scandinavia to the northernmost portion.



The northern and southern boundaries of the boreal forest are approximately defined by the 600 and 1300 growing degree-day isopleths. These are shown in their current positions and in the positions they would occupy under a warming associated with a doubling of CO_2 levels.

It has also proved possible to model the potential changes in the range of certain tree species in eastern North America for a doubling of atmospheric carbon-dioxide levels. The differences between their present ranges and their predicted ranges in the middle of the twenty-first century is very large.



Present and future ranges of four tree species in eastern North America: (a) present range; (b) range in 2090 AD under the GISS GCM $2 \times CO_2$ scenario. The black area is the projected occupied range considering a rate of migration of 100 km per century. The grey area is the potential projected range with climate change.