Chapter 1: Historical Overview of Climate Change Science

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Figures

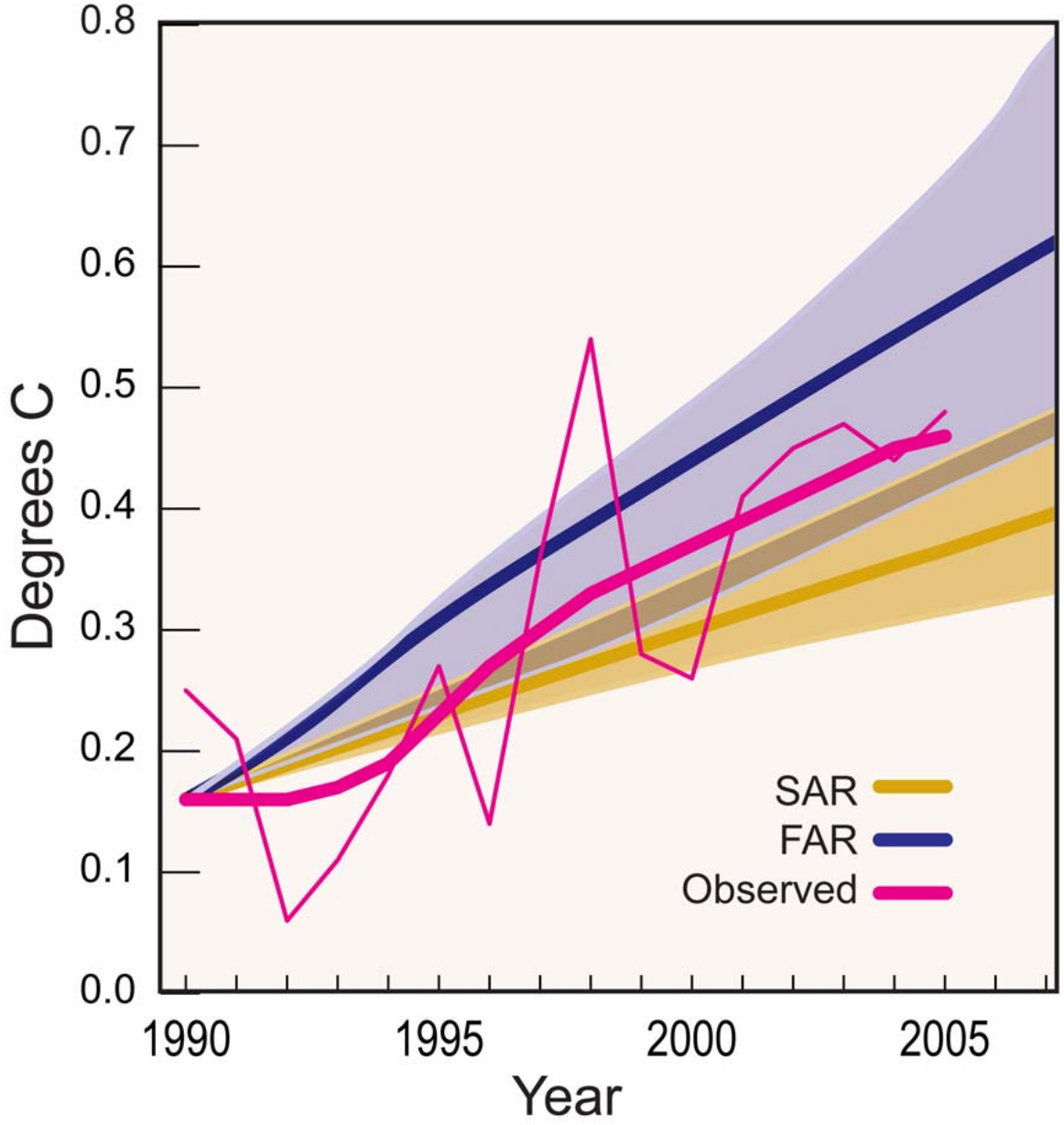


Figure 1.1. Time evolution in global average atmospheric surface temperature as projected in the IPCC First Assessment Report or FAR (1990) and Second Assessment Report or SAR (1996), compared with observations. Figure 1.1 Best estimated model projections from the FAR and SAR are in solid lines with their range of estimated projections shown by the shaded areas. Annual mean observations are depicted by the thin magenta line, and a smoothed estimate from a 13-point binomial filter is shown by the thick magenta line (see Chapter 3 for more information about this filter).

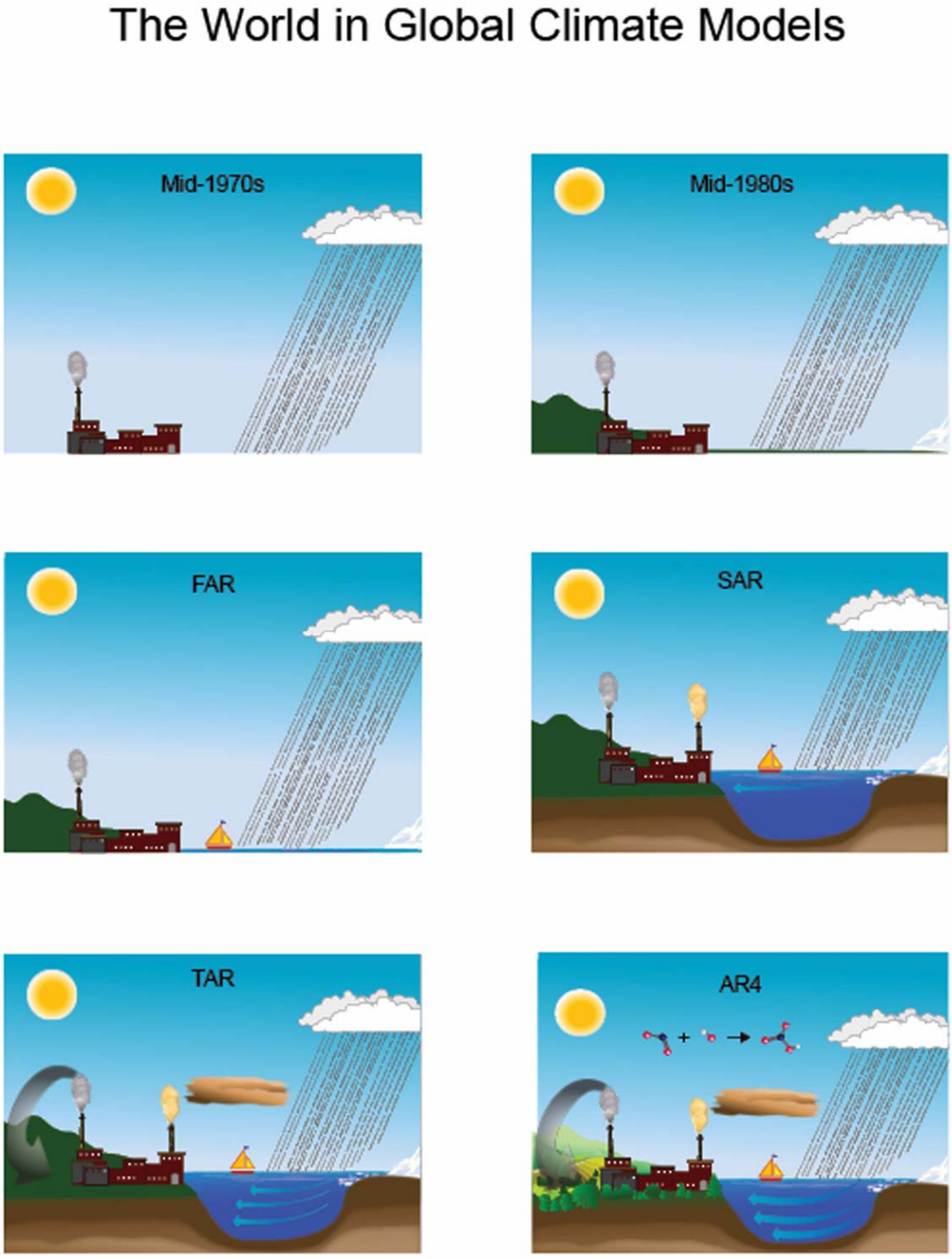


Figure 1.2. The complexity of climate models has increased over the last few decades. This is shown pictorially by the different features of the world included in the models.

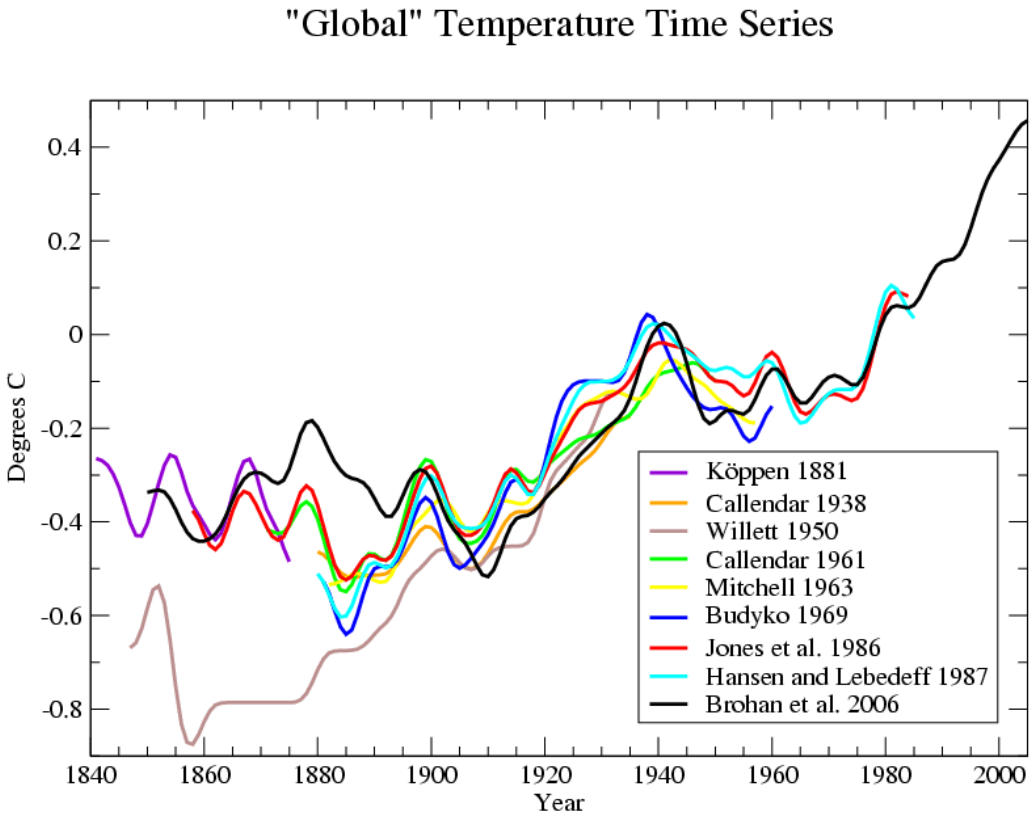


Figure 1.3. "Global" temperature time series. Köppen (1881) tropics and temperate latitudes using land air temperature. Callendar (1938) global using land stations. Willett (1950) global using land stations. Callendar (1961) 60°N to 60°S using land stations. Mitchell (1963) global using land stations. Budyko (1969) Northern Hemisphere using land stations and ship reports. Jones et al. (1986a,b) global using land stations. Hansen and Lebedeff (1987) global using land stations. Brohan et al. (2006) global using land air temperature and sea surface temperature data. All time series were smoothed using a 13-point binomial filter (see Chapter 3 for more information on this filter). The Brohan et al. (2006) time series is also shown in Chapter 3, Figure 3.2.6. Each of the other time series was originally presented as anomalies to the mean temperature of a specific and differing base period. To make them comparable, the time series have been adjusted to have the mean of their last 30 years identical to that same period in the Brohan et al. (2006) time series.

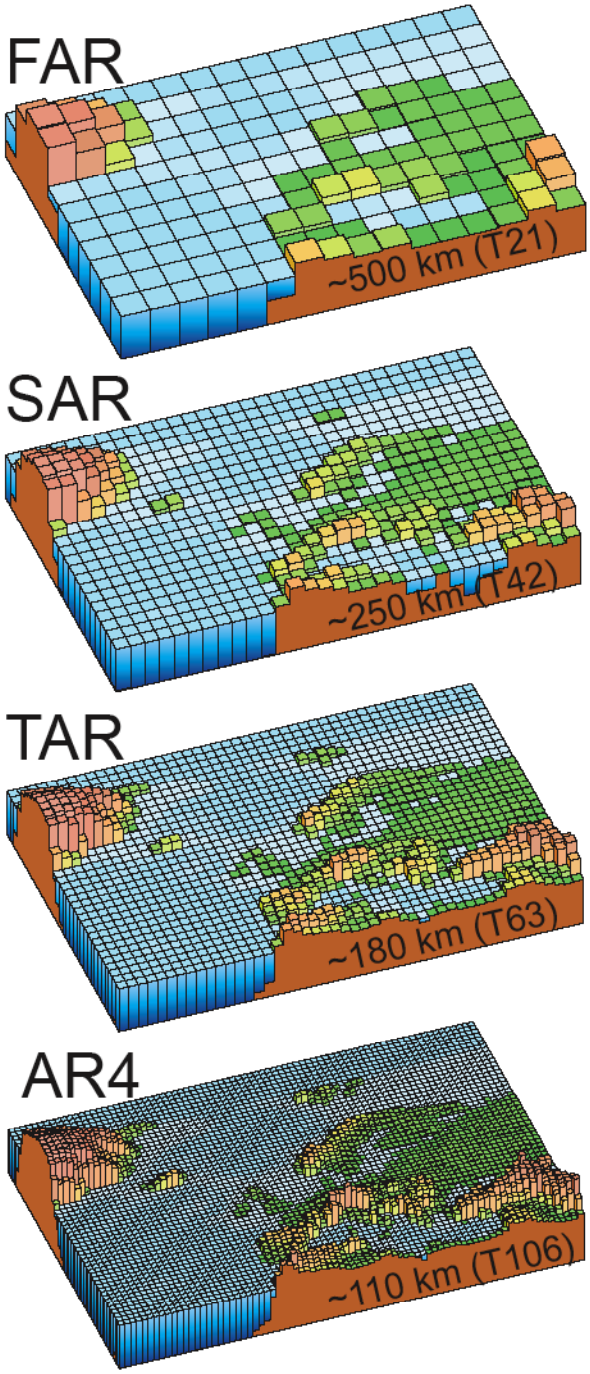
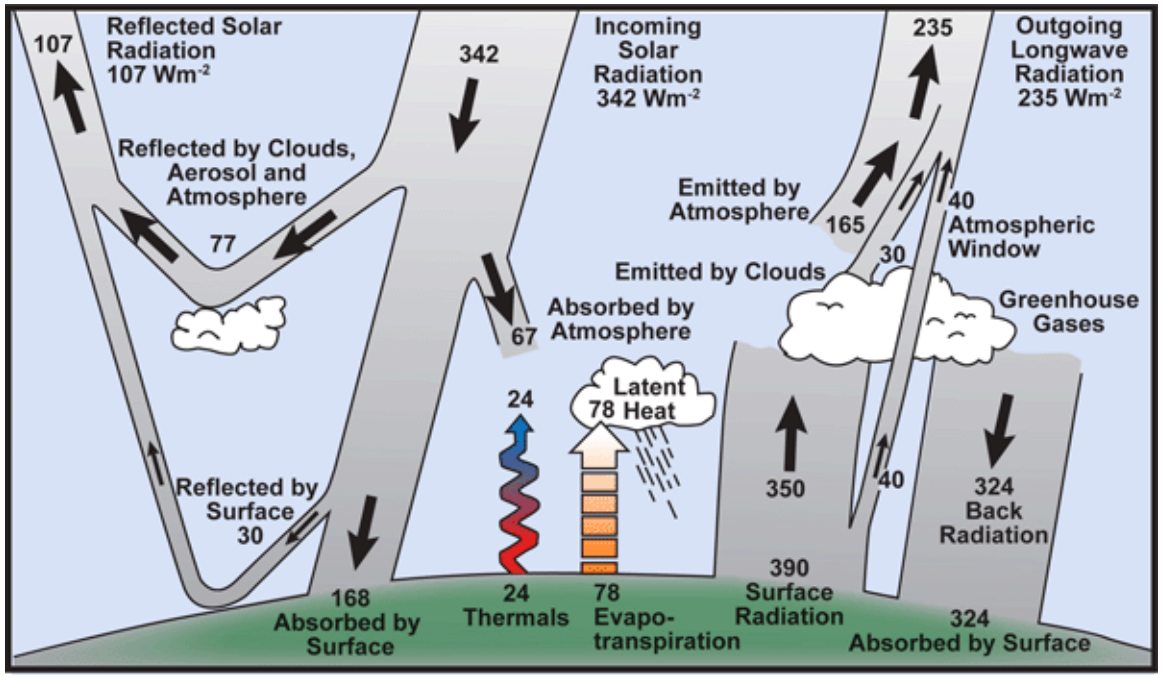
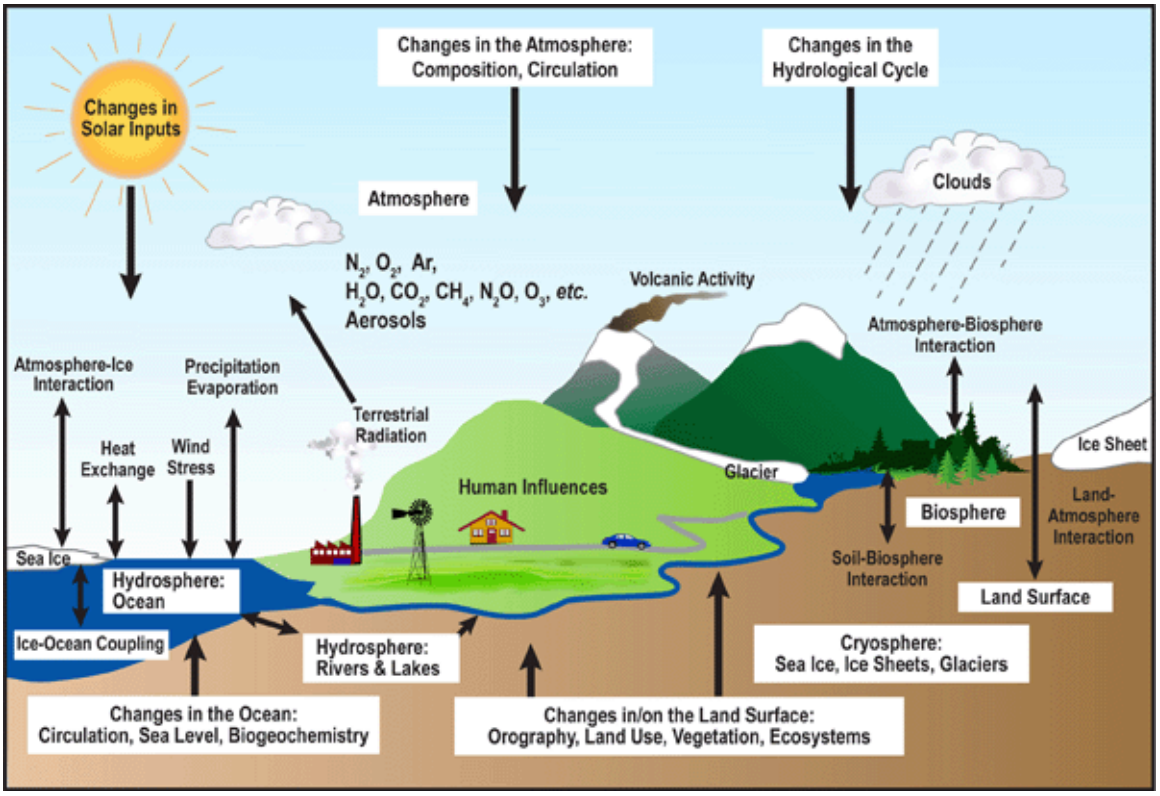


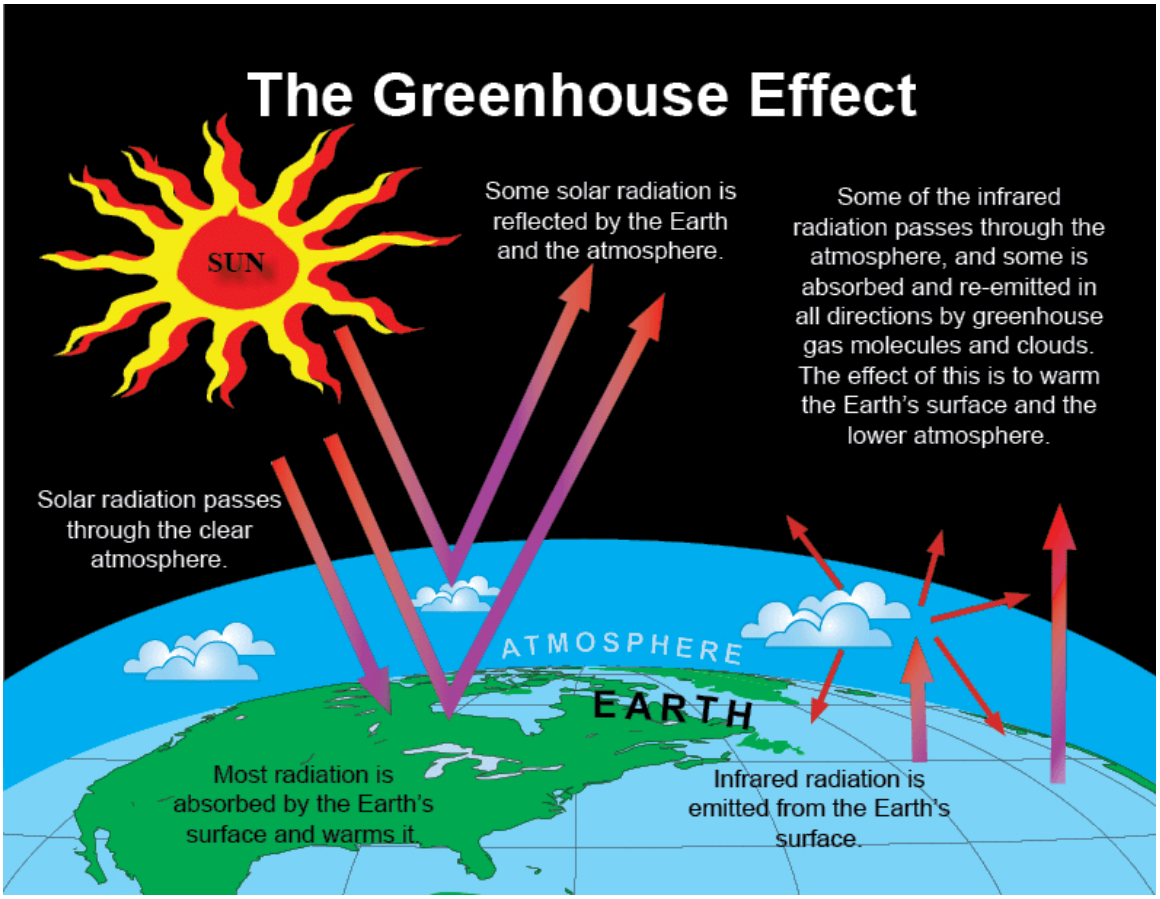
Figure 1.4. Geographic resolution characteristic of the generations of climate models used in the IPCC Assessment Reports: FAR (1990), SAR (1996), TAR (2001), and AR4 (2007). The figures above show how successive generations of these global models increasingly resolved northern Europe. These illustrations are representative of the most detailed horizontal resolution used for short-term climate simulations. The century-long simulations cited in IPCC Assessment Reports after the FAR were typically run with the previous generation's resolution. Vertical resolution in both atmosphere and ocean models is not shown, but it has increased comparably with the horizontal resolution, beginning typically with a single-layer slab ocean and ten atmospheric layers in the FAR and progressing to about thirty levels in both atmosphere and ocean.



Question 1.1, Figure 1. The Earth's annual and global mean energy balance. Source: Kiehl and Trenberth (1997).



Question 1.2, Figure 1. Schematic view of the components of the climate system, their processes and interactions.



Question 1.3, Figure 1. An idealized model of the natural greenhouse effect. See text for explanation.