# Chapter 1: Historical Overview of Climate Change Science
## Figures

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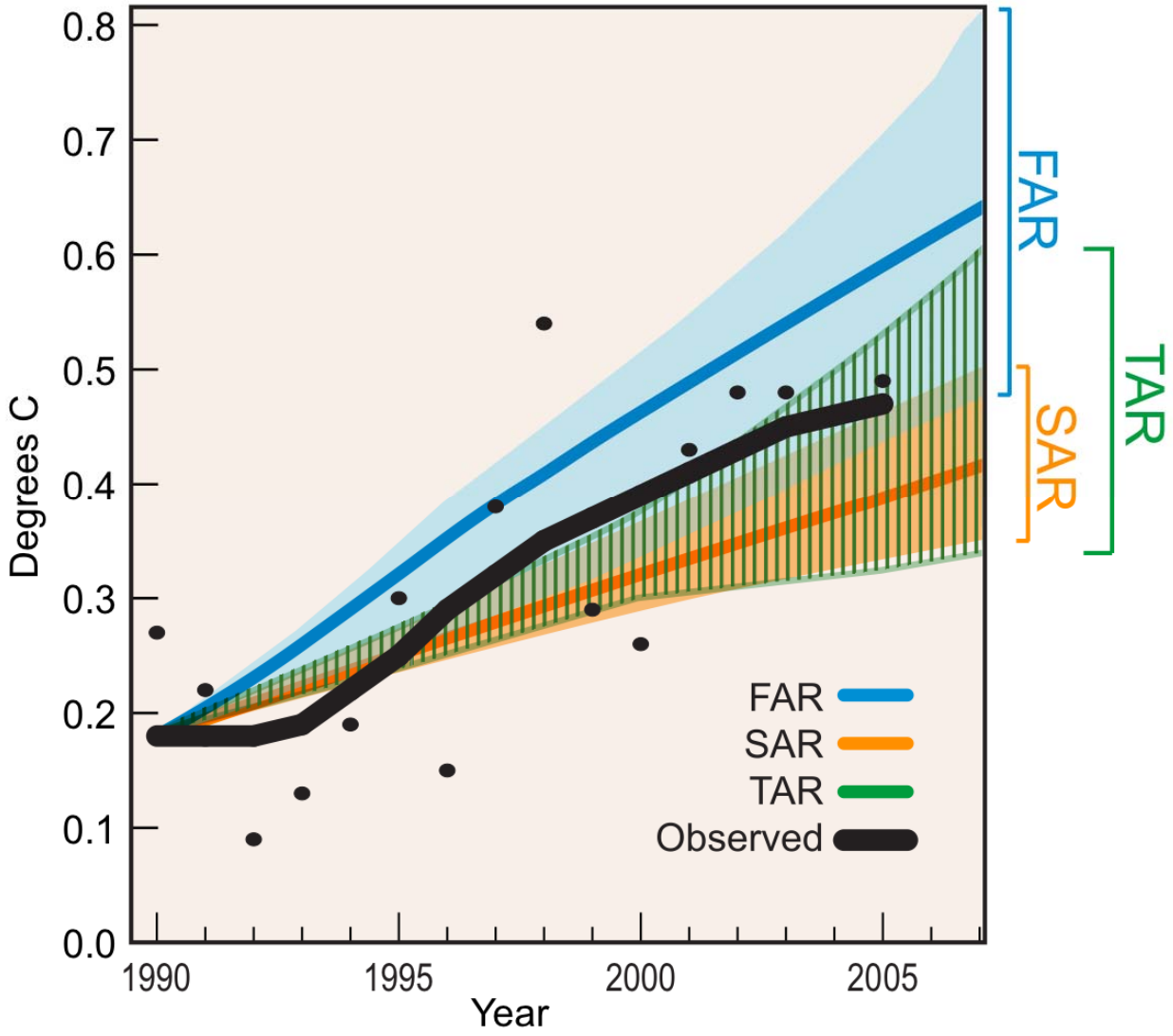



**Figure 1.1.** Yearly global averaged surface temperature (Brohan et al., 2006), relative to the mean 1961–1990 values, and as projected in the IPCC First Assessment Report or FAR (1990), Second Assessment Report or SAR (1996) and Third Assessment Report or TAR (2001). Best estimated model projections from the FAR and SAR are in solid lines with their range of estimated projections shown by the shaded areas. The TAR did not have best estimated model projections but rather a range of projections. Annual mean observations (Chapter 3, Section 3.2) are depicted by black circles and a smoothed estimate from a 13-point filter (Chapter 3, Appendix 3.A) is shown by the thick black line.

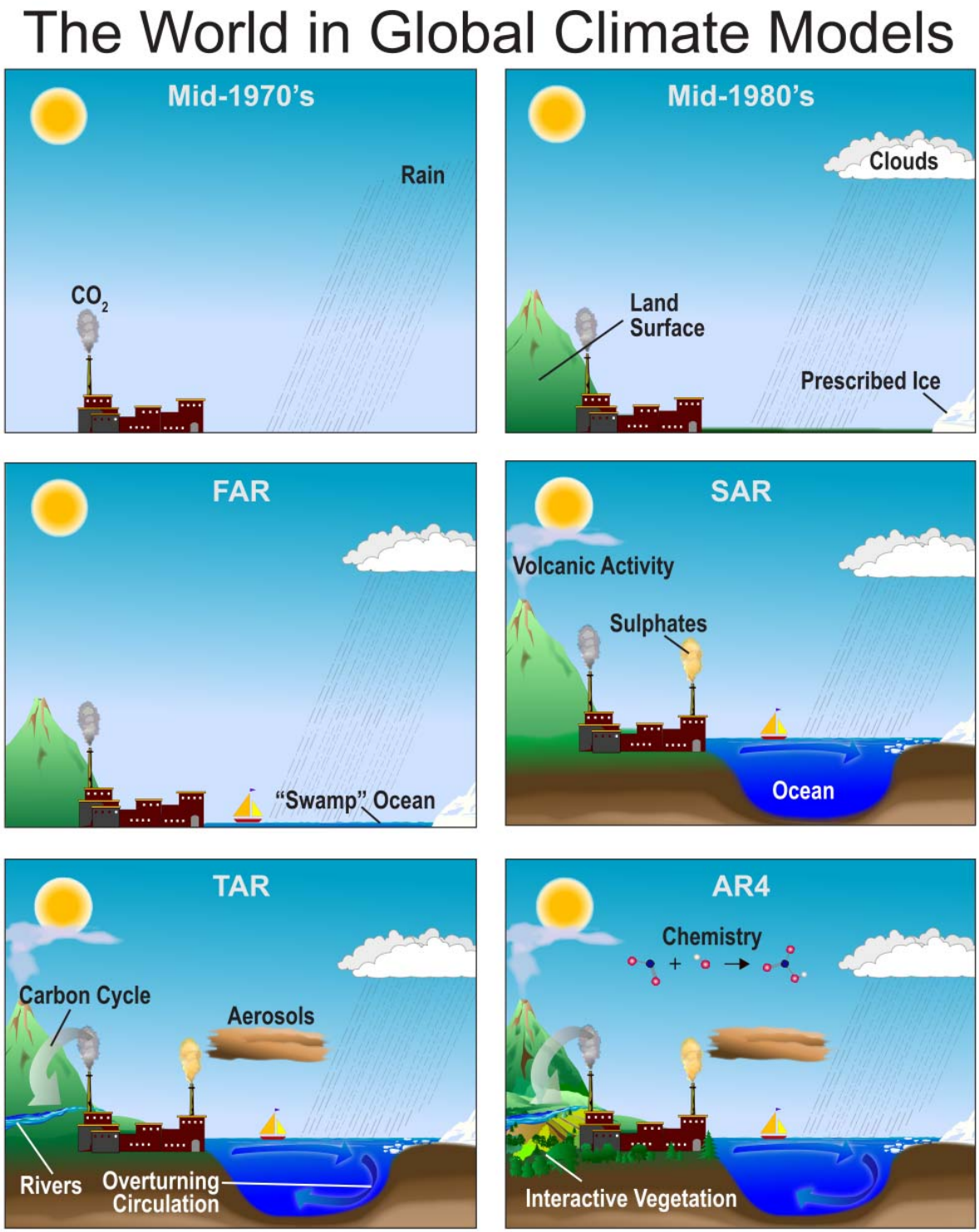



**Figure 1.2.** The complexity of climate models has increased over the last few decades. The additional physics incorporated in the models are shown pictorially by the different features of the modelled world.

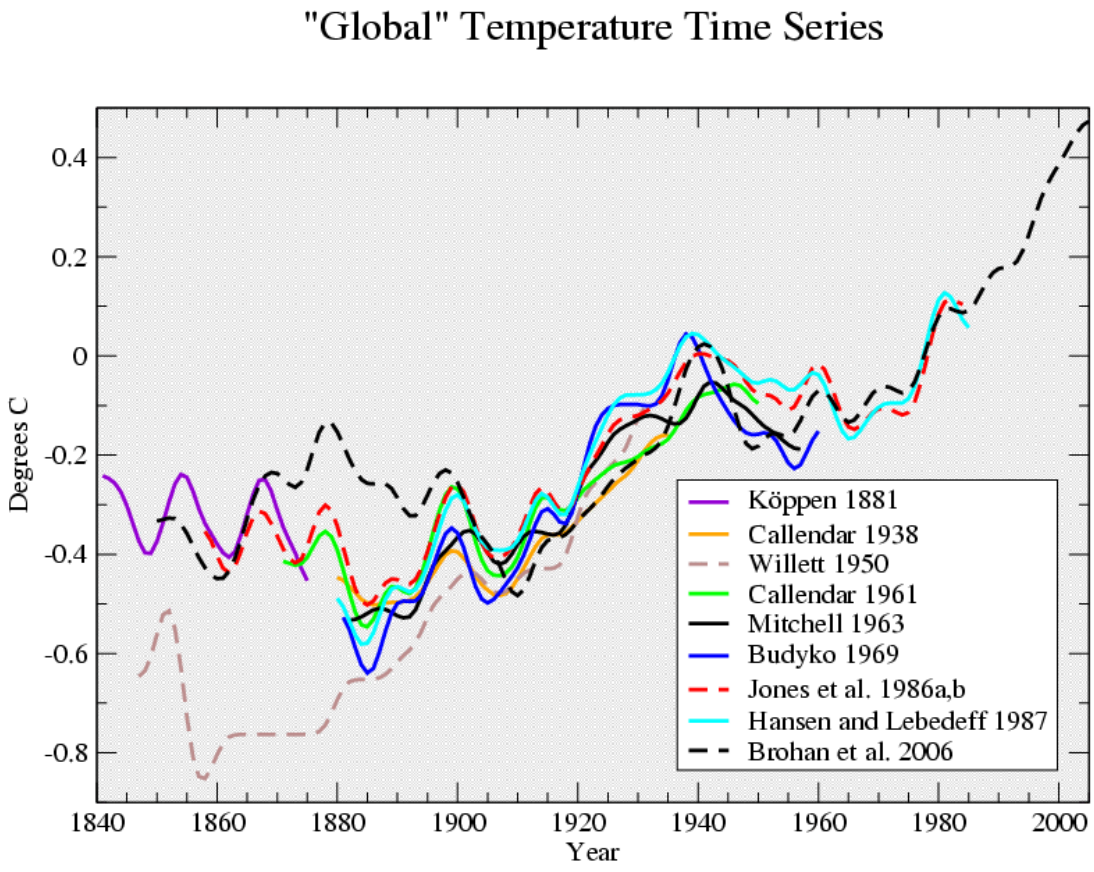



**Figure 1.3.** "Global" temperature time series. Köppen (1881) tropics and temperate latitudes using land air temperature. Callendar (1938) global using land stations. Willett (1950) global using land stations. Callendar (1961) 60°N to 60°S using land stations. Mitchell (1963) global using land stations. 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 is the longest of the currently updated global temperature time series (Chapter 3, Section 3.2). All time series were smoothed using a 13-point filter (Chapter 3, Appendix 3.A). The Brohan et al. (2006) time series are anomalies from the 1961–1990 mean (°C). Each of the other time series was originally presented as anomalies from the mean temperature of a specific and differing base period. To make them comparable, the other 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) anomaly time series.

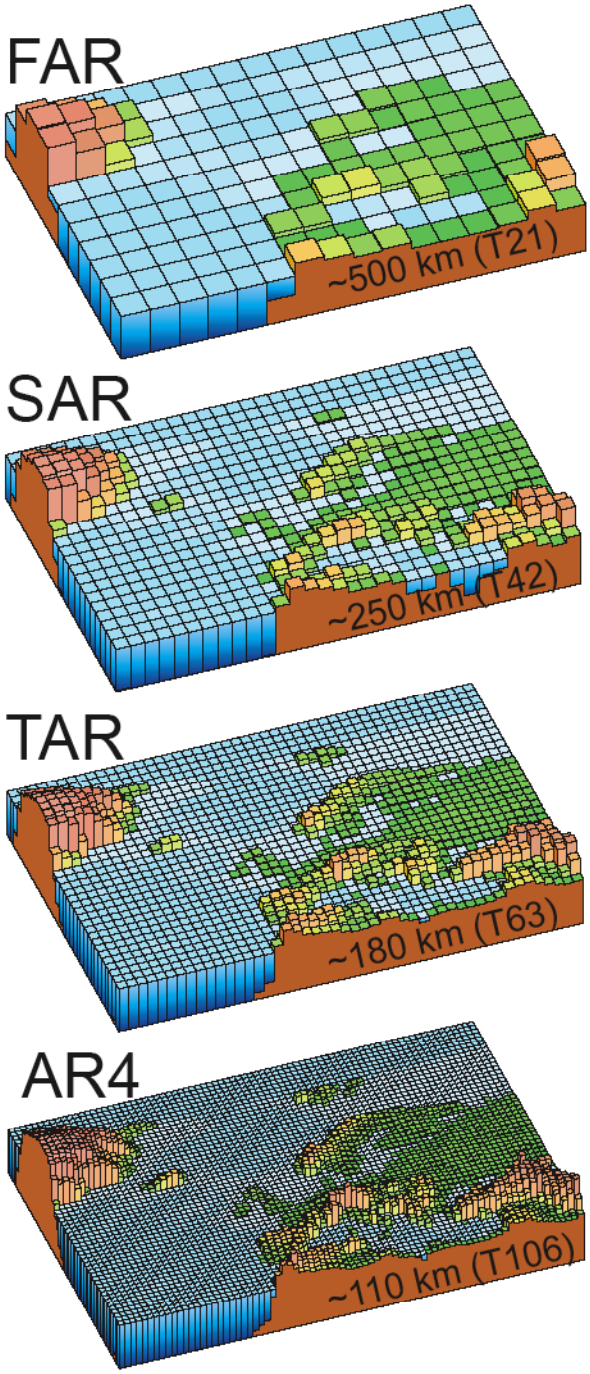
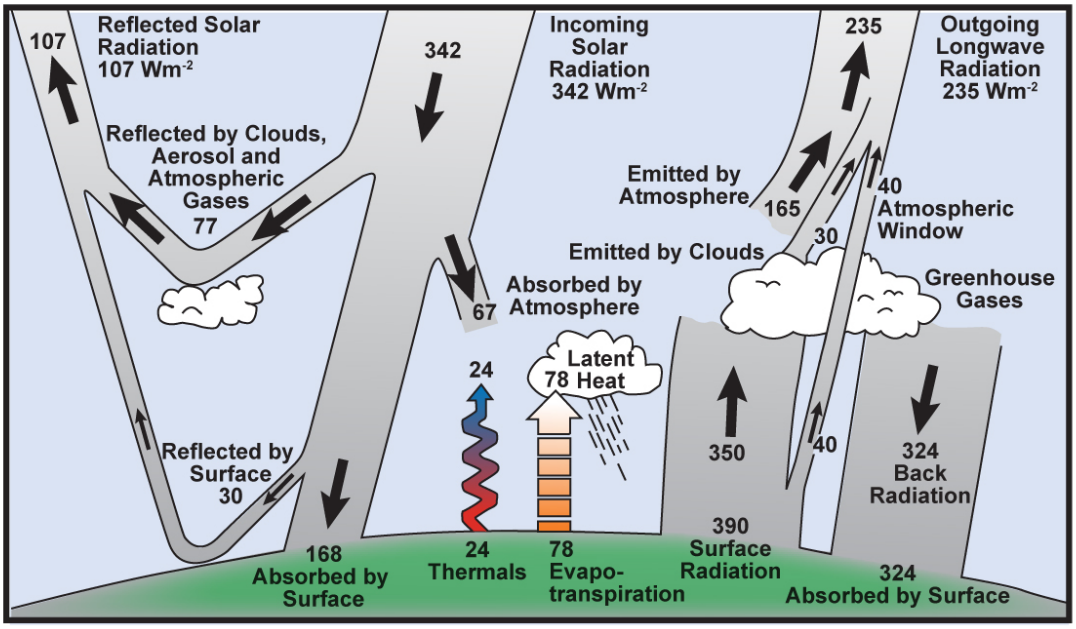
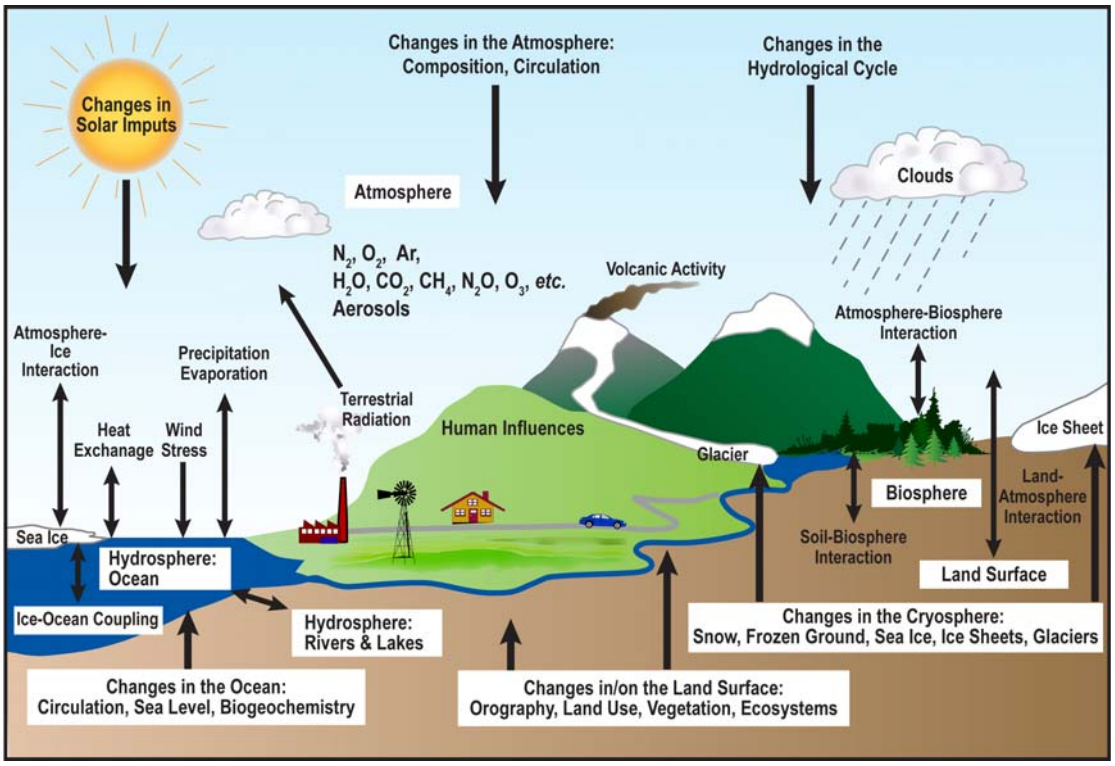


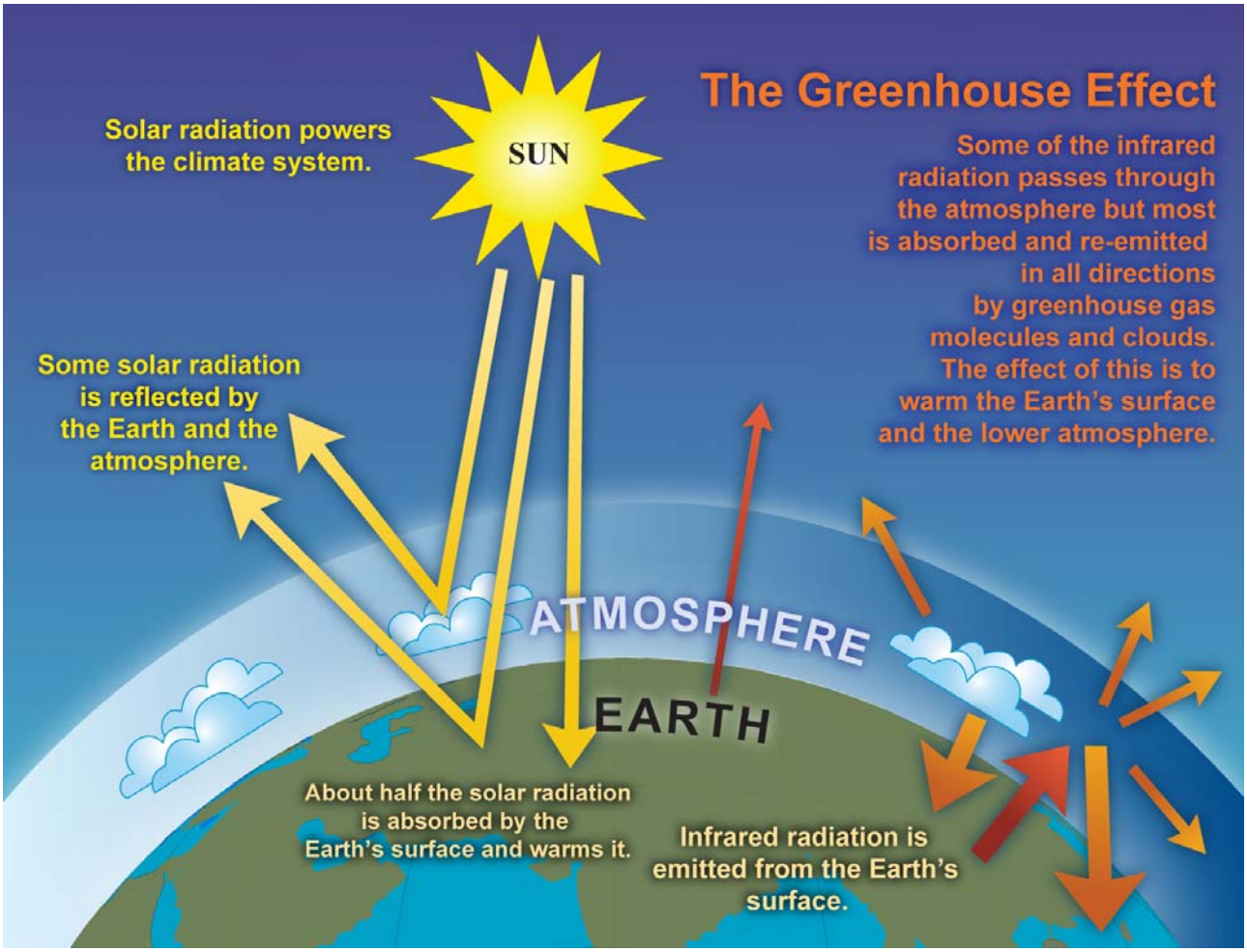

**Figure 1.4.** Geographic resolution characteristic of the generations of climate models used in the IPCC Assessment Reports: FAR (1990), SAR (1996), TAR (2001), and AR4 (2007). The figures above show how successive generations of these global models increasingly resolved northern Europe. These illustrations 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.




**FAQ 1.1, Figure 1.** Estimate of the Earth's annual and global mean energy balance. Over the long-term, the amount of incoming solar radiation absorbed by the Earth and atmosphere is balanced by the Earth and atmosphere releasing the same amount of outgoing longwave radiation. About half of the incoming solar radiation is absorbed by the Earth's surface. This energy is transferred to the atmosphere by warming the air in contact with the surface (thermals), by evapotranspiration and by longwave radiation which is absorbed by clouds and greenhouse gases. The atmosphere in turn radiates longwave energy back to Earth as well as out to space. Source: Kiehl and Trenberth (1997).




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




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