

Fig. 4.28 Radiation geometry in cooling to space. (a) The complete longwave radiative balance for the layer in question (not drawn to scale) and (b) the simplified balance based on the assumption of cooling to space.

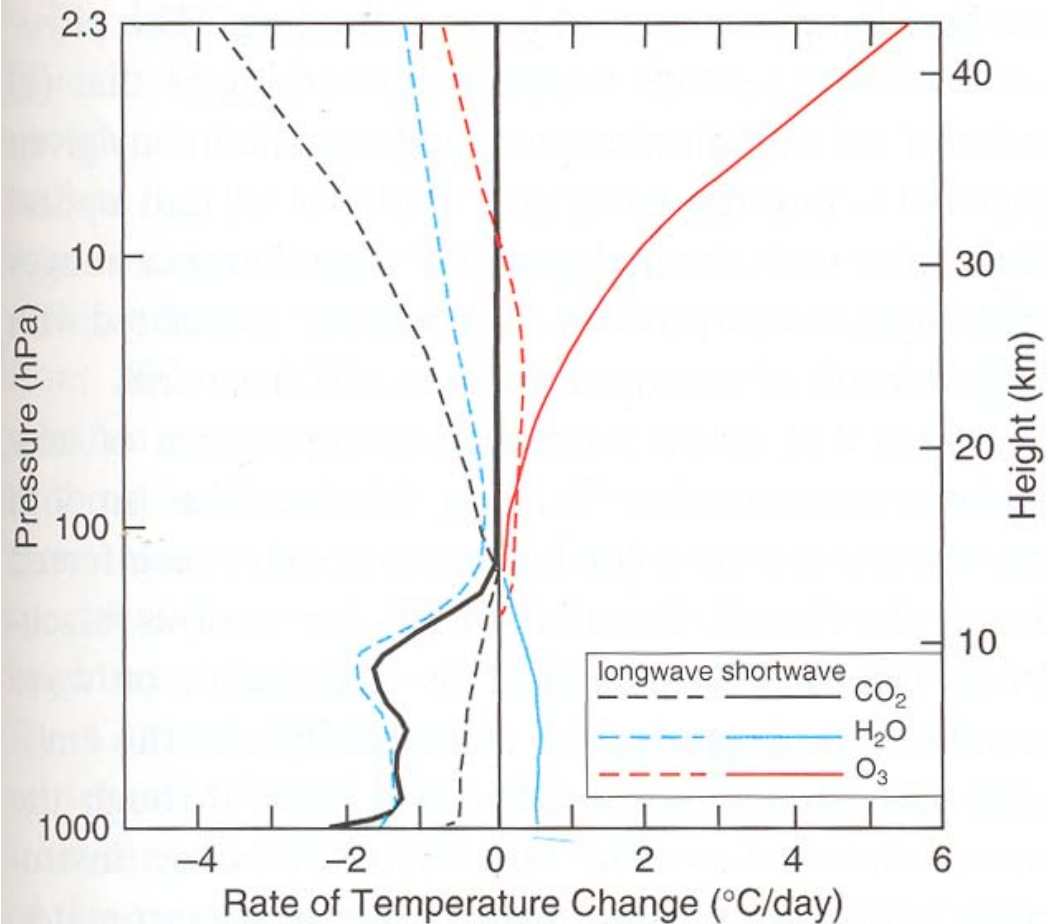


Fig. 4.29 Vertical profiles of the time rate of change of temperature due to the absorption of solar radiation (solid curves) and the transfer of infrared radiation (dashed curves) by water vapor (blue), carbon dioxide (black), and ozone (red). The heavy black solid curve represents the combined effects of the three gases. [Adapted from S. Manabe and R. F. Strickler, *J. Atmos. Sci.*, **21**, p. 373 (1964).]

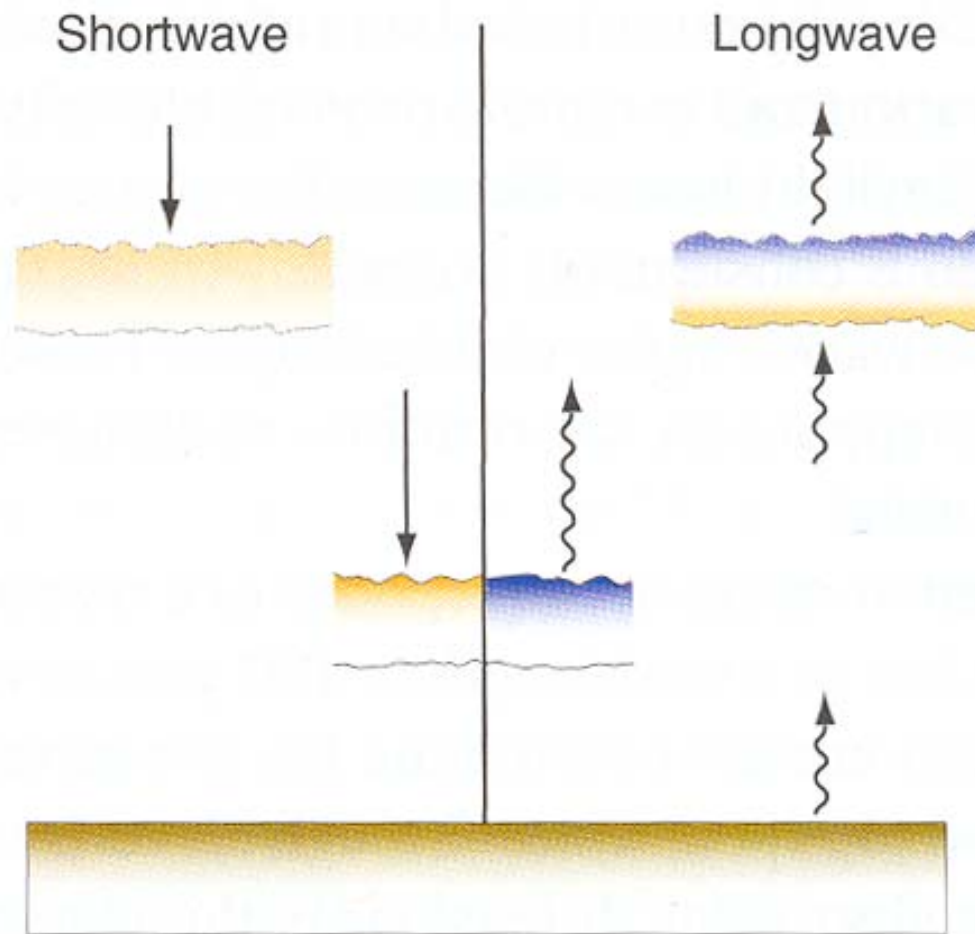


Fig. 4.30 Schematic of vertical profiles of heating in cloud layers at various heights in the atmosphere as indicated. Orange shading indicates warming and blue shading indicates cooling. Effects of shortwave radiation are represented on the left, and effects of longwave radiation on the right.