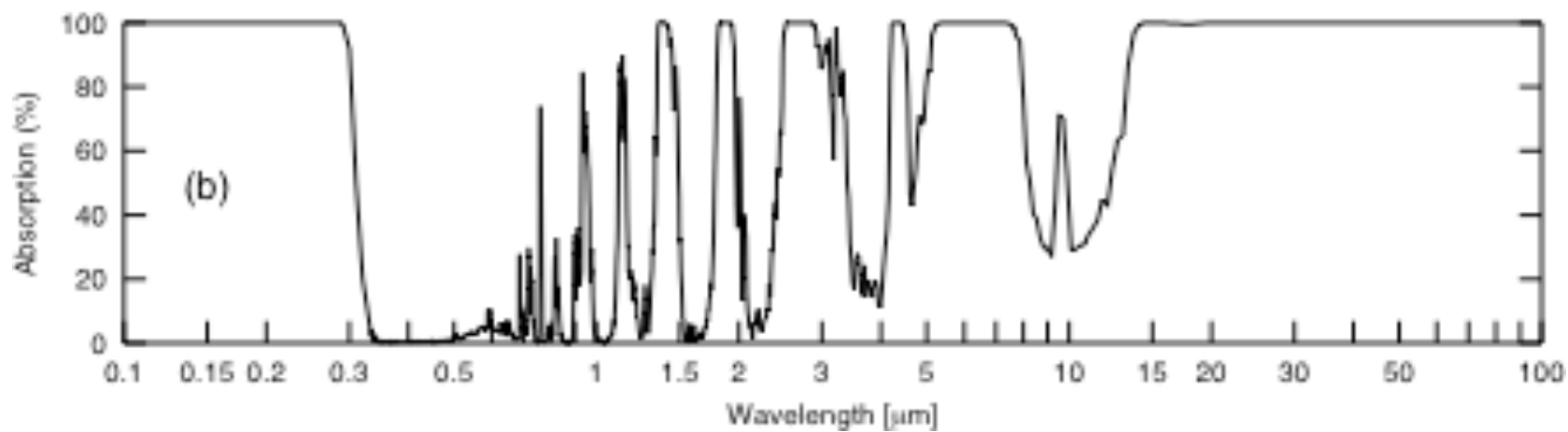
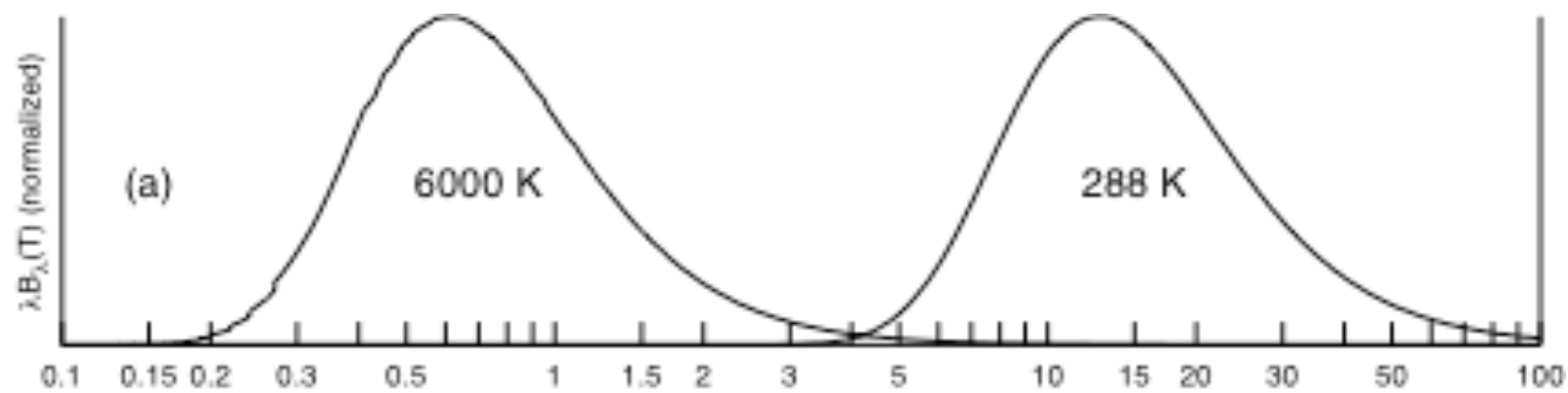
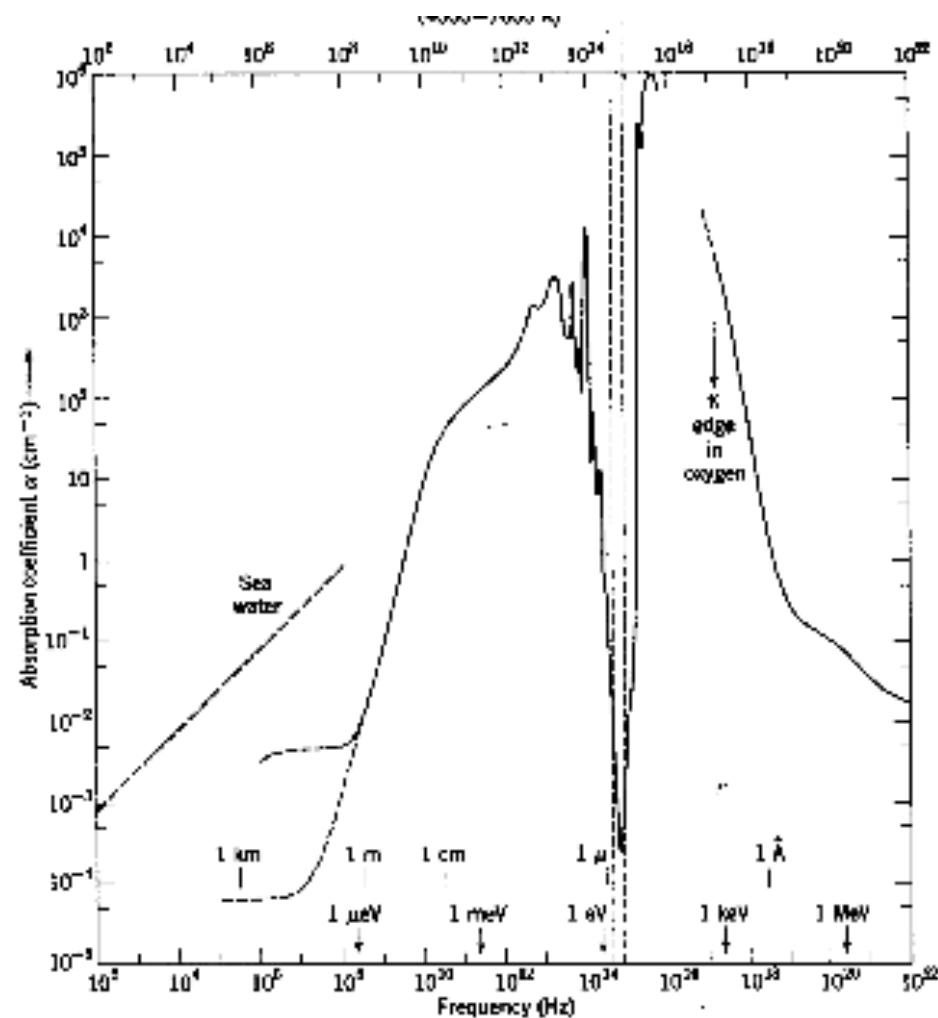


Table 3.1: Regions of the electromagnetic spectrum

Region	Spectral range	Fraction of solar output	Remarks
X rays	$\lambda < 0.01 \mu\text{m}$		Photoionizes all species; absorbed in upper atmosphere
Extreme UV	$0.01 < \lambda < 0.1 \mu\text{m}$	3×10^{-6}	Photoionizes O_2 and N_2 ; absorbed above 90 km
Far UV	$0.1 < \lambda < 0.2 \mu\text{m}$	0.01%	Photodissociates O_2 ; absorbed above 50 km
UV-C	$0.2 < \lambda < 0.28 \mu\text{m}$	0.5%	Photodissociates O_2 and O_3 ; absorbed between 30 and 60 km
UV-B	$0.28 < \lambda < 0.32 \mu\text{m}$	1.5%	Mostly absorbed by O_3 in stratosphere; responsible for sunburn
UV-A	$0.32 < \lambda < 0.4 \mu\text{m}$	6.2%	Reaches surface
Visible	$0.4 < \lambda < 0.7 \mu\text{m}$	38%	Atmosphere mostly transparent
Near IR	$0.7 < \lambda < 4 \mu\text{m}$	52%	Partially absorbed, mainly by water vapor
Thermal IR	$4 < \lambda < 50 \mu\text{m}$	0.9%	Absorbed and emitted by water vapor, carbon dioxide, ozone, and other trace gases
Far IR	$0.05 < \lambda < 1 \text{ mm}$		Absorbed by water vapor
Microwave	$\lambda > 1 \text{ mm}$		Clouds semi-transparent

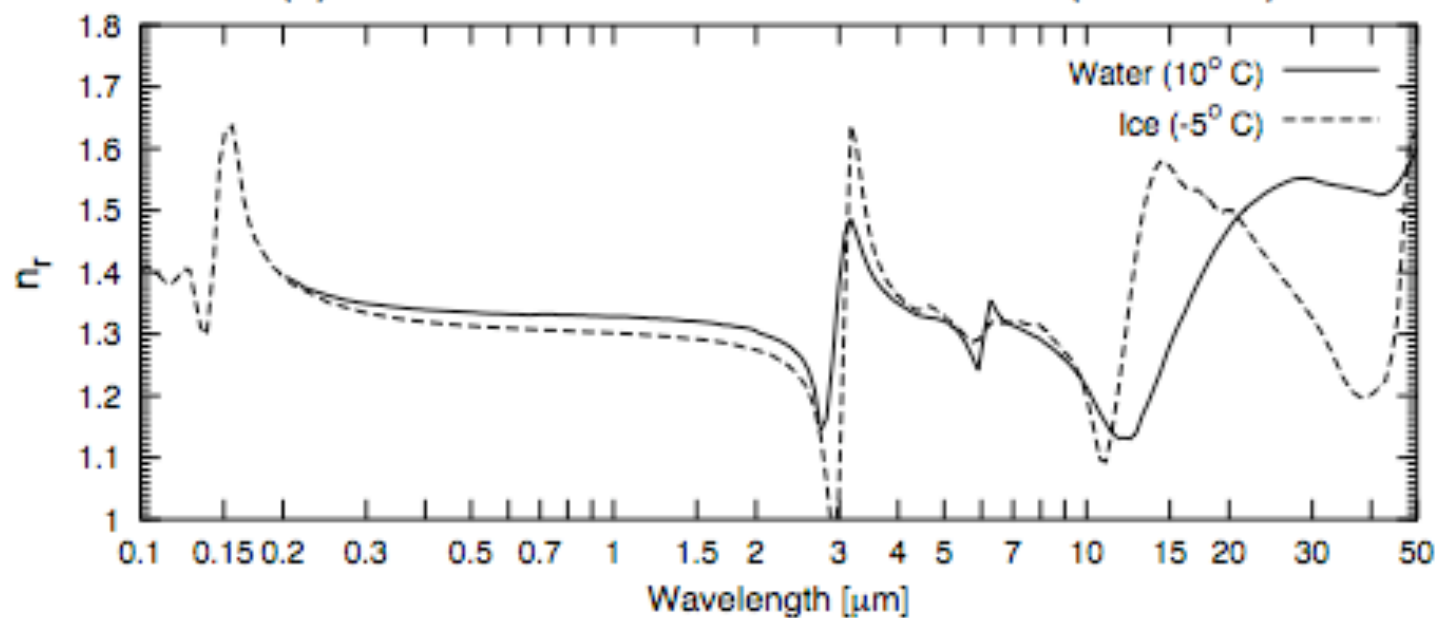




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Fig. 7.9 The index of refraction (top) and absorption coefficient (bottom) for liquid water as a function of linear frequency. Also shown as abscissas are an energy scale (arrows) and a wavelength scale (vertical lines). The visible region of the frequency spectrum is indicated by the vertical dashed lines. The absorption coefficient for sea water is indicated by the dashed diagonal line at the left. Note that the scales are logarithmic in both directions.

(a) Index of Refraction of Water and Ice (Real Part)



(b) Index of Refraction of Water and Ice (Imag. Part)

