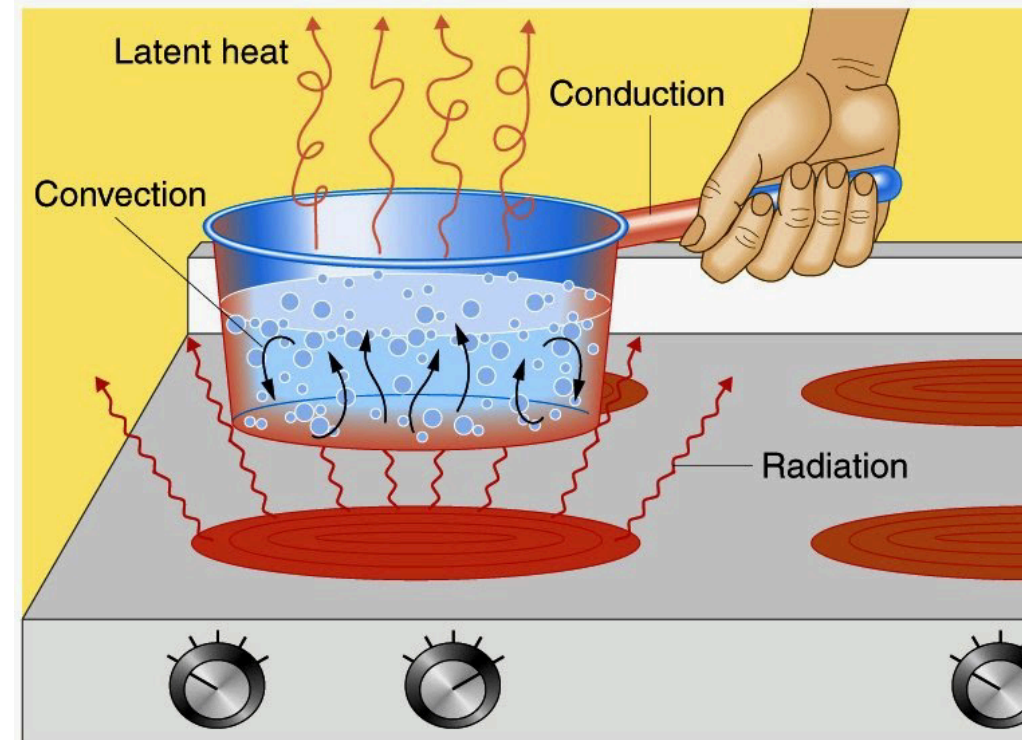# Global Warming
Lecture 3.1
Electromagnetic Radiation

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  - Convection is when a fluid (either a liquid like water or a gas like the atmosphere) moves to carry heat from one place to another.
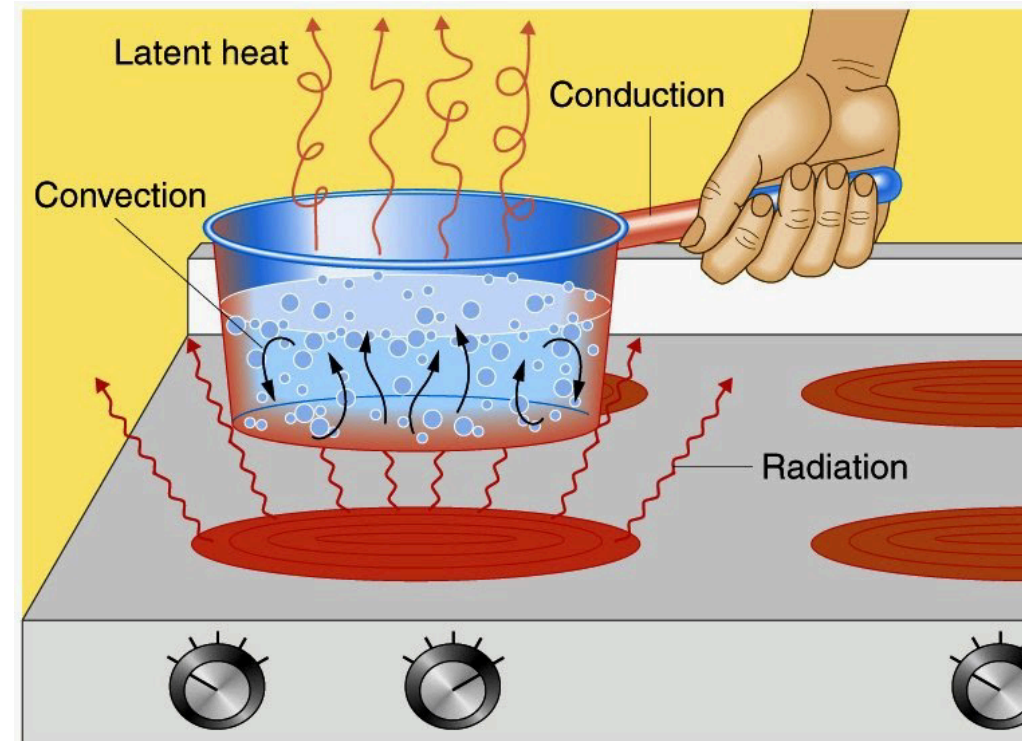
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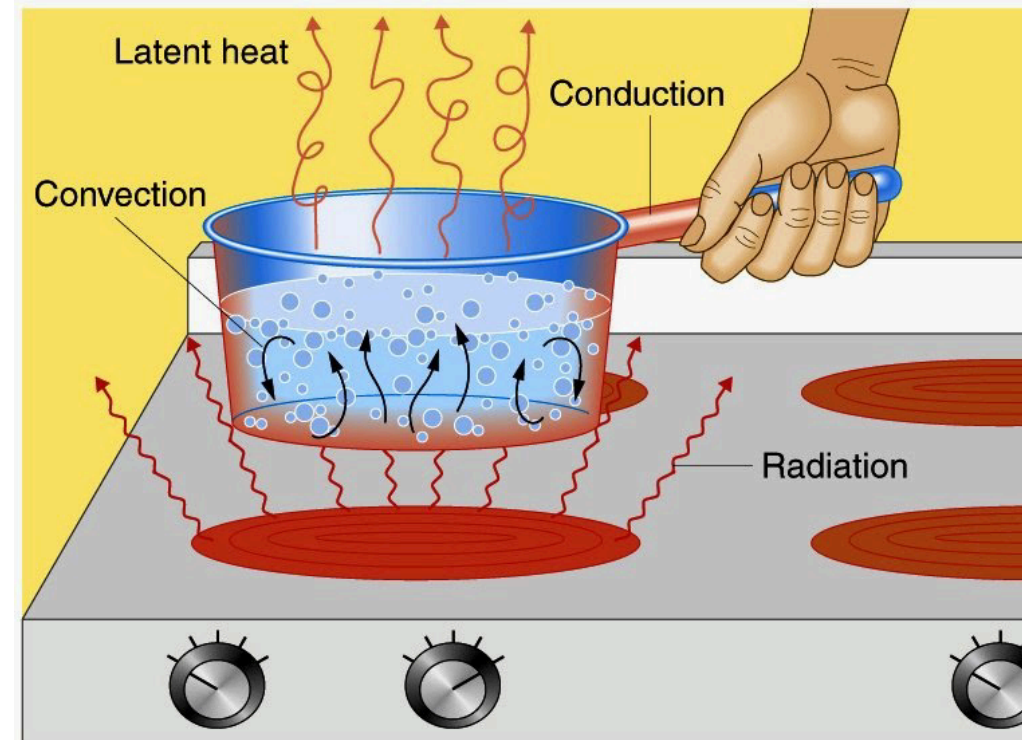
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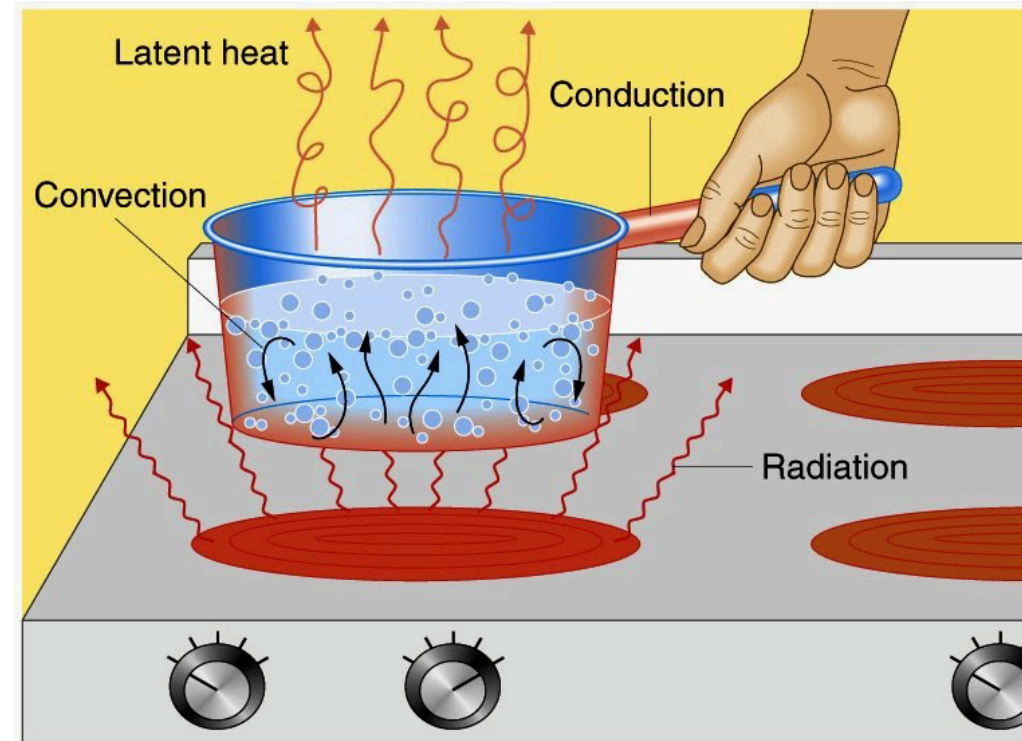
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Difference between them?

Convection: both medium and heat "move" around on a human scale
Conduction: only heat "moves" around

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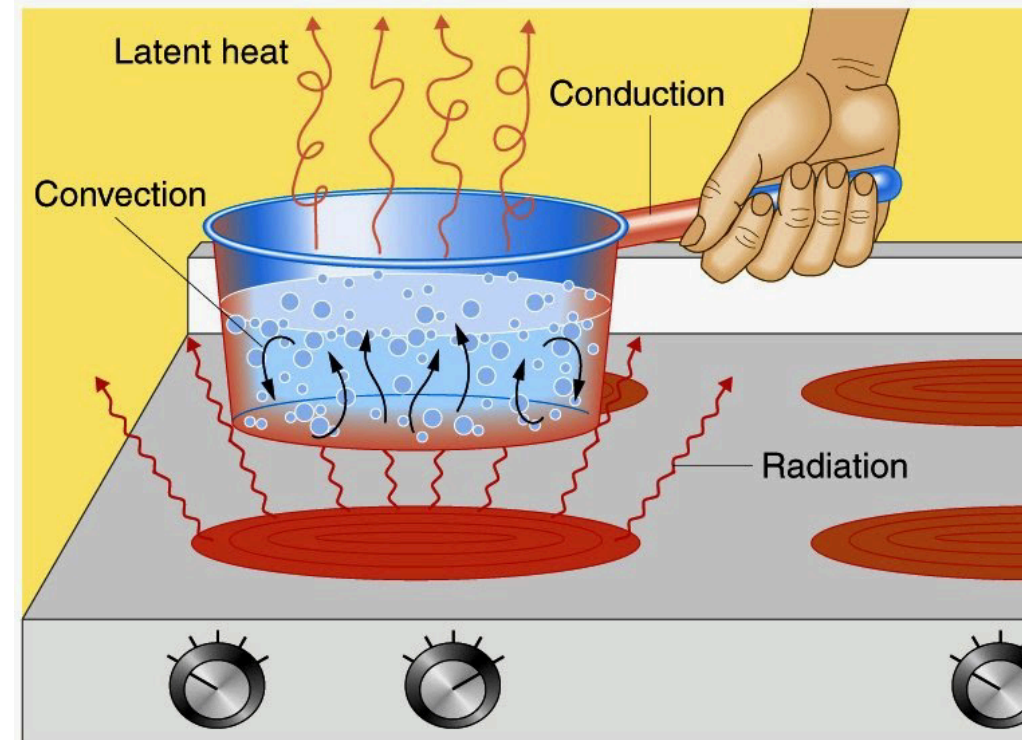- **3. Latent heat**
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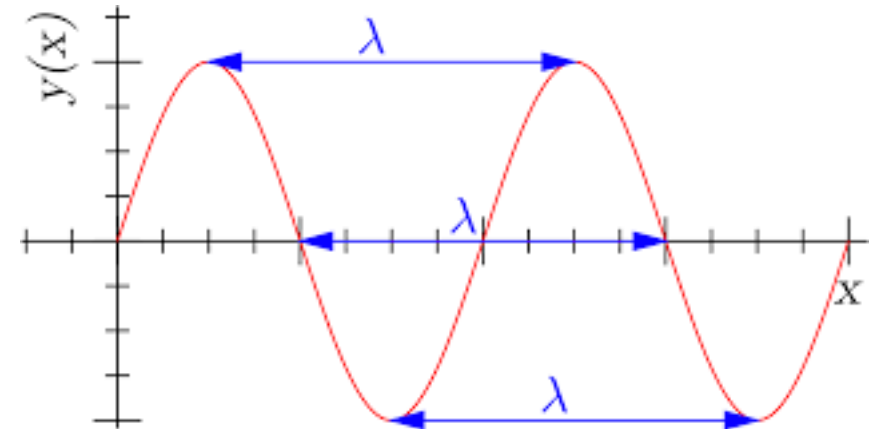- **4. Electromagnetic radiation**
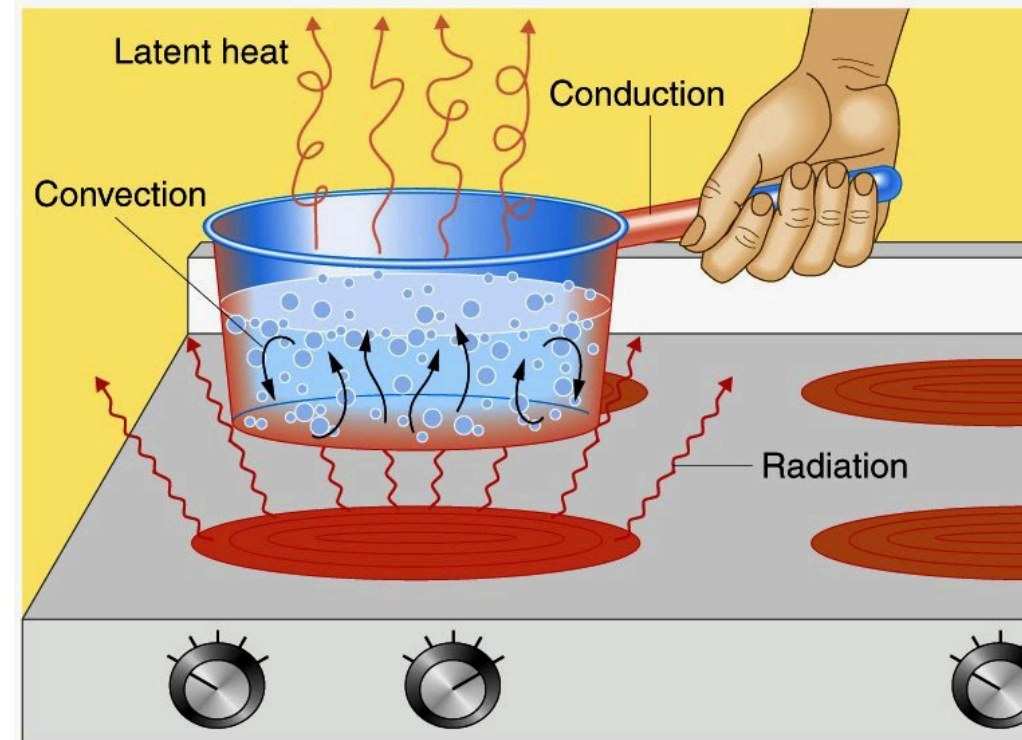
Electromagnetic radiation

- Propagating oscillations (or waves) in electric and magnetic fields. (Waves carrying energy propagates)
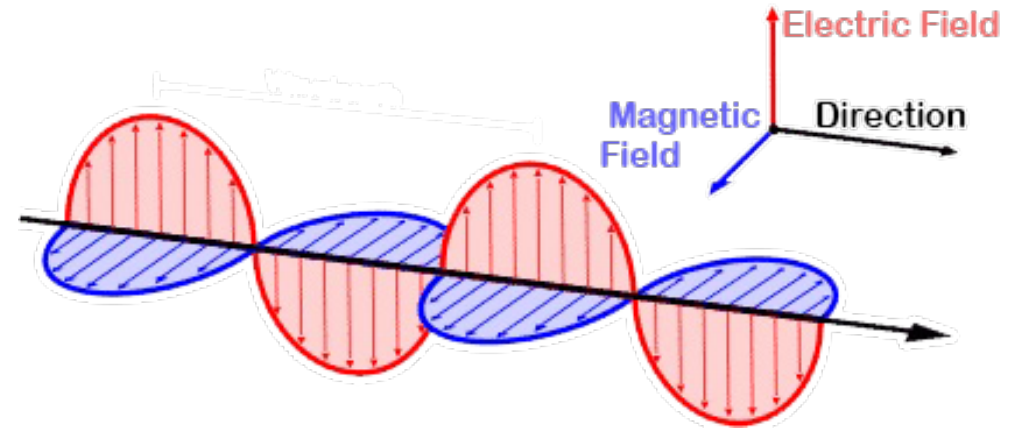
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- Electromagnetic radiation has a frequency (v) and a wavelength (λ):
  - Wavelength (λ): The distance between two wave crests (or troughs)
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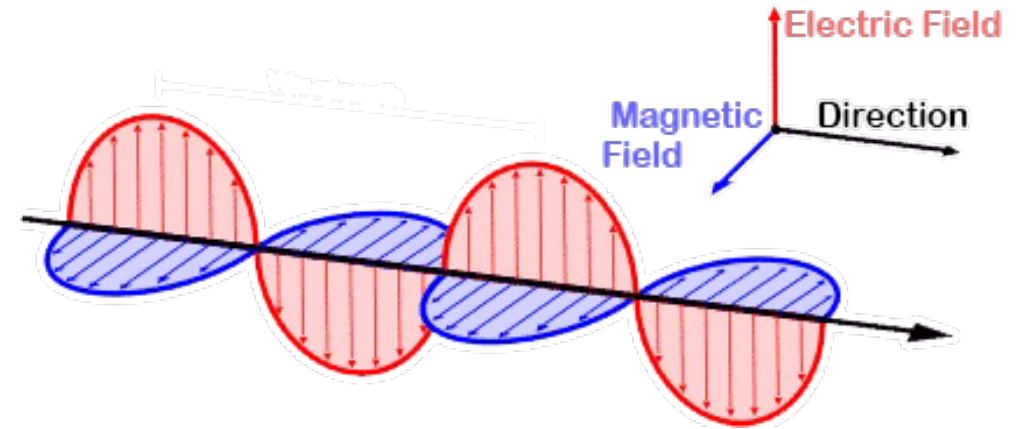
Electromagnetic radiation

Electric Field

Magnetic Field   Direction
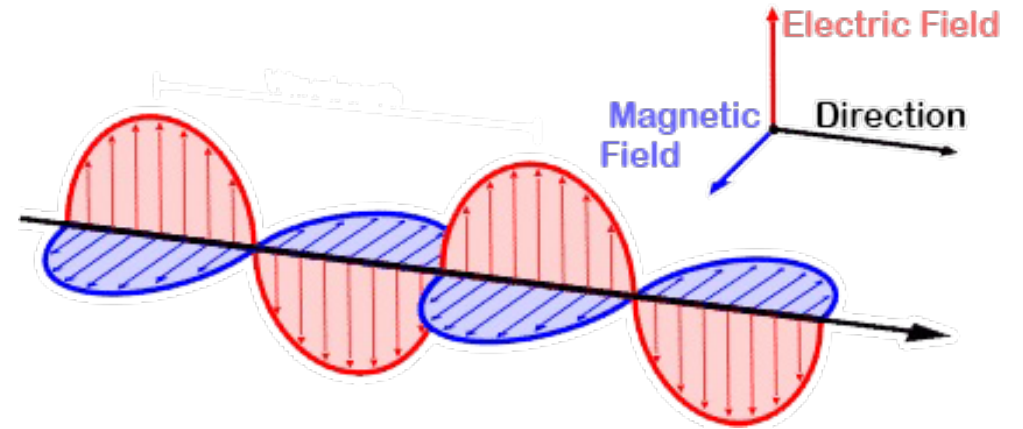
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$$c = \lambda v$$

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$$v = c/\lambda$$

speed of light	wavelength	frequency
2.998×10^8 ms^{-1}	(in m)	(in s^{-1} or Hz)
~ 3×10^8 m/s		

constant for all wavelengths in vacuum!

Units!

Example:

Speed of light in a vacuum:
$$c = 3.0 \times 10^8 \ m \ s^{-1}$$ constant for all wavelengths!

$$\nu \sim s^{-1}$$

$$\lambda = \frac{c}{\nu}$$

Blue light has a frequency of $6.67 \times 10^{14} \ s^{-1}$.
What wavelength does this correspond to (in nm)?

$$= \qquad \textbf{nm}$$

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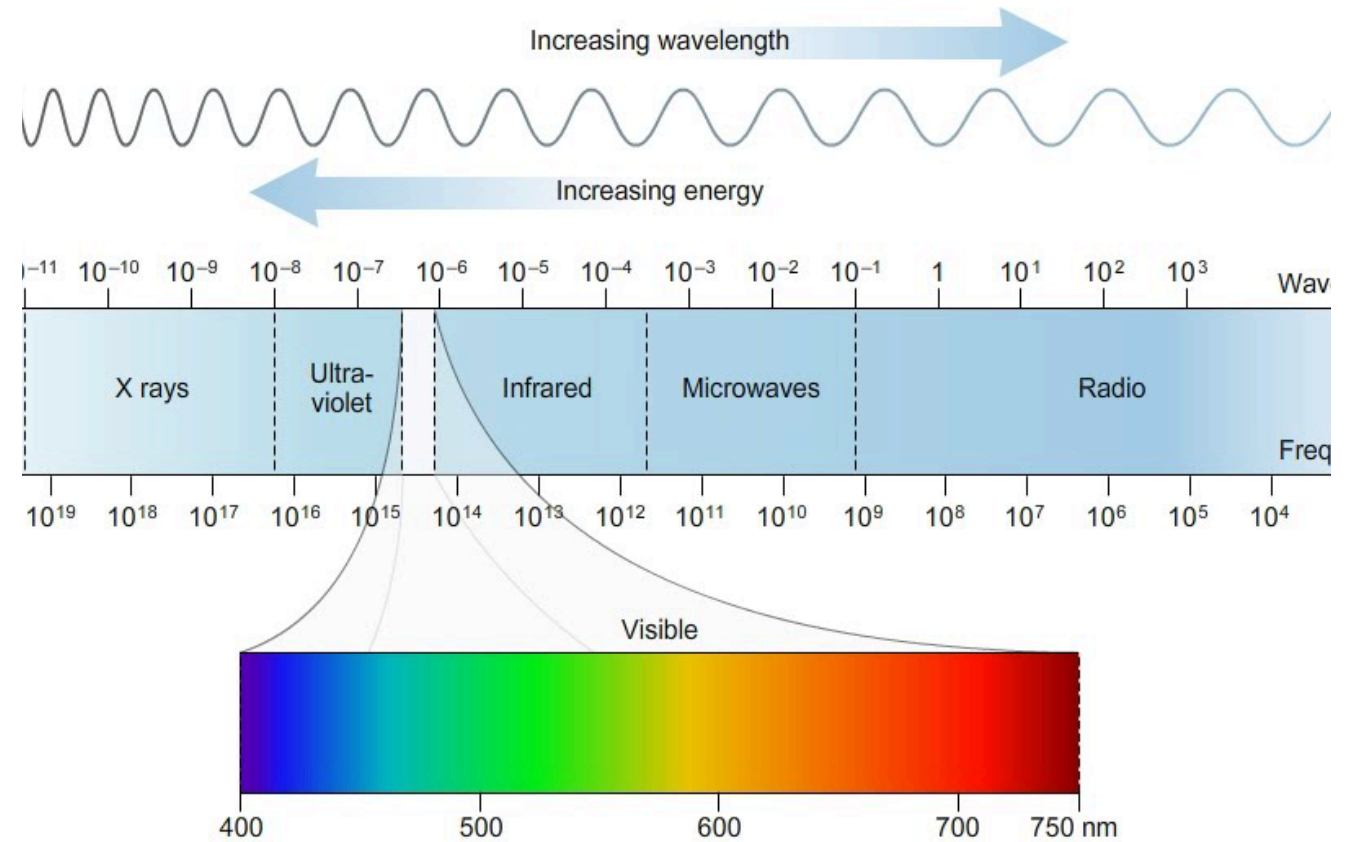
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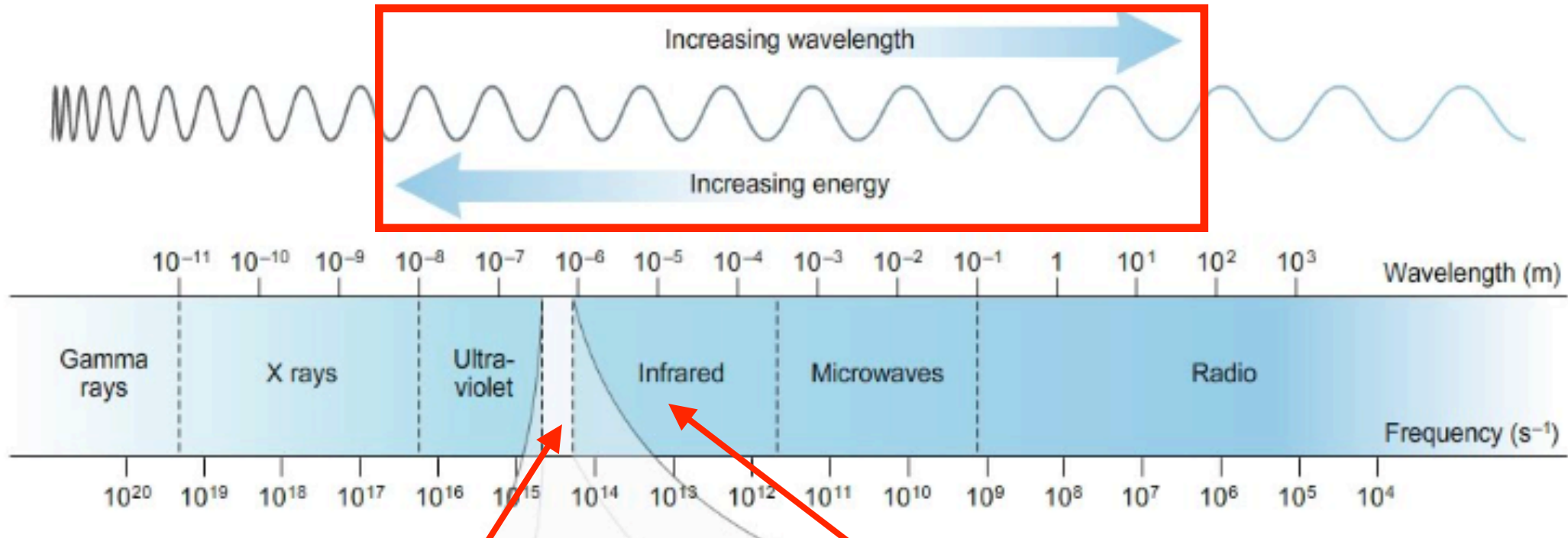What wavelength does this correspond to (in nm)?

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Types of electromagnetic radiation

- Visible Light:
  - Wavelength: 400- 750nm

- Ultraviolet Radiation
  - Wavelength: 0 nm to 400 nm

- Infrared radiation:
  - Wavelength: 700 (nm) to 1 (mm).

Longwave and shortwave radiation

Sun: shortwave radiation visible and near infrared

Earth: longwave radiation infrared

Radiation lab:

1. Human bodies

2. Classroom, computers

3. Glass