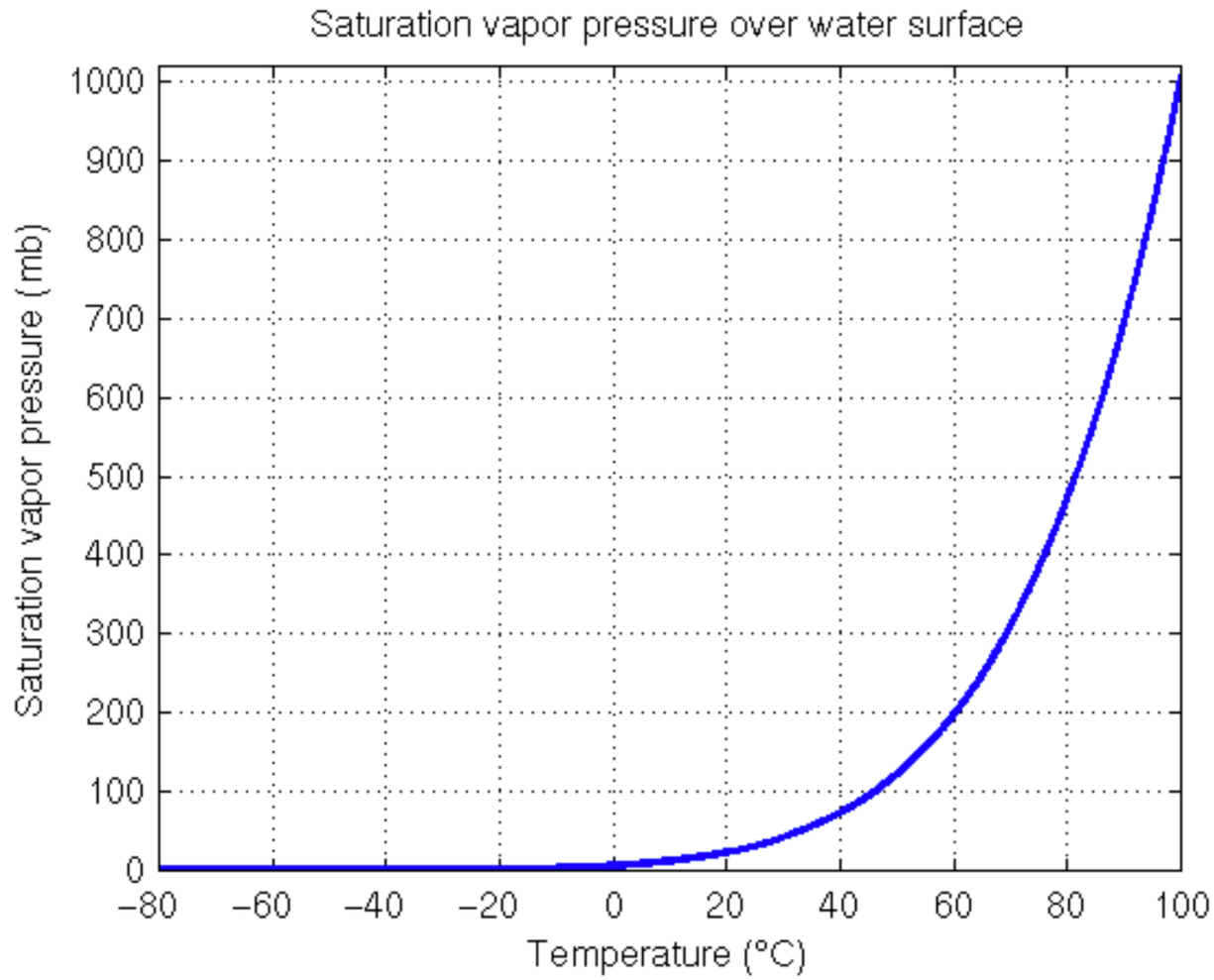
Global Warming
Lecture 4.4
Water-Vapor Feedback

Review: Water vapor pressure

- **“Saturation vapor pressure”** - the maximum amount of water air can carry (e_s)
- **Relative humidity (RH)** - The current humidity as a fraction of saturation vapor pressure
- The amount of water vapor in air depends very strongly on temperature!



Relative humidity stays fairly constant with increasing temperature, while e_s goes up (according to the graph). This means that e must go up to compensate.

As T ↑ $RH = 100 \times \frac{e}{e_s}$

(Stays constant)

e (goes up with T)

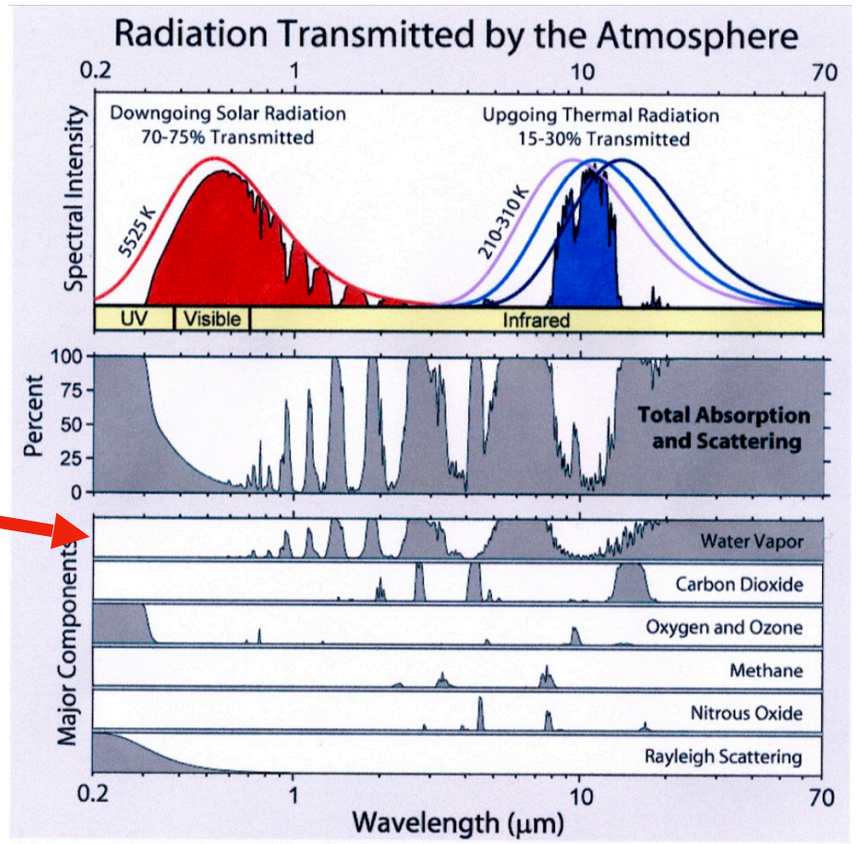
e_s (goes up with T)

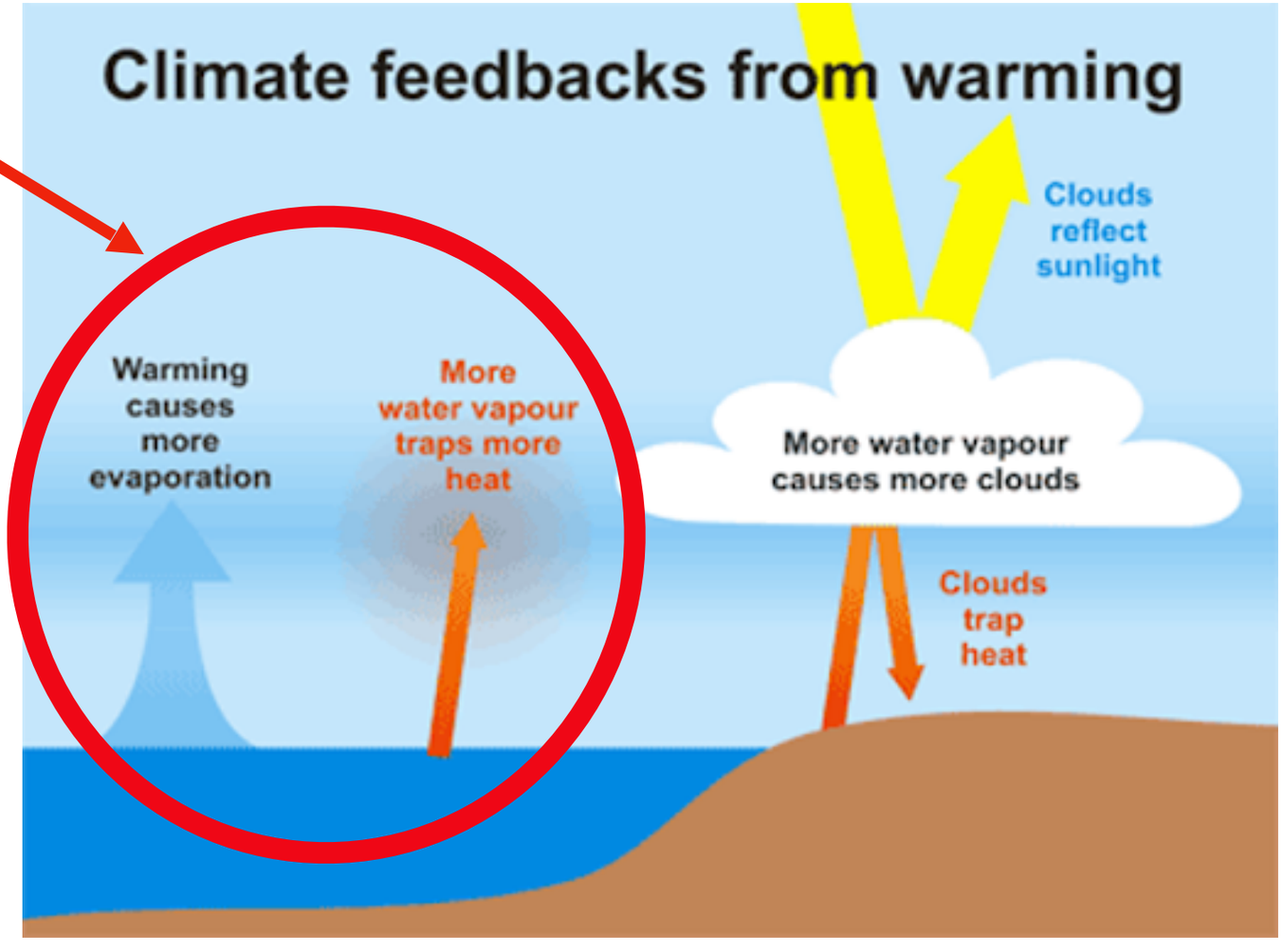
Radiative component of Water-Vapor Feedback

- **Water vapor** is an important greenhouse gas

- **Water vapor content in the atmosphere** is tightly controlled by temperature, so it acts as a feedback on increasing temp: the “Water-Vapor Feedback”

- **Note:** Water vapor content is strongly controlled by temperature, so while it amplifies temperature changes in our climate its not what ultimately determines perturbations to the climate itself





Review of logarithms and exponentials:

1. $2^3 = 2 \times 2 \times 2$
2. $e^x = exp(x)$ means e multiplied by itself x times
3. $\ln(e) = 1$ $\qquad\qquad$ $\ln(x) = \log_e(x)$
4. $\log(a^b) = b\log(a)$
5. $\log_a(b) = \dfrac{\ln(b)}{\ln(a)}$
6. exp(a)/exp(b) = exp(a-b)