

METR 5223: Atmospheric Radiation

# Stand and Deliver

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Within 5%, what is the number of kilograms of air per square meter of the Earth's surface?

Within 5%, what depth of water has the same column density as the atmosphere?

Within 10%, what depth of water has the same heat capacity as a column of the atmosphere?

Within 5%, what is the current ppmv of CO<sub>2</sub>?

The year 2008 atmospheric concentration of CO<sub>2</sub> *by either volume or number* is 385 ppm. What is the current concentration in ppm *by mass*?

(a) 582 ppm

(b) 255 ppm

(c) 1004 ppm

(d) none of the above

Within 5%, what is the number of kilograms of CO<sub>2</sub> per square meter?

If all 385 ppmv of CO<sub>2</sub> condensed out of the atmosphere as “dry ice”, it would form a layer of thickness:

- (a) 3 kilometers
- (b) 3 meters
- (c) 3 millimeters
- (d) 3 microns

If the “effective emission temperature”  $T_e$  of the sun increases by 1%, by what percent does the outward flux density increase?

If the incoming solar radiation to Earth increases by 4%,  
by what % does the “effective emission temperature”  $T_e$   
of the Earth increase? (in equilibrium)

The per capita residential electricity consumption in the US is:

(a) 50 terawatts

(b) 50,000 W

(c) 5,000 W

(d) 500 W

A very large wind turbine produces (on average):

(a) 1 GW or  $10^9$  W

(b) 1 MW or  $10^6$  W

(c) 1 kW or  $10^6$  W

(d) 1 W

A typical nuclear power plant produces (on average):

(a) 1 TW or  $10^{12}$  W

(b) 1 GW or  $10^9$  W

(c) 1 MW or  $10^6$  W

(d) 1 kW or  $10^3$  W

The average power of solar radiation reaching the ground over the entire area of Cleveland County (area is  $1445 \text{ km}^2$ ) is:

(a) 200 GW

(b) 20 GW

(c) 2 GW

(d) 200 MW