

$$4(3.1415)(6378 \text{ km}^2) \left( \frac{1000^2 \text{ m}^2}{\text{km}^2} \right) (0.70) = 5.61 \times 10^{10} \text{ m}^2 \text{ of water on the surface}$$

Volume of water that would be evaporated in 1 yr if it was the sole absorber =

$$\text{Area} * \text{depth} = 5.61 \times 10^{10} \text{ m}^2 * 10 \text{ m} = 5.61 \times 10^{11} \text{ m}^3.$$

$$\text{Mass of water} = 5.61 \times 10^{11} \text{ m}^3 * 1000 \text{ kg/m}^3 = 5.61 \times 10^{14} \text{ kg}$$

$$\text{Moles of water} = 5.61 \times 10^{14} \text{ kg} / (0.018 \text{ kg/mole}) = 3.116878792 \times 10^{16} \text{ moles}$$

$$\text{Joules absorbed by earth in 1 year} = 3.116878792 \times 10^{16} \text{ moles} * 41 \text{ kJ/mole} = 1.22 \times 10^{18} \text{ kJ} = 1 \times 10^{21} \text{ J}$$

**Check:** solar radiation reaching upper atmosphere:  $1360 \text{ W/m}^2$

Of the  $1360 \text{ W/m}^2 = 1360 \frac{\text{J}}{\text{sm}^2}$  that reaches the earth's upper atmosphere, only 70% penetrates.

$$4(3.1415)(6378 \text{ km}^2) \left( \frac{1000^2 \text{ m}^2}{\text{km}^2} \right) (0.70) \left( 1360 \frac{\text{J}}{\text{sm}^2} \right) \left( \frac{3600\text{s}}{\text{h}} \right) \left( \frac{24\text{h}}{\text{d}} \right) \left( \frac{365.25\text{d}}{\text{y}} \right) = 2 \times 10^{21} \text{ J/y}$$