

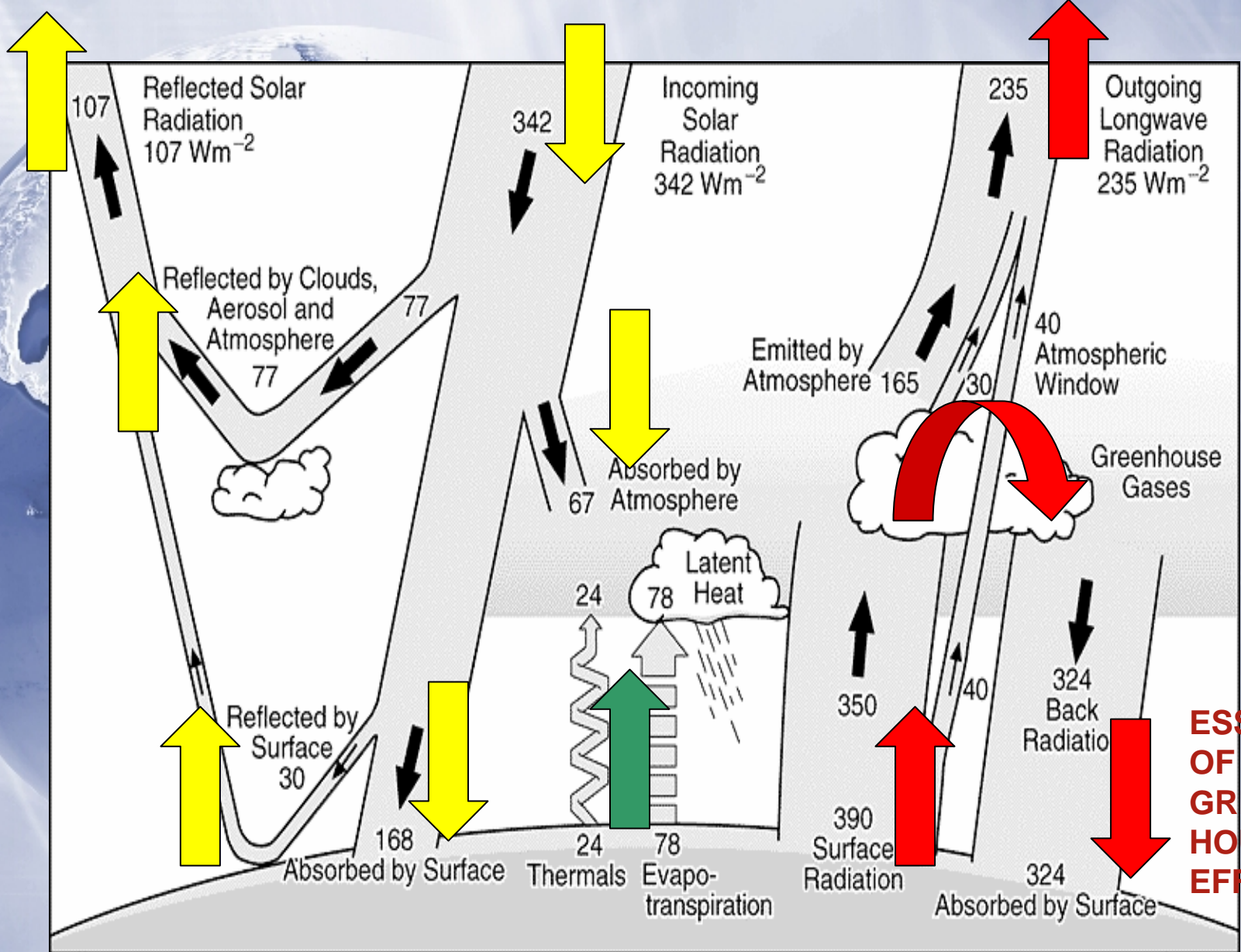


ENERGY BALANCE IN THE CLIMATE SYSTEM

**WHAT ARE THE VERTICAL FLOWS OF ENERGY
THAT DETERMINE GLOBAL TEMPERATURES?**

**THE FUNDAMENTAL UNITS WE WILL USE
TO MEASURE FLOWS ARE **WATTS/(METER)²****

ENERGY BALANCE IN THE CLIMATE SYSTEM



ESSENCE OF THE GREENHOUSE EFFECT

Image courtesy of IPCC.



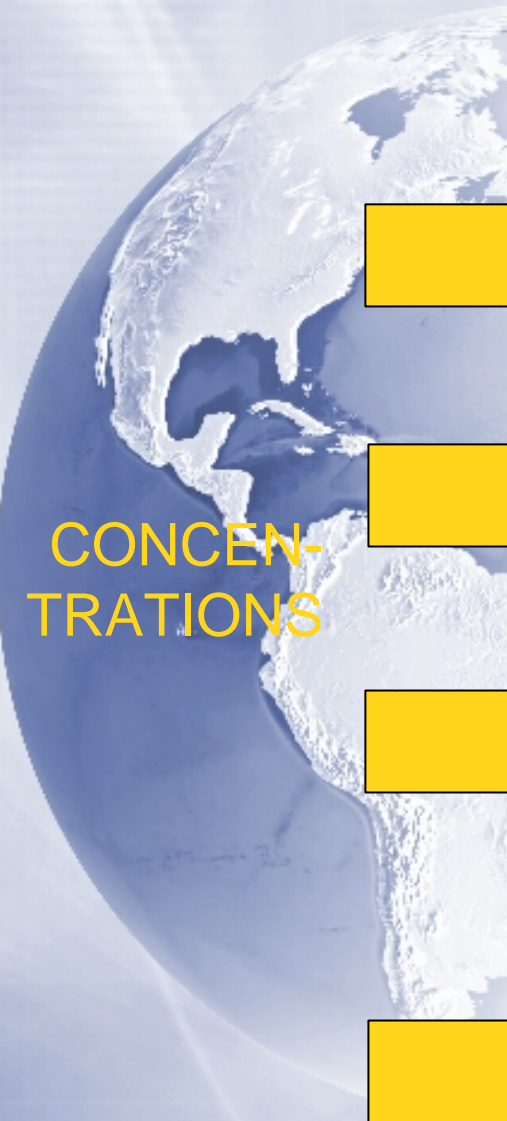
HUMAN & OTHER INFLUENCES ON CLIMATE

HOW IS THE COMPOSITION OF THE ATMOSPHERE CHANGING?

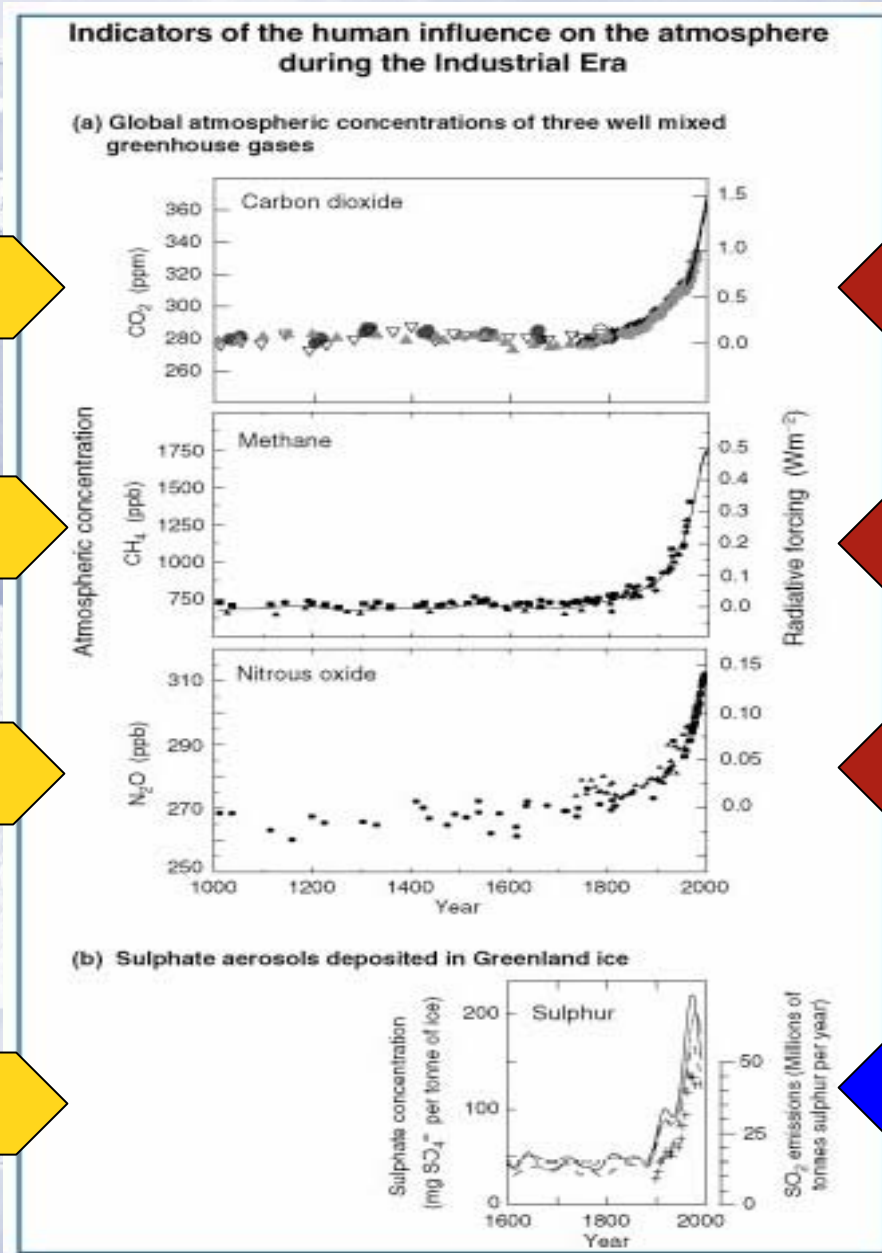
HOW HAVE THE ENERGY FLOWS CHANGED SINCE PRE-INDUSTRIAL TIMES?

RADIATIVE FORCING (watt/m^2) IS THE CHANGE IN THE VERTICAL ENERGY FLOW (at the tropopause) INDUCED BY CHANGES IN GREENHOUSE GASES, AEROSOLS, & OTHER CLIMATE FORCING PROCESSES

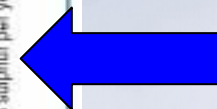
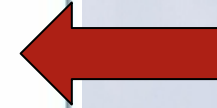
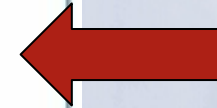
COMPOSITION CHANGES: PREINDUSTRIAL TO PRESENT



CONCENTRATIONS



RADIATIVE FORCING



EMISSIONS

Image courtesy of IPCC.

WHAT ARE THE MAJOR HUMAN & NATURAL ACTIVITIES FORCING CLIMATE CHANGE IN THE INDUSTRIAL ERA (1850-2000)?

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THERMAL STRUCTURE OF THE ATMOSPHERE

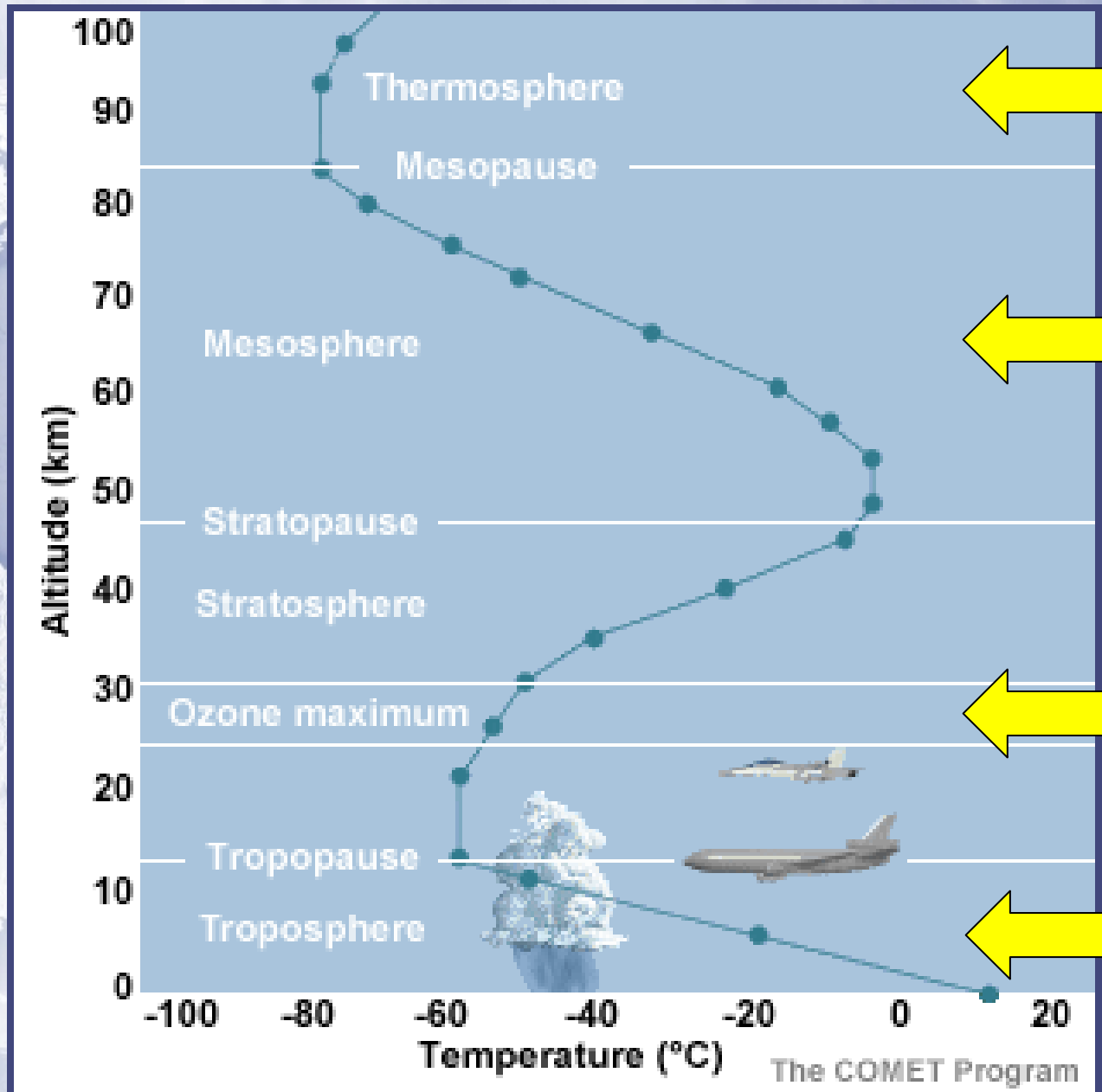


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