

## Annual Average Heat Budgets for Latitude Zones (Surface and Atmosphere Combined)

### High Latitudes

$$0 \approx \text{Rate of change of temperature} \propto \text{Rate of change of heat content} = \text{Rate of absorption of solar radiation} - \text{Rate of emission of LWIR radiation} + \text{Net transport of heat from middle latitudes by winds (in midlatitude cyclones straddling middle \& high latitudes)**}$$

### Middle Latitudes

$$0 \approx \text{Rate of change of temperature} \propto \text{Rate of change of heat content} = \text{Rate of absorption of solar radiation} - \text{Rate of emission of LWIR radiation} + \text{Net transport of heat from low latitudes by ocean currents (gyres straddling low \& middle latitudes)*} - \text{Net transport of heat to high latitudes by winds (in midlatitude cyclones straddling middle \& high latitudes)**}$$

### Low Latitudes

$$0 \approx \text{Rate of change of temperature} \propto \text{Rate of change of heat content} = \text{Rate of absorption of solar radiation} - \text{Rate of emission of LWIR radiation} - \text{Net transport of heat to middle latitudes by ocean currents (gyres straddling low \& middle latitudes)*}$$