

Earth's Energy Budget

Ins and Outs of Earth's Energy Budget

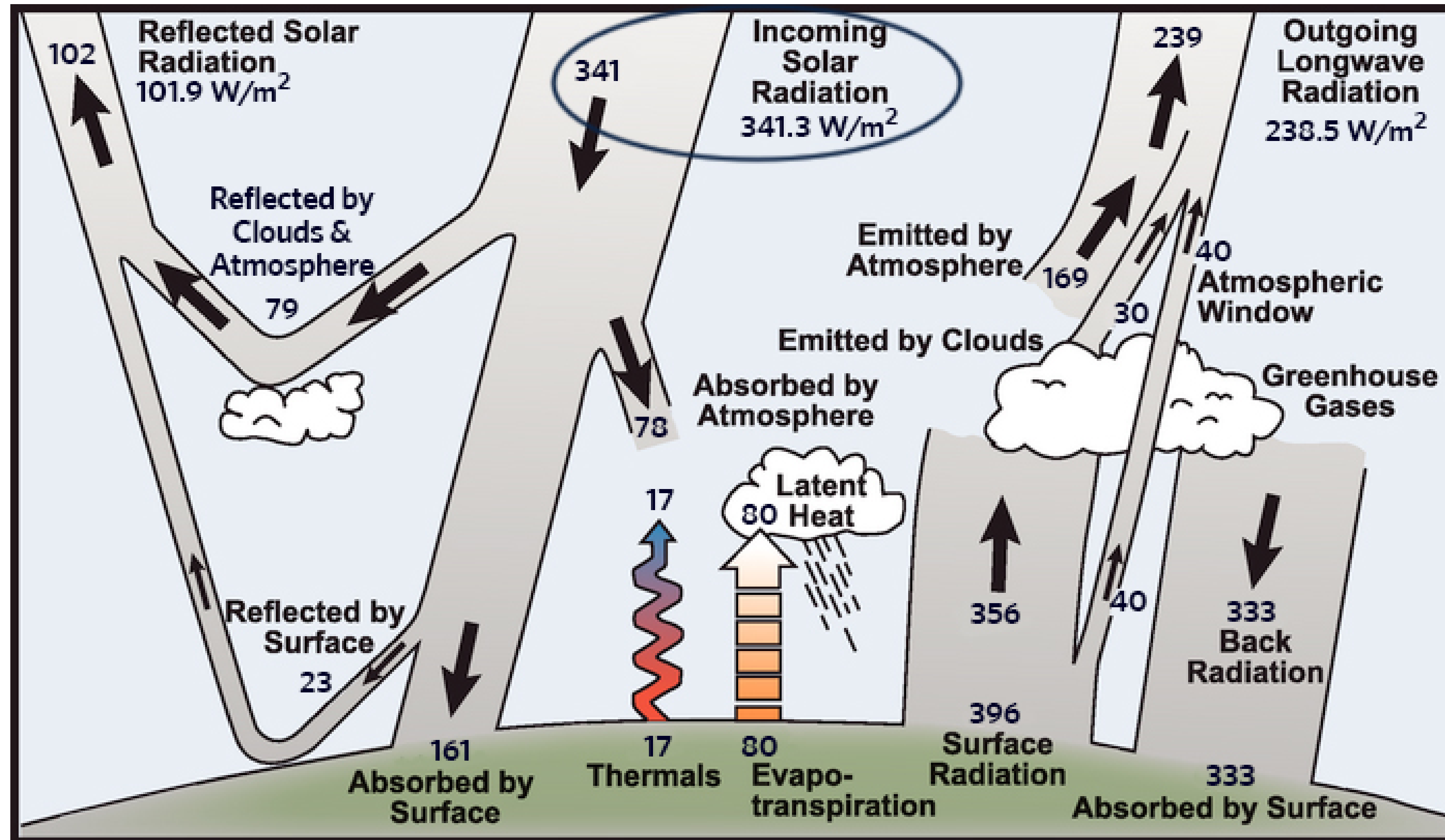
MODULE 3.2

3.2 Ins and Outs of Earth's Energy Budget

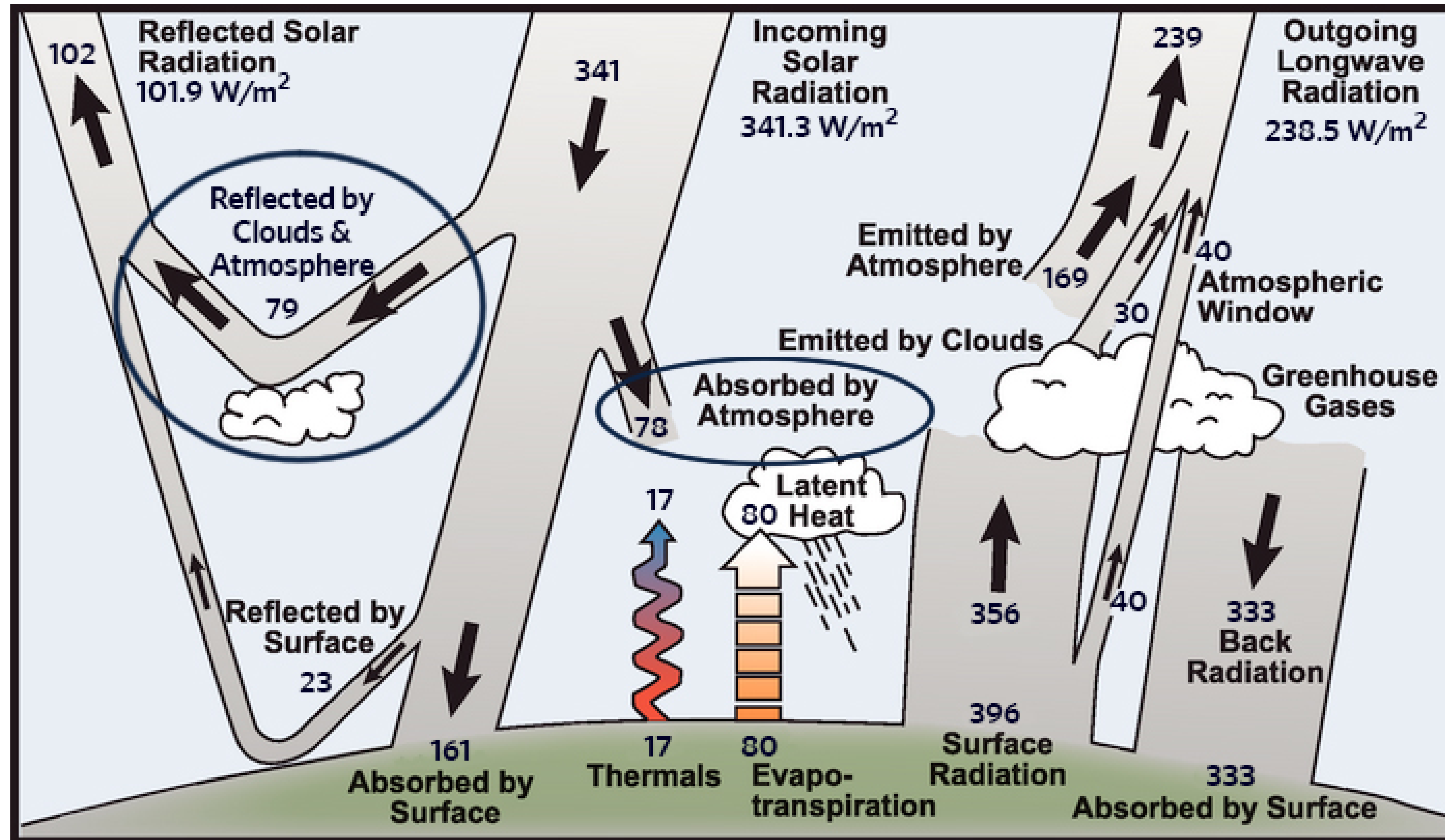
Lesson Goals:

- » Describe how incoming and outgoing electromagnetic radiation interacts with Earth's surface and its atmosphere
- » Balance energy budgets for the top of the atmosphere, the atmosphere, and Earth's surface

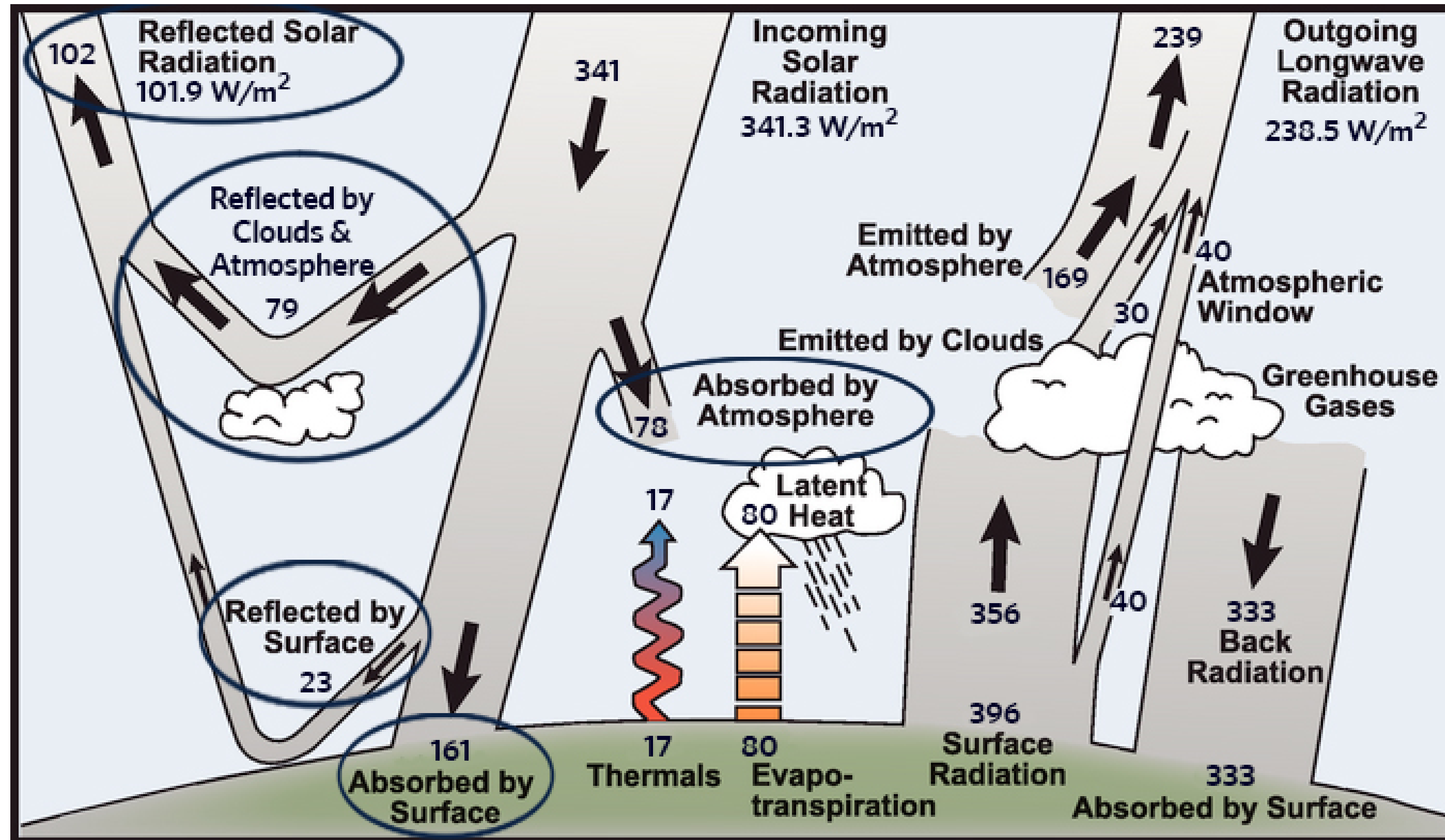
Earth's Annual Energy Budget



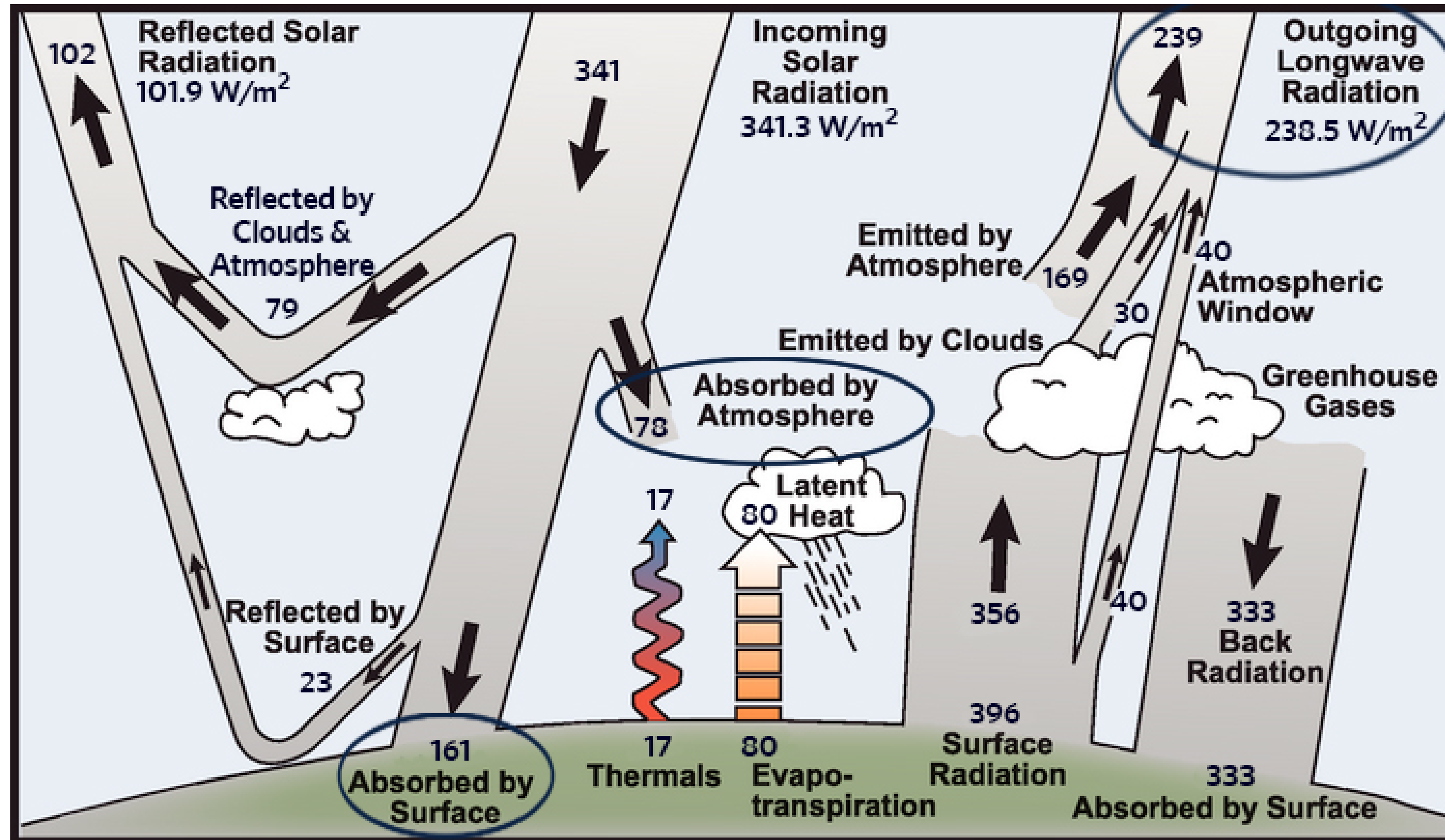
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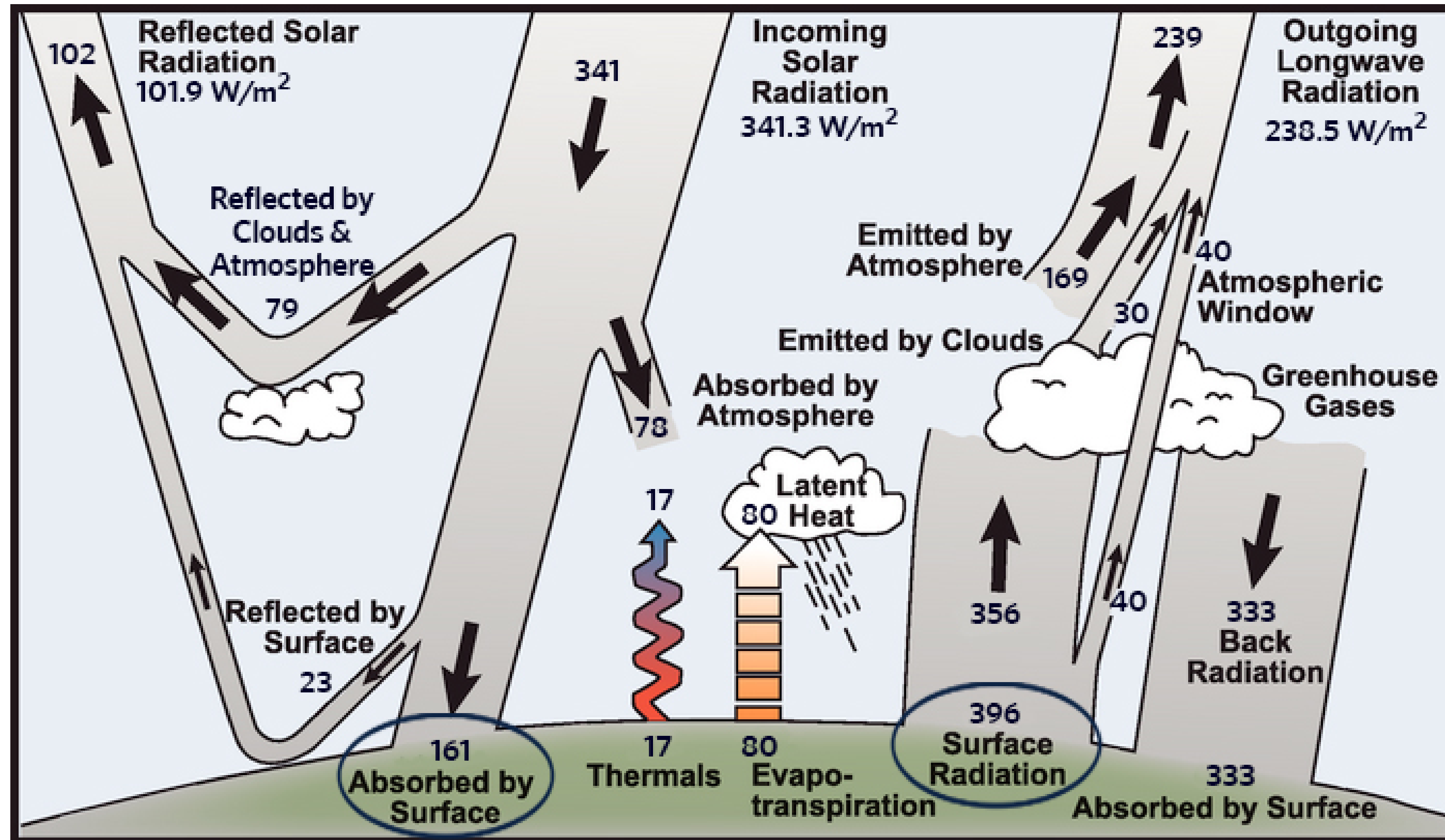
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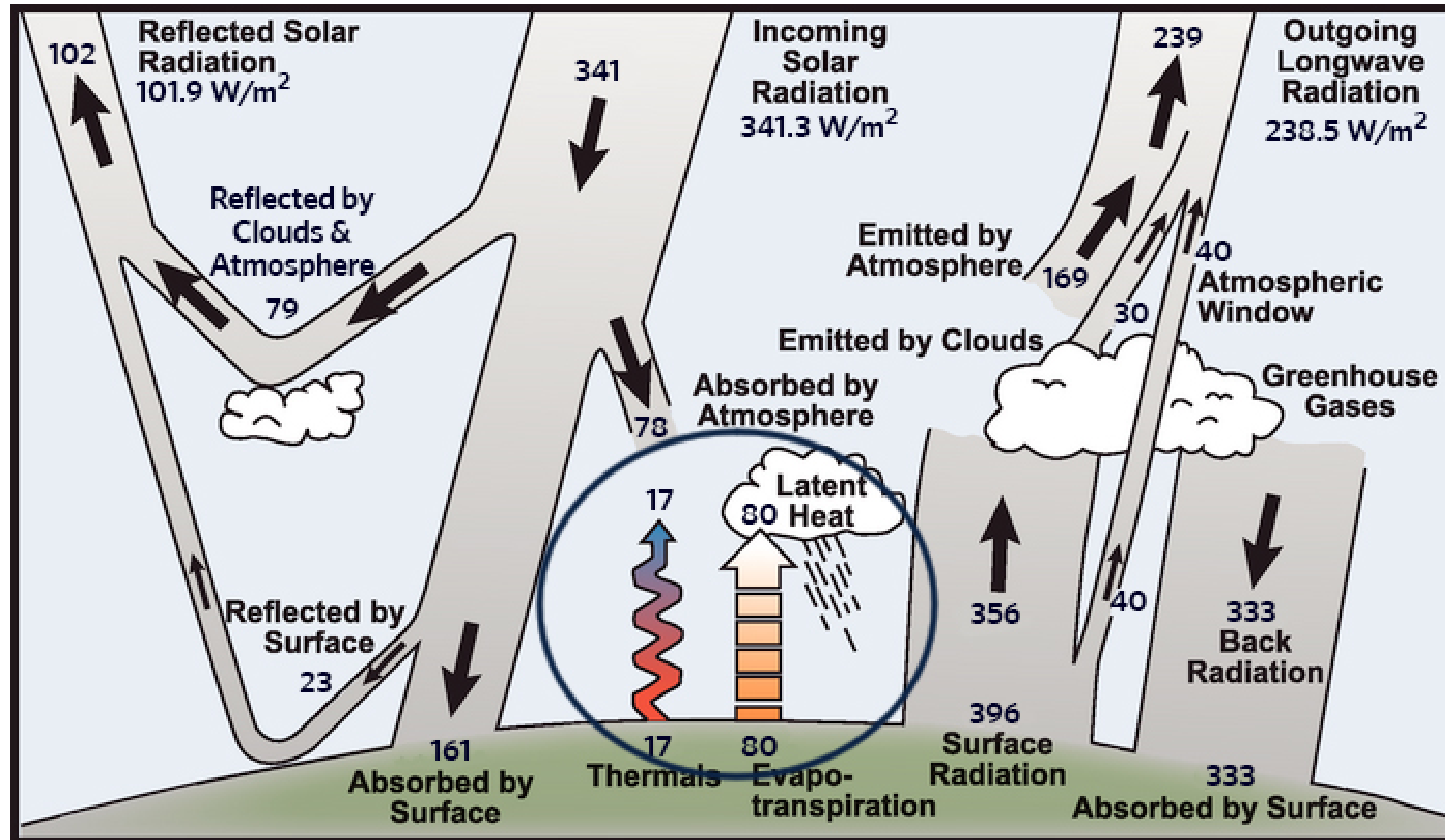
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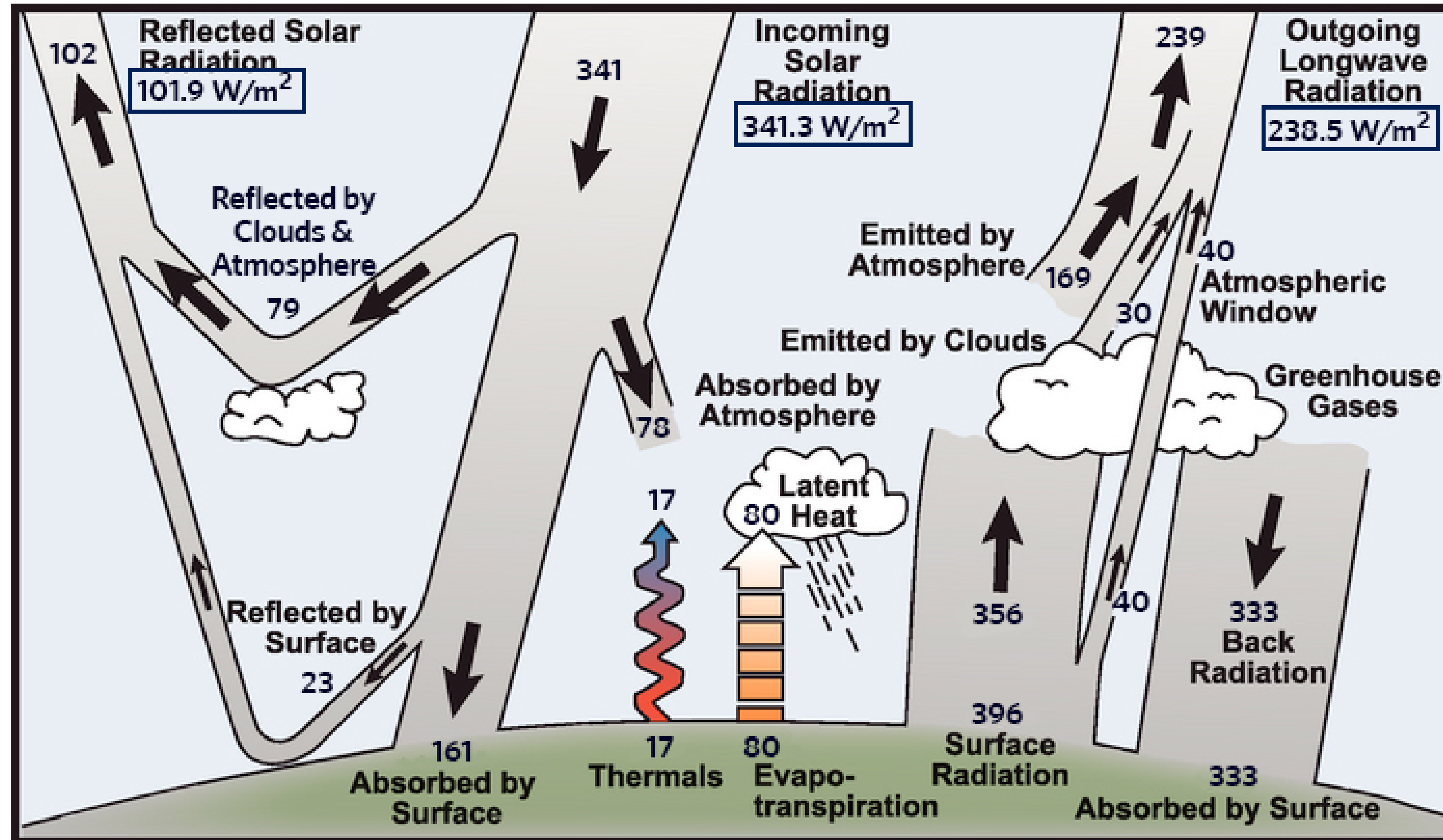
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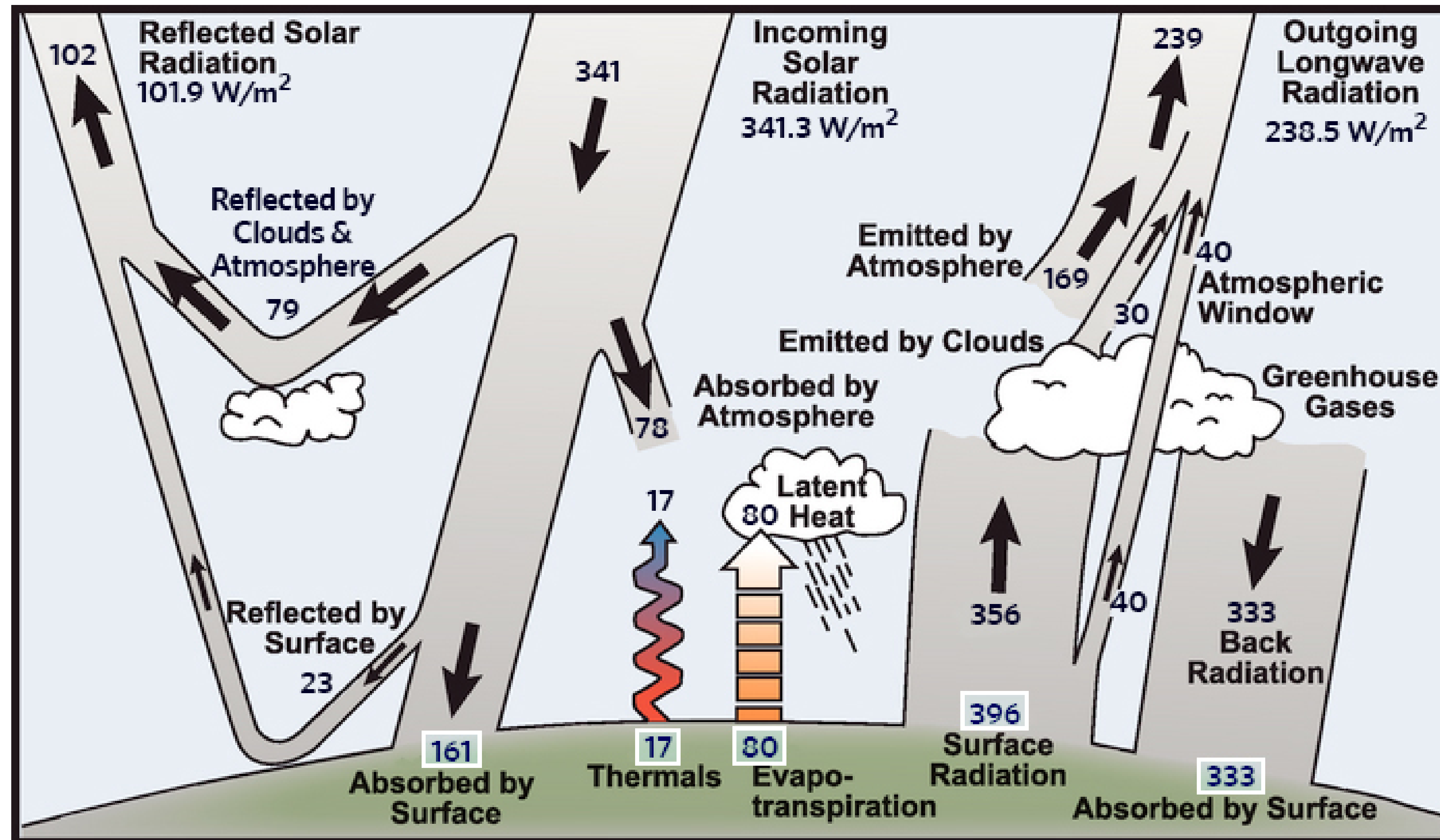


Based on flows through the top of the atmosphere, is Earth in balance, or gaining, or losing energy?



- A. In balance
- B. Gaining energy
- C. Losing energy

Based on flows on this diagram, is Earth's surface in energy balance, or gaining, or losing energy?



- A. In balance
- B. Gaining energy
- C. Losing energy

Key Points

- » Shortwave radiation from the Sun is the ultimate source of energy for Earth's climate system.
- » About 30% of incoming solar radiation gets reflected directly back to space.
- » Earth absorbs energy from two sources: incoming solar energy and energy re-emitted back toward Earth by greenhouse gases.
- » Earth therefore heats up to a temperature at which it can radiate enough energy such that its energy outflow will balance its energy inflow.
- » The planet is currently out of balance, with inflow exceeding outflow.
- » Earth's temperature will rise until inflow and outflow are back in balance.