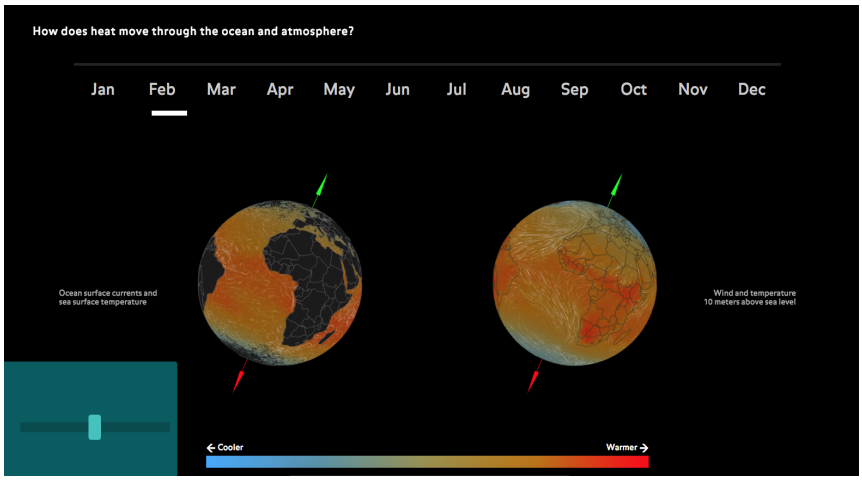
How Climate Works

Energy from the Sun drives climate.



Screen 3: Moving Heat
How does heat move through the system?

resting screen

Move the sliders below to discover Earth's dynamic system

intro—is this the same as the resting state? if so, cut this one.

The air and oceans distribute the relatively large amount of solar energy at the equator toward the poles, which receives very little. How does this energy move?

globe labels

right: **Ocean-** Currents and water temperature at the sea surface *left:* **Atmosphere** Wind currents and air temperature near the sea surface

callout: Gulf Stream

Gulf Stream *western Atlantic boundary current* This fast-moving current carries heat from the tropics toward the poles along the coast of North America.

callout: Kuroshio current

Kuroshio Current
western Pacific boundary current
A warm current running north from the tropics. In the mid-latitudes, it joins the North Pacific current and flows eastward.

callout: Hadley cells

Hadley cells
Warm air rises from the equator, then cools as it moves toward the poles. This cool air sinks to the surface, creating a loop of air circulation known as a Hadley cell.

callout: peru current

Peru Current
eastern Pacific boundary current
A cold, north-flowing current that brings nutrients to sea life near South America. This current weakens during El Niño years, warming coastal areas and reducing fish populations.

callout: Antarctic circulation

Southern Ocean
Antarctic circumpolar current
The world's largest current circles Antarctica. Here, very cold, nutrient-rich bottom waters rise to the surface, travel north and are distributed throughout the world's oceans.

callout: polar jet stream

Northern Polar Front
Here, cold polar air meets warm air moving north from equator. This forms a fast-flowing, wavy river of air that drives weather patterns from west to east.

callout: trade winds

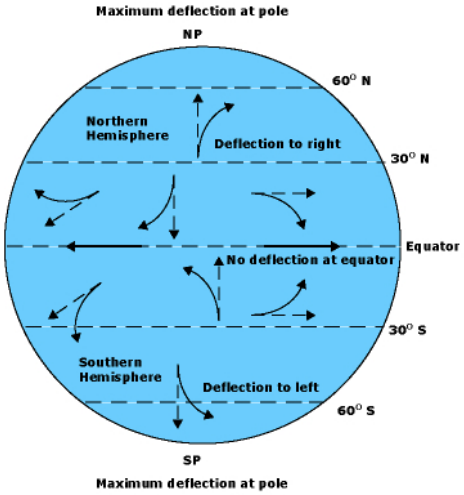
Trade Winds
Some warm, tropical air cools and sinks before reaching the poles. These masses return to the equator, flowing southeast in the Northern Hemisphere and northwest in the Southern Hemisphere. They meet at the Intertropical Convergence Zone.

note: can cut last line (ITCZ) if too long

callout: Coriolis effect

Coriolis Effect
Earth's rotation deflects rising air masses. Without this force, air would move directly from the tropics to the poles—but the Coriolis Effect results in currents moving in a curved path.

Brian—can we animate something like this? Just the deflection between 30°N and 30°S



callout: climate equator

Thermal Equator
This band of warm air rises from where solar energy is most concentrated. This changes seasonally, moving slightly north in June and south in December.

*currents label—**could change based on animation***

faster lines show faster currents

scale label: temperature

warmer ——————— colder
temperature

references

sea surface temperature: NASA Goddard Space Flight Center
ocean surface currents: NASA Jet Propulsion Laboratory
air currents and temperature: NOAA Global Forecast System