Introduction to Earth's Climate System

Earth's Climate System

MODULE 2.1

2.1 Earth's Climate System

Video Lesson Goals:

» Describe the primary components of the Earth system: the atmosphere, hydrosphere, biosphere, and geosphere.

» Explain how three primary factors each influence energy flow in Earth's climate system: solar energy, reflectivity, and the greenhouse effect.

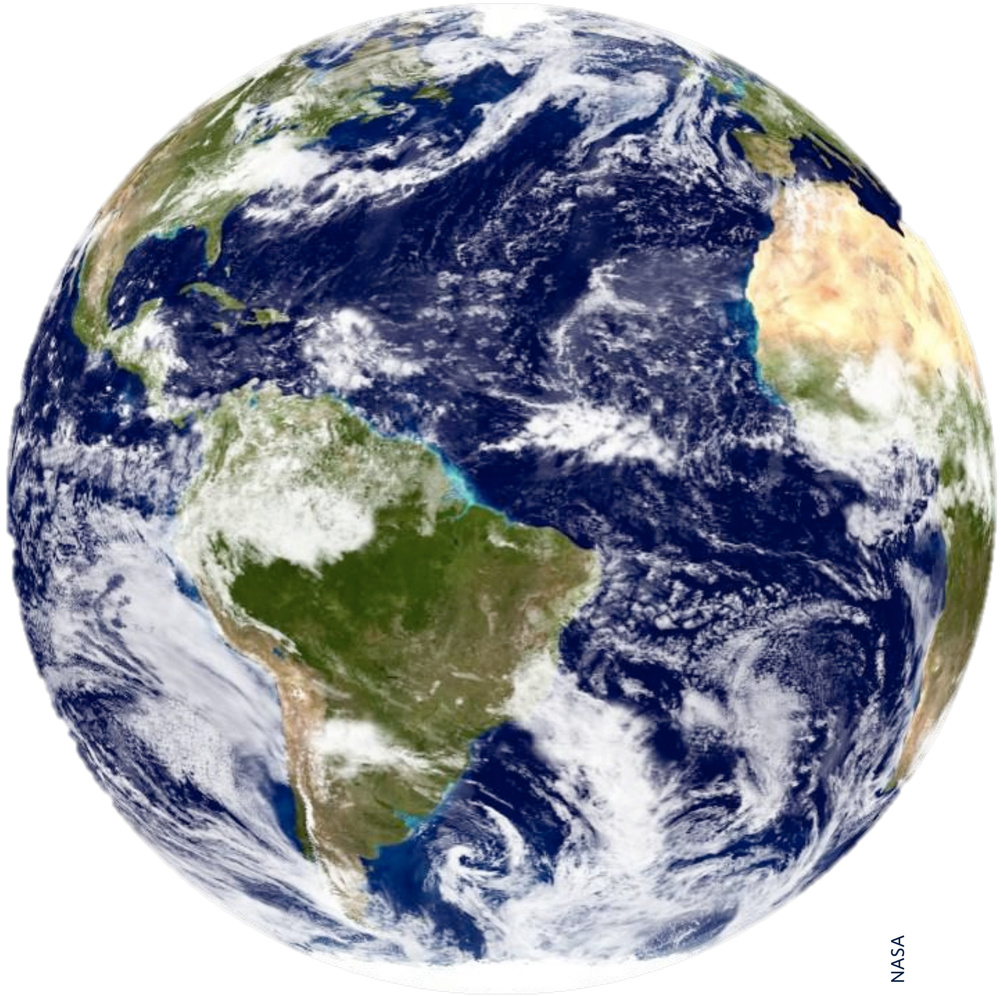
What's YOUR mental model?

» Get out a piece of blank paper, or open a blank electronic file in which you can draw and write text.

» Set a timer for 15 minutes.

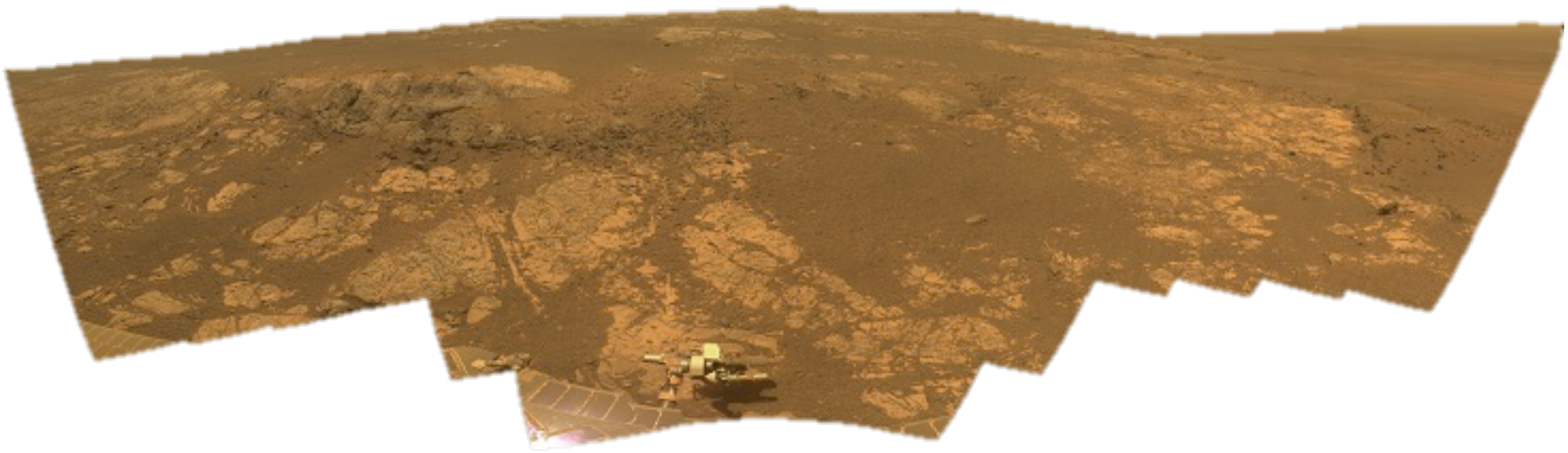
» Take 15 minutes to draw and annotate what the phrase "Earth's Climate System" makes you think of.

Build a planetary climate system



NASA

A rocky surface

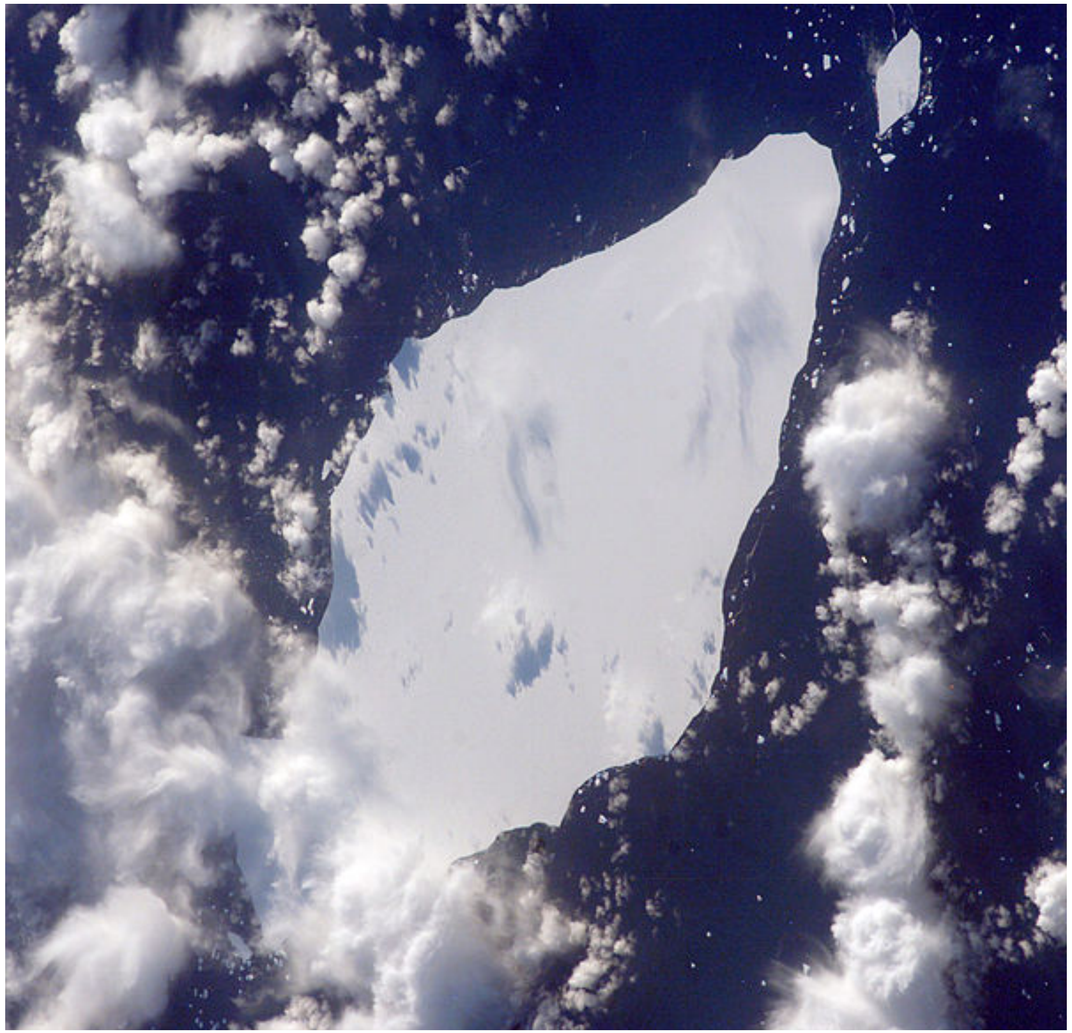


NASA

Gases: an atmosphere

NASA

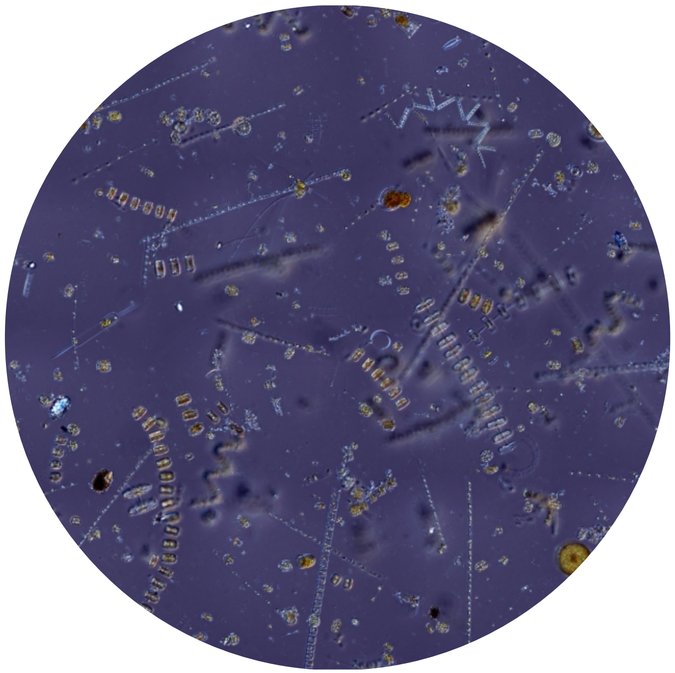
Water



NASA

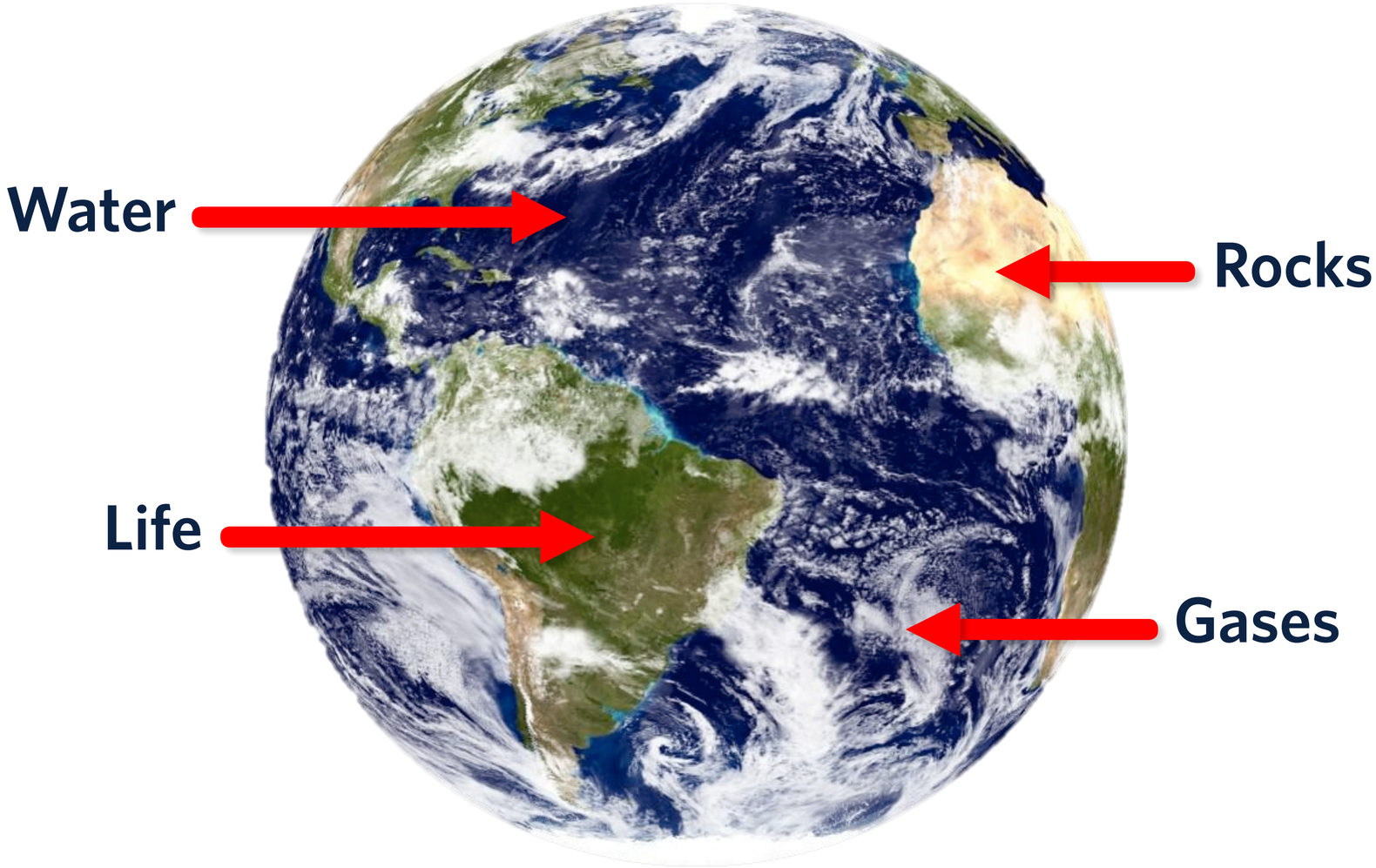
Life

THE PHYTOPLANKTON ENCYCLOPEADIA PROJECT



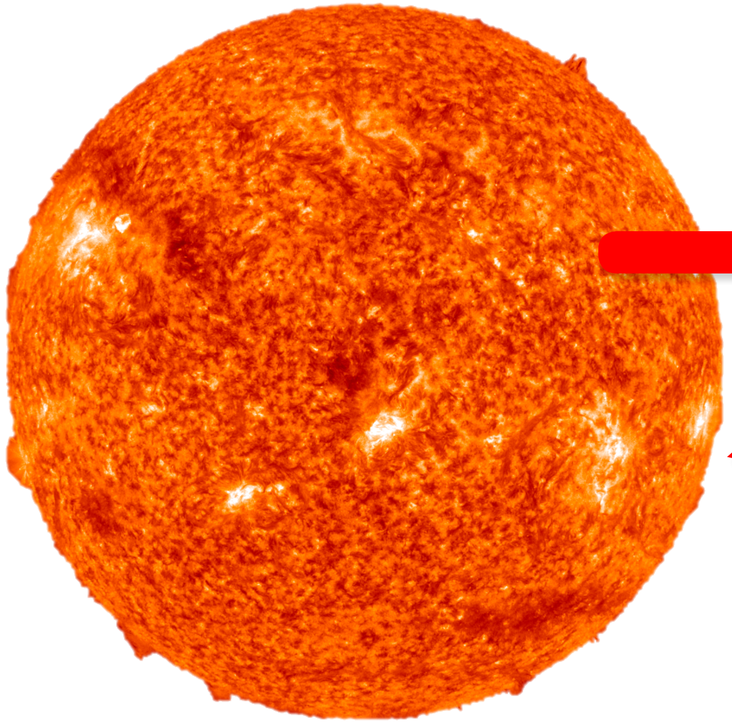
RISSELL: PUBLIC DOMAIN

Life



NASA

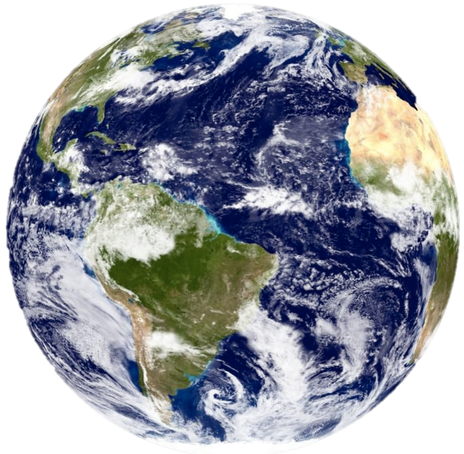
Energy Flows:
Solar energy, Earth's reflectivity, & the greenhouse effect



The SUN: Energy source

REFLECTION back to space

By clouds & aerosols* in the atmosphere, and by Earth's surface (rocks, water, ice, plants…)



The GREENHOUSE EFFECT:

Infrared radiation emitted by Earth's surface is absorbed and re-emitted by greenhouse gases, slowing the passage of energy back to space

* AEROSOLS ARE TINY DROPLETS OR PARTICLES SUSPENDED IN THE ATMOSPHERE

NASA

Key Points

» The atmosphere, hydrosphere, biosphere, and geosphere comprise a useful way to describe the basic reservoirs for materials on Earth

» Materials constantly exchange among these reservoirs

» The primary source of energy for Earth's climate system is the Sun

» The reflection characteristics of Earth materials in all four reservoirs influences how much solar energy reflects directly back to outer space

» Greenhouse gases in the atmosphere, with concentrations controlled by flows of material to and from the atmosphere and the other three reservoirs, act to slow the passage of energy from Earth's surface back to space, warming Earth's surface and lower atmosphere.

Add to your climate system

» Get out your drawing again

» Add at least 2 features or processes to it that you hadn’t included before.