QUICK START GUIDE
To Finding Data/Imagery for Student Investigations

For additional information and to link to the resources below, go to the interactive table at:
http://k12datapaths.strategies.org

This table lists examples of NASA datasets and imagery that could be used for student investigations related to content and practices in the *Framework for K-12 Science Education*. Explore the data on the left using the online sources listed on the right. Many datasets are available through multiple sources; each source provides unique features, analytical tools, and time periods. Sources are color coded for relative level/ease-of-use: BLUE (introductory), ORANGE (intermediate), and GREEN (advanced).

…using these online sources of data.

Online sources:
- **Precipitation Measurement Missions** — https://pmm.nasa.gov/data-access/visualization
- **NEO** • http://neo.sci.gsfc.nasa.gov
- **Google Earth Engine Time Lapses** — https://earthengine.google.com/timelapse
- **The GLOBE Program** • https://www.globe.gov/globe-data
- **MY NASA DATA** • http://mynasadata.larc.nasa.gov
- **Change Matters Viewer** — http://www.esri.com/software/landsat-imagery/viewer
- **Worldview** — http://worldview.earthdata.nasa.gov

Data examples that *students* can use… / Data examples that *educators* can use…	…to investigate these types of phenomena… …to make connections to K–12 content and practices…	Precipitation Measurement Missions	NEO	Google Earth Engine Time Lapses	The GLOBE Program	MY NASA DATA	Change Matters Viewer	Worldview
Aerosols: Tiny liquid or solid particles dispersed in the atmosphere; can be caused by natural processes or human activity.	Air quality and pollution (ESS3.C) / Earth's energy budget (ESS2.A) / Weather & climate (ESS2.D)		●		●	●		●
Black Marble/Earth at Night: Nighttime view of Earth, showing visible light emanating from man-made sources, e.g., city lights.	Urban growth/heat Islands (ESS3.C) / Power outages (ESS3.C) / Seasonal migration (LS2.C)				●			●
Blue Marble Next Generation: Composite images showing how the surface would look to a human in space if our world had no clouds and no atmosphere.	Seasonal changes on land surface (spring greening, snowmelt, drought, etc.) (LS2.A, ESS2.D)		●					●
Climate: Solar Insolation, temperature, precipitation, albedo, greenhouse gases/carbon, aerosols, and topography.	Factors contributing to global and regional climate (ESS2.D)		●		●	●		●
Earth System: Solar insolation, surface temperature, cloud fraction, aerosols, precipitation, and vegetation index.	Earth system and cycles (ESS2.A)	●	●		●	●	●	●
Land Cover Classification: Maps displaying the Earth's natural and human-made landscapes as color-coded categories.	Land cover changes (ESS3.C, LS2.C)		●		●	●	●	
Land Surface: Since 1972, **Landsat** satellites have been observing Earth's land surfaces and coastal regions. **MODIS Near-Real-Time Data:** Data for applications related to natural hazards and disasters (e.g., volcano ash plumes, drought, fires, severe storms, and sea ice conditions).	Coastline changes (ESS2.C) / Deforestation (ESS3.C) / Ecosystems (LS2.C) / Natural hazards & disasters (ESS3.B) / Sea ice movement (ESS3.B) / Water & land use changes (ESS2.C)			●			●	●

← **INTRODUCTORY** →   ← **INTERMEDIATE** →   ← **ADVANCED** →

Data examples that *students* can use…

Data examples that *educators* can use…

…to investigate these types of phenomena…

…to make connections to K–12 content and practices…

…using these online sources of data.

- **Precipitation Measurement Missions** https://pmm.nasa.gov/data-access/visualization
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Data example	Phenomena / K–12 connections	Precipitation Measurement Missions	NEO	Google Earth Engine Time Lapses	The GLOBE Program	MY NASA DATA	Change Matters Viewer	Worldview
Land Surface Temperature: Temperature of what is on the land surface (e.g., snow and ice, grass, roads), which is different from air temperature. Land temperature anomaly maps show higher or lower than average temperatures.	Global warming (ESS3.D); Urban heat islands (ESS3.C); Weather/seasons (ESS2.D)		●		●	●		●
Precipitation: Global and regional rain and snow accumulation.	Natural hazards and disasters (floods, landslides, severe storms) (ESS3.B); Water cycle and resources (ESS2.C); Weather and climate (ESS2.D)	●	●		●	●		●
Radiation and Energy: Albedo—relative amount of incoming radiation reflected up; Solar insolation—amount of Sun's energy that reaches the surface; Solar radiation—amount of sunlight reflected by Earth's surface, clouds, & atmosphere (shortwave) or absorbed then emitted by Earth's surface, water vapor, gasses, and aerosols (longwave).	Earth's energy budget (PS3.D); Electromagnetic spectrum (PS4.B); Plant growth patterns (LS2.C); Solar power (ESS2.A, PS3.D); Weather and climate patterns (ESS2.D)		●		●	●		●
Sea Ice: Sea ice changes the normally dark blue ocean into solid white ice. This affects weather and climate—sunlight that would be absorbed by the ocean is now reflected back by the ice, due to its high albedo.	Earth system and feedback loops (ESS2.A); Electromagnetic radiation (PS4.B)		●			●		●
Sea Surface Temperature: Temperature of the very top layer of the ocean and other large bodies of water.	Carbon cycle/carbon in ocean (PS3.D); El Niño (ESS2C, ESS2.D); Hurricanes and typhoons (ESS3.B); Marine ecosystem health (LS2.A); Ocean circulation and climate (ESS2.C)		●		●	●		●
Vegetation and Leaf Area Indices: Measure of the "greenness" of Earth's landscapes—where and how much green leaf vegetation was growing during a time period.	Deforestation (ESS3.C, LS2.C); Forest and crop health (LS2.C); Plant growth patterns (LS2.C); Seasonal changes (green up/down) (LS2.A)		●		●	●	●	●
Weather: Atmospheric temperature, pressure, radiation, and water vapor, precipitation.	Weather and climate (ESS2.D)	●	●		●	●		●

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