

All about the Hydrosphere

Colorado Science Academic Standards 2020

- High School Standard 3. Earth and Space Science
 - 6. The planet's dynamics are greatly influenced by water's unique chemical and physical properties
 - 12. Global climate models used to predict future climate change continue to improve our understanding of the impact of human activities on the global climate system.

Colorado Math Academic Standards 2020

- High School Standard 3. Data, Statistics, and Probability
 - HS.S-ID.C. Interpreting Categorical & Quantitative Data: Interpret linear models.
 - HS.S-IC.B. Making Inferences & Justifying Conclusions: Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

Math and Science concepts I want to incorporate are data analysis, cause and effect, ability to read graphs, and present scientific research.

Objectives: Scientists will be able to describe the water cycle and apply that knowledge to the hydrosphere. Scientists will be able to research, compare, and present historical data about hydrosphere events.

In high school Earth Science (9th grade) we review the water cycle before addressing Earth's hydrosphere and weather patterns. My students are interested in weather, weather patterns, and finding out when the next snow day is. I find that my students know about the water cycle but they do not apply the water cycle to outside factors that it is affected by and how the water cycle feeds into weather patterns. Factors that can affect the water cycle are solar radiation, air temperature, vapor pressure, wind, atmospheric pressure, and salinity levels.

Data collection will be based on the understanding of data analysis, graph reading, cause and effect of water cycle, and climate readings. This data serves as an engaging content because students can chose data and dates to compare. Students will be able to choose what data set they would like to compare. The data graphs are interactive and color based when comparing different dates.

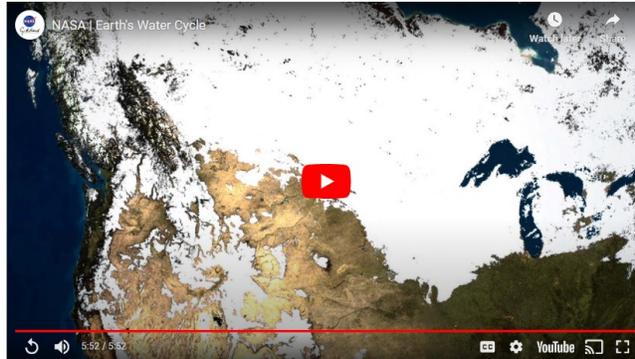
Measurable outcomes will be in a presentation style for the students. Students will present what data they researched, why they chose that specific data, how the hydrosphere and water cycle is involved, and what they learned from their research. Students will submit all work and a reflection paper about their completed assignment. I will have check in's with students throughout the research time to help guide deeper thinking.

When the lesson concludes evidence that will be collected include a hand drawn water cycle model, class discussion about effect of water cycle on the hydrosphere, and presentation of hydrosphere research.

Resources to be used at various times:

- Video about Earth's Water Cycle, Source: NASA Goddard, Video to reviewing the water cycle
 - o <https://www.youtube.com/watch?v=oaDkph9yQB8>

Video: Earth's Water Cycle



Earth's Water Cycle | <https://www.youtube.com/watch?v=oaDkph9yQB8> | Source: NASA Goddard

Water is necessary for sustaining life on Earth and helps connect the Earth's systems. Precipitation, evaporation, freezing and melting and condensation are all part of the hydrological cycle (AKA water cycle)- a never-ending global process of water circulation from clouds to land, to the ocean, and back to the clouds. This cycling of water is intimately linked with energy exchanges among the Atmosphere, Cryosphere, Hydrosphere, and Geosphere. These connections help define the Earth's climate and cause much of natural climate variability. Knowing details about where precipitation occurs, how much, and its characteristics allows scientists to better understand the impact of precipitation on streams, rivers, surface runoff and groundwater.

- Earth System Data Explorer site lets you select sphere, category, dataset, and date. Multiple dataset selections can then be compared to each other.
 - o <https://larc-mynasadata-2df7cce0.projects.earthengine.app/view/earth-system-data-explorer>



Earth System Data Explorer

Dataset Selection

1. Select a Sphere of the Earth System

Hydrosphere

- El Nino Southern Oscillation
- Precipitation
- Sea Level Rise
- Sea Surface Properties

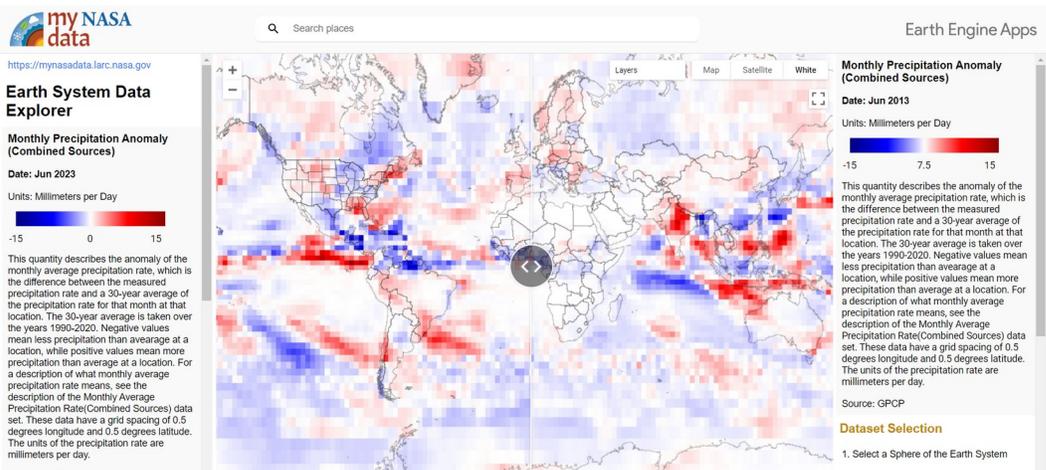
Choose Dataset

4. Select the Date

Year

Month

- Student's will choose **Hydrosphere** but then have a choice of **Category, Dataset, and Date** to display data on the world map. Maps can also be compared to different date ranges.



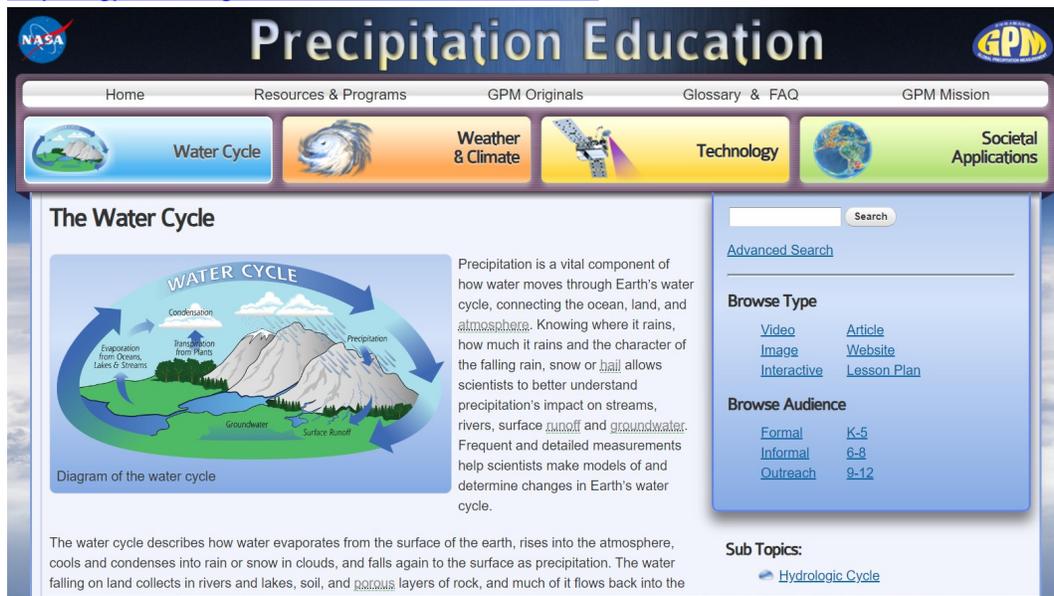
- Above is a comparisons of monthly precipitation of June 2023 to June 2013. The arrows slides back and forth during comparisons.
- Climate Kids site for prior knowledge gaps and fun learning. Students can choose topics about weather and climate, atmosphere, water, energy, and plants and animals.
 - <https://climatekids.nasa.gov/>



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- Precipitation Education site with interactive information on the water cycle, weather and climate, technology, and societal application.

0 <https://gpm.nasa.gov/education/weather-climate>



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- About the hydrosphere site discusses the water cycle and how it interacts with other Earths systems.

0 <https://myasadata.larc.nasa.gov/basic-page/about-hydrosphere>

About The Hydrosphere



This image represents the **hydrosphere** throughout the My NASA data website.

What is the Hydrosphere?



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