

Title: 10 words

Employing NASA-data to model interactions in earth systems

Workshop description - 40 words

Participants will gain experience with technology-rich lessons that engage their students in the analysis of data obtained by earth-observing satellites to monitor the flow of energy and matter in Earth systems, and make reasonable inferences regarding the health of our planet.

Please provide a detailed description of your workshop for the review committee so they may visualize what will happen in the session. Provide a rough agenda and include the following components: time estimate of each task, and a description of what the presenter and participants are doing during this time. You may include links to outside resources in your description below. You may use hyperlinks to outside resources (please paste the full and direct URL when linking, including http://).

Word Minimum: 100; Word Maximum: 2,000

This workshop is designed to help teachers develop techniques for engaging their students in NGSS science and engineering practices using data collected by NASA earth-observing satellites to better understand issues related to the health of our planet.

The adoption of NGSS requires a paradigm shift in science teaching and learning. In particular, NGSS requires students to engage in NGSS practices to build deeper understanding of science and engineering content and make sense of phenomena and design solutions to real-world problems. Students develop models of systems within the natural world and use them to explain phenomena and propose solutions to problems.

In this workshop, teachers will learn how to employ NASA data to help their students develop scientific questions and develop models about the interactions of the hydrosphere, biosphere, geosphere, and atmosphere. Participants will learn how to engage their students in the analysis and interpretation of data and to construct explanations from evidence. Using NASA datasets and free online analytical tools such as CODAP, Google Sheets, and image processing software, teachers will learn how to address relevant issues regarding the health of our planet.

Time schedule:

0:00-15:00. Participants look for patterns in NASA environmental data sets

15:00-20:00 Participants download a variety of relevant phone-base sensors and apps that can be used to organize and interpret data

20:00-35:00. The workshop leader models the analysis of complex data sets using these apps.

35:00-90:00 The workshop leader leads participants in the analysis and interpretation of environmental data to discern the health of our planet.

List the applicable standards or performance expectations/standards/EP&Cs:

This workshop is designed to help teachers develop lessons for their secondary school students that require them to analyze and interpret data (SEP-4) from earth-observing satellites to understand and model energy and matter flow in the Earth's systems (HS-ESS2-4).

How are the three dimensions of the NGSS integrated into your lesson?

NASA collects a tremendous amount of data regarding various environmental parameters of our Earth, including, but not limited to, surface temperature, soil moisture, plant-stress, atmospheric carbon dioxide, cloud cover, and atmospheric ozone. This workshop focuses on seeing patterns (CCC-1) in NASA data, and then analyzing and interpreting such data (SEP-6) to make reasonable inferences regarding the flow of energy and matter in Earth's systems [ESS2] and the influence of human activity on Earth systems [ESS3].

How does this work in a coherent storyline to help students make sense of phenomena?

Most secondary school students have heard of adverse global phenomena such as climate change, coral bleaching, sea-level rise, and deforestation. In this workshop, teachers will learn how to help their students employ free-analytical tools to analyze NASA data sets so that they may make reasoned interpretations regarding the causes and potential cures of these phenomena.