Career Connections Exploration (CCE) 3:
Geospatial Analyst - Teacher Guide

Learning Time: 2 - 50 minute class periods

Instructional Setting:

- Home, online, classroom

Career Connection Exploration Questions:

- How do geospatial analysts make use of NASA tools?
- Which careers depend on geospatial analysts' ability to interpret NASA data?

Learning Performances:

- Students interpret data from a NASA tool and apply it to careers related to (or reliant upon) geospatial analysts
- Students use their own experiences to identify other careers or times in their own life where the NASA tool may be helpful

NGSS Connections:

Disciplinary Core Ideas (DCI) *Students build towards
LS2.C: Ecosystem Dynamics, Functioning, and Resilience **ESS3.C: Human Impacts on Earth Systems** **ESS2.A: Earth's Materials and Systems** **ESS3.B: Natural Hazards**

Student Activity	**Option 1:** Lake Mead	**Option 2:** Trashcan Volcano	**Option 3:** NIR & NDVI
Science and Engineering Practices (SEP)			
Analyzing Data and Interpreting Results	X	X	X
Using Mathematics and Computational Thinking	X		X
Developing and Using Models		X	
Constructing Explanations and Designing Solutions		X	
Cross Cutting Concepts (CCC)			

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Cause and Effect	X	X	X
Stability and Change	X		X
Patterns	X	X	X
Scale, Proportion, and Quantity	X	X	X

Introduction:
Students do not need any prior experience to do this Career Connection Exploration (CCE). This CCE covers the NGSS Science and Engineering Practices (SEPs) listed in the table above and provides students with practice thinking about the Nature of Science principle "Science is a way of knowing; Science investigations begin with a question" (Next Generation Science Standards 2018).

The purpose of this CCE is to allow middle school students to "pull the curtains back" on a STEM career that relies on NASA-related resources (e.g., satellite data) and explore NASA-generated data. The activity does not require parent supervision or additional resources to complete, and can be done in the classroom or at home. In addition, this could be used as material for absent students, as class material to leave with a substitute teacher, or as supplementary material to help build student understanding of potential career options.

Advanced Preparation

- Prepare copies of the appropriate Student Activity Guide as needed.

Teaching Resources

- Google tool for struggling students - Text-to-speech extension for struggling readers

Phase 1: Introduction

- Students are introduced to the CCE they will be exploring.

Example introduction:
Geospatial analysts use satellite data to help people make good and safe decisions about all sorts of things. Without geospatial analysts, it would take a lot longer to gather all of this important data, and in some cases it might not be possible.

In this Career Connection Exploration your task is to explore a little bit about what it means to be a geospatial analyst. You will read about one particular geospatial analyst and the type of

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work that they do, and then you will have a chance to try out some of the tools and data that geospatial analysts use every day. Finally, you will think about some of the other careers that geospatial analysts support, both directly and indirectly.

- Students “vote with their feet'' regarding whether or not they would like to become a geospatial analyst. They go to the eastern side of the classroom if they would like to become one, to the western side if they would not, and the northern side if they are not sure.

Phase 2: Day in the Life

Gather Information

- Students are presented with a “A day in the life of a geospatial analyst” narrative that is derived from an interview with Colin Brooks, a geospatial analyst at the Michigan Tech Research Institute. This short reading introduces students to the day-to-day activities, responsibilities, training, education, and public misconceptions related to geospatial analysts.
    - Student Resources
        - CCE3_DayInTheLife_GeospatialAnalyst_Student

Reading Strategy Teacher Note: As students read through the narrative, it may help for them to write down whatever comes to mind. Example prompts include:

- What would you say to the author if you were having a conversation?
- What questions do you have?
- What does the text remind you of or make you think of?

If working with individual paper copies, students may want to use colored pencils to highlight different components. If working with shared text copies, students can make their notes on a separate piece of paper or in their science journal. If working electronically, Kami is an extension available in Google Chrome that provides students with a variety of useful tools to annotate text electronically.

Analyze Information

- After reading the narrative, students work in pairs to display their thinking by answer questions in the following graphic organizer:
    - CCE_DayInTheLife_Student_GraphicOrganizer

Communicate Information

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- The class comes together and discusses their answers to the questions above. Students look for similarities and differences in how they interpret the narrative.

Phase 3: Try it Out!

Gather Information:

- Students complete an activity using data from a geospatial analyst tool in one of the options below. There are several ways this could be done depending on your classroom needs:
  - You could pick one option for all students to complete
  - Students could pick the option they are most interested in
  - You could set up stations and all students could work through all the options

Name	Time to complete	Guides	Description
Option 1: Changing Lake Mead	1 hr	Student Guide Teacher Guide Slides	Students investigate how NASA satellite images are useful for monitoring landscape changes through the context of the shrinking of Lake Mead.
Option 2: Trashcan Volcano	1-1.5 hr	Student Instructions (Slides) Student Guide Teacher Guide Teacher Instructions (Optional Place-Based Adaptation)	Students use an online GIS tool called The National Map (TNM) Viewer to figure out the best location for a trashcan volcano. Students share the map they made and answer reflection questions about their experience.

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Option 3: NIR & NDVI Images	1 hr	Student Guide Teacher Guide Slides	Students explore some of the uses of Near-Infrared (NIR) images by investigating how NIR can be used to identify underwater vegetation as well as combined with other image data to classify terrestrial vegetation health using NDVI.

Analyze Information:

- After completing their guide, students reflect on their experience working with the tool using questions similar to the following:
    - How might a geospatial analyst use tools like The National Map (TNM) Viewer to answer questions?
    - How might these NASA tools be helpful to some other careers besides geospatial analyst?
    - How might these NASA tools be helpful to you?

Communicate Information:

- Students come together as a class to discuss their experiences with the NASA tool and their answers to the three questions above.

Phase 4: Mind Mapping

- Students work in small groups and consider other careers related to or dependent on geospatial analysts by developing a mind map.
    - Student Resources
        - CCE3_MindMapping_Student
    - Teacher Resources
        - CCE3_MindMapping_Teacher

- The class comes together to compare their individual mind maps, and develop a whole-class mind map.

- Students once again “vote with their feet'' regarding whether or not they would like to become a geospatial analyst.

- Students pair up with a partner to individually discuss why they voted the way they did. Students share their responses with the class.

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