Earth Science Everywhere

Exploring Agriculture

A Lesson for Middle School STEM

Developed by AmericaView

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Table of Contents

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Introduction

Remote Sensing is the process of gathering data about an area or object by analyzing the energy it reflects or emits, all without physically going there or touching it. We have our planet earth where billions of people live all around and there are many natural and artificial processes and elements (like river flow, landslides, agriculture, rocks, minerals, water, forests, glaciers etc.) involved. We often wonder how things are going around different parts of the world but it's not possible for us to go everywhere physically. And this is where remote sensing can help us which has many applications, such as Forestry, Urban Use and Planning, Wildlife Biology/Conservation, Water Use and Quality, Agriculture, Disaster Management etc. Among all, agriculture is a very significant field as human beings are greatly dependent on it for food, a core element for our survival. Therefore, the lesson focuses on the application of remote sensing in agriculture.

This lesson refers to electromagnetic spectrum and remote sensing topics. It is recommended that the "Exploring the Electromagnetic Spectrum" lesson is completed first.

Keywords: Remote Sensing, Satellite, Agriculture, Google Earth Pro

Time Frame: 45 minutes

Learning Objectives

The objectives of the lesson are –

- To understand the basic concept and uses of remote sensing.
- To learn the roles of remote sensing in the field of agriculture.
- To build primary skills in using Google Earth Pro to visualize historical satellite imagery.
- To acquire knowledge on the interpretation of satellite images.

Materials

In order to complete the activities in this Lesson, the following materials/resources are essential:

- Internet access
- One computer per pair of students (one-to-one is preferred)
- Google Earth
- Smartboard or other projection system

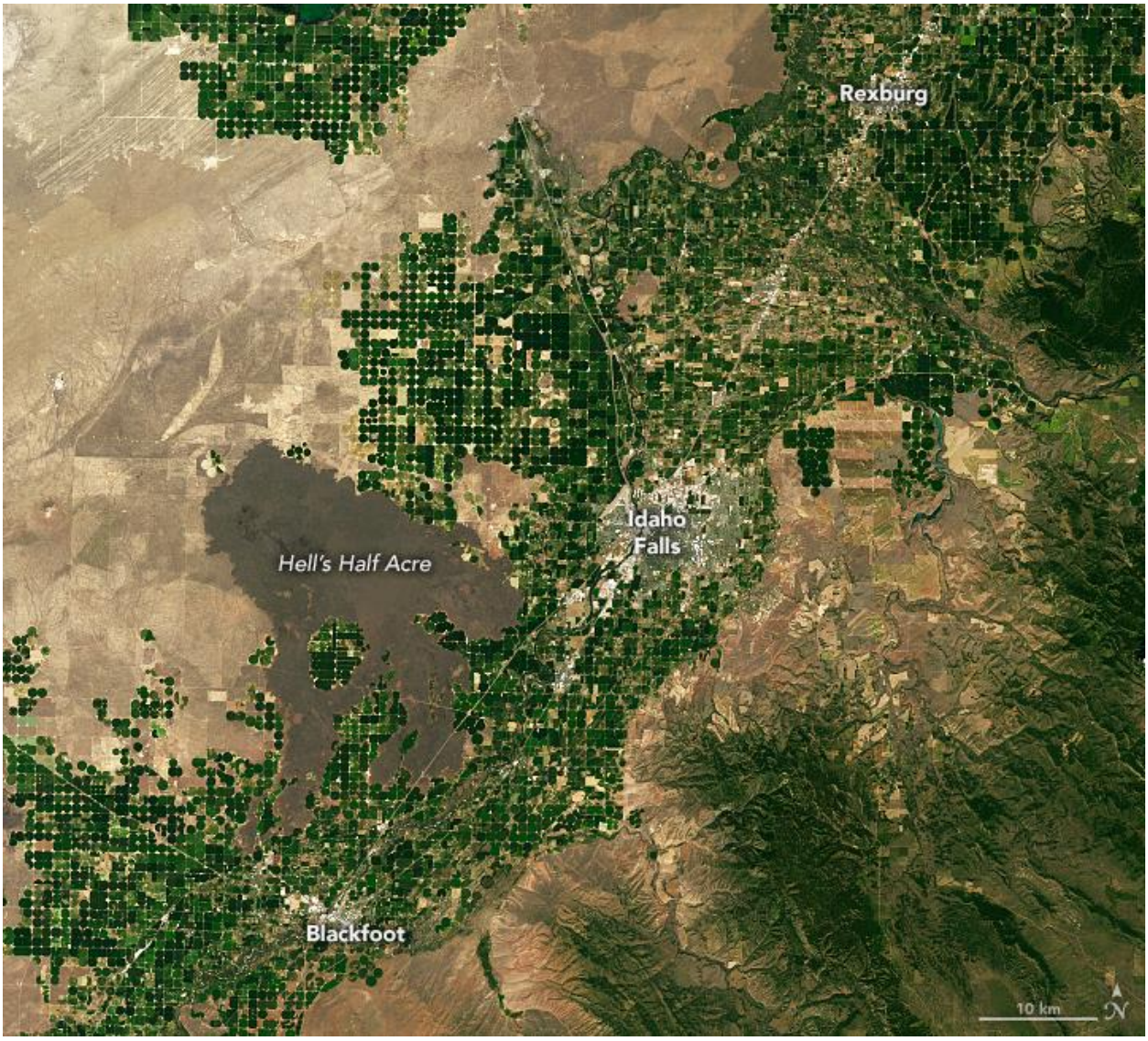
Learning Standards

National Council for Geographic Education (NCGE) Standards –

- Standard 1: How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.
- Standard 8: The characteristics and spatial distribution of ecosystems on Earth's surface.
- Standard 14: How human actions modify the physical environment.
- Standard 15: How physical systems affect human systems.
- Standard 17: How to apply geography to interpret the past.

Warm Up:10 minutes

Let's have a closer look at an image of Idaho Potato Belt. With the help of remote sensing, we can learn about the agricultural scenario of our planet without physically going to the field.



After looking closely at the image, think about these questions:

- What is going on in this picture?
- What do you see that makes you say that?
- How will it impact agriculture? Good or Bad? Why?

You might discuss your answers with your classmates.

Reading Activity:10-15 minutes

Idaho leads the U.S. in potato production, with nearly a third of the country's potatoes coming from the Snake River Plain, a flat region stretching across southern Idaho. Let's read the article from NASA Earth Observatory – 'Idaho's Potato Belt'. This reading will help to know more about the image given in the warm-up session and answer the questions. Follow the link - https://www.earthobservatory.nasa.gov/images/150646/idahos-potato-belt .

Additional Reading (Optional)

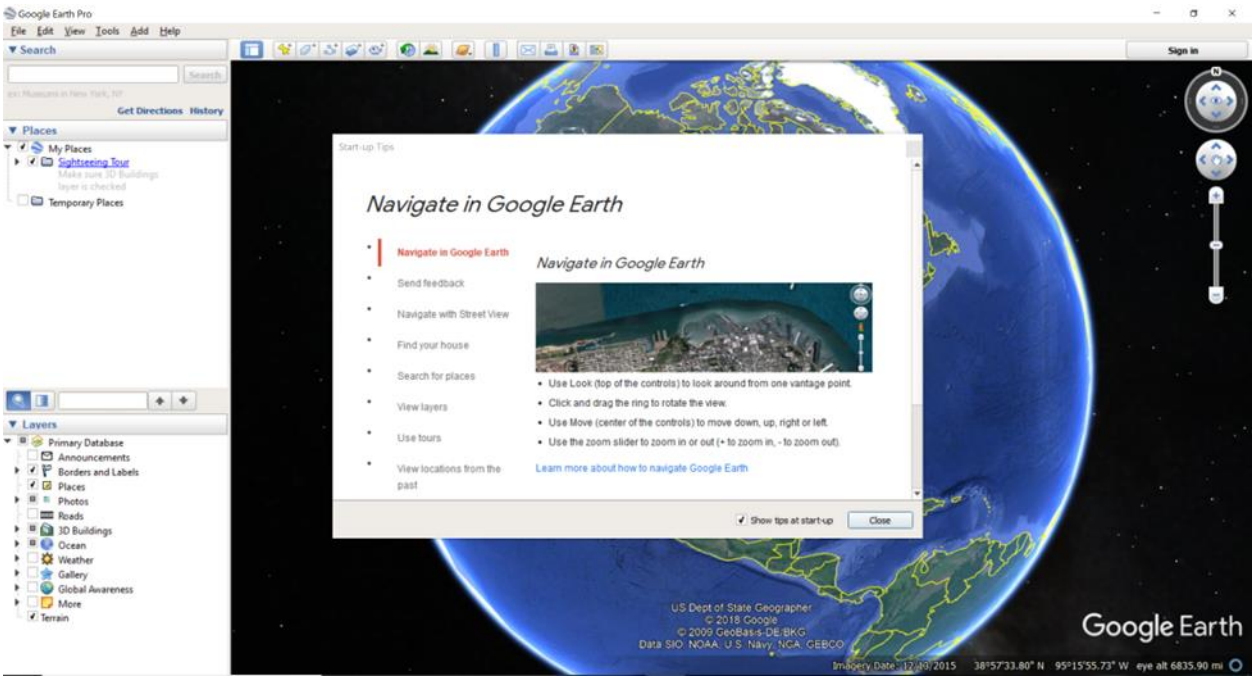
Water is an essential part of agriculture. You can read the article and look at the animation on water level change at Lake Powell. Webpage link - https://earthobservatory.nasa.gov/world-of-change/LakePowell

Google Earth Exercise:10-15 minutes

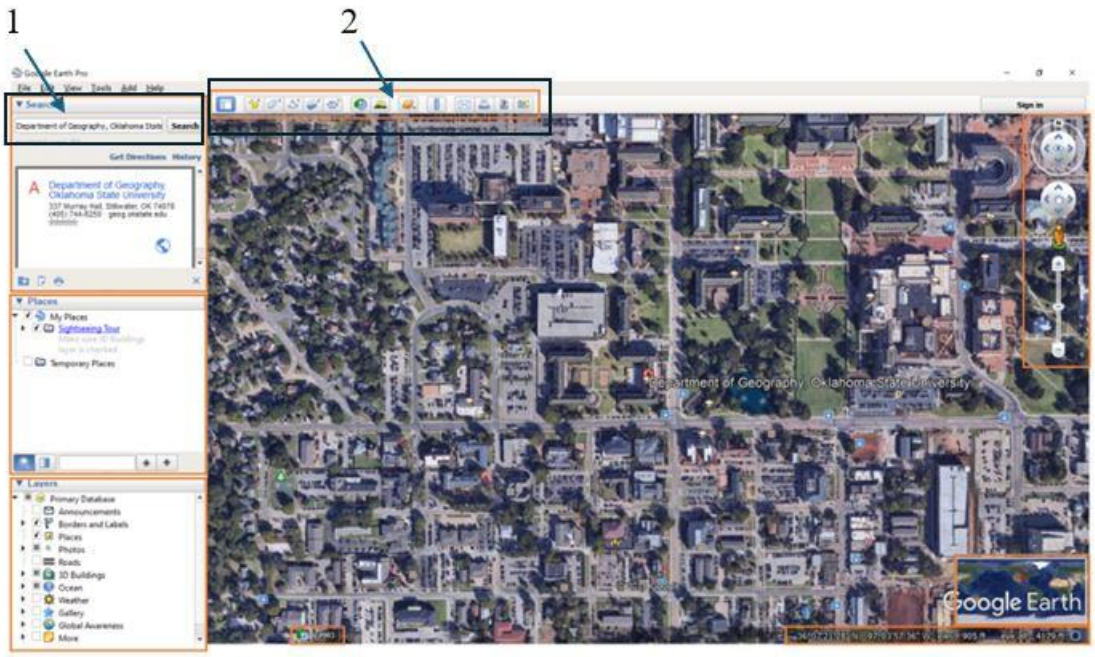
We now know that remote sensing can help us know what is going on somewhere throughout time. What if we try something like that by ourselves? Google Earth Pro can help us do that. Let's have a look at how things have changed in Idaho's potato belt. Follow the steps below –

Step 1:

Open Google Earth Pro



Here is an overview of the application, there are many tools but for now we need the following –



1. **Search box** - Use this to find places and directions and manage search results.

2. **Toolbar buttons** – There are many options, but we need Display historical imagery for now.

Conceal or the display the side bar	Display sunlight across the landscape
Add a placemark for a location	View the sky, moon and planets
Add a polygon	Measure a distance or area size
Add a path (line or lines)	Email a view or image.
Add an image overlay on the Earth	Print the current view of the Earth
Record a tour	Show the current view in Google Maps
Display historical imagery	Save the current view as imagery file

<u>Step 2</u>

Put the coordinates (latitude and longitude) of Idaho Potato Belt in the search box and click on 'Search'

43.394881°, -112.131713°

This will take you to the desired place, you can zoom in/out using the +/- options on the right side of the screen.

Step 3

Now click on the Display historical imagery and a time-slider will open. Use the arrows or drag and drop the slider to move back and forth and see how the locations have changed over time.

As now you can see how things have changed over time around Idaho's potato belt, can you relate it to your answers for the questions asked earlier in the warm-up section? Or the reading on Idaho's potato belt? You can check your answers with your classmates.

Career Exploration:5 minutes

Remote Sensing has great career prospects in the field of agriculture. You can explore some specific options at the U.S. Department of Interior website following the links below.

Geography - https://careers.doi.gov/occupational-series/geography

Cartography - https://careers.doi.gov/occupational-series/cartography

If there is additional time or if you want to make this a longer activity in the future, begin at the below link. Students can click on "Find Your Path" then "Get Started" to search careers based on their personal interests.

https://careers.doi.gov/

Wrap-Up:5 minutes

Finally, let's finish our lesson with some exciting Wordwall quizzes. Have the students play the online game to test their comprehension of the main topics of the lesson. The printable quiz is also available as follows.

1. Quiz - https://wordwall.net/play/75586/108/845

2. Word Search - https://wordwall.net/play/75585/937/654

3. Maze Chase - https://wordwall.net/play/75586/293/819

Quiz

Date: _____ Name: _____

1. Which part of our body is a remote sensing tool?

A ☐ 

B ☐ 

C ☐ 

D ☐ 

Word Search

Date: _____ Name: _____

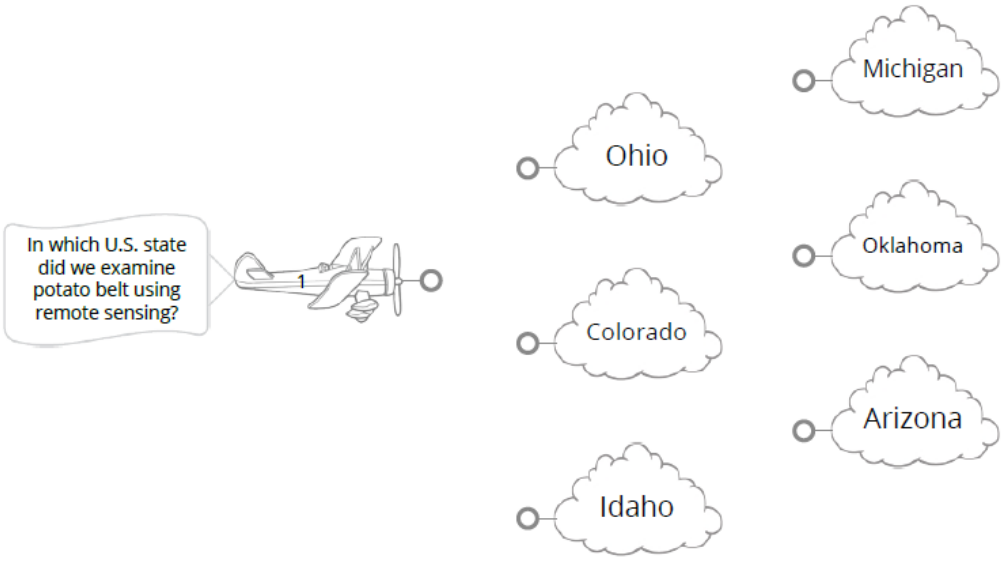
1. Remote Sensing
2. Agriculture
3. Satellite
4. Google Earth

U	V	Q	V	F	W	L	P	R	A	B	N	I	H
G	F	Y	U	X	G	S	H	E	G	X	E	D	Y
T	G	C	S	X	O	A	C	M	R	R	R	H	L
I	T	O	P	O	O	T	G	O	I	P	C	N	A
H	Q	B	I	N	G	E	T	T	C	V	R	F	R
Z	V	D	I	Z	L	L	X	E	U	E	Q	N	U
W	K	H	G	B	E	L	Z	S	L	T	P	E	Y
U	M	F	B	C	E	I	J	E	T	R	I	V	B
X	X	S	H	E	A	T	R	N	U	H	S	L	L
P	Z	N	C	O	R	E	Z	S	R	H	Q	D	L
L	F	R	O	T	T	E	S	I	E	A	L	D	X
X	T	I	F	F	H	J	U	N	Z	Q	P	O	K
Q	D	Z	M	X	C	R	D	G	B	S	U	G	U
C	P	H	T	F	L	R	X	N	Z	O	T	W	U

Maze Chase

Date: _____ Name: _____

Draw a path from each airplane to its answer - don't crash into other clouds along the way



The End