

## Investigating Earth's Spheres

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Eyes on Earth

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Teaching about Earth spheres to students is essential because it is a form of higher-order thinking which helps students make real-world connections to the environment in which they live. It involves the students gaining an understanding of how the four major spheres function and how they interact together. The four major spheres taught include the lithosphere, biosphere, atmosphere, and hydrosphere. In addition, the cryosphere and the anthroposphere, which add to the human impact on the Earth, are often taught in conjunction with the four major spheres. Teaching students about the Earth's spheres separately and how they each interact helps students understand the “big picture” of why they should learn about the Earth's systems. Teaching each sphere separately is important because the students need to understand the uniqueness and features of each sphere individually before learning how they interact with each other. Teaching each sphere independently of the other is complex because of how intertwined they are.

The approach of teaching each of the Earth's spheres separately is the way I have taught them in the past, but it is difficult because it is challenging to find ways that one sphere is not connected to another. I usually teach about the geosphere first, then the hydrosphere and cryosphere together because they are so closely related. Then the biosphere and the human influence of the anthroposphere have on the biosphere. Lastly, I teach the atmosphere and then tie all the spheres together. A simple lesson that I incorporated into my lesson of Earth spheres this year was [Earth System Interactions: Background Information](#) from My NASA Data site. This lesson was a great way to introduce the students to how the spheres connect by using the colorful graphic

that explained how they all work together. The students need to understand how the spheres interact because their interactions are the driving force of all of the Earth's processes.

When teaching the Earth sphere lesson this year, I used the Understanding by Design method or backward design to build my lesson. I used this method to ensure that I was developing a plan with the learning goals in mind to ensure that my lesson focused on the goals and the end assessment before teaching it. Using this lesson planning format and all the new lesson resources from this class, I was able to prepare a better lesson plan this year than I have in the past. Learning about and using the My NASA Data site has dramatically improved my teaching of the Earth spheres. After taking this class, I realized that I was not emphasizing each sphere enough. I can say that I have never taught the cryosphere in detail before, and it is the sphere my students have enjoyed learning about the most. The reason most likely is because they said they had never been taught about it before this class. I used the [NOVA Polar Lab](#) this year when teaching the cryosphere. It is a 360° interactive game that takes the students on three different missions.

The first mission is to Ellesmere Island in Canada, where they are taken on a mission with paleontologists looking for fossils of ancient plants and animals. Mission two takes the students to the National Lacustrine Core Facility in Minnesota, where they interact with different geologists studying ice cores. The third mission takes the students to Greenland and Antarctica, where they meet a climate scientist and an ecologist and learn how the warming waters impact the ice sheet and animals that live there. While the students explored the missions, they kept a journal of their daily

adventures. The students loved doing this activity. Every day, they shared something they learned or someplace exciting they visited with me. I was unsure about using this at the high school level, but they were disappointed when they finished all the missions. Next year, a lesson that I will add to my class is the GLOBE Connections: System and System Models. The lesson that I plan on using will discuss the interaction between the spheres in our area and how they influence the world around us. The GLOBE Connections Program I plan to explore more with before next year to incorporate the activities into my class.

The class that I have this year in High School Earth science are students that most struggle with academics, and learning about the spheres has been a complex concept for them to understand. Most of the students in the class could name a few of the spheres with some guidance, but the only sphere they could tell me much about was the hydrosphere, which is only because most elementary teachers seem to teach the water cycle, which I also taught my middle school earth science class. However, I also taught about the other spheres, just not to the depth that I know realize it should be taught. Overall, the students have enjoyed learning about all the spheres, but gaining a deeper understanding of how they connect seems to be a struggle. The solution that I have found to help overcome some of the classes struggles in learning about the spheres is finding interactive and hands-on activities. I used several Google Earth activities where the students explored regions worldwide. One that they found interesting was about Sea Level Rise and the Fate of Coastal Cities. I plan to tie this lesson to the My NASA Data lesson of Coastal Consequences of Sea Level Rise.

I plan to use the NASA materials to continue building my lesson over the Earth spheres and share the information I have learned with other teachers in my building. I am currently working with the Junior High science teacher and a few upper elementary science teachers to introduce them to all the amazing websites and lessons I have learned from taking this class. Next year, one lesson that I hope to incorporate is the SPHERES OF EARTH: an Introduction to Making Observation of Earth Using an Earth System Science Approach; this activity is about the different spheres and how they are interrelated. This lesson is also a 5E lesson which is the type of lesson that I like to use when developing them for my classes. I plan to continue exploring the various NASA sites and build on my Earth science curriculum over the next year. I have already been implementing the lesson that we created for this class. I have made a few changes to them by adding more sources of information, so I can modify them to fit the needs of my students each year. A few of the lessons that I had in the plans needed to be modified to meet the needs of the students that I have this year, and I also want to make sure that I have activities to challenge the students.

## Work Cited

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