

# The Four Earth Sciences

The four basic areas of Earth Science study are:

**geology, meteorology, oceanography and astronomy.**

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## Geology: Science of the Earth

*Geology is the primary Earth science. The word means "study of the Earth". Geology deals with the composition of Earth materials, Earth structures, and Earth processes.*

## Meteorology: Science of the Atmosphere

*Meteorology is the study of the atmosphere and how processes in the atmosphere determine Earth's weather and climate. Meteorology is a very practical science because everyone is concerned about the weather.*

## Oceanography: Science of the Oceans

*Oceanography is the study of Earth's oceans - their composition, movement, organisms and processes.*

## Astronomy: Science of the Universe

*Astronomy is the study of the universe.*

<https://www.youtube.com/watch?v=j1cKBuxBWKY>

☺ Find your index card.... write your name large and clear on one side, on the other side clearly write an Earth Science related question or topic you would like to learn more about .

Pass your card to your right ☺

# Why learn Earth Science?



## Introduction

**Earth Science is the study of the Earth and its neighbors in space. It is an exciting science with many interesting and practical applications.**

- Some Earth scientists use their knowledge of the Earth to locate and develop energy and mineral resources, or locate clean water.
- Others study the impact of human activity on Earth's environment and design methods to protect the planet, such as soil to grow food.
- Some use their knowledge about Earth processes such as volcanoes, earthquakes and hurricanes to plan communities that will not expose people to these natural hazards.

# Why learn Earth Science?



## Conclusion

**It is important for everyone to learn how Earth and its systems work.**

- Only then can citizens make informed judgments that affect our planet, protect its surface, care for its atmosphere, safeguard its water and sustain life.
- Earth Science knowledge is the only tool we have to ensure public understanding of Earth and its delicate balance of systems.

# “Good Will Hunting”

- There are a number of unsolved problems in mathematics
- Seven of which were designated in 2000 by the Clay Mathematics Institute as “Millennium Prize Problems,”
- Each with a purse of \$1,000,000.
- To date, only one has been solved.



So, what are today's biggest unanswered questions in earth science?

## Four outstanding questions in earth science



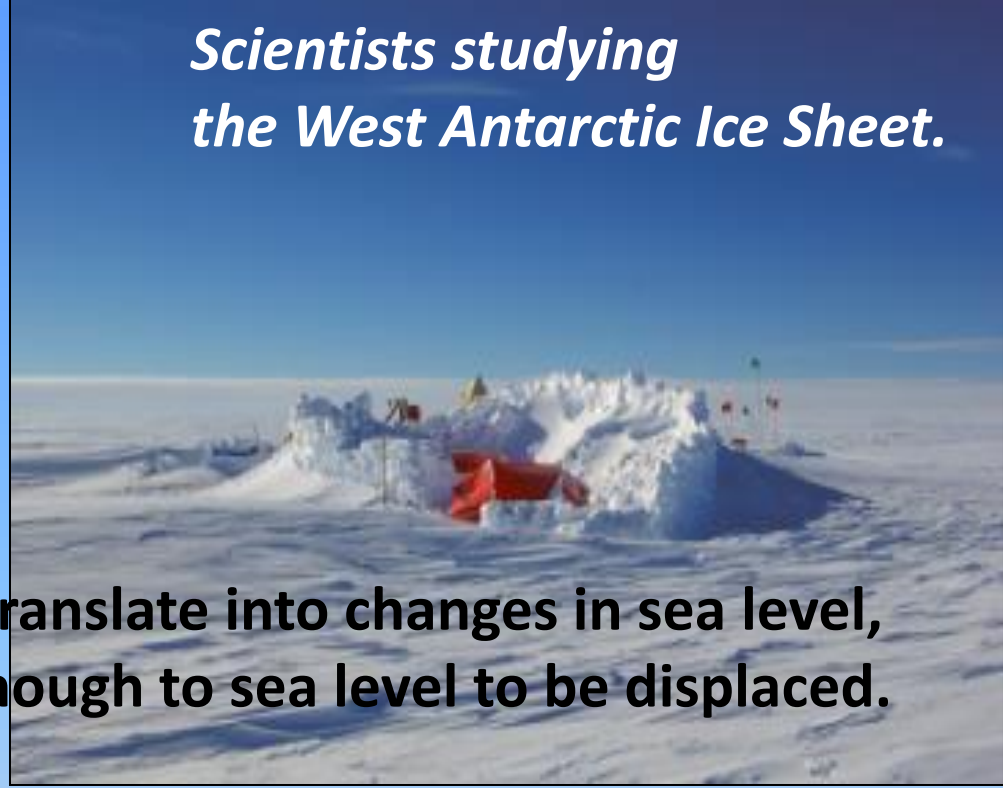
*A magma chamber beneath Yellowstone National Park has produced super-eruptions in the past and may do so again someday.*

- it would be nice to know where the next super-eruption might occur.
- These eruptions are so rare , perhaps one per 100,000 years on average, that they pose little risk to humans now.
- Why haven't we found one yet?

**1. Where are the big magma chambers that produce huge super-eruptions?**

## 2. How stable is the West Antarctic Ice Sheet and what does it mean for global sea levels?

*Scientists studying the West Antarctic Ice Sheet.*



- Mass changes in the ice sheet translate into changes in sea level, and a lot of people live close enough to sea level to be displaced.
- Many factors control how rapidly ice flows, and thus how rapidly ice sheets can transfer land ice to the ocean .
- Modern investigations point to the importance of “threshold” behavior. ..the potential that at some high-enough temperature, the speed will jump abruptly and irreversibly!
- some urgency! — we want to get answers in time to provide useful guidance to people making decisions about energy and the environment.



### 3. Is there life on any other planetary body in our solar system?

*A Martian outcrop contains a mineral indicating that a past environment was wet and non-acidic, possibly favorable to life.*

- NASA and others have been trying to address this question for decades, but it's very difficult.
- sample return is the only way to get a definitive result.
- Icy moons in the outer solar system, such as Saturn's Enceladus, could harbor life, but we know much less about these worlds.
- The good news is that efforts to find life result in new knowledge about the physical and chemical processes and geologic history of these interesting worlds.





*Sauropods' massive sizes are well established, but less is known about their biology.*

#### **4. So we know a lot about dinosaur fossils, what about dinosaur biology?**

- we have a lot of details to fill in concerning their biology. How heavy were the dinosaurs? Were they fast or slow?
- Using laser technology known as lidar (Light Detection and Ranging), scanned the mounted skeletons of 14 modern, large-bodied mammals, used a computer to construct a digital, 3-D “hull” around each skeleton.
- The hulls provide a minimum volume which, when multiplied by the mammals' known body densities, provides weight estimates.