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| Earth Orbit Application | |
| Purpose | * Introduction of orbital parameters and their influences on insolation (solar radiation) |
| Introductory questions | * Why does Earth experience seasons today? * How does seasonal variability look across different parts of the globe? * Why are the tropics usually warmer while the poles are usually cooler? |
| Steps | * Let students discuss the above questions. * Bring idea of earth’s orbit. * Let students play with the first application to understand earth’s orbits’ influences on insolation & seasons. * Make them think about and recognize the periodical patterns of the orbital parameters and insolation and differences in these patterns. * Bring the idea that earth orbit can also have a huge influence on other climate change phenomena, such as ice ages. |
| Take-away question | * Why does the change of earth’s orbits and insolation look not very prominent in the recent 500 years? |

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| Water Cycle Application | |
| Purpose | * Introduction of oxygen isotopes (delta 18O) & water cycle |
| Introductory questions | * How do we know how these insolation changes through time have affected occurrences of ice ages? |
| Steps | * Let students discuss the above question. * Briefly explain that oxygen isotopes in the deep ocean sediments can do the job because they represent the size of ice volume. * Let students play with the second application to understand why we want to look at this archive. |
| Take-away question | * If we see that the amount of Oxygen-18 is higher than normal, what does this indicate? (usually o-18: 0.2%, o-16: 99.8%) |

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| Delta 18O and Insolation Data Application | |
| Purpose | * Relating to oxygen isotope & Insolation data to understand the correlation between these two things. |
| Introductory questions | * What is the correlation between solar radiation and the size of ice volume? |
| Steps | * Let students discuss the above question. * Show the d18O record by itself first. Students first need to understand what the upward and downward trends in d18O mean in terms of ice volume (increasing means increasing ice, decreasing means decreasing ice). * Have them situate themselves in the graph by finding “the present” and think about how unique the present looks compared to the rest of the last 800,000 years. * Have them think about the timing of previous ice ages by looking at upward and downward trends in the d18O data and recognizing the “saw-tooth” pattern. * Then overlay the insolation data on the d18O record. Let them see the examples to know what the general correlation between these two things should look like. |
| Take-away question | * Based on our understanding of orbital parameters and the timing of variability, we might expect that the Earth would descend back into an ice age some time over the next few thousand years. But the graph does not show such a trend, why? |