

EARTHQUAKES AND THE CARBON CYCLE WITH PROFESSOR ROBERT HILTON

TALKING POINTS

1. What is the carbon cycle, and how does it control Earth's climate? (See *The Carbon Cycle*)
2. How does carbon sequestration typically happen? What conditions might lead to greater levels of sequestration? (See *How is carbon normally sequestered?*)
3. What is the role of earthquakes and landslides in carbon sequestration? How does this differ from more typical sequestration processes? (See *How do earthquakes provide a sequestration 'shortcut'?*)
4. What did Bob and his collaborators learn from the Wenchuan earthquake? What had to be in place to make these findings possible? (See *What challenges has this research faced?*)
5. What role do sediments play in Bob's research? What tools are needed for them to be informative? (See *How are sediments useful for Bob and his team?*)
6. Bob's team uses carbon isotopes to measure two types of sediment qualities. What are these qualities, and how do the techniques differ? (See *How can researchers determine sediments' origins?* and *How can sediments be dated?*)
7. Do you think earthquakes play a significant role in mitigating climate change? What other forms of sequestration might be more effective? (See *So could earthquakes help tackle the climate crisis?*)
8. What are some examples of geochemistry being used in scientific research? (See *What is geochemistry?*)
9. Describe three career postgraduate career paths in geochemistry. (See *What employment opportunities does geochemistry offer?*)

ACTIVITIES FOR HOME OR IN THE CLASSROOM

Draw a diagram of the global carbon cycle, using arrows to show movement of carbon between different sources. Start off by drawing a version without humans or their impacts on the planet. Consider these points when doing so:

- Make sure to include the atmosphere, living organisms, the ocean, soil, sediments and rock.
- Use different arrow sizes to indicate the likely relative quantities of carbon movement, according to your judgement.
- Think about what might happen if one component were removed. What if there were no animals, or no plants? What if there were no sediments? What if there was no atmosphere?
- Think about Bob's comments on the contribution of earthquakes to the carbon cycle. How significant do you think this is compared to other factors?
- Now include humanity in your diagram. How are we disrupting the cycle?
- How might other aspects of the cycle respond to humanity's input? For instance, might vegetation or the ocean modify their uptake of carbon?

Once you are done, search online and compare your diagram to ones from trustworthy sources. Look up the answers to the questions raised in the bullet points. The resources below might prove a useful starting point. How do your predictions of different carbon cycle scenarios compare?

MORE RESOURCES

- The Khan Academy provides a good introductory article to the carbon cycle. Find it here: <https://www.khanacademy.org/science/biology/ecology/biogeochemical-cycles/a/the-carbon-cycle>
- The European Space Agency has a fascinating video showing how the carbon cycle fluctuates over time, seasonally or over decades. Watch it here: https://www.esa.int/ESA_Multimedia/Videos/2018/02/Carbon_Cycle