

# CLIMATE SCIENCES WITH PROFESSOR ZHENGYU LIU AND DR BETTE OTTO-BLIESNER

## TALKING POINTS

### KNOWLEDGE

1. What is paleodata? Include some examples.
2. What is the Community Earth System Model?

### COMPREHENSION

3. Why is modelling past climate changes useful for predicting future climate changes?
4. How does pollen in sediment cores give information about past climates?

### APPLICATION

5. The greenhouse gas effect could possibly lead to a new 'African Humid Period'. What might this mean for African urban and rural areas?
6. How do you think Earth's position relative to other celestial bodies (e.g. the Sun) might have affected its past climate? Do you think this is likely to affect climate change in the next hundred years?

### ANALYSIS

7. Liu says that the paleodata they used likely had a 'bias towards the summer season'. Thinking about the evidence collected from ice and sediment cores, what do you think he means by this?
8. How do you think Liu's and Bette's different specialisms make them good collaborators?

### SYNTHESIS

9. What evidence might suggest that the Atlantic Meridional Overturning Circulation is weakening? How would you test this hypothesis if you were a scientist?
10. Why do you think Liu and Bette chose to model the last 21,000 years, rather than a shorter or longer timeframe?

### EVALUATION

11. What do you think lies in store for the future for climate modelling, as processing power and scientific knowledge increase further?
12. Assuming that there is evidence that monsoons are getting stronger and ocean currents are weakening, how would you advise societies around the world to prepare for the effects of these phenomena?

## ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

Individually or in groups, design a poster that explains how the Earth's climate has changed since the Last Glacial Maximum. This should include:

- A timeline going from 21,000 years ago to present
- Reference to evidence supporting conclusions on the Earth's past climate, drawn from the article and online research. This should include:
  - Evidence from paleodata such as ice cores and sediment cores
  - Evidence from models such as CESM
  - Discussion of knowledge gaps or conflicting evidence
  - Examples of how the Earth's climate at points in the past affected living organisms
  - Predictions on how future climate change will affect the Earth system

Try and make your poster as eye-catching and engaging as possible. When it is complete, present it to your class.

## MORE RESOURCES

This webpage offers more detail on the TraCE project:  
<https://www.cgd.ucar.edu/ccr/TraCE/>

The National Center for Atmospheric Research, where Bette works, offers a range of outreach and education activities. Learn more here:

<https://ncar.ucar.edu/what-we-offer/education-outreach>

This video from SciShow gives a potted history of the Earth's climate:

[https://www.youtube.com/watch?v=dC\\_2WXyORGA](https://www.youtube.com/watch?v=dC_2WXyORGA)