

Wallace Broecker

Newberry Professor of Earth and Environmental Sciences at Columbia University

2008 Balzan Prize for the Science of Climate Change

For his extraordinary contributions to the understanding of climate change through his discoveries concerning the role of the oceans and their interactions with the atmosphere, as well as the role of glacial changes and the records contained in ice cores and ocean sediments. His contributions have been significant in understanding both gradual and abrupt climate change.

Institution Administering Research Funds:

Comer Science and Education Foundation (90% of total prize)

Adviser for the Balzan General Prize Committee: Enric Banda

Past Patterns of Precipitation and Earth Temperature

The general aim of Wallace Broecker's Balzan Research Project was to determine whether the paleoclimate record can support the prediction according to which, as the planet is warmed by fossil fuel CO₂, precipitation will be more strongly focused on the Equator. Lacking an adequate warm analogue, a cold one – namely, the situation during the last glacial period – has been already used with encouraging results (i.e., less focusing of rainfall on the tropics during colder times). However, possible flaws in the cold analogue have yet to be evaluated. Research activities focused on data from different sources, including deep sea sediments and closed-lake basin size, cave deposits and ice core records. Wallace Broecker supported three postdoctoral fellows:

- Jimin Yu: As part of his PhD research at the University of Cambridge, he demonstrated that the boron to calcium ratio in the CaCO₃ shells of bottom dwelling open ocean foraminifera are tightly correlated with the extent of carbonate ion undersaturation. At Lamont-Doherty Earth Observatory at Columbia University, he used this method to reconstruct the evolution of deep ocean carbonate ion concentration from the glacial maximum (~25 kyrs ago) to the present. His goal was to evaluate the role of deep ocean chemistry in the rise of atmospheric CO₂ content at the close of the last glacial period.

- Xianfeng Wang: As part of his PhD research at the University of Minnesota, he created an 18O record for stalagmites in Brazil and showed that millennial duration fluctuations in monsoon rainfall were exactly antiphased with those in China. At Lamont-Doherty Earth Observatory, he continued this research, but also diversified his efforts by measuring the concentrations of ²³⁴U, ²³⁰Th, ²³¹Pa and ¹⁰Be in sediments from the abyssal ocean. In so doing, he followed up on research done by Richard Ku in the 1970s with modern instrumentation.
- Irene Schimmelpfennig: She completed her PhD in France on the production rate of ³⁶Cl in separated minerals. She worked with Joerg Schaefer's group at Lamont-Doherty Earth Observatory to pursue the use of ³⁶Cl and ¹⁰Be in what is termed "cosmic-ray exposure dating".

Researchers:

Supervisor Professor R. Lawrence Edwards

Researchers Irene Schimmelpfennig
 Xianfeng Wang
 Jimin Yu

Publications:

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