

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 amount)

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 is 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 focus on data from different sources, including deep sea sediments and closed-lake basin size, cave deposits and ice core records. Wallace Broecker is supporting three postdoctoral fellows:

- Jimin Yu. As part of his Ph.D. research 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 is using this method to reconstruct the evolution of deep ocean carbonate ion concentration from the glacial maximum (~25 kyrs ago) to the present. His goal is 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 Ph.D. 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 is continuing this research but is also diversifying his efforts by measuring the concentrations of 234U, 230Th, 231Pa and 10Be in sediments from the abyssal ocean. In so doing, he is following up on research done by Richard Ku in the 1970s with modern instrumentation.
- Irene Schimmelpfennig. She completed her Ph.D. in France on the production rate of 36Cl in separated minerals. On 6th April 2010, she joined 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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