

Determining Past Climate Trends: Proxy Data

One of the biggest difficulties when attempting to analyze global warming trends is that instrumental data has only been recorded for about the past 140 years (NOAA Satellite and Information Service). Thus, scientists often resort to what is called, "proxy sources." The word proxy basically means "substitute," and in the field of science proxy data is often used when other, more direct means of data, cannot be obtained. In the study of global warming, several proxy sources can be used to obtain climatic data from times much further back than a mere 140 years. Tree rings, ice cores, radiometric dating, and corals are but a few often used proxy sources.

While tree rings have proved to be the most chronologically accurate, scientific uncertainty always exists. Thus, combining the data from several proxy sources gives the most accurate picture for Palaeoclimate dating (Jansen et al., 438-9). In fact, the given report entitled "Palaeoclimate" uses a vast variety of different proxy sources to more accurately analyze climate trends and predict future trends. For example, since radiocarbon dating is often used to analyze the age of materials, one could combine the data obtained from a measurement of carbon-14 to data obtained from tree rings in order to obtain a more precise prediction of the age of the tree. Perhaps, then, the amount of CO₂ present in the atmosphere throughout the course of the tree's life could also be determined, leading to assumptions regarding the possible state of the climate earlier in the tree's life.

There are limitations, however, with using carbon-14 for dating. The ratio of carbon-14 to carbon-12 in the atmosphere is not constant, as was assumed when radiocarbon dating was invented in 1949 (Spencer et al., 679). This is caused in part by such things as changes in solar activity, magnetic field fluctuations, and contamination from the burning of fossil fuels. Furthermore, carbon-14 can only be used for samples less than approximately 45 thousand years old, because after eight half-lives there is not enough of the sample left to measure accurately. Instead of carbon-14, the isotope carbon-13 may also be used in dating and predicting climate change, since it is a naturally occurring and stable isotope of carbon. A particular area of study described by Jansen et al. in "Palaeoclimate" is that of C-13 isotopes in marine and continental records, "as it has some similarity with the ongoing rapid release of carbon into the atmosphere by humans" (page 442). Thus it seems that while carbon-14 may give clues to how old samples are, carbon-13 might be a more accurate predictor of the state of the carbon cycle, and thus, global warming.

References:

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<http://www.ncdc.noaa.gov/paleo/globalwarming/proxydata.html>

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