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Bruins, H.J.; Plicht, J. van der; Mook, W.G.

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DATING OF CLIMATE AND HUMAN HISTORY: A BASIS FOR CLIMATE IMPACT ASSESSMENT

HENDRIK J BRUINS

Ben-Gurion University of the Negev, Blaustein Institute for Desert Research, 84990 Sede Boqer Campus, Israel

Radiometric dating of interdisciplinary data sets is a vital prerequisite to link human and environmental history in time. However, a time-relationship between a certain climatic and archaeological change does not necessarily imply a cause-and-effect linkage. A sharp distinction should be drawn between time correlation and causal association. Experiments and models are necessary to assess whether a climatic change during a certain period affected a particular cultural-economic activity. Development of agricultural systems in the Eastern Mediterranean from incipient Epi-Paleolithic strategies down to modern times might be studied experimentally, in relation to climatic and other environmental parameters. It is important to know at which thresholds, both climatic and social, system breakdown of a certain subsistence strategy or economic activity is likely to occur. System analysis in relation to climate impact assessment should follow the linkage in time between human and environmental history.

ESTABLISHING CALIBRATED ¹⁴C CHRONOLOGIES: PROBLEMATIC TIME ZONES AND HIGH-PRECISION DATING, WITH REFERENCE TO NEAR EASTERN ARCHAEOLOGY

H J BRUINS¹, J VAN DER PLICHT² and W G MOOK^{2,3}

The pattern of past variations in the amount of atmospheric ¹⁴C affects the degree of accuracy that can be attained with radiocarbon calibration. Four principal time zones occur in the period since 3400 BC, in which calibration precision is highly limited:

3340–2920 BC
2890–2590 BC
770–405 BC
AD 1660–1950

The reason is the rather horizontal trend of the calibration curve over these stretches of time. As a result, radiocarbon dates cannot be accurately calibrated in the following BP time zones (parallel with the above historical periods):

4570 ± 20 BP to 4310 ± 20 BP
4250 ± 20 BP to 4050 ± 20 BP
2530 ± 20 BP to 2390 ± 20 BP
230 ± 20 to Present

Even high-precision ¹⁴C dates in these time zones may yield 1-sigma calibrated age ranges of several hundred years. However, for other time periods, in which the calibration curve has a more evenly descending trend, high-precision radiocarbon dating is essential for obtaining calibrated ¹⁴C dates with medium- to high-precision. Examples are presented, with particular reference to Near Eastern archaeology, using the computer calibration program of Van der Plicht and Mook (1988).

¹Ben-Gurion University of the Negev, Blaustein Institute for Desert Research, 84990 Sede Boqer Campus, Israel

²Centre for Isotope Research, University of Groningen, NL-9718 CM Groningen, The Netherlands

³Netherlands Institute for Sea Research (NIOZ), 1790 AB Den Burg, Texel, The Netherlands

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DATING ARCHAEOLOGICAL ENTITIES IN THE DESERTIC LEVANT

ISRAEL CARMI

Department of Environmental Sciences and Energy Research, Weizmann Institute of Science, 76100 Rehovot, Israel

and

OFER BAR-YOSEF

Department of Anthropology, Peabody Museum, Harvard University, Cambridge, Massachusetts 02138 USA

Assembling the radiocarbon dates for the Holocene period in the Southern Levant and especially from desertic sites, enables us to modify the chronological boundaries between archaeological periods and cultures. The calibration of many dates indicates the need to reconsider several accepted cultural explanations and the meaning of archaeological gaps in sub-regional sequences. Using the calibration curve as a partial indicator for climatic fluctuations, we will examine here a few archaeological cases dated to the mid-Holocene through the historical periods.

COMMON SPECTRAL FEATURES IN THE 5500-YEAR RECORD OF TOTAL CARBONATE IN SEA SEDIMENTS AND RADIOCARBON IN TREE RINGS

G CINI CASTAGNOLI, G BONINO, M SERIO

Istituto di Cosmo-Geofisica, 10133 Torino, Italy

and

CHARLES P SONETT

Department of Planetary Sciences, Lunar and Planetary Laboratory, The University of Arizona, Tucson, Arizona 85721 USA

We present the results of the analysis of the carbonate time series obtained from the Ionian Sea core GT90-3 and corresponding $\Delta^{14}\text{C}$ from trees. The 3.6-m core extends backward in time to 5520 BP, and extends the results obtained earlier (Castagnoli *et al* 1990a,b; in press) from core GT14 and core GT89-3.

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