

RECENT RADIOCARBON DATING OF UPPER PALEOLITHIC SITES IN THE EASTERN MEDITERRANEAN: A REVIEW OF THE WORK AT OXFORD*R A HOUSLEY*

Radiocarbon Accelerator Unit, Oxford University, Oxford OX1 3QJ England

The importance of the eastern Mediterranean region for the later Paleolithic has been demonstrated by the series of early thermoluminescence (TL) dates for anatomically modern hominids reported from cave sites in the area (Valladas *et al* 1987, 1988). Recent accelerator mass spectrometry (AMS) ^{14}C dates from the 'Levantine Aurignacian' levels at Kebara Cave (Hedges *et al* 1990) have added to this story as have ^{14}C dates from similar and later (*ie*, 'Levantine Aurignacian' and 'Proto-Kebaran') horizons at Ksar 'Aqil (Mellars & Tixier 1989).

The intention of this paper is to review some of the recent AMS dating undertaken by the Oxford Laboratory on Late Upper Paleolithic and Epipaleolithic sites in the Levant, in particular from sites that belong to the 'Kebaran' and 'Natufian' industrial traditions. The dates to be mentioned are on charred bone, seeds and charcoal, and come from the following sites: 1) the Natufian levels at Hayonim (Cave and Terrace), Mt Carmel; 2) a number of Kebaran sites in the Jordan Valley (Ohalo II, Urkan-e-Rubb IIa and Fazael; 3) several Terminal Pleistocene sites in the western Negev; 4) a further set of dates on the Wadi el-Jilat complex of sites in Jordan. Finally, some mention will be made to the difficulty in obtaining archaeologically acceptable dates with such material.

REFERENCES

- Hedges, REM, Housley, RA, Law, IA and Bronk, CR 1990 Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 10. *Archaeometry* 32(1): 101-108.
- Mellars, PA and Tixier, J 1989 Radiocarbon accelerator dating of Ksar 'Aqil (Lebanon) and the chronology of the Upper Palaeolithic sequence in the Middle East. *Antiquity* 63: 761-768.
- Valladas, H, Joron, JL, Valladas, G, Arensburg, B, Bar-Yosef, O, Belfer-Cohen, A, Goldberg, P, Laville, H, Meignen, L, Rak, Y, Tchernov, E, Tillier, AM and Vandermeersch, B 1987 Thermoluminescence dates for the Neanderthal burial site at Kebara in Israel. *Nature* 330: 159-160.
- Valladas, H, Reyss, JL, Joron, JL, Valladas, G, Bar-Yosef, O and Vandermeersch, B 1988 Thermoluminescence dating of Mousterian 'Proto-Cro-Magnon' remains in Israel and the origin of modern man. *Nature* 331: 614-616.

MODELING THE $\Delta^{14}\text{C}$ RESPONSE TO A COMPLEX SOLAR FORCING*JOHN L JIRIKOWIC and PAUL E DAMON*

Department of Geosciences, The University of Arizona, Tucson, Arizona 85721 USA

Spectral analysis of the high-precision $\Delta^{14}\text{C}$ calibration record indicates the $\Delta^{14}\text{C}$ variations may not be responses to several separate sinusoidal forcings, but may, in fact, represent a system of harmonics from a single complex solar variation. Such a solar variation would likely express itself with both variations in the solar magnetic field and in solar energy output. The former variation would affect ^{14}C production. The latter would undoubtedly have a climatic effect. After adapting the outcrop-diffusion model of Seigenthaler and Oeschger, we have used a computer software package (developed from "System Dynamics" as conceptualized by Jay W Forrester) to model the ^{14}C system's time-variant behavior. The model permits the behavior of each parameter of the cycle to be studied separately. Production and climate-sensitive model parameters were individually varied at the harmonic periodicities to test model sensitivity. These suite forcings were then compared to the spectral and statistical characteristics of the $\Delta^{14}\text{C}$, solar activity and climate time