Radiocarbon dating and archaeology in the Middle to Late Bronze Age of the Eastern Mediterranean: a happy marriage?

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The absolute time scale of the Eastern Mediterranean before 500 BCwas established through the work of many scholars by piecing together temporal evidence from various sources connected to the dynastic periods of ancient Egypt. This formed – and still forms – the backbone of the absolute time scale going back to about 3000 BC.

When radiocarbon dating was developed some 60 years ago, it first appeared as a true revolution to archaeology for establishing an independent absolute time scale based on the well-established law of radioactive decay. However, the initial enthusiasm was damped by the fact that the $^{14}C/^{12}C$ ratio in atmospheric CO_2 was not constant over time, and the determination of absolute ages depends on a ^{14}C calibration. The "wiggly" character of the calibration curve often limits the precision of absolute radiocarbon dates. Great strides have been made to reduce the uncertaintywhen additional information about the temporal order of archaeological samples was available, applying methods of Bayesian statistics. In a seminal work by the Oxford AMS lab, a direct comparison of radiocarbon dated material from the dynastic period revealed essentially a good overall agreement with the historical chronology of ancient Egypt [1].

However, a particularly persistent disagreement of about 100 years remains in the 2nd Millennium BC between the absolute time scale derived from archaeology and radiocarbon dating, respectively. The current status of this dispute will be discussed,including the results from the Hyksos site at Tell el-Daba in the Nile delta [2], from the Minoan eruption of Santorini [3], and a more recent comparison of radiocarbon results in the Levant [4].

[1] C. Bronk Ramsey et al., Radiocarbon-based chronology for dynastic Egypt, *Science***328** (2010) 1554-1557.
[2] W. Kutschera et al., The chronology of Tell el-Daba: A crucial meeting point of ^{14}C dating, archaeology, and Egyptology in the 2nd Millennium BC, *Radiocarbon***54** (2012) 407-422.
[3] S.W. Manning et al., Dating the Thera (Santorini) eruption: archaeological and scientific evidence supporting a high chronology, *Antiquity* 88 (2014) 1164-1179.
[4] Höflmayer et al., New evidence for Middle Bronze Age chronology and synchronisms in the Levant: radiocarbon dates from Tell el-Burak, Tell el-Daba, and Tel Ifshar compared, *Bulletin of the American Oriental Research***375** (2016) 53-76.