

ASSESSING ATMOSPHERIC ^{14}C CONCENTRATION IN CENTRAL BRAZIL DURING THE BOMB PEAK PERIOD THROUGH TROPICAL TREES AND SPELEOTHEMS

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ABSTRACT: When dealing with radiocarbon dating, the need for calibration of conventional ages, given that carbon isotopic ratios vary in time and space, call for the knowledge of radiocarbon concentration within specific reservoirs over time. In temperate regions, well distinguished seasons enable several environmental records to be used for establishing robust chronologies. Empirical curves have been developed covering the whole 50 ky of ^{14}C dating limits, the most recent being Marine13 (for global surface ocean) and IntCal13 (for Northern Hemisphere atmospheric signal). Southern Hemisphere is represented by the SHCal13 curve, constructed upon very limited records. In the tropics, despite the lack of cold/warm cycles, the seasonality of rains and floods provide favorable conditions for the formation of annual growth layers both in speleothems and even in some species of trees. However, these records can only be assessed by comparison to other techniques, as dendrochronology and U-Th dating, so that annual growth can be validated by radiocarbon measurements. In order to better evaluate the behavior of ^{14}C concentration within the atmosphere over time, the pattern of bomb carbon incorporation by the atmosphere then by the biosphere can be used to evaluate isotopic equilibrium at each growth layer. The large discrepancies between ^{14}C concentrations in each year during the 1950-1980AD time range, make of the bomb peak curve an important tool for the validation of tree species and growth conditions with potential to provide suitable chronological records so that such studies can be extrapolated to centuries or millennia. In this work, we present two examples of chronological records from central Brazil: an individual of *Cedrela fissilis* dated by dendrochronology and a stalagmite, dated by U-Th, from the bomb peak period, i.e. after 1950AD. Radiocarbon Accelerator Mass Spectrometry (AMS) was used to compare the isotopic ratios of tree rings with the carbon 14 concentration in the atmosphere during the nuclear tests based on curve bombSHCal1-2. The tree rings are in very good agreement with the bomb peak curve and the speleothem DCF ranges from 5 to 20% between 1966 and 1992 AD while $\delta^{13}\text{C}$ varies between -12.5 and -11.0 ‰. We discuss the limitations of both records and their potential use to evaluate atmospheric carbon 14 concentration over the last millennia.

KEY-WORDS: CALIBRATION, RADIOCARBON, ATMOSPHERIC CARBON.