



Annually resolved atmospheric radiocarbon records reconstructed from tree-rings

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The IntCal13 calibration curve is mainly based on data measured by decay counting with a resolution of 10 years. Thus high frequency changes like the 11-year solar cycles or cosmic ray events [1] are not visible, or at least not to their full extent. New accelerator mass spectrometry (AMS) systems today are capable of measuring at least as precisely as decay counters [2], with the advantage of using 1000 times less material. The low amount of material required enables more efficient sample preparation. Thus, an annually resolved re-measurement of the tree-ring based calibration curve can now be envisioned.

We will demonstrate with several examples the multitude of benefits resulting from annually resolved radiocarbon records from tree-rings. They will not only allow for more precise radiocarbon dating but also contain valuable new astrophysical information. The examples shown will additionally indicate that it can be critical to compare AMS measurements with a calibration curve that is mainly based on decay counting. We often see small offsets between the two measurement techniques, while the reason is yet unknown.

[1] Miyake F, Nagaya K, Masuda K, Nakamura T. 2012. A signature of cosmic-ray increase in AD 774-775 from tree rings in Japan. *Nature* 486(7402):240-2.

[2] Wacker L, Bonani G, Friedrich M, Hajdas I, Kromer B, Nemeč M, Ruff M, Suter M, Synal H-A, Vockenhuber C. 2010. MICADAS: Routine and high-precision radiocarbon dating. *Radiocarbon* 52(2):252-62.