Geophysical Research Abstracts
Vol. 21, EGU2019-12003, 2019
EGU General Assembly 2019

A blind comparison of radiocarbon labs

Brent Ward and John Clague
Simon Fraser University, Earth Sciences, Burnaby, Canada (bcward@sfu.ca)

Correlation of glaciations in disparate mountainous regions commonly relies on radiocarbon. Although it is the most common geochonological method used in Quaternary, archeological and geomorphic studies, the method is not without issues. A blind comparison of seven different radiocarbon laboratories was carried out to test reproducibility of radiocarbon age determinations. Lab A and E utilize the radiometric method, and Labs B, C, D, F and G utilize the accelerator method. Duplicate samples were sent to the laboratories without their knowledge that they were participating in the test. The results are provocative as there are significant differences among the laboratories:

Three separate macrofossils from the same sample - 18,380±100 (Lab B), 17,380±130 (Lab C), and 17,820±140 (Lab C).

A single Picea sp. (spruce) branch - 19,600±170 (Lab A), 19,500±170 (Lab A), 18,420±110 (Lab B), 17,290±130 (Lab C), and 19,300±150 (Lab D).

A single Picea sp. (spruce) branch used as a standard by the GSC Radiocarbon Laboratory was analyzed five times resulting in an average age of 25,100±∼150. The same log yielded ages of 25,320±400 (Lab A), 24,000±160 (Lab C), 25,160±100 (Lab D), 25,210±120 (Lab D), 24,710±170 (Lab E), 24,790±170 (Lab F), and 24,950±170 (Lab G).

A single Salix sp. (willow) twig - 30,400±480 (Lab B), 28,310±280 (Lab C), 33,240±230 (Lab D), and 33,140±230 (Lab D).

A single Salix sp. (willow) twig - - 24,930±940 (Lab C) and Lab D (>44,000). A second Salix sp. twig from the same sample - 33,290±380 (Lab C). A third Salix sp. twig from the same stratigraphic level - Lab D 46,500±1200 (Lab D).

The differences between laboratories generally become larger with increasing age, raising the possibility that some labs introduce a small amount of modern carbon during processing. Because chronologic control is vital for many Quaternary studies, these results are disturbing. Radiocarbon users are cautioned that different laboratories may provide significantly different ages, making correlation potentially problematic. The problem is especially acute for samples at or near the limit of radiocarbon dating. The issue of laboratory consistency aside, we also advise caution in interpreting radiocarbon ages, as they are, in reality, a probability distribution. Internal testing at the GSC Radiocarbon Laboratory demonstrates that variation between samples processed and analyzed at the same facility in some cases can exceed the combined error. This is important when researchers are trying to determine lags and leads to climate forcing.