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LETTER TO THE EDITOR

Reply to R. J. Francey

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The difference in interpretation can indeed be reduced to two different basic concepts. Our results suggest that assimilation of biospheric decomposition CO_2 is the most logical way to explain the observed large $\Delta^{14}C$ differences between tree-stem cellulose and tropospheric CO_2 in 1963. It should be noted that $\Delta^{14}C$ is corrected for isotopic fractionation using $\delta^{13}C$ and thus is insensitive to the effects of light, humidity, etc., on isotopic fractionation of carbon during photosynthesis. One then has to conclude that subcanopy air and photosynthate exported by different branches to the stem are incompletely mixed.

Incomplete mixing of both air and exported photosynthate will lead to a vertical gradient in $\Delta^{14}C$ in the tree. This gradient will be most pronounced in 1963 when the rapid injection of nuclear weapons produced ^{14}C into the troposphere made tropospheric CO_2 distinctly different from biospheric decomposition CO_2. The "age" of subcanopy biospheric CO_2 was then of little importance. We plan to measure a vertical $\Delta^{14}C$ profile in a tree from a dense canopy forest to resolve the basic differences outlined by Francey.