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Bomb ^{14}C recorded by tree rings in China- A brief summary

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Atmospheric nuclear weapons tests caused a dramatic increase of atmospheric $^{14}\text{CO}_2$ with a peak around 1964, thereafter, bomb ^{14}C became a powerful tool for dating recent carbonaceous material. There are lots of observational atmospheric $^{14}\text{CO}_2$ records and reconstructed $^{14}\text{CO}_2$ records based on annual tree rings covered bomb peak in the world, and they were compiled by Hua et al. in 2022. In China, however, continuous atmospheric $^{14}\text{CO}_2$ records since the 1950s are scarce, and only several tree ring ^{14}C records were reported. Here, we summarized four published tree ring bomb ^{14}C records and three new records from our latest research between 27°N and 47°N in China. The results show the $\Delta^{14}\text{C}$ of these records are generally higher than the average level in mid-latitudes of the Northern Hemisphere (NH zone 2 defined by Hua et al. (2022)) during the period of 1964-1989. This phenomenon is likely due to the impact of the atmosphere nuclear testing at Semipalatinsk (Kazakhstan), and the effect of Lop Nor nuclear weapons tests in Northwest China is not obvious. A local Suess effect began to appear in the records from urban and suburban sites since 1990s, of which the ecological half-life ($T_{1/2,e}$, ~ 10.5 years) is shorter than that of remote sites. $T_{1/2,e}$ of records in remote sites range from 10.66 to 12.38 years, with an average of 11.54 years, are close to the level of the tree ring records in South Korea and Japan. It may suggest the impact of atmosphere diffusion is not very different. What should be highlighted is that these bomb ^{14}C records of tree rings in China presents apparent differences with those records in similar latitudes in the other regions, therefore, there could be an additional uncertainty when the average bomb ^{14}C value in the world (e.g. average in NH zone 1, 2 or 3) were used to dating recent samples in China. To solve the above-mentioned problem, more tree ring AMS- ^{14}C data in wider area in China are desired.

Student Submission

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