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Effect of anthropogenic activities on atmospheric 14C content and radiocarbon chronologies of the future.

Irka Hajdas
ETH Zurich, Particle Physics, Laboratory of Ion Beam Physics, Zurich, Switzerland (hajdas@phys.ethz.ch)

Radiocarbon (14C) is a naturally produced radioactive isotope of carbon (T1/2=5700 yrs), which is continuously produced in the atmosphere. This occur in a reaction of thermal neutrons, which are secondary particles, products of cosmic rays reactions with the atmosphere, with nitrogen that is commonly present in the atmosphere. Until the mid 19th century the natural concentration showed temporal variability around the mean value (14C / 12C ratio =1.8 x 10-12). However anthropogenic activity created 2 types effects that are changing the 14C concentration of the atmosphere. Industrial revolution triggered adding 14C free (old) carbon that originates from the burning of fossil fuels (Suess effect). This in the late 19th century and early 20th century atmosphere was becoming older.
The nuclear tests in the 1950ties caused additional production of radiocarbon atoms (artificial). The effect has been almost double of the natural production and created an excess 14C activity in the atmosphere and in terrestrial carbon bearing materials. The bomb produced 14C has been identified soon after the tests started but the peak (ca. 100% above the normal levels) reached its maximum in 1963 in the northern Hemisphere where most of the tests took place. In the southern Hemisphere the bomb peak reached lower values (ca. 80 % of normal level) and was delayed by ca. 2 years. After the ban on nuclear tests the atmospheric 14C content began to decrease mainly due to the uptake by the ocean but also due to the above mentioned addition old carbon. Continuous monitoring of the atmospheric 14C ratio during the years that followed the nuclear tests, provide basis for environmental studies. Applications range from studies of ocean circulation, CO_2 uptake, carbon storage in soils and peat, root turn over time to the medical, forensic and detection of forgeries.
However, the so called ' 14C bomb peak' nearly disappeared due to the combined effect of ocean uptake of CO_2 and an input to the atmosphere of the '14C-free' carbon dioxide.
This paper will discuss effects that the ongoing change in atmospheric 14C has on geochronologies of the most recent deposits and future anthropogenic records.