Radiocarbon content in single-year tree rings of Japanese cedar

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The radiocarbon contents in the atmosphere and thus in the tree-rings reflect the state of solar activity and the interplanetary magnetic field. By measuring the radiocarbon contents in tree-rings with annual time resolution, we can trace back the characteristics of the eleven-year solar cycles and the twenty-two year solar polarity reversals during the pre-historical periods including the epochs of anomalous state of the Sun such as the Maunder and the Spoerer Minima. In order to clarify the changes of the eleven-year solar cycle in association with long-term variations of solar activity level, we measured the radiocarbon contents in Japanese cedar trees for 880-960 AD and 1413-1745 AD. The spectral analyses of the data have revealed the suppression of the eleven-year variations and the slight stretching of the cycle lengths during the grand activity minima, while slight shortenings of the solar cycles were detected during the great activity maxima. It supports the strong connection of solar cycle length and solar activity level. We report the results obtained by the radiocarbon data, and discuss the state of the recent active Sun in its history. We also discuss solar influence on the terrestrial climate with multi-decadal time scales.