

Radiocarbon dating of ancient Japanese document and *kohitsugire* calligraphy

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AMS radiocarbon dating on ancient Japanese documents, sutras and books of known age

History is a reconstruction of past human activities, evidence of which is remained in the form of documents, records, relics, folk tradition and so on. Ancient documents are indispensable materials for historical studies, and in particular the written ages are essential for the reconstruction of human activities.

For the analysis of long-lived nuclide, accelerator mass spectrometry (AMS) was developed in 1977. AMS reduced the sample loss for ^{14}C analysis to only a few milligrams of carbon and radiocarbon dating became applicable to ancient documents. Radiocarbon age can be converted to calendar age with the calibration curve. However, wooden sample generally may have a calibrated age older than the historical age due to tree ring and the storage years. Therefore, the calibrated age is strictly different from the historical age when the document was written. The essential purpose of dating on historical or archaeological materials besides ancient documents is to pursuit the historical age when they had been used as tools. Before the application radiocarbon dating to ancient documents, the relationships between calibrated radiocarbon age and historical age should be clarified.

We measured radiocarbon ages of the ancient documents, sutras and printed books of known age. The results indicated that there is little gap between the calibrated radiocarbon age and the historical age of Japanese paper; consequently, it was concluded that the Japanese paper is a suitable sample for radiocarbon dating. Japanese paper had been made mainly from deciduous trees: *Kozo*, *Ganpi* and *Mitsumata*. Ancient Japanese documents, therefore, belong to a category of wooden sample. However, fresh branches grown within a few years were cut selectively for Japanese paper, since the fiber of the old branch is not suitable for paper manufacture and yields paper of poor quality. In addition, *Kozo* paper, most popular Japanese paper, is usually used within one year, because long-preserved paper dose not fit to write with Indian ink on it. Although the document written on old paper gives an older radiocarbon age, such document is paleographically recognizable by the blue of ink. The little gap between the calibrated age and the historical age is due to such tradition and characteristics in manufacturing and usage of Japanese paper.

AMS radiocarbon dating of *kohitsugire* calligraphy

Kohitsugire is a paper fragment of calligraphy from an old manuscript written mainly in the *Heian* and *Kamakura* periods (correspond to AD794-1333). The old manuscripts written in these periods are rarely discovered as complete books. *Kohitsugire* paper fragments, therefore, hold potentially significant information for historical, literary and paleographical study, because of their antique handwriting and description on historical incidents. There are, however, many copies and counterfeits written in several centuries later, mainly in Edo period (AD1603-1867), among the *kohitsugire* fragments attributed to the famous calligraphists. While the written age or the author of the ancient manuscript can be generally presumed by the paleographical views, it is difficult to ascertain whether *kohitsugire* leaves with only a few calligraphical lines are genuine or not.

We have been working on radiocarbon dating focused on ancient Japanese document of known age. The previous study indicated that calibrated radiocarbon ages of Japanese paper are in good agreement with corresponding historical ages of the documents. We, therefore, started this study on radiocarbon dating of *kohitsugire* calligraphy in 1999. This is my main subject of study.

Some examples were given below. *Itsumeihonchokakugire* is a *kohitsugire* calligraphy attributed to *Fujiwara Koze* who is one of the famous calligraphists in Japanese history. This calligraphy was written on the paper sheet decorated with indigo-blue-dyed fiber, as if clouds are billowing in the sky. Such paper is called *Tobikumogami*. By radiocarbon dating of this *kohitsugire*, it was shown that the calligraphy written in the late 10th or early 11th century when *Fujiwara Koze* flourished as a calligraphist and this *kohitsugire* is the oldest example among the extant *Tobikumogami*.

Fujiwara Teika and Prince *Munetaka* are also well-known calligraphists and famous as many counterfeits mingling among their genuine calligraphies. Although it is difficult only by paleographical viewpoint to judge whether well-counterfeited *kohitsugire* calligraphy is genuine or not, we found three counterfeits attributed to them by radiocarbon dating.

Miwagire is a generic name for *kohitsugire* leaves from the manuscripts of *Kokinwakashu* anthology with an identical format. *Miwagire* had been attributed to *Shunkan* (?-1179) who is a Buddhist monk of *Shingon* sect and also well-known as a tragic hero of *yoruri* play. Recent study on the calligraphy, however, suggests that the handwriting of *Miwagire* is not by *Shunkan* and takes on style of Kamakura period (AD1192-1333). By radiocarbon dating, it was shown that *Miwagire* was written in the 14th century and is surely not by *Shunkan*.