PALAEOMAGNETISM OF UPPER CARBONIFEROUS ROCKS IN AKIYOSHI PROVINCE, S. W. HONSHU, JAPAN

by

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(with 4 Text-figures)

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Abstract

In this paper, a palaeomagnetic study of a reddish tuffaceous shale of Upper Carboniferous (s.l.) age developed in Akiyoshi Province, S.W. Honshu, Japan, will be briefly presented. The stability of rock magnetism was tested. The pole position determined by the present study is approximately 7°S Lat., 67°E Log., which is strikingly different from that previously determined from the Carboniferous rocks in the Kitakami Mountains in N.E. Japan, although the samples in the latter are of slightly older geologic age than those of the present study (MINATO and FUJIWARA, 1965).

Stratigraphic positoin of the sampled rocks

In 1963, fossils were found in reddish tuffaceous shales at a locality near Ohkubo in Akiyoshi Province by HASEGAWA (1963). The fossils include corals,

Table 1. Sequence of Palaeozoic formations developed in Akiyoshi Province after HASEGAWA, 1963; MINATO and KATO, 1963

European and Russian Standard		Akiyoshi Province
Westfalian	Moscovian	Limestones of the *Fusulina-Fusulinella* zones
Upper Namurian	Bashikirian	Limestone of the *Profusulinella* zone
Lower Namurian	?	Limestone of the *Nagatophyllum* zone Greenish purplish basaltic tuffs Reddish tuffaceous shales with fossils*
Upper Viséan		Onimaru Series, unexposed

* sampled rocks

bryozoans, brachiopods and pelecypods which were described by MINATO and KATO (1963). According to them, the age of the fossils may be early Namurian, or at least slightly younger than the Upper Viséan Onimaru Series of the Kitakami Mountains.

The unusual lithology and fossiliferous of this reddish tuffaceous shale makes it unique among Japanese Palaeozoic deposits. A palaeomagnetic study under the direction of Prof. MINATO was therefore undertaken by the present author.

Measurements

The specimens were measured by means of an astatic magnetometer at the palaeomagnetic laboratory, Department of Geology and Mineralogy, Hokkaido University. The result is tabluated in table 2. The virtual pole position of the age represented by the sampled rocks was determined to be at 7°S, 67°E.

This location is quite different from what the author expected prior to measurement, inasmuch as a pole position of 71°N Lat., 63°W Long., previously been determined from Tournasian rocks in the Kitakami Mountains. Further, the observed declination at these two localites varys by over 100 degrees.

The author therefore became suspicious of the stabily of the remanent magnetization in the Akiyoshi specimens. Whereas the Kitakami specimens are composed of basaltic volcanic rocks, the present specimens are andesitic tuffs and might be presumed to be comparatively unstable with respect to magnetization. Some of the specimens therefore were placed in stroage for the purpose of subsequent

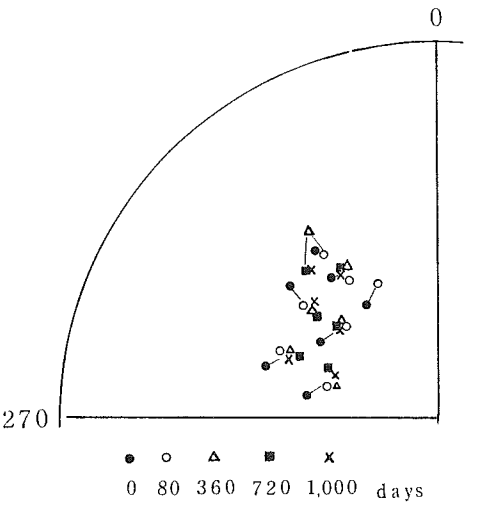

Fig. 1
Change in the direction of remanent magnetization during storage.

checks on possible changes in the direction of remanent magnetization.

As a result, the direction of magnetization was found to have shifted to some extent during 4 years (Feb. 1963–Jan. 1967).

Nevertheless, as in shown in fig. 1, this seems not to have been affected by the prevailing direction of the geomagnetic field. The remanent magnetization of the samples tested thus can be concluded to be fairly stable.

To further test the stability of samples, alternating magnetic field demangnetization, thermo-demagnetization, thermo-magnetic analysis and X-ray analysis of the rock specimen was applied.

The Curie temperature of the ferromagnetic components of the present material ranges from 580°C to 600°C. The ferromagnetic mineral was determined by X-ray analysis to be γ-Fe_2O_3.

As a result of these stability tests, the remanent magnetization of the samples was to be sufficiently stable for reliable palaeomagnetic determinations (Fig. 2–4).

Table 2.

Mean direction and intensity of magnetization				Pole position		
Declination	Inclination	α	e. m. u./gr.		δ_p	δ_m
S65°W	27°	15°	2.5×10^{-4}	7°S, 67°E	10°	16°

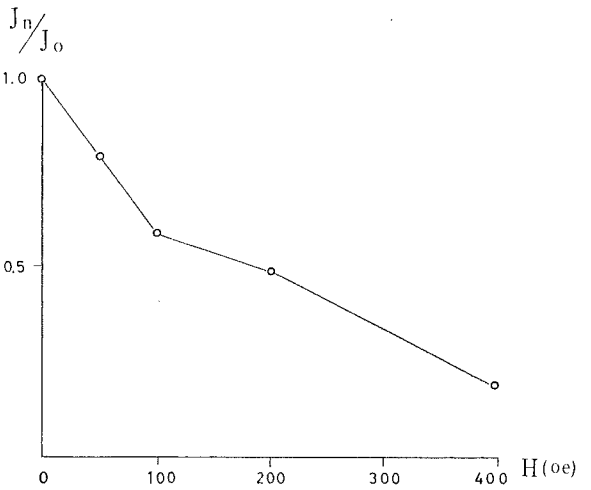

Fig. 2
Value of relative intensity of N. R. M. after A-C demagnetization. H(oe); intensity of A-C magnetic field J_n/J_0; relative intensity of N. R. M.

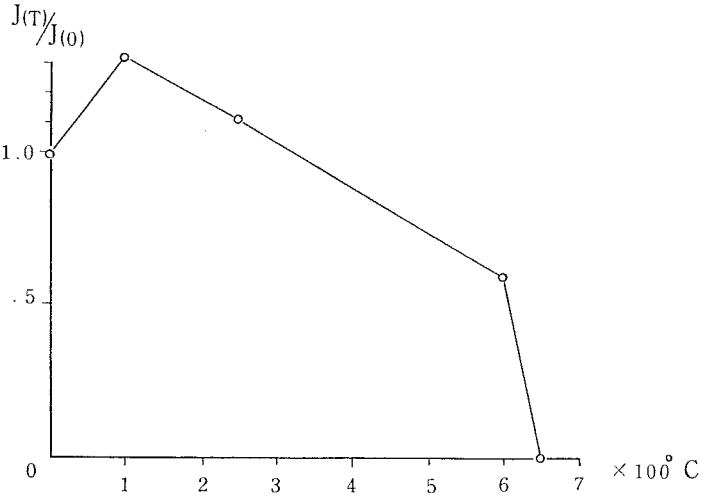

Fig. 3
Value of relative intensity of magnetization after thermo-demagnetization.

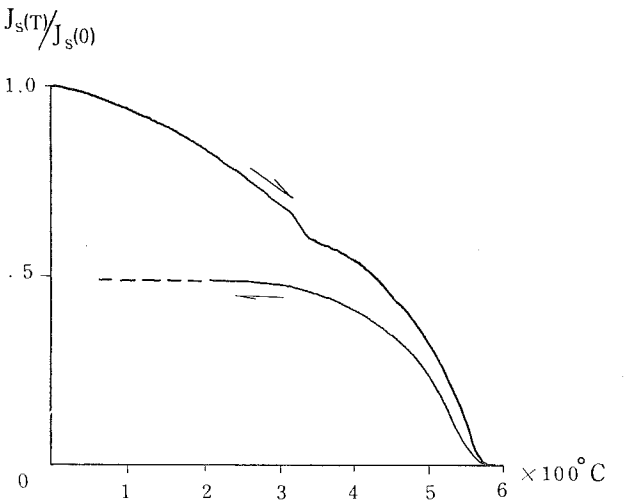

Fig. 4
Thermo-magnetic curve of reddish tuffaceous shale. $H_{ex}=3{,}300$ Oe

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