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## CRACKS AND FISSURES OF POST-ALLERØD AGE IN THE NETHERLANDS

### Abstract

In summer 1966 during practical field-work, periglacial phenomena were studied. This note is the result of observations on the occurrence of cracks and fissures in a fossil soil, the so-called Usselo-soil. This soil contains a bleached layer 5 to 10 cm thick and is often rich in charcoal. The charcoal dates from the transition Allerød time—Late Dryas time (about 8900 years B. C.) and the soil is of Allerød age (van der Hammen, 1957). The cracks and fissures intersect the Usselo-soil, therefore the phenomena are younger.

In this region a description of fissures and cracks from this age is unknown. An example will be given below.

### FISSURE

Locality: sandpit on the east side of Daarle.

The walls of the sandpit are 1.5 to 3 m high — the upper part consisting of Younger Coversand I and II, the lower part of Older Coversand. The Usselo-soil, developed in the upper part of Younger Coversand I, could be traced over a distance of about 25 m. Five fissures with a mutual distance of about 3 m between them were observed, each intersecting the Usselo-soil. Between these fissures some cracks were observed. The total depth of the fissures ranges from 80 to 140 cm and from 15 to 130 cm below the Usselo-soil. Their maximum width varies from 10 to 20 cm with a rapid decrease from the top. The adjoining layers are turned down (fig. 1, pl. 1). The filling consists of sand, bleached or colored by iron and humus infiltration.

South of Daarle, Van der Hammen (1951) investigated the same deposits. According to the data of Wierden the grain size composition of the deposits is:

Younger Coversand II:  $1.4\% < 50\mu$ ,  $11.3\% 50-105\mu$ ,  $50.7\% 105-210\mu$  and  $36.3\% > 210\mu$

Younger Coversand I:  $2.8\% < 50\mu$ ,  $12.7\% 50-105\mu$ ,  $63.4\% 105-210\mu$  and  $21.1\% > 210\mu$

Top of Older Coversand:  $3.4\% < 50\mu$ ,  $42.2\% 50-105\mu$ ,  $52.4\% 105-210\mu$  and  $2.7\% > 210\mu$ .

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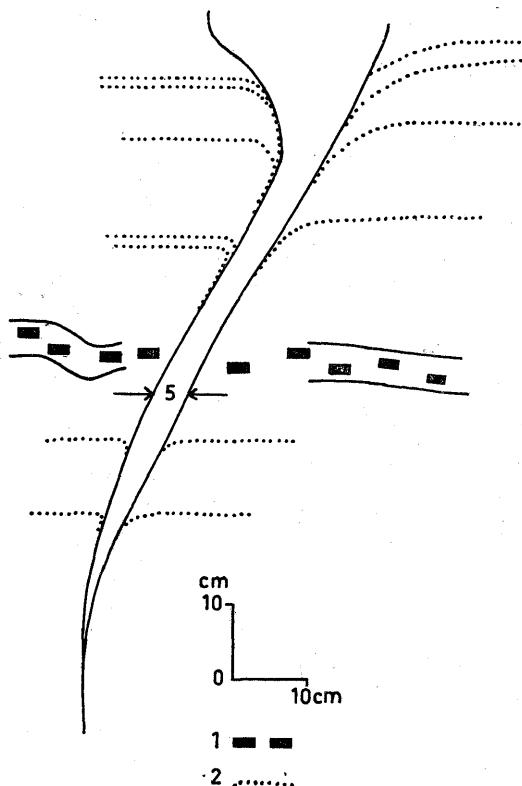


Fig. 1. Sketch of the frost-fissure near Daarle  
 1. Usselo-soil; 2, very coarse sand

#### CRACK

Locality: eastern part of the sandpit of a brick-factory on the road from Blaricum to Huizen.

In the deepest part of the pit ice-pushed deposits are exposed. These are overlain by a pavement of windworn stones. On top of these stones the Usselo-soil is found which contains charcoal and is covered by Younger Coversand II. This deposit has about the same grain size composition as the Younger Coversand II of Wierden. From about 50 cm below surface in this 2—3 m thick deposit, several cracks were recognized at a distance of 0.2 m to 1.5 m. Their maximum depth is 2 to 3 m and their maximum width is 3 mm, what implies a practically equal width. The adjoining layers are turned down (fig. 2, pl. 2). The cracks are filled up by sand of about the same grain size composition as the Coversand. A remarkable

fact is that most cracks were not long enough to reach the Usselo-soil.

The same type of cracks in the Usselo-soil was found in several exposures in the northern and central part of the Netherlands. In the Daarle sandpit their width is hair-thin to 3 mm and the maximum depth is about 1 m (fig. 3).

Fissures of the same age have been found near Zuid-Laren, Emmen and Apeldoorn, too. In the southern part of the Netherlands no cracks or fissures of this age have been found until now. The occurrence of this kind of fissures near Emmen and Apeldoorn was recorded by Maarleveld (1964). Near the Dutch border in Belgium a similar observation has been made by De Ploey (1961) however the length of the crack was no more than 30 cm. In Germany Frechen & Rosauer (1959) found in the pumice deposit of Kärlich (near Neuwied) fissures of a maximum length of 100 cm.

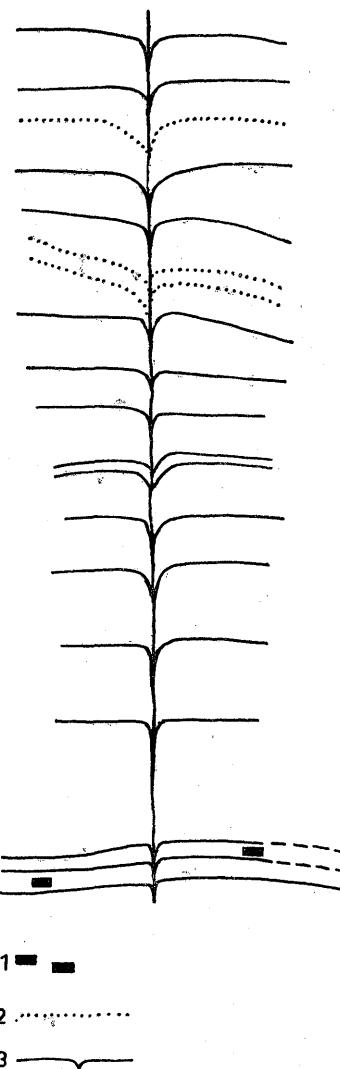


Fig. 2. Sketch of the frost-crack near Huizen

1. Usselo-soil;
2. very coarse sand;
3. very fine sand;

(horizontal and vertical scale: see fig. 1)

#### CONCLUSIONS

The observations demonstrate an age younger than the Allerød time of both the cracks and the fissures. The cracks are characterized by a width not exceeding 3 mm, whereas that of the fissures ranges from 9 to 20 cm. Furthermore the cracks possess a practically uniform width; the fissures show a rapid decrease in width from top to bottom. At the contact of the wall at least a part of the layers is turned down as well in the case of a crack,

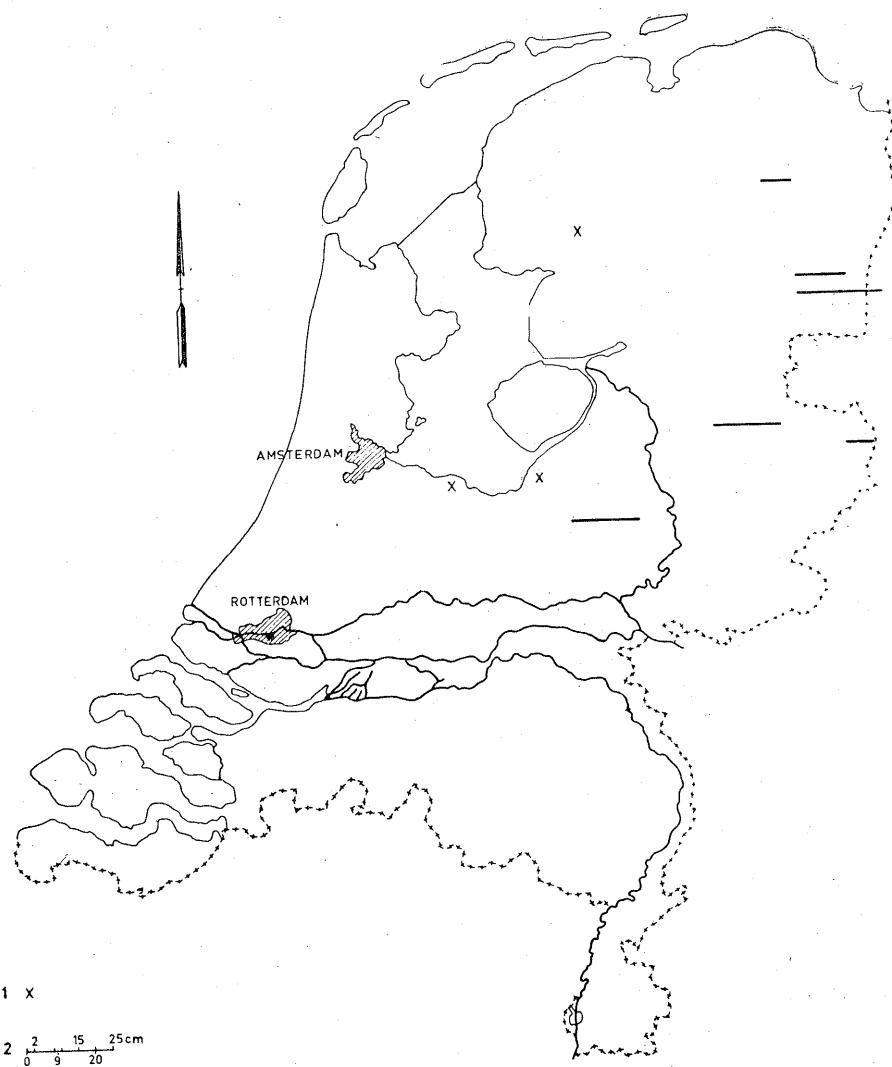


Fig. 3. Map of the maximum width of frost-cracks and frost fissures of post-Allerød age in the Netherlands

1. maximum width 3 mm; 2. scale of maximum width

as sometimes, of a fissure. Down turned and upturned layers have been found in one crack.

In a section the mutual distance between the cracks may be very short, whereas this distance between the fissures in a section may be several meters. The investigated cracks and fissures in the Netherlands are found

in deposits of about the same grain size composition and origin. So far as the age is concerned it is only sure the phenomena are younger than the Allerød time. On the other hand the same phenomena have never been found in Holocene deposits in the Netherlands, so it is obvious to suppose a Late Dryas-time age. Formation by desiccation in pure sand is not probable and this is the reason to consider that these phenomena have been formed by frost during abrupt falls of temperature.

Until now, cracks and fissures from this time have been found in the northern and central part of the Netherlands. It is not sure there is a relation between them and the occurrence of discontinuous permafrost during the Late Dryas-time in these parts of the Netherlands. In the future the study of these phenomena and related problems will be continued.

#### ACKNOWLEDGMENT

The author's thanks are due to Prof. Dr. G. C. Maarleveld for guidance during the field-work and for reading the manuscript.

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Pl. 1. Frost-fissure near Daarle



Pl. 2. Frost-crack near Huizen