LL9: April 1983

Loess Letter is published by the Quaternary Research Group of the University of Waterloo; it is the informal newsletter of the INQUA Loess Commission. LL appears twice a year, usually April and October. Requests for copies, and material for publication should be sent to Prof. Ian Small, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. Brief research papers are published, also reviews of recently published material, and news items and announcements.

LL9 is a special issue to celebrate the symposium on 'Correlation of Quaternary Chronologies' to be held at York University, May 26-29, 1983. This accounts for the emphasis on loess stratigraphy in this issue. For details of the York conference, contact: Prof. W. C. Mahaney, York University, Atkinson College, Department of Geography, 4700 Keele Street, Downsview, Ontario, M3J 2Y7 (Phone: 416-667-2523 or 416-667-2513).

LL sends congratulations to the Geology Department of Carleton College, Northfield, Minnesota; the department was founded in 1932 by Laurence Gould and to celebrate its 50th Anniversary a symposium on 'Revolution in the Earth Sciences 1932-82' will be held at Carleton College on April 14-16, 1983. Dr. Robert Ruhe will deliver an address on 'Advances in the Study of Loess' - which we hope to report on in LL10. The Carleton meeting will provide an opportunity for a discussion on the 1983-87 program for the North America Working Group of the Loess Commission - these discussions will also be reported in LL10.

LL10 is due to be a special issue on 'Scanning Electron Microscopy and Loess' - to mark the occasion of the 'SEM in Geology' meeting to be held at Oxford University, September 6-8, 1983. Details of the Oxford meeting can be obtained from The Administrator, Royal Microscopical Society, 37/38 St. Clements, Oxford OX1 1AJ, England. Abstracts should be submitted by 15 June, 1983 - on special forms which are obtainable from The Administrator, RMS. Research papers are called for which emphasise the microscopical aspects of geological investigations.

We reported the death of Alexander Alexiev in LL8. In this issue we re-publish one of his shorter papers as a memorial. Another notable loess investigator has died: in the issue of Geotimes for February, 1983 the death of John Chapman Frye was announced. He was Chief of the Illinois Geological Survey from 1954 to 1972, and author of many major loess papers.

Corrections: Some errors crept into LL8. We contrived to change Ed. Gill's initials - he is E. D. Gill, not E. G. Gill. Ed. Derbyshire has an alternative report on his lecture on the Chinese loess: E. Derbyshire argued that the loess making up the Loess Plateau is not made up of glacial rock flour but formed by weathering processes in the Ordos Desert (not the Tibetan). In support of his argument he cited recent work showing that the glaciers (not ice sheets) in Tibet were much smaller than previously thought.

Cover: If a philatelist were to assemble a thematic collection on the topic of 'Loess' it would be a small one. There is however one postage stamp which celebrates a famous loess investigator, the 1963 stamp issued by the Soviet Union to mark the centenary of the birth of V. A. Obручев. Its time for another loess stamp, perhaps for INQUA '87. Some governments (e.g. NZ) will respond to suggestions - so write to your Chief Postmaster.

LOESS COMMISSION

A business meeting of the Commission was held in Moscow at the INQUA '82 Congress. For the inter-congress period 1983-87 the officers of the Commission are:

President: Marton PECSI, Hungary
Vice-President: Karl BRUNNACKER, Germany, BDR
Secretary: Jean-Pierre LAUTRIDOU, France

Full members of the Commission are:

Jim BOWLER, Australia
A. E. DODONOV, U.S.S.R.
Günter HAASE, Germany, DDR
LIU Tung-Sheng, China
G. A. MAVLYANOVA, Uzbek SSR (U.S.S.R.)
Ian SMALLEY, Canada

Apart from the already existing regional working groups within the Commission (North American Working Group: R. V. Ruhe and Western Pacific Working Group: J. Bowler) two new ones have been created:

Geotechnical properties of loesses
N. I. KRIGER
PMIIS, Okrzhny proezd 18
105058 Moscow, U.S.S.R.

Geochemistry and environmental chemistry of loesses and loess soils
Otto FRANZLE
Geographical Institute, University of Kiel
D-23 Kiel-1, Olshansenstrasse 40-60
Germany BDR
The editorial board for Loess Letter is: Marten Poesia, Karl Brunacker, Jean-Pierre Lautridou and Ian Smalley. We hope to expand it soon so that world-wide representation is obtained. The main function of LL remains that of communication between members of the Loess Commission and dissemination of news about loess.

**GEOTECHNICAL STUDIES OF LOESS IN NORTH AMERICA**

It is proposed that a sub-group of the North American Working Group be formed to promote geotechnical studies of loess in Canada and the U.S.A. If you are interested please contact Dr. Alan Lutenegger, Geotechnical Test Systems Inc., P.O. Box 2265, Ames, Iowa 50010, U.S.A.


1. Introduction

The Loess Plateau of China is bounded by the Riyue Mountains on the west, the Taihang Mountains on the east, the Qinling Mountains on the south, and the Yinshan Mountains on the north. Of its area of 580,000 square kilometres, 430,000 square kilometres are soil-eroded lands (Huang Wei, 1978).

On the basis of landform, the Loess Plateau may roughly be divided into four regions. They are (1) the rolling highland region, (2) the relatively flat highland region, (3) the sandstorm region, and (4) the earth and rock mountain region. The most seriously water-eroded areas are located in the first region (Figs 1 and 2) and next comes the second region. In the third region wind erosion prevails. Water erosion and wind erosion are not so serious in the fourth region.

In the first region, 5,000-10,000 t/km²/y of loess may be washed away, the maximum value being 20,000 tons/km²/y. On average 1.6 billion tons of the sediments carried each year by the Huang He to its lower reaches come from the Loess Plateau (Qi Wen, 1979).

The main cause of the severe soil erosion in the Loess Plateau is that a great part of the sloping lands were formerly cultivated without any conservation measure. The quantity of eroded soil from these sloping, cultivated lands with slopes of 8-30° varied from 50 to 200 t/ha/y, and the corresponding water loss amounted to 300-500 m³/ha/y. So the yields of farm crops were very low, ranging from 500 to 800 kg/ha.

3.2 Infiltration The infiltration rate of the loess was determined in situ at several places in the Loess Plateau using a double-ring infiltrometer keeping a constant head of water at around 2 cm. An infiltration formula was derived as follows (Fang, 1957; Fang et al., 1958),

\[ K_t = K + \frac{K_1}{t^a} \]

in which

- \( K_t \) is the instantaneous infiltration rate at time \( t \);
- \( K_1 \) is the instantaneous infiltration rate at the first unit time;
- \( t \) is the time of test;
- \( K \) and \( a \) are constants.

The average infiltration rate (Kav) during a certain period of time is calculated by the following formula:

\[ Kav = K + \frac{1}{t-1} \int_1^t \frac{K_1}{t^a} \, dt = K + \frac{K_1}{1-a} \left( \frac{1}{t} \right) \]

There are three main characteristics of the loess which influence the infiltration rate. They are:

1. **Texture.** Other things being equal, the higher the percentage of sand in the loess, the larger is the infiltration rate (Figure 3).
2. **Moisture content.** Other things being equal, the higher the moisture content, the smaller is the infiltration rate (Fig 4).
3. **Structure.** Other things being equal, the higher the percentage of aggregates, the larger is the infiltration rate. But the influence of the structure on the infiltration rate is much more conspicuous than the influence of the other two factors (Table 4).

![Figure 3. Infiltration curves for the loess at different sand contents.](image-url)
Figure 22. The steps in terrace construction by machine on relatively gravelly sloping land.
(1) Collecting the surface soil by shovel-thrower. (2) Building terrace bank by dammer plough (Fig 23). (3) Removing subsoil by shovel-thrower and shaping bank by hand tools. (4) Spreading surface soil evenly over entire field by shovel-thrower and levelling land surface by grader.

Figure 23. Dammer plough used to build the retaining wall of terraces.

FIG. 2: Lithostratigraphical parallelization of the exposures of the Paks brickyards and the borehole-profiles of the loess plateau of Paks
FIG. 4: Young loess in hilly region

CHRONOLOGICAL EVALUATION OF LOESS SNAILS FROM PAKS USING THE THERMOANALYTICAL METHOD

SZIKOR, Gy. - BORSY, S.

FIG. 6: Comparison of the derivatographic parameters of Pleistocene loess snails of Paks. Amounts of material released at temperatures of 20–200°C [A], 200–400°C [B], 400–650°C [D], determined by the evaluation of the DTG, TG curves.

FIG. 1 Sketch plan showing the towns endangered by cellar collapse


Due to water seepage from public utilities and poor drainage the loess strata have locally been moistened, and have lost their stability causing collapses that have endangered overlying establishments. Survey work and damage preventing activities are now in progress.
The loess at Jiuzhouat, Lanzhou, People's Republic of China - a note

Edward Derbyshire

Soils Research Laboratory, University of Keele, Keele, Staffs, ST5 5BG, England.

The greatest thickness of loess so far recorded makes up the bulk of the mountain Jiuzhouat (2067 m), 4.5 km northwest of the city of Lanzhou on the dry western margins of the Loess Plateau of central China. Some 335 m of loess and loess-derived sediments rest on a fluvially-planned and faulted basement of Neogene to Pliocene rocks of the eastern part of the plateau at 91 m of Wucheng loess (Lower Pleistocene), 204 m of Lishih loess (Middle Pleistocene) and 34 m of the Upper Pleistocene Malan loess.

The mean grain size of the Malan loess at Jiuzhouat (5.2B: coarse silt) is coarser than the underlying Lishih and Wucheng loesses (7B: medium silt). Co-plots of mean silt s: sorting coefficient suggest two distinct populations (Fig. 1). The silt grades consist of quartz (over 60%), with feldspars and mica. Carbonates total 8-19% but, unlike the sulphates, are generally dispersed. 'Loess dolss' are rare. The palaeosols lack the bright colours of those farther east and organic contents are low even in the best developed buried soils. Analysis by the writer of a palaeosol in the Wucheng loess at Jiuzhouat showed a gradation down the profile in both total carbonates (8.7 - 16.3%) and organic matter (0.8 - 0.4%) and a similar result was obtained from analysis at Keele of a Lishih palaeosol (11.6 - 15.3% and 0.4 - 0.35% respectively).

The clay grade mineralogy is also dominated by quartz, with feldspar, calcite and illite/hydrromica as ancillaries. Montmorillonite, present in the Luochuan type section in Shaanxi (Han 1982), has not yet been recognized in XRD traces at Keele: there is a broad peak at 1A in some samples but they do not appear to be smectites. The XRD traces of Malan, Lishih and Wucheng loesses from Jiuzhouat are remarkable for their consistency, the composition being accorded with derivation from a dry, alkaline environment in which eluviation was relatively weak (cf. Wang, Wu and Yu, 1978).

The geomagnetic chronology at Jiuzhouat is not yet clear. The Matuyama-Brunhes boundary occurs 105 m above the base and there are two appreciable thicknesses with normal polarity 80 m and 58 m above the base with a thin normal polarity at 44 m. On the south side of the city of Wuquanshan, however, the Jaramillo normal event has been determined 14 m above the base. Loess began to accumulate at Lanzhou, therefore, less than 1.6 m yr. ago and perhaps less than 1.2 m yr. ago (cf. Wang and Yue 1982). The loess at Karamdan in the Tajikistan S.S.R. is thinner but apparently older (2.4 m yr. Pen'kov and Ganov 1980) than the basal Jiuzhouat loess. This raises the fundamental question of the primary causes of loess accumulation in different parts of the Eurasian loess belt.

The Jiuzhouat loess, made up of rather angular quartz with feldspars and mica, was almost entirely sedimented from the air. It has a loose, single-grain fabric with clay grade particles occurring as coatings, clusters and buttresses between silt grains. Voids ratios are high (0.8) and, with a collapse ratio of 10% more, it satisfies the collapsing soil criteria of both Denisov (1951) and Feda (1966). The microfabric varies with overburden and weathering history, and hence with age. Symmetrical silt-sized aggregates of clay-size quartz, feldspar and mica occur occasionally: they may represent floccs deflated from desert pans and wadi courses which cover substantial areas to the north and north-west. Wetting and drying after deposition also leads to flocculation especially as cationic concentration increases during decreases in porewater content. Clay grade aggregations are thus drawn by porewater menisci towards pore margins giving rise to the clay bridges visible in loess of all ages.

Normal consolidation with depth occurs by 'dry' compaction. In this case, the process is intergranular shearing: clay buttresses are disrupted but not dispersed. Local saturation of the loess, however, results in hydroconsolidation. This destroys clay buttresses, reduces the voids ratios and increases the anisotropy of the fabric (Derbyshire 1983 in press). This has been an important process in the past during colluviation and alluviation. The microfabric of loessic colluvium and alluvial deposits is dispersed clay and fine silt grades mantling the coarser silts throughout. The microfabric of loess thus provides a means of discriminating it from loessic colluvium and loessic alluvium.

Although rather low in carbonates, the Jiuzhouat loess contains siliceous cements and coatings in the palaeosol horizons. Iron is an accessory mineral in these cements. Silica occurs as inter-grain cements and overgrowths in the Wucheng and Lishih loesses. This is rare in the coarser silt skeleton of the Malan loess.

Only limited, small scale edge damage occurs on the Jiuzhouat loess particles: they cannot be compared to the edge-crushing to be seen on glacially-comminuted silt. Concave surfaces produced by simulated salt weathering and hydration in the laboratory (e.g. Sperling and Cooke 1980) are similar to those seen on the younger loess particles. These grains lack the Hertzian cracks and partly-rounded corners which are fairly common on subglacially-processed grains.

Re-evaluation of the evidence of Pleistocene glacial extent in China (e.g. Cui 1980; Zheng and Li 1981; Shi 1982; Derbyshire 1983a in press) suggests that glaciers did not develop in south-east China and that the extent of valley and piedmont glaciers and ice caps (but no ice sheets) was limited and localised in Tibet.

Conclusion

1. Particle shape, size and fabric are consistent with origin by deflation of silts from wadis, fans and desert plains to the
north and north-west of Lanzhou.

2. The loess of the Lanzhou region is a product of the desiccation of High Asia. This began in the Lower Pleistocene with an uplift (exceeding 3,500 m in 2 million years) of the Tibetan plateau and the Himalaya (Li et al. 1979). It is thus a concomitant of, rather than a product of the localized glaciation to the southwest.

3. The vast majority of the loess at Jiuzhoutai is an aeolian silt or siltstone. The microfabric and metastable behaviour of this material is quite distinctive and different from those silts translocated and deposited in slurries and streams. Such sedimentation produces loessic colluvium and loessic alluvium, respectively, but not loess.

REFERENCES


We conclude by stressing the importance of our experiments as a means of obtaining information about the provision of fine rock material by frost shattering. In the context of contemporary discussions on the origin of loess, it is possible to assert that the freezing of unweathered rocks can, if favourable moisture conditions persist, provide only small amounts of fine rock material, but that chalced carphylaceous rock types can liberate large amounts of particles in the silt and large clay-sized ranges. Moreover, altered silicic rock types can release considerable amounts of fine material. We believe that these findings explain the abundance of fine rock material in the Saalian-Weichselian 'head' deposits of Normandy, frost shattering having acted on weathered rock during the preceding interglacial period. Lastly, we assert that frost shattering could have supplied loesses with silt-sized material and even coarse clay-sized particles (but not fine clay-sized particles, except in the case of argillaceous rocks, marls and some weathered types).

The results of our research must be viewed within the framework of a continuing programme of research. We are aware that modification of the scheme outlined above is always possible as we continue to explore new techniques and examine more rock types. However, at present, we are in a position to define, prior to a frost shattering experiment, the relative frost susceptibility of a rock and the characteristics of the debris which it will furnish. Further, we can distinguish loess deposits from deposits formed by frost shattering. Lastly, by examining the characteristics of frost shattered periglacial deposits, we may be able to estimate the number of freeze-thaw cycles responsible for their formation and speculate on the climatic environment in which they developed.
Quaternary Dust Mantles of China, New Zealand and Australia: edited by R. J. Wasson, Australian National University 1982, pp.253 (to order send A$5.00 to the Secretary, Dept. Biogeog. & Geomorph., Res. Sch. Pacific Studies, ANU, P.O.B.4, Canberra City ACT 2600, Australia).

This is the Proceedings of the WPWG Dust Mantle Workshop held in Canberra in late 1980; 8 papers from China, 4 from NZ, 17 from Australia and one from Nigeria. LL echoes Jim Bowler's words in the preface: If the Workshop and Proceedings provided an opportunity to acknowledge the contribution of Liu Tung-sheng to China's loess studies, it did likewise for his Australian counterpart, Bruce Butler, author and pioneer of parna. During this Workshop and field trip many of us acknowledged the reality of parna and took occasion to pay tribute to the man who first recognized it.

We can only reproduce a few items - we focus on loess stratigraphy in China.

ABEOLIAN PROCESSES AND DUST MANTLES (LOESS) IN CHINA

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ABSTRACT

Distributional patterns, environmental characteristics and stratigraphy of loess in China are discussed. Loess and paleosols occurred alternately during the Quaternary period in northern China. A palaeoclimatic curve is proposed and tentatively correlated with the palaeoclimatic curve of deep sea core V26-238.

Aeolian processes and deposition of dust during the Quaternary in China has been closely related to the effect of aridity and cooling of the atmosphere, development of the westerlies, fluctuation of sea level as well as the uplifting of the Qinghai-Xizang (Tibet) Plateau. These factors are important in any attempt to determine the mode of generation, transportation, and accumulation of the dust mantle (loess), and also the reconstruction of the history of the Quaternary.

Figure 2. Fossil snails from the Loess Plateau

Figure 7. Longterm climatic fluctuation curves of Lochoan, compared with the oxygen isotope records in core V26-238 (after Shackleton and Opdyke, 1973)
The term ‘yuans’ is used to refer to a flat highland cut by deep valleys in loess deposits (Fig. 2). The Lochoan yuans is located in the Lochoan county, Shannan province, in the loess region.

There are many loess yuans on loess plateaus in China. The five largest yuans are the best preserved (Fig. 1). They are named from west to east: Balun yuans in western Gansu, Dongshi yuans in eastern Gansu, Lochoan yuans and Ji yuans in northern Shaanxi, and Xinian yuans in Western Shaanxi. The Lochoan yuans has the most complete profile of loess. We shall describe the geological environment of loess deposits on Lochoan yuans, permitting us to recognize the geological conditions for loess deposition on the loess plateaus as a whole.

GEOLICAL BACKGROUND FOR FORMATION OF LOCHOAN YUAN

Lochoan yuans lies in the southwestern part of Northern Shaanxi loess plateau, and is tectonically a small-scale intermontane basin on the Ordos platform (Fig. 3) at an average altitude of 1100 m. The basin is bounded by mountains on three sides: Shanxi yuans on the east, Xiaowu on the west, and Beilu (Maokou and Yufengshan and others) on the south. The altitude of these mountains is 1500-1900 m and their relative height above the basin is 400-500 m. The basin is oriented northeast to southeast (Fig. 4), and the centre of the basin lies to the south of Lochoan City. The Locke River meanders through the basin from north to southeast and then into the Yellow River.

Figure 1. Distribution of loess yuans in the middle Huanghe Valley

Figure 5. Different loess types and soils in the Lochoan
A Preliminary Study of Soil Synchrography in the Loessian Loess Section

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On the loess plateau in North China, large numbers of palaeosols are developed within loess sections (Zhong, 1935). The possible origins of palaeosols in the Chinese loess, and their geological implications, have been expanded by Liu Yung-sheng and Zhu Xian-bo many times, and they hold that the palaeosol horizons within the middle Pleistocene Lishi loess is a forest-dwelling soil (Liu Yung-sheng, 1957; Liu Yung-sheng, et al., 1966; Zhu Xian-bo, 1965).

Well developed on the loess plateau are quite a few large-scale loess deposit basins, forming loess 'farms' (flat highlands). Among them, the 'farms' at Lohanem is a typical example. At the Helinghu section at Lohanem, where loess and palaeosols occur alternately, the loess strata may be subdivided (from oldest to youngest) into early Pleistocene Wuchang Loess, middle Pleistocene Lishi Loess and late Pleistocene Malian loess (Liu Yung-sheng, et al., 1966b). The boundary between Wuchang loess and Lishi loess is approximately at the Brushless-Kurozuma boundary (in Zhi-sheng, et al., 1977). Thirteen reddish-brown palaeosols, and one greyish-brown palaeosol situated at the top of Malian loess, were all preserved within the Brushless loess strata (Fig. 1, 2).

LOESS AND PALAEOSOLS - GEOLOGIC RECORDS OF BIOSCLIMATIC ENVIRONMENTS

Palaeosols in loess contain a leached horizon (A) which changes upwards to loess, a well-developed argillic horizon (Bw or Bt) and carbonate horizon (Bc) as well as loess parent materials (C). The average grain size (Gd), CaCO3 content and FeO/Fe2O3 in the argillic horizons of the palaeosols are lower than in unaltered loess. The illite contains some montmorillonite layers and vermiculite content is relatively high in the argillic horizon by comparison with the loess. (Tan Jia-jun, et al., 1979). At the top of each palaeosol, and at the base of the overlying loess, there are hortodendron small assemblages reflecting a relatively warm and humid habitat (Chen De-jing, et al., 1979). Within the palaeosols, broadleaf tree pollen dominate followed by coniferous tree pollen, and the hortodendron pollen is dominated by angiosperms. Apparently, the palaeosols were formed beneath warm humid forests or forest-steppe areas with weakly acid to weakly alkaline conditions.

The composition and structure of the loess are rather homogenous. Humidian fossils found in loess indicate a prevalence of dry-steppe fauna during deposition. Borreanaceae pollen dominates in the loess. Catharesia small assemblages, appearing mostly in loess layer, reflect an ecological environment of dry and cold desert steppe. All the evidence from the carbonate-rich loess shows that it accumulated in a rather dry-cold steppe environment under weakly alkaline pedogenic conditions (Liu Yung-sheng, et al., 1978).

Figure 1. A diagrammatic Loess-Palaeosol section of the Xiangqiao, Lohanem County
QUATERNARY VERNTECUTIES AND THEIR LIFE
ENVIRONMENT IN LOESS REGIONS OF CHINA

Liu Tung-sheng, Yuan Hao-yin, Gao Pu-qing, Sun Pu-qing

Figure 8. The distribution of Lishi Loess and Mysospalax tingi and Megaloceros percyoides in Lishi Loess

Figure 9. The distribution of Malan Loess and Mysospalax fontanieri and Struthis anderssoni in Malan Loess
A loess section is commonly composed of interbedded loess and paleosols. Stratigraphic studies of loess have shown that a complete loess section can be divided into descending order into late Pleistocene loess, middle Pleistocene loess (upper part and lower part) and early Pleistocene fluvial loess (Li et alia, 1962). Recent studies have revealed that Holocene loess lies, somewhat sporadically, over earlier loess (Qiuo, et al., 1980; Zhang, et alia, 1979).

Almost no fossils, especially vertebrates, have been discovered in loess sections, making effective biostatigraphic subdivision and correlation difficult. Furthermore, although some advances have been made in loess-chronological study with palaeomagnetic data (An, et alia, 1971; Li, et alia, 1974) and radiocarbon dates calculated for the paleosols in the Malan and Holocene loess, it is still difficult to carry out chrono-stratigraphic division of the loess using these limited data. Therefore, subdivision of the loess for climatic reconstructions relies upon investigations of the depositional environment of loess, its weathering and diagenetic development reflected in its mineral composition, and mineralogical features based upon clay mineralogy.

Studies of loess have shown that it is essentially composed of silt, quartz and variable proportions of clay particles which in general account for 15 - 25% of the total. Paleosols within the loess contain more clay particles (Li, et alia, 1962). Geological conditions at different stages of the loess depositing cycle, such as depositional environment, weathering processes and diagenetic development, may be reflected in clay minerals. Studies of clay minerals in loess and buried soils may illuminate Quaternary paleo-environments and much of their evolutionary history.

![Figure 3. Relative amounts of main clay mineral species and Illite Index in Lochuan Section, Qinshui Province](image-url)
cohesive material (if tested without a rubber-membrane cover) in cases of testing with a rubber-membrane cover. Some of the samples showed axial deformations up to 50 per cent of the height of the sample without an ultimate destruction. Tested again, but without a rubber membrane, these deformed samples demonstrated a substantially greater strength (curve C in Fig. 1) than that of non-covered samples tested in the same conditions (curve B in the Figure).

In the light of these test data, the strength of the loess studied can not be explained by the presence of any particular bonding material, but may be due to the above mentioned interaction between the plate-shaped solid particles and the liquid and gaseous phases of the loess.

The test results presented herein form a part of a research program on the possibilities of a new soil-strength concept.

References


The Literature of Loess (Part I)

Die Literatur über der Löß ist ungeheuer - Paul Woldstedt 1961.

There is a large literature devoted to the loess deposits of the world, and it provokes varied responses from contemporary loess investigators. A range of views can be seen in the Woldstedt quotation above - it all depends on how you translate that key word 'ungeheuer' - it could simply be 'enormous' and the sentence becomes a simple, judgement-free statement of the situation. Or it could be 'monstrous' - which would express a widely held view that we are about to be overwhelmed.

Actually the major problem with the loess literature is not its great bulk but its incredible diversity; and its a many faceted diversity. To start with, and most obviously, there are the linguistic problems; there is a major loess literature in English - but there is an even larger one in Russian, and there are highly significant collections in German, French and Chinese; to say nothing of the material in Spanish, Polish, Bulgarian, Hungarian and other European languages.

A number of papers in Italian and you have run the linguistic gamut, and the size of the problem is clearly revealed. Given this revelation we can assess the problem carefully and see where the major linguistic impediments to information flow occur.

For the sake of argument, and as a great simplification, we can group the loess languages into six packages. They are arranged in order of estimated bulk of publication:

1) Russian, and similar
2) English
3) German
4) French
5) Chinese
6) Other European languages

The major outstanding problem appears to be (still) lack of communication between groups 1 and 2 - and this is where there will have to be determined action by the communications group of the Loess Commission. The two major publishing language groups are acting independently - there is little interaction - due to several factors. From the English side it would be useful if publications in Russian were made readily available, and if Russian papers could carry a substantial English abstract. In the reverse direction writers in English should make more effort to know the Russian literature, and to cite actual papers. There is a great tendency to writers to cite literature in their own language but responsible scholarship requires a knowledge of relevant work in every language. We have gone backwards in this respect: Tutkovskii, writing in 1899 (in Russian) was able to cite and discuss material in English, German and French; and he quoted, with great effect, the statement by J. Geikie:
"Löss is certainly one of the most remarkable accumulations of the Pleistocene age". J. Geikie, 1898.

Another aspect of the diversity of the loess literature is the splitting into different subject areas and the loss of material of general interest because it is buried in some specialized topics. Where is the current action on the loess front? There is certainly action in the engineering region and there is a large output of Russian engineering papers - they form a significant fraction of current loess publications. We can make a subject grouping as we did for languages:

1) Engineering, mostly subsidence problems, soil stabilization, slopes.
2) Agriculture, soil conservation, irrigation.
3) Stratigraphy.
4) Loess material, mineralogy, particle production.
5) Mapping, local studies.
6) Geomorphology and distribution.
7) Archaeology, anthropology, history.

Where does all this material get published, and - perhaps more importantly - where does it get abstracted? Geotechnical Abstracts (see LL6) does a remarkably good job of abstracting the technical loess literature - in all languages. Agricultural Abstracts is effective for material with an agricultural bias or application (see LL7). Both Geotechnical and Agricultural Abstracts are available by computer access techniques, and both are good across the language range. For subjects falling within the very general heading of geology, the Bibliography and Index of Geology, published by the American Geological Institute, gives excellent coverage: loess appears in the subject index under the major heading 'sediments' and the minor heading 'sediments - clastic sediments' - a sub heading of which is loess. The BIG is complemented by Geo Abstracts, particularly part E which has a section 'Recent Aeolian Environments'. (to be continued......)


L'étude des séquences loessiques constitue, en dépit de hiatus indiscutables, le meilleur moyen d'investigation et donc de compréhension d'une période froide. Elle permet ainsi de discerner les changements dynamiques et climatiques tant sur le plan géographique que chronologique.
III. CONCLUSIONS

L'étude de la séquence loessique d'Iville et sa comparaison avec les grandes coupes du Nord-Ouest et de l'Ouest du Bassin de Paris met en évidence l'existence d'une région de transition entre les deux paléo-provinces normandie et séquanienne. Cette zone, qui s'inscrit du Pays d'Ouche au Vexin, ne s'interrompt qu'au voisinage de la Seine.

L'étude micromorphologique montre l'importance de la dynamique froide pressentie sur le terrain : la quasi-permanence des structures indique la présence d'eau ou de glace témoignant d'un paléo-environnement qui n'est jamais très continental. Au cours du Weichselien ancien, les mouvements de reptation perturbent l'agrégation pourtant typique d'un gel profond, permettant ainsi de mettre en doute l'existence d'un pergélisol. Pour l'un d'entre nous (M.V.), la présence de pergélisol n'est pas démontrée à Iville. Nous n'avons pas retrouvé les grandes fentes en coin existant au Nord à Mesnil-Esnard (au niveau du Sol éponyme) et à Gios (au Sud-Ouest) ; base du Sol de Roumire (Lautridou et al., 1981 b). En raison de la découverte de ces fentes de glace dans ces carrières, la proximité d'un pergélisol (peut-être discontinu) paraît cependant probable à l'un d'entre nous (J.P.L.). Enfin, on peut préciser l'évolution hydromorphe des limons « interstadiaries ». P. Haeusser et B. Van Vliet (1981) ont décrit sur la coupe d'Harmignies (Belgique) des pseudogleys de toundra qui présentent des caractères communs. Mais la formation de ces sols, en relation avec un engorgement temporaire resultant du gel saisonnier, est également liée à la présence de matière organique. Ils signalent qu'ils s'observent préférentiellement dans la partie supérieure des dépôts ou d'horizons humifières, absents à Iville, mais présents à Mesnil-Esnard et à Gios.

Au point de vue stratigraphique, outre la confirmation d'une belle séquence weichselienne, il faut insister sur l'importance des paléosols rougeâtres de base dont nous pouvons montrer dans la région rouennaise et elbeuvienne l'âge très ancien (début Pléistocène moyen). Vers le Centre et l'Est du Bassin parisien, ils sont parfois très proches de la surface (comme au Titel) et difficilement datables : les données d'Iville, complétant celles de Mesnil-Esnard et de Saint-Pierre, permettent d'intégrer ces paléosols isolés dans une belle séquence pédosatigraphique.
PRELIMINARY STUDY ON PALEOMAGNETIC STRATIGRAPHY OF LOESS IN THE MIDDLE REACHES OF THE YELLOW RIVER

(Abs.)

On the basis of paleomagnetic measurement of loess in the middle reaches of the Yellow River we obtained the following geological times and ages which are given only for discussion and reference.

<table>
<thead>
<tr>
<th>Geological time</th>
<th>Strata</th>
<th>Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q&lt;sub&gt;1&lt;/sub&gt;</td>
<td>Loess deposit and black loam beneath it</td>
<td>0—6</td>
</tr>
<tr>
<td>Q&lt;sub&gt;2&lt;/sub&gt;</td>
<td>The 1st loess stratum</td>
<td>8—35</td>
</tr>
<tr>
<td>Q&lt;sub&gt;3&lt;/sub&gt;</td>
<td>The 1st reddish brown fossil soil</td>
<td>30—60</td>
</tr>
<tr>
<td>Q&lt;sub&gt;4&lt;/sub&gt;</td>
<td>The 2nd loess stratum</td>
<td>60—100</td>
</tr>
<tr>
<td>Q&lt;sub&gt;5&lt;/sub&gt;</td>
<td>The 2nd reddish brown fossil soil</td>
<td>100—110</td>
</tr>
<tr>
<td>Q&lt;sub&gt;6&lt;/sub&gt;</td>
<td>The 3rd loess stratum</td>
<td>110—131</td>
</tr>
<tr>
<td>Q&lt;sub&gt;7&lt;/sub&gt;</td>
<td>The 3rd reddish brown fossil soil</td>
<td>131—140</td>
</tr>
<tr>
<td>Q&lt;sub&gt;8&lt;/sub&gt;</td>
<td>The 4th loess stratum</td>
<td>140—165</td>
</tr>
<tr>
<td>Q&lt;sub&gt;9&lt;/sub&gt;</td>
<td>The 4th reddish brown fossil soil</td>
<td>165—174</td>
</tr>
<tr>
<td>Q&lt;sub&gt;10&lt;/sub&gt;</td>
<td>The 5th loess stratum</td>
<td>174—197</td>
</tr>
<tr>
<td>Q&lt;sub&gt;11&lt;/sub&gt;</td>
<td>The 5th reddish brown fossil soil</td>
<td>180—210</td>
</tr>
<tr>
<td>Q&lt;sub&gt;12&lt;/sub&gt;</td>
<td>The top of loess stratum beneath the 7th loess stratum</td>
<td>400</td>
</tr>
<tr>
<td>Q&lt;sub&gt;13&lt;/sub&gt;</td>
<td>The top of the lowest loessial silt</td>
<td>700</td>
</tr>
<tr>
<td>Q&lt;sub&gt;14&lt;/sub&gt;</td>
<td>Well cemented reddish loessial strata containing Jaramillo normal event</td>
<td>700—1,200 (?)</td>
</tr>
</tbody>
</table>

![Image of skull](image.png)
Carte des loess de Normandie : loess (carbonaté), limon à doublets (non calcaire), sables de couverture.

Map of the loess of Normandy: loess (calcic), limon à doublets (definition p. 19), cover sands

Thickness : moins de 4 m less than 4 meters
plus de 4 m more than 4 meters
Preliminary to a synthesis on sedimentological changes of loess in North-Western France


Parmi les types de loess, le loess typique est à distinguer nettement. Il se définit comme un limon pur caractérisé par une texture dominée par la fraction 30-63 microns, une structure finement porceuse, sans litage apparent, une couleur jaunâtre à brun-jaunâtre, la présence fréquente de CaCO₃ à l'état diffus. Ce dernier caractère permet d'ailleurs d'établir une subdivision à l'intérieur des loess, l'absence de carbonate étant originelle ou due à une décalcification postérieure au dépôt ; cette subdivision peut avoir une signification géographique (ex : Normandie) ou au contraire être aléatoire (ex : Nord).

Les loess non typiques se distinguent selon les variations de la texture et de la structure. Dans le groupe des loess litées se place notamment le type non carbonaté des limons à doubles, caractérisé par la fine alternance de lits brunautes et jaunâtres plus ou moins argileux. Les formations limoneuses litées peuvent incorporer des éléments de substrat (sables, silex, débris rocheux). La teneur en argile (moins de 2 microns) est un important critère distinctif pour la définition des paléosols (Bk) et des loess argileux dont la teneur en argile dépasse 25 %.

Si les types de loess se différencient en fonction des variations de la composition texturale, des éléments grossiers qui leur sont éventuellement associés stratigraphiquement et de leurs caractères structuraux sédimentaires et pédologiques, le faciès de leur courbe granulométrique, qui présente des caractéristiques générales très constantes sur de longues distances, est déjà un critère distinctif de reconnaissance. Cette donnée, apparemment la plus précise, mesure la nature de l'analyse granulométrique et est en géotechnique l'une des approches initiales des formations.

La courbe granulométrique cumulative d'un loess est une sigmoïde (fig. 2) avec une branche médiane très redressée entre 10 et 50 microns, indicatrice d'un très bon classement du sédiment dont la médiane se situe en général entre 20 et 30 microns. De plus, cette sigmoïde possède deux autres caractères : la dissymétrie, la branche supérieure (sables) étant très limitée par rapport à la branche inférieure, et la faible pente de la branche inférieure due à une forte proportion (parfois plus de 50 %) d'argile fine (moins de 0.2 microns) par rapport à l'argile totale (Lautridou, 1979).

Lithostratigraphy and chronostratigraphy of the loess of Normandy:
1 : lacustrine-clay : Reuverian and Pre-Tiglan - 2 Silt - 3 Loess - 4 Sandy loess - 5 Sand - 6 B horizon of brow forest soil (brun lessivé) or of a leached soil (lessivés) - 7 B horizon of intensively leached and rubbedy soil - 8 Violeta soil.
J.P.L., 1981
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