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LOESS LETTER No 6 OCTOBER 1981

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The 11th INQUA Congress will be held in Moscow from the 1st to the 11th August 1982; Commission 4 - The Loess Commission - will be meeting during the Congress, and on field trip A.11 before the Congress. Marton Pecsi, President of the Loess Commission, has suggested in Circular No. 2 (1980), that members should participate in field trip A.11 to the classical loess regions of Central Asia, Uzbekistan and Tadjikstan. During the nine-day excursion (23-31 July 1982) there will be discussions of the complex problems of loess and palaeosol research. It is suggested that members of the commission contact the organising committee in good time, indicating their intention to take part in Excursion A.11.

At the Congress proper, there will be a joint meeting of the Commissions for Loess and Palaeopedology; this will be entitled: "Lithology and Stratigraphy of Loesses and Palaeosols" and the following topics will be discussed:

1. Lithological properties of loesses in different climatic zones.
2. Morphogenesis and catenary associations of loessial palaeosols.
3. Stratigraphy and dating of loesses and their palaeosols.
4. Aspects of economic utilisation of areas covered by loesses.

Papers and contributions to this meeting are invited; the Chairman/Presidents of the two Commissions involved are:

Loess: Prof. Dr. Marton Pecsi
Institute of Geography
Academy of Sciences
Budapest, HUNGARY

Palaeopedology: Prof. Dr. Dan H. Yaalon
Geology Department
Hebrew University
Jerusalem, ISRAEL

NOTE: Dr Yaalon's address until 31 January 1982, will be: Geomorphology Department, Research School of Pacific Studies, Australian National University, POB 4, Canberra ACT 2600, AUSTRALIA.

The Warsaw/Moscow Loess Monograph

An ambitious project is about to be undertaken by loess investigators from the Universities of Warsaw and Moscow. Drs. Grabowska-Olszewska and Komissarova are assembling a comprehensive loess monograph, and they are seeking the active participation of all loess enthusiasts. The following is from a draft of their circular letter to prospective contributors:

"The project organisers and authors from the Universities of Warsaw and Moscow have suggested that the title of the work might be: 'Composition, structural and textural features of loess deposits in relation to their genesis and engineering utilization' and they have made the following suggestions with respect to the contents:

Part I. Preface
Introduction: Designs, tasks and investigation methods

Chapter 1 General knowledge of loess deposits
- **1 Engineering-geological features of loess deposits*
- **2 Occurrence and age of loess deposits*
- **3 Main directions and short history of loess deposit investigations*

Chapter 2 Basic hypotheses of the origin of loess deposits
- **1 Aeolian hypothesis and its modifications*
- **2 Proluvial hypothesis*
- **3 Alluvial hypothesis*
- **4 Deluvial hypothesis*
- **5 Fluvioglacial hypothesis*
- **6 Soil-eluvial hypothesis*
- **7 Cryo-eluvial hypothesis and others*

Part II. Characteristics of loess deposits from different countries

Chapter 3 (Country)

**1 Occurrence and age of loess deposits*

**2 Lithological features of loess deposits in relation to their genesis, micro-aggregate structure, granulometric, chemical and mineralogical composition, natural water content, density, porosity, structure and texture*

**3 Physico-chemical, physico-mechanical and thermo-physical properties of loess deposits*

Part III. Analysis of loess-deposit-origin hypotheses in relation to the problem of their composition and properties

Chapter 4 Aeolian hypothesis
Proluvial
Alluvial
Deluvial and others

Summary and final observations; Problems for the future.

It is planned that Part I would be written by authors from Warsaw and Moscow Universities. Before final production it would be discussed by all the authors involved in the monograph. The chapters in Part II will concern the loess problems of the given country according to the proposal as in Chapter 3.

The book will be published in the English language in Poland and simultaneously in the Russian language in the USSR. Your chapter (and all contributed chapters) should not be longer than 15 pages.

We would like to receive all the texts (with illustrations) not later than 30 April 1982. We propose to organise a meeting for all the authors, probably during the XI INQUA Congress in Moscow, 1-9 August 1982.

It may be just possible to have an additional meeting in association with Symposium 16 (Aeolian Sediments & Processes) at the Sedimentological Congress at Hamilton, Ontario, Canada, 22-28 August 1982. At these meetings we would have the opportunity of giving the work its final shape.

As a further development of our co-operative enterprise we would like to request you to send us actual loess samples which are representative of deposits in your area. We would like to carry out SEM examinations in Warsaw or in Moscow. Our addresses are:

Prof. B. Grabowska-Olszewska
WARSAW UNIVERSITY
Institute of Hydrogeology and Engineering Geology
Al. Zwirki i Wigury 93
02-089 Warszawa, Poland

Dr. N. Komissarova
MOSCOW STATE UNIVERSITY
Department of Geology
117234 Moscow, USSR

We hope that you will be able to join us in this work. If you cannot perhaps you could pass our request on to one of your colleagues who is interested in loess."

Thermoluminescence Dating of Loess

A.G. Wintle
Godwin Laboratory, Sub-department of Quaternary Research, Free School Lane, Cambridge, CB2 3RS, England

In LL5 there were several references (pages 2, 7 and 9) on the dating of loess by thermoluminescence (TL) and I feel that a brief account of the technique would be useful for people interested in dating loess. A review paper by Wintle and Huntley entitled "Thermoluminescence dating of sediments - a review" will be published later this year in the new journal, Quaternary Science Reviews (editor D.Q. Bowen, Publisher Pergamon Press) and readers interested in more details are recommended to read it. An earlier review paper by Dreimanis *et al.* (1978) is also recommended.

TL dates have been produced in the USSR for about 15 years, principally by Shelkoplyas and Morozov at the Institute of Geology in Kiev. In the last 2 years TL dates have been quoted in the English language literature but there is always insufficient information to enable us to evaluate the results. Outside of the USSR, particularly at the Research Laboratory for Archaeology in Oxford, TL studies have been carried out over the same time period but they have concentrated on its use for dating archaeological pottery. This split in the direction of research, which followed TL work on older geological samples in the early 1960s, was probably due to the needs of the geologists and archaeologists in those countries at that time. Only in the last 5 years have studies on sediments been made outside of the USSR, principally at Simon Fraser University in Vancouver, Canada, and in the Sub-department of Quaternary Research in Cambridge, England. These studies have shown that TL dating of sediments is not as easy as implied by Shelkoplyas.

TL dating has been applied to a variety of sediments including tills and glaciomarine silts. Loess, however, is probably the simplest type of sediment from the TL point of view because of its uniformity, thickness of deposit and aeolian origin. Dates for loess deposits in the Ukraine, Tadjikistan, Hungary and China have been quoted in the literature, though the TL workers responsible for the last two areas stress the preliminary nature of their dates in their original publications. For these reasons the TL of loess is being studied by three laboratories in Britain, at

the Universities of Cambridge, Sussex and Oxford.

An extensive description of the TL technique as applied to pottery has been provided by Aitken (1975). Here I shall attempt only a brief summary. The basis of the TL dating technique, whether applied to pottery or sediments, is the ability of certain minerals to retain information concerning their past radiation history. When these minerals are exposed to ionizing radiation (alpha, beta or gamma), they are able to trap electrons at defects in their crystal lattice, the number of electrons that are trapped being proportional to the radiation dose. Two such minerals are quartz and feldspars. The electrons that had become trapped because of the minerals' exposure to ionizing radiation in their environment since the time of crystallization have been removed, either by heating (e.g. to form pottery) or by exposure to sunlight (e.g. as sediments are deposited). From that time onward more trapped electrons are produced by the ionizing radiation from the naturally occurring radioactive decays in the uranium and thorium decay chains and by the decay of K-40. Hence the number of trapped electrons at a later time is proportional to the time since heating (or exposure to sunlight), the ability of the mineral to trap electrons and the radioactive content of the material containing the minerals.

If these minerals are heated, the electrons will be released from their traps and a small proportion of them recombine at luminescence centres in the mineral. When this occurs, a photon is emitted and this light emission is known as thermoluminescence. The size of the TL signal is a measure of the number of trapped electrons, and therefore the age. Hence the age is given by the equation:

$$\text{Age (years)} = \frac{\text{Natural TL}}{(\text{TL per unit radiation dose}) \times (\text{dose per year})}$$

where the natural TL is the signal from the sample taken directly from its natural environment; the TL per unit radiation dose is the TL sensitivity of the sample which is obtained by measuring the TL after exposing the sample to a known amount of ionizing radiation from a laboratory source and the dose per year is the amount of radiation received per year by the sample in its natural environment and is obtained by measuring the uranium, thorium and K-40 contents of the sample with a completely different set of measurements.

Because the age equation appears to be simple and the equipment needed to measure the TL is relatively inexpensive (compared for example to a radiocarbon laboratory) and easy to use, several people have produced dates without any understanding of the physics of the technique. Until a routine method has been shown to work for samples of known age and the factors limiting the technique have been explored, it is necessary for TL research to be carried out by, or in association with, physicists so that there is a proper appreciation of the radiation dosimetry and luminescence properties of the minerals. Such studies are at present underway in about 5 different countries.

Because most sediments have never been heated, it is not possible to apply the same measurement techniques as are used for pottery. Although sunlight empties electrons out of traps very quickly, about 80% goes in the first 30 minutes, it is not totally efficient. This results in a residual TL signal which was in the sample at the time of deposition and which must be separated from the subsequent radiation induced signal. Separating these signals is one of the major difficulties in dating sediments, particularly younger ones. Older samples provide a different problem, non-linearity of the TL sensitivity at higher doses; this is further complicated by the fact that a large sensitivity change occurs on heating and hence one

cannot simply compare the natural TL with that induced in the same sample which has just been heated whilst its natural TL was measured. These problems are brushed aside in most of the earlier studies but are now being extensively investigated.

These problems and also inadequate understanding of the radiation dosimetry probably mean that most of the dates published are correct only to within a factor of two. There has been a total lack of test programmes on samples of known age, mainly due to the fact that so few loess deposits have been dated by any other technique. The most likely regions for such test programmes are those with Quaternary volcanic activity such as the Eifel area of West Germany and also New Zealand, where fission track dating of ash layers may be possible. TL dating of any samples which are much older than 10,000 years, the limit of pottery production, must be checked by comparisons with other techniques and also by consistency within a site.

References

Aitken, M.J. (1975): Physics and Archaeology, 2nd edition, Clarendon Press.

Dreimanis, A.; Hütt, G.; Raukas, A. and Whippey, P.W. (1978): Geoscience Canada, 5, 55-60.

PUBLICATIONS 1

A brief introduction to the loess in China. Some general remarks about the land on the Loess Plateau (or Loessial Region). Zhu Xianmo, published by the Institute of Soil and Water Conservation, Academia Sinica, Wugong, Shaanxi, PRC. December 1980. 10 p.

A general outline of the Chinese loess, with an appendix of 42 photographs.

Extract:

Loess is widely deposited in the northern part of China, especially in the middle basin (reaches) of the Yellow River. The question that has frequently arisen as to what comprises true loess, whether it should be confined to a lithological definition, or include all fine materials accumulated through the process of wind deposition, is still a more or less question open to discussion. Now I prefer to consider loess as accumulations of fine divided, wind-blown dust (mainly originated from rock-weathering and primary soil formation, so that I have also to consider the materials of loess, desert and gobi-desert originated from the same cause or source) which may not have undergone varying degress of weathering since it was first deposited. The loess of northwest China has been eroded and redeposited by water in many places, and the wind is more or less constantly shifting surface horizons. In general, we speak of loess that we mean to indicate the wind-blown dust deposits, and we always use the term "secondary loess" or "reworked loess" for those loessial materials which have been eroded and redeposited by water. In speaking of the loessial region, however, we mean to indicate the region in which most of the loess is more or less strongly calcareous. This will include by far the most part of the northern and eastern Gansu, central and northern Shaanxi, most part of Shanxi and smaller areas of eastern Qinghai, southern Neimeng, western Henan, western and westcentral Shandong. Loess-like materials are also widely deposited in the Northeast China. There are deposits of what is probably loess in the lower Changjiang (Yangtze) valley, especially in Anhui and Jiangsu, and smaller areas in Jiangxi and Hubei.

The main types of the water erosion and their related factors on the Loess Plateau. Zhu Xianmo, published by the Institute of Soil and Water Conservation, Academia Sinica, Wugong, Shaanxi, PRC. January 1981. 86 p.

Extract:

There are the five main characteristics of precipitation in the loess regions. They are as follows:

1. *There is always a very dry weather in spring.*
2. *In summer, there are both concentrated rain and heavier rainstorms.*
3. *In fall, the distribution of rainfall is very uneven.*
4. *In winter, there is lack of snowfall.*
5. *The precipitation varies greatly both from season to season and year to year.*

The average rainfall is higher in the southeast part of the loess regions (650 mm), lower in the northwest part (350mm). The rainfall concentrates in the period from July to September in a year. At this time of a year, the rainfall makes up of 50 per cent, or sometimes even 70 per cent of the total rainfall, which often appears to have rainstorm with hailstones, 80 per cent of which often concentrates in one day. For example, at the Shiwan Station in Xiaoshuigou, there occurred on July 23, 1971 a heavy rain of 212.6 mm in 6 hours 25 minutes, which was 43% of the rainfall of the whole year. There was another example, near Wushengqu, there occurred on August 1977 to the next morning within 8 hours a rainstorm of near 1,400 mm, which was equal to the total rainfall of the four and half years. The rainfall of one rainstorm can usually comprise 10 per cent of the total rainfall in a year or so, and the rainfall intensity can reach over 2 mm per minute. It can be seen from these that the rainstorm and the rainstorm with hailstones in particular have caused the great damages to soil ...

Principles of stratigraphic subdivision of Upper Pliocene to Quaternary deposits of Tajikstan. A.Y. Dodonov *in* Granitsa Neogena i Chetvertichnoi Sistemy (The Neogene-Quaternary Boundary), ed. K.V. Nikiforova and A.Y. Dodonov. Izd-vo'Nauka', Moscow 1980, 22-31 (in English).

Table I

Stratigraphic scale: Systeme	Stage	Section	Subsection	Paleomagnetic data	Tajik depression: Stratigraphic subdivisions	Bone-bearing horizons	Geomorphology of valleys	Loess and soil formations (Pk pedocompjex, L loess)	Archaeology	Tectonic phases	Glacial and fluvioglacial formations of Eastern Pamirs
Quaternary (Antropogene)		Pleistocene	Upper	Brunhes; 0.02 Laschamp; 0.11 Blake	Dushanbe complex		Erosional-aggradational terraces ranging in elevations above valley floors from 10 to 200–220 m	L, I Pk, L, IIPk, L, IIIPk, L, IV Pk, L, V Pk, L	Gissar culture; Mouste-rian; Karatau culture	Baljuan	III generation
			Middle	Brunhes	Iliak complex			VI Pk, L, VIIPk, L			
			Lower	Brunhes; 0.69	Vakhsh complex			VIII Pk, L, IX Pk, L, X Pk		Khovaling	
		Eopleistocene		Matuyama; Jaramillo 0.89, 0.95; Olduvai 1.61, 1.79	Kayrubak suite	Lakhuti-2; Lakhuti-1; Kuruksay-3; Kuruksay-2	Erosional-aggradational levels raning in elevations 300–400 m	25–28 fossil soils and intervening loess horizons		Kuruksay	II generation
Neogene	Pliocene	Upper		Matuyama; 2.43; Gauss; 3.32	Kuruksay suite	Kuruksay-1 (Navrukho)	Erosional-aggradational levels ranging in elevations 600–700 m	Red fossil soils and loess with traces of soil reworking		Talbar	I generatin
		Middle		Gilbert							

Extracts:
Sediments of the Eopleistocene generation, the Kayrubak Suite, are distributed wider than those of the Kuruksay Suite. Lithologically and by their origin, they are similar to the upper Pliocene formations. However, the Eopleistocene deposits differ from the upper Pliocene ones in a lesser lithification, a greater content of autochthonous clastic material, a predominance of red-brown and brown soils in subaerial strata. The Kayrubak Suite is deformed less than the Kuruksay Suite. In the foothill zone, an erosional-aggradational level of 300 to 400 m above valley floors corresponds to the deposits of the Kayrubak Suite. In the sequence of subaerial sediments of the Eopleistocene (0.8 to 1.8 m.y.) there are 25 to 28 fossil soils intervened by thin (1 to 4 m) loess horizons. A good idea of the structure of this part of the sequence can be obtained on the one of the most complete loess sections of Tajikistan, the Chashmanigar section. There the thickness of the Eopleistocene loess-soil strata is 80 to 100 m.

The Pleistocene generation in the loess-soil sections embraces up to ten levels of soil formation, not counting the recent soil. Alluvial deposits of erosional-aggradational terraces rising from 8 or 10 to 200 or 220 m above valley floors correspond to the Pleistocene subaerial formations. The Pleistocene strata are very weakly deformed. Brown, light brown, and cinnamon fossil soils are predominant in the Pleistocene sequence.

The climatostratigraphic principle is of a great importance in the minute stratigraphic subdivision of the upper Pliocene to Quaternary deposits. Most distinctly the climatostratigraphic units can be distinguished in loess-soil formations of the Pleistocene and Eopleistocene. These are loess horizons and buried soils (pedocomplexes). In the Pleistocene sequence there are 10 "warm" and 10 "cold" horizons corresponding, probably, to interglaciations (interstades) and glaciations (glacial stades), respectively. The presence of buried soils in the Eopleistocene sequence shows the possibility of the minute subdivision of the Eopleistocene.

Stratigraphic datums within the Pleistocene subaerial strata are the pedocomplex X which can be checked by the position of the Matuyama/Brunhes reversal and soil complexes VII, VI, V, and II whose age is determined by paleomagnetic and thermoluminescence data. For instance, a paleomagnetic feature identified as the Laschamp event (20,000 years) occurs above the pedocomplex II. The age of the soil complex V is determined by the Blake geomagnetic event occurring above it (110,000 years) as well as by thermoluminescence dates of loesses, suggesting that the age of the pedocomplex is between 100 000 and 150 000 years. The ages of the soil complexes VI and VII, according to thermoluminescence dates, are about 200 000 and 300 000 years, respectively.

Benchmark Loess Stratigraphy

A volume of papers on loess stratigraphy is being assembled for publication in the 'Benchmark' series by Hutchinson & Rose of Stroudsburg, Pennsylvania. The Editor is Ian Smalley (Soil Bureau, DSIR, Lower Hutt, New Zealand) and he would be pleased to hear from anyone who has an opinion as to which are the most important and significant papers in the field on loess stratigraphy. This is a field which has leapt into prominence quite recently with the development of new dating techniques and the demonstration by Kukla, Lozek, Fink and others that loess deposits do contain a detailed and informative record of Pleistocene events, and that there is a good correlation with the oceanic record. Despite its recent prominence which will cause a number of current papers to be included in the collection, loess stratigraphy has a long history and it will be necessary to look back well into the nineteenth century to obtain a complete record. It is possible that the most perceptive early paper was published in New Zealand - this is the study by John Hardcastle of the Timaru loess, published in 1891, in which he clearly pointed out how the loess served as a 'climatic register'.

A regional distribution of material is proposed with major sections for North America and Europe (including Russia/Soviet Union) and smaller sections on China and New Zealand; the size of the section reflects the amount of relevant published material rather than the importance of the deposits. A major lack at the moment is any accessible stratigraphic data on the South American loess - the editor would be very pleased if anyone could point out some usable material on South American loess stratigraphy. India and Israel will not be neglected, but it will be appreciated that, in such an undertaking, a certain amount of (unintended) bias is inevitable. A major problem is still that of getting to grips with the vast literature in Russian; suggestions on early Russian stratigraphic papers are needed, and also some more indications of current research activity. In fact, if you have any ideas or suggestions on any aspect of loess stratigraphy, please send them.

PUBLICATIONS 2/SM IN SOFIA

Stresses and deformations in stabilized loess.
M. Minkov, D. Evstatiev, P. Karachorov, P. Slatov, G. Stefanov and J. Jellev. Proc. 10th Int. Conf. Soil Mech. & Foundation Eng., Stockholm 1981, 2, 193-197.

The Bulgarian soil mechanics group has been very productive recently with two papers at the Stockholm Conference and a considerable contribution to the European Soil Mechanics Meeting in Brighton. The Meeting at Brighton was the 7th European Conference on Soil Mechanics & Foundation Engineering; the proceedings have been published in five volumes. The theme of the European Conference was 'Design Parameters in Geotechnical Engineering' and so much interesting work in this field is being produced by the Bulgarian workers that we are devoting a special section of LL6 to their recent publications.

Extract:
The investigation of the stress-strain behaviour of natural stabilized loess subsoils under loading with big plates is most reliable, because it is carried under conditions closest to the actual condition of the subsoil under real foundations. Due to the fact that the tests "in situ" are too labour consuming, there are still few data allowing reliable conclusions about the behaviour of loess subsoils under loading.

The experiments carried out in the Soviet Union provide data about the condition of a loess subsoil at natural and artificially increased water content beneath big rigid plates (Goloubkov et al, 1968; Lomize et al, 1969; Tystovich et al, 1979) for loads of normal use from 200 to 300 kPa. The aim of the present study is the investigation of:

(i) the deformation state of natural loess subsoils, caused by loads of normal use.
(ii) the stress-deformation state of the same subsoils under loads exceeding the limit of proportionality between stresses and deformations.
(iii) the influence of a stabilized upper layer on the distribution of stresses and settlements in a subsoil of natural loess.

Compaction and stabilization of loess in Bulgaria.
M. Minkov, D. Evstatiev, P. Donchev and G. Stefanoff. Proc. 10th Int. Conf. Soil Mech. & Foundation Eng., Stockholm 1981, 3, 745-748.

Extracts:
In a terrain patterns design (Minkov, Evstatiev, 1975), convenient primarily for the purposes of

geotechnical dividing into districts and mapping, the whole variety of loess subsoils in Bulgaria is included into 3 types and 14 classes. The design allows a pre-orientation with respect to the most expedient way of preliminary preparation of the subsoil by compaction or stabilization. As a basic parameter of the proposed terrain patterns design the total collapse settlement of the loess soil layer at overburden pressure

$$\Delta_c = \Sigma n_{mp_i} H_i$$

was used. Here n_{mp_i} *is the additional relative oedometric settlement caused by flooding the specimen under a vertical loading equal to its overburden pressure "in situ";* H_i *is the thickness of a component loess layer in cm.*

The method proposed by Litvinov (1969) which combines deep moistening with the dynamic effect of directed underground explosions, turned out to be very suitable for Bulgarian loess soils. The method is adapted to Bulgarian conditions, and improved technically by the Geotechnical Laboratory. It has been used for compaction of the subsoils of several 16-storeyed residential blocks in Russe (Donchev, 1980). The method has been used at the foundation work of tower buildings on loess and this is done for the first time in the world. The process of compaction takes practically only a moment (from 50 to 80% of the subsidence is realized within minutes after the explosion) and the total collapse is from 2 to 10 times larger than at the regular hydro-compaction.

On the predicted and real behaviour of loess bases.
M. Minkov, D. Evstatiev, P. Donchev, A.P. Alexiev, G. Stefanoff and I. Krastilov. Design Parameters in Geotechnical Engineering. Proc. 7th European Conf. Soil Mech. & Foundation Eng., Brighton 1979, 1, 53-56.

Extracts:
The loess soils occupy about 10,000 km² in Northern Bulgaria and have been several times subject to detailed engineering-geological, Minkov (1968) and others, and soil-mechanical, e.g. Stefanoff and Kremakova (1960), investigations.

One of the most difficult and yet non-solved adequately problem of the engineering practice in these soils is the relation between their predicted and real parameters.

The results exposed here have not, of course, the pretention to be a definitive solution of this problem. They represent merely a summary of the work done during the initial stage of a prolonged, and much more large investigation, undertaken extensively in Bulgaria.

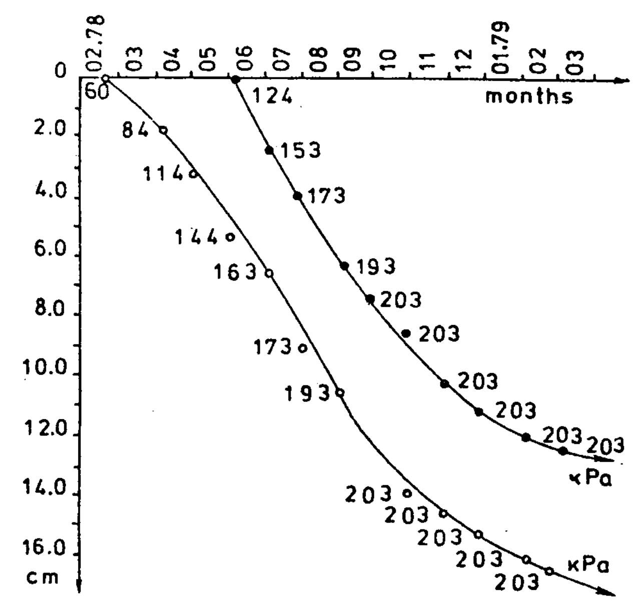


Fig.1 Measured Settlements of Two 16-story Residential Buildings Erected on Compacted by Moistening and Deep Blasting Loess Soil Base

a5: MINKOV, EVSTATIEV, DONCHEV, ALEXIEV, STEFANOFF AND KRASTILOV

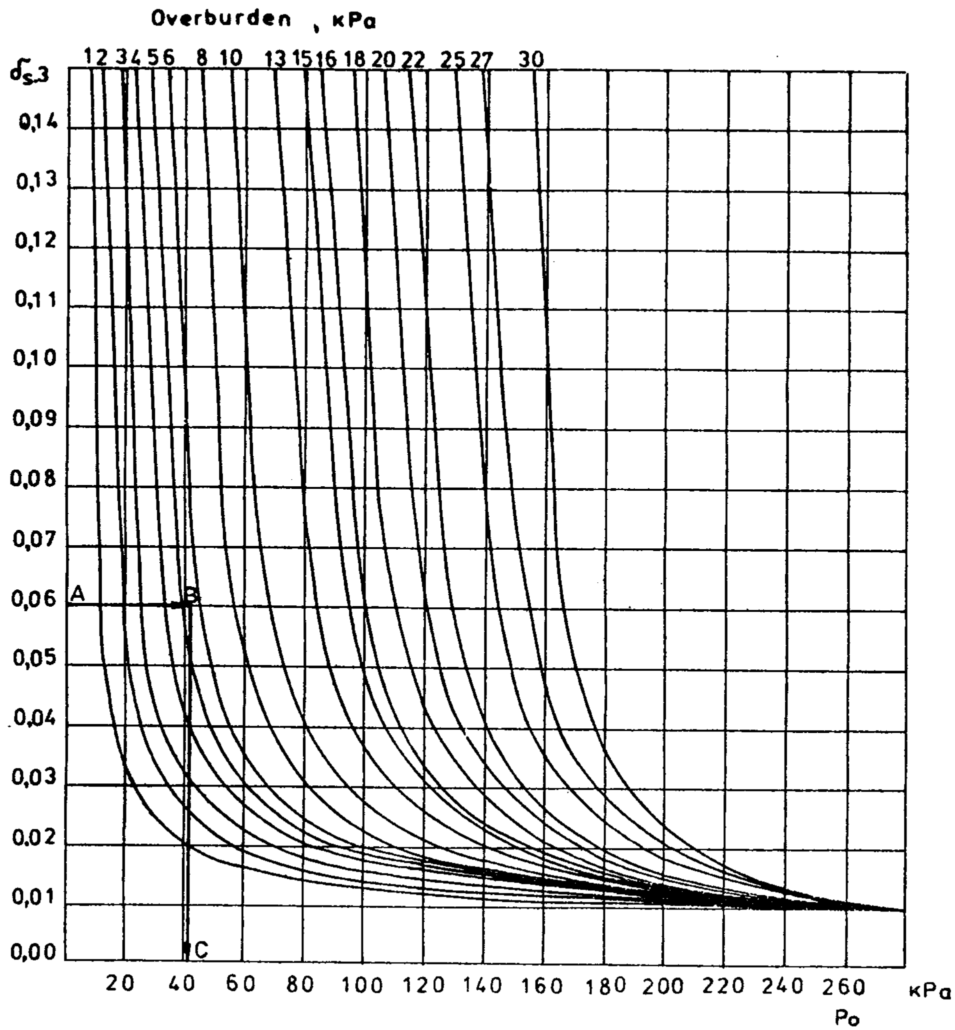


Fig. 2 Nomogram for Determining the Initial Subsidence Load

Mainly laboratory and in situ methods for a direct measurement of loess subsidence are used in the Bulgarian civil engineering practice. But some indirect criteria and methods are used too. This of Stefanoff (1961), for example, for determining the value of subsidence under any load, on the base of the subsidence observed under 300 kPa, is widely used. The Minkov's indirect method is based on the using of some physico-mechanical parameters (n and w) which are common in the soil mechanics, Minkov (1968). This method has been improved recently, Minkov et al (1977) by including of some coefficients related to the loess composition.

Design parameters for special soil conditions.
J.L. Justo and R. Saetersdal. Design Parameters in Geotechnical Engineering. Proc. 7th European Conf. Soil Mech. & Foundation Eng., Brighton 1979, 5, 127-158.

This is general report No. 5 and includes discussion of loess soils; in fact the authors state that "Loess is the pioneer of collapsing soils, for it was known long ago that loess is highly collapsible when porosity exceeds a certain value". The report contains detailed consideration of the work of the Bulgarian group and of other loess investigators.

Extracts:
Minkov et al. (1979) and Minkov (1979) indicate that the laboratory modulus of Bulgarian natural loess is smaller ly a factor ranging from 2.5 to 3.5 times than the plate loading modulus, and several times smaller than the modulus obtained from settlement measurements in buildings. On the other hand, for moistened and compacted loess the agreement between measured and calculated settlement is good. There is a considerable discrepancy between laboratory methods to find the total subsidence under overburden pressure, J_γ*, and in situ methods, except when* J_γ *is*

larger than 75 cm (Minkov et al., 1977). J_γ may be determined by flooding pits with an area larger than 400 m^2 or in actual channels. In general J_γ in situ is smaller by a factor of up to five.
One of the causes of the difference between laboratory and in situ modulus is ascribed by Minkov to defects in soil investigation and in sampling; that is the reason why the differences are more important for loess with a complex in situ structure. Minkov et al. (1979) describe a sampler consisting of a thin-wall inner tube with a sharpened cutting edge, which is introduced under pressure in the soil, but without rotation; at the same time a lateral auger rotates around the inner tube to facilitate its penetration into the soil. The sample has a length from 0.50 to 1.00 m and a diameter of 10 to 12 cm.

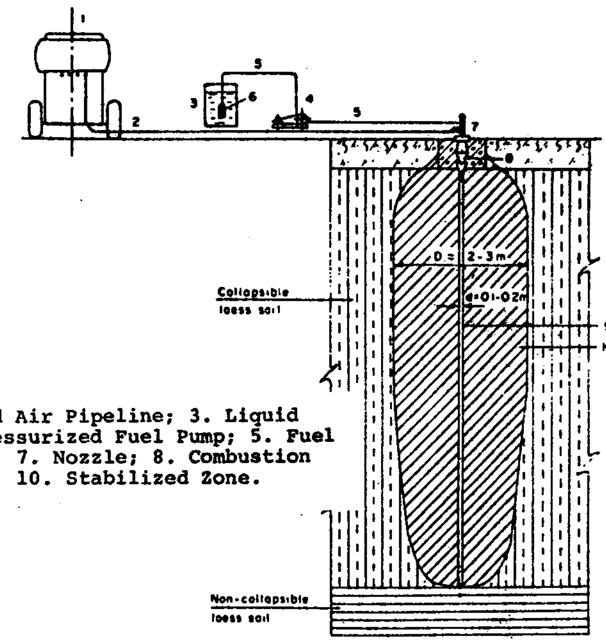
Minkov et al. (1979) state that a 16 storey building founded on natural loess may settle from 1 to 3 cm. On the other hand, for the same loess moistened and compacted the post-constructive settlement may reach 16.4 cm which is usually a non-allowable settlement. It would be interesting to know whether the reason for compaction and moistening in this case is earthquake resistance. The weakening produced by overcompaction in wet samples of gypseous collapsing silts has been described by Salas and Justo (1971), and in loess by Alexiev and Evstatiev (1967).
In Feda's (1979) paper, a relation deformation modulus-depth in loess is found for every relevant stress increment, from oedometer or plate loading tests. For a given foundation, this allows one to draw the design deformation modulus-depth relationship, that usually can be approximated by a straight line. This permits one to draw settlements from a graph.

Musaelyan (1979) describes laboratory and plate loading tests to find the relative collapse and strength decrease of loess soils under dynamic loading. The tests described do not simulate seismic action well,

but they do show the great importance of dynamic action in collapse and strength decrease. According to Minkov et al (1979) almost all buildings seriously damaged by the big Romanian earthquake of 4 March, 1977, were founded on natural collapsing loess, but the buildings erected on compacted or stabilized loess suffered no important harm.

Soil improvement - State-of-the-Art Report (preliminary). J.K. Mitchell and R.K. Katti. General and State of the Art Reports, 10th Int. Conf. Soil Mech. & Foundation Eng., Stockholm 1981, 261-317.

Some of the techniques discussed by Mitchell and Katti are applicable to loess soils; we offer the following illustrations:



1. Compressor; 2. Cold Air Pipeline; 3. Liquid Fuel Container; 4. Pressurized Fuel Pump; 5. Fuel Pipe Line; 6. Filters; 7. Nozzle; 8. Combustion Chamber; 9. Bore Hole; 10. Stabilized Zone.

Fig. 36 Scheme for Deep Thermal Stabilization (Litvinov, 1960)

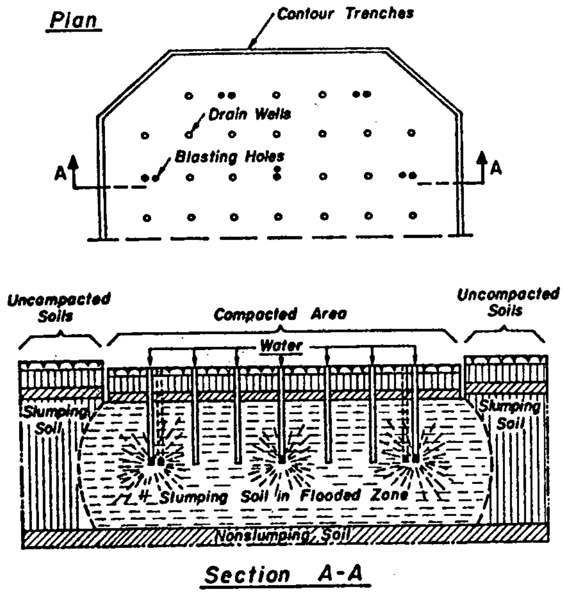


Fig. 2 Loess Compaction by Hydro-Blasting

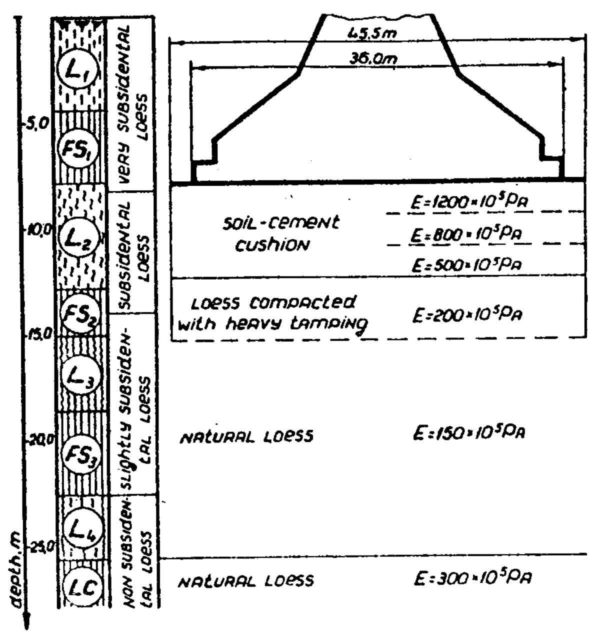


Fig. 30 Improved Foundation Soils for Large TV Tower (Minkov et al.,1980)

Geodex/Card 177

Card 177 is, of course, 'Loess'; the Geodex Retrieval System is a punched card information retrieval system which gives access to the material in Geotechnical Abstracts. Anybody who has an interest in the practical or geotechnical aspects of loess should be aware of this useful abstracting and information access system. Geotechnical Abstracts, published monthly since 1970, provides 1824 abstracts per year covering more than 500 international periodicals and conference proceedings; the publisher is Deutsche Gesellschaft für Erd and Grundbau, Essen, Germany/BRD; the editors are Herbert Kühn and Rudolf Floss. The matching Geodex Retrieval System is produced by Geodex International Inc., P O Box 279, Sonoma, California 95476, U.S.A.

About 20 000 abstracts have now been published, and quite a few of these relate to loess. A typical loess card is illustrated; it's a one-year card; multi-year cumulations appear as much larger cards. Each hole gives the number of a Geotechnical Abstract relating to loess. The cards can be stacked and used with a viewing screen to combine key words. No. 185/08 from our card is a paper by Browzin and Tahir, the abstract gives a good summary and a comprehensive list of keywords. With the continuing emphasis placed by the INQUA Loess Commission on practical loess problems, and the special feature in this issue of Loess Letter on the Bulgarian Soil Mechanics group, this seemed like an opportune moment to draw the attention of LL readers to this efficient and accessible system for obtaining practical loess data. In the 'Publications 3' section, we have some observations on the new 'Landslides' volume by the U.S. Transportation Research Board; the various sections are covered by abstracts GA 186.40 to GA 186.47 in Geotechnical Abstracts Part 8 for

1980. Actually none of the abstracts mentions loess landslides, which is why we need LL as well.

177 * Loess

GEODEX RETRIEVAL SYSTEM FOR GEOTECHNICAL ABSTRACTS 171.00-190.99(10/1979-10/1980)

ALSO SEARCH THE THREE LARGER CARD DECKS COVERING GEOTECHNICAL ABSTRACTS PUBLISHED 1970-1979

... / compression / tension / shear / strain / stress-strain curv... / weathering / model (analytical) / research oriented (ED)

GA 185.08 D 6

Stress-deformation of loess of low natural moisture

Browzin, B. S. / Tahir, A. H.

Spec. Sess. No. 9, 'constitutive equations of soils', IX Int. Conf. Soil Mech. Found. Engng. Tokyo, Japan, July 1977, pp. 21—27, 4 fig., 2 tab., 13 ref.

Loess might be defined by two index properties: the granulometric composition and the dry unit weight. The fraction 0.010-0.050 mm is predominant in typical loess. On the basis of over four hundred sample analysed from three continents, it was concluded that the fraction 0.010-0.050 mm deserves the name loessial fraction. Based on loessial fraction notion, an engineering classification of loess is proposed. It was further established that if material is loess and the natural water content is below 15 %, subsidence is expected. The consolidation-subsidence tests determine the amount of subsidence on the basis of the rate of deformation of the samples flooded under load in a conventional type consolidometer. It was established that during the consolidation-subsidence test the first phase is characterized by the accelerating rate of deformation which indicates subsidence, the second phase is characterized by decelerating rate of deformation which indicates the process of post-subsidence consolidation, both observations providing the basis for establishing constitutive equations for describing loess behaviour during the complete cycle of deformation.

loess / grain size distribution / density / classification / water content / consolidation / settlement / strain rate / deformation / model (analytical) / analysis / theoretical (ED)

PUBLICATIONS 3

Landslides: Analysis and Control, ed. R.L. Schuster and R.J. Krizek. Transportation Research Board (NAS Washington D.C.) Special Report 176, 234 p., 1978.

This volume is the successor to Highway Research Board Special Report 29 'Landslides and Engineering Practice' published in 1958. Report 29 contained the famous paper by D.J. Varnes entitled 'Landslide Types and Processes' (it was Chapter 3); this paper has become a classic and the large chart which accompanied it became the standard pictorial representation of landslide types. It defines, among others, landslides in loess. The new version, Report 176, has Chapter 2 by Varnes, with the title slightly changed to 'Slope Movement Types and Processes' (GA 186.42) and the pictorial chart somewhat revised. Actually the revision looks rather retrograde from a loess point of view in that loess slides are now not so well illustrated. Just to remind you of the 1958 chart, we reproduce the relevant slide diagrams.

The loess flow shown in Plate 1n is the 1920 Kansu Province slide which is perhaps the most famous loess slide; the only reference given to this remarkable event is the popular account by Close and McCormick which appeared in the 'National Geographic Magazine' in 1922 (LPB 191); the earthquake which caused the loess slide has also been described by none other than V.A. Obruchev in a paper published in 1924: 'Uber das grosse Erdeben in der Provinz Kansu (China) am 16 Dezember 1920' Zeit Ges.f.Erdkunde zu Berlin (for 1924) 340.(LPB 679). The Kansu slide is usually presented as a dry slide but Lutenegger (1981, v.i.) has suggested that it might be considered a wet system slide, somewhat akin to the failure observed in a quickclay.

Extracts:

The falls of loess along bluffs of the lower Mississippi River valley, described in a section on debris falls by

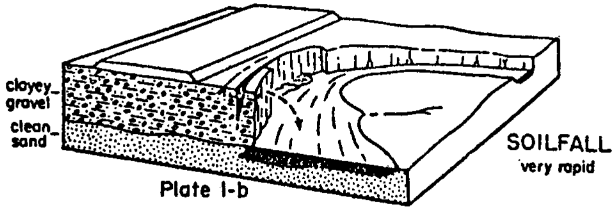


Plate I-b

PLANAR

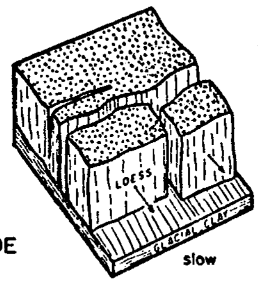


Plate I-g
BLOCK GLIDE

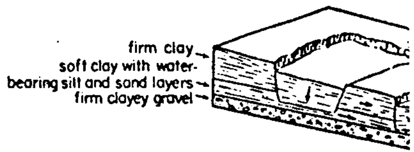


Plate I-
FAILURE BY LATERA

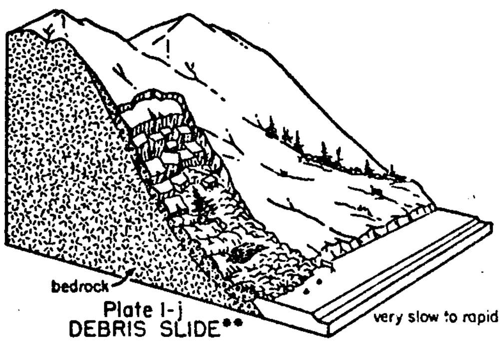
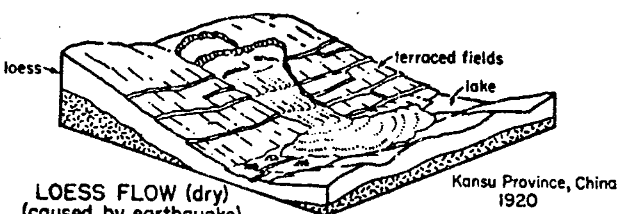


Plate I-j
DEBRIS SLIDE**



LOESS FLOW (dry)
(caused by earthquake)
extremely rapid

Plate I-n

Sharpe (2.146,p.75), would be called earth falls (or loess falls) in the present classification. (p.12)

Flows of loess mobilized by earthquake shock have been more destructive of life than any other type of slope failure. Those that followed the 1920 earthquake in Kansu Province, China (Close and McCormick, 2.23), shown in Figure 2.1r5, took about 100 000 lives. Apparently the normal, fairly coherent internal structure of the porous silt was destroyed by earthquake shock, so that, for all practical purposes, the loess became a fluid suspension of silt in air and flowed down into the valleys, filling them and overwhelming villages. The flows were essentially dry, according to the report. Extensive flows of loess accompanied the Chait earthquake of July 10, 1949, in Tadzhikistan, south-central Asia, and buried or destroyed 33 villages as the flows covered the bottoms of valleys to depths of several tens of meters for many kilometers (Gubin, 2.54). (p.20)

Loess, or wind-deposited silt, can be identified unmistakably in aerial photographs by its vertical-sided gullies, which are evenly spaced along wide, flat-bottomed tributaries to show a featherlike drainage pattern. Such a landform is confirmed by equal slopes on hills and valleys (an indication of uniform material), heavy vegetative cover in dissected areas, extensive farming in undissected areas, and soft gray tones (Figure 3.28). Earth flows and minor slumps, generally referred to as cat steps, are commonly found in loess. The cat steps appear as fine, roughly parallel, light tone contours on the aerial photographs. Because of their small size, they are not always evident. The individual steps of these small slumps are commonly about a meter wide and several centimeters to a meter high. These subtle features are shown in Figure 3.29. (pp.63-64)

The loess index entries in Report 176 are: 12, 20, 63, 65, Fig. 2.1, fall 12, Fig. 2.1c, flow 20, Fig. 2.1r5.

Stability of loess in light of the inactive particle theory. A.J. Lutenegger. Nature 291, 360 only, 1981.

Extract:

In the classical Terzaghi sense, loess soils, which are composed predominantly of silt particles, probably wouldn't be considered sensitive soils, in that the ratio of undisturbed to remolded strength, at constant moisture content, is usually around 3, depending on clay content, and therefore would generally fall into the category of medium sensitivity. If, however, sensitivity is taken as the ratio of undisturbed to saturated strength (in unconfined compression) as indirectly suggested by Feda, then some loess soils would have to be considered quick.

Loess soils, particularly bluff-line deposits, typically lose shear strength as a result of moisture saturation; in which case landslide potential becomes an extreme hazard. Loess in this state may be susceptible to "spontaneous liquifaction" which could help explain the extent of landslides during the 1920 earthquake in the Kansu Province of China.

Pleistocene deposits and superficial structures, Allington quarry, Maidstone, Kent. B.C. Worssam *in* 'The Quaternary in Britain' ed. J. Neale and J. Flenley, Pergamon 1981, pp.20-31.

Extract:

The present account arises from a study, initiated by Dr W.A. Read as District Geologist, East Anglia and South-East England Unit, IGS, of the causes of periodic local but rapid and deep subsidences that occur in the built-up area of Maidstone. Examination of a particularly spectacular subsidence in Queen's Road, Maidstone, in 1974 led Dr Read to the conclusion that the hollow lay at the intersection of two gulls formed by cambering in the Hythe Beds formation, and that the subsidence had resulted from the sudden collapse of a metastable infill of silt. A search for good surface exposures of similar material in the vicinity led to Allington Quarry. Examination of samples by Dr D. McCann (IGS Engineering Geology Unit) and Dr J.A. Catt (Rothamsted Experimental Station) has shown that some at least of the silt infilling fissures has the physical properties of loess. It may well, therefore, constitute part of the loess deduced (Perrin, Davies and Fysh, 1974; Catt, 1977) to have formerly covered a large part of southern England. The present paper examines the mechanism of cambering in the light of exposures provided by Allington Quarry between 1976 and 1979. Mr F.G. Berry (IGS East Anglia and South-East England Unit) undertook a study of the palaeontology of the silt, based on some samples collected by Dr Read and others collected by himself. His results are given as an Appendix.

The formation of loess material and loess deposits: Some observations on the Tashkent loess. I.J. Smalley. Geophys. u. Geol., Geophys, Veröff. d. KMU Leipzig 2 (2), 247-257, 1980.

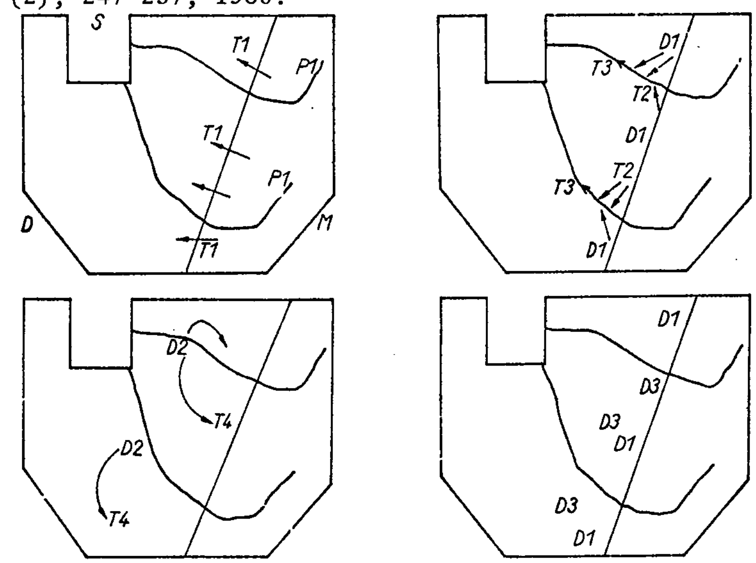


Fig. 2. Simple event sequence diagram for the formation of a loess deposit at the mountain/desert transition region. External symbols indicate M mountains, D desert, S inland sea. Two rivers flow from M through D to S. The sequence of P, T and D events leads to the formation of a loess deposit (D3) at the desert fringe

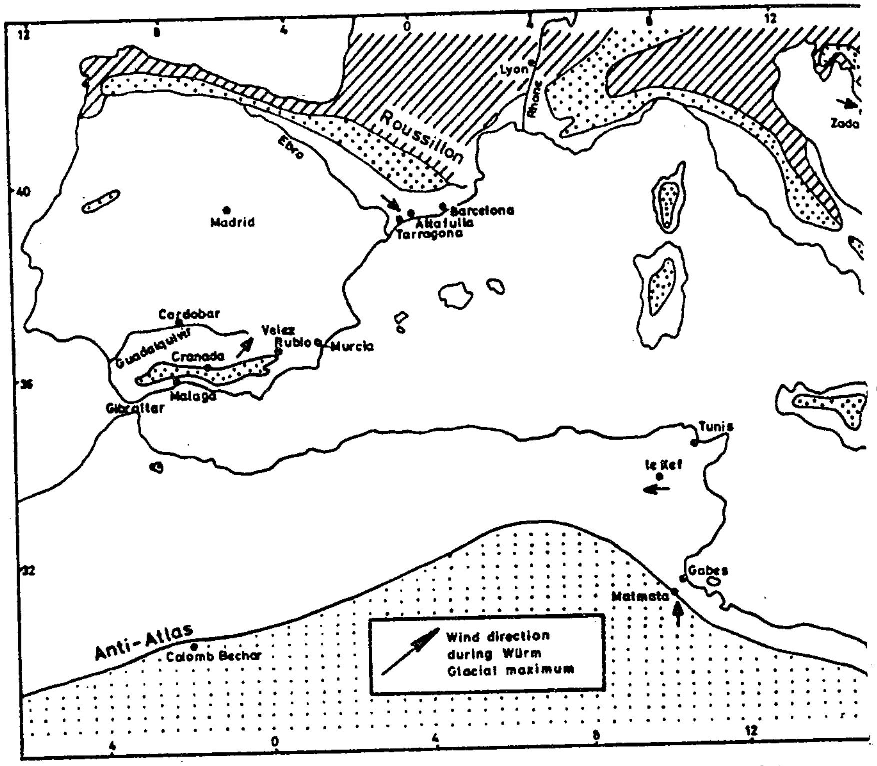
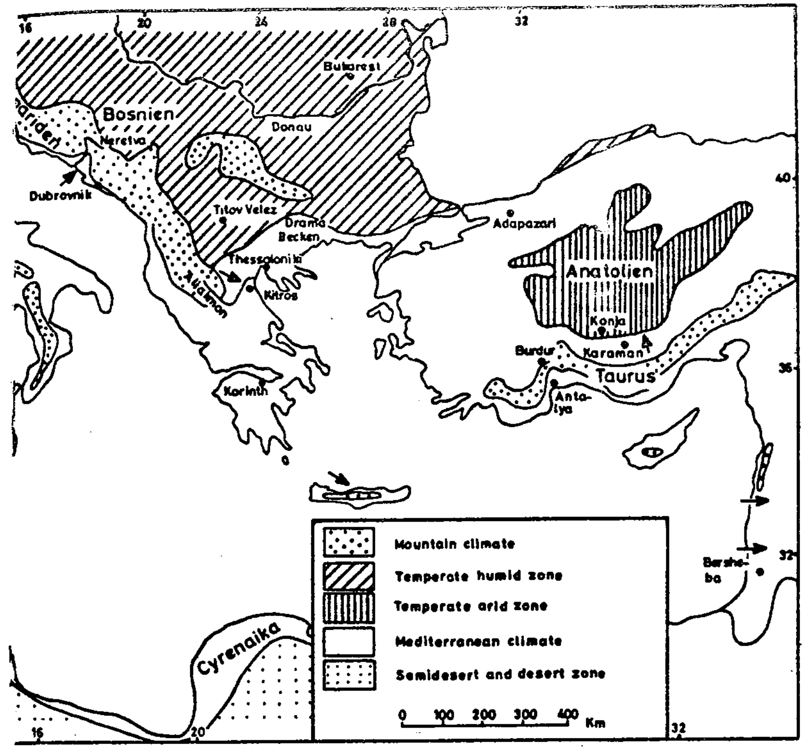


Figure 1. Regional review of the Mediterranean area based on present classification of the climate according to Walter & Lieth (1960). Furthermore, the wind direction during the glacial maximum, as it can be deducted from the eolian sediments, has been included.

'Typical' loess is characteristic for this part of the zone. Dust loam, free of carbonate, is found in glacial as well as in today's humid areas. Deluvial loess, marked by reworced deposits, is increasingly found toward the maritime NW Europe, mainly in certain fine stratigraphic layers (Brunnacker & Hahn 1978). The southern boundary extends through the lowlands across the southern Balkans, northern Italy and SE Spain. The Mediterranean loess, to the south, is marked by a characteristic highly tolerant Mediterranean mollusc fauna. In more humid regions, it still shows the properties of typical loess. Toward more arid regions (the number of arid months and not the absolute amount of precipitation is decisive for comparison), it is more and more replaced by deluvial loess with fluviatile reworked sediments (Brunnacker 1974).



Extract from Brunnacker 1980.
See page 34 for reference.

For various reasons, the Mediterranean loess is more patchily distributed than the periglacial loess. The reason for this lies in the limitation of the area supplying the loess particles; for example, massifs, broader valleys and coastal zones. Increasingly the loess was reworked, mainly from arid regions and was removed by fluviatile transport over large distances from the original place of sedimentation (high flood deposits). For this reason, the identification of the loess material becomes considerably more difficult. In addition, there have been redepositions due to soil erosion caused by man. This again adds to the difficulties in recognizing loess material from a geological mapping especially as loess in this region is too often rated as a subordinate geological element.

Young Pleistocene loess as an indicator for the climate in the Mediterranean area. K. Brunnacker *in* 'Sahara and Surrounding Seas', ed. M. Sarnthein, E. Seibold & P. Rognon. A.A. Balkema 1980, pp.99-113.

Extract:
During the last ice age in Central Europe, the northern loess boundary lay north of the Central mountains. The zone on periglacial congelifraction follows further north. The northern loess boundary is a consequence of a too-cold climate, because the glacial congelifraction zone lacks suitable vegetation to allow the final dust deposit. The southern loess boundary is expected to be in North Africa and in the Near East, where the climate was too dry for a suitable vegetation (today about 150 (-200) mm precipitation per yard). This loess zone can be subdivided into two regions: a northern one with periglacial loess and a southern one with Mediterranean loess. The periglacial loess is found together with appearances of solifluction and partly shows ice wedges and cryoturbations. Furthermore, it contains the typical periglacial mollusc fauna.

PUBLICATIONS 4/"STUDIES ON LOESS"

A major Loess Commission publication - courtesy of Akademial Kiado in Budapest: a complete volume (No. 22) of Acta Geol. Acad. Sci. Hungary - a journal which has carried many distinguished loess contributions in the past. Forty-five papers on various aspects, in five sections. The contributions to this volume will be considered in detail in LL7 - our second pre-congress issue, but in the meantime, here in LL6 we reproduce the contents pages just to whet your appetites.

ACTA GEOLOGICA

Tomus XXII

Fasciculi 1—4

INDEX

LATE CENOZOIC CHRONOLOGY OF THE SUBAREAL SEDIMENTS

LITHO-BIO- AND MAGNETOSTRATIGRAPHY OF LOESS AND ALLUVIAL SEDIMENTS

PROPERTIES AND TYPES OF LOESS AND LOESS-LIKE SEDIMENTS

ENGINEERING GEOLOGICAL AND GEOTECHNICAL INVESTIGATIONS OF LOESS

INTERDISCIPLINARY CHARACTERIZATION OF THE MOST IMPORTANT LOESS PROFILES IN HUNGARY

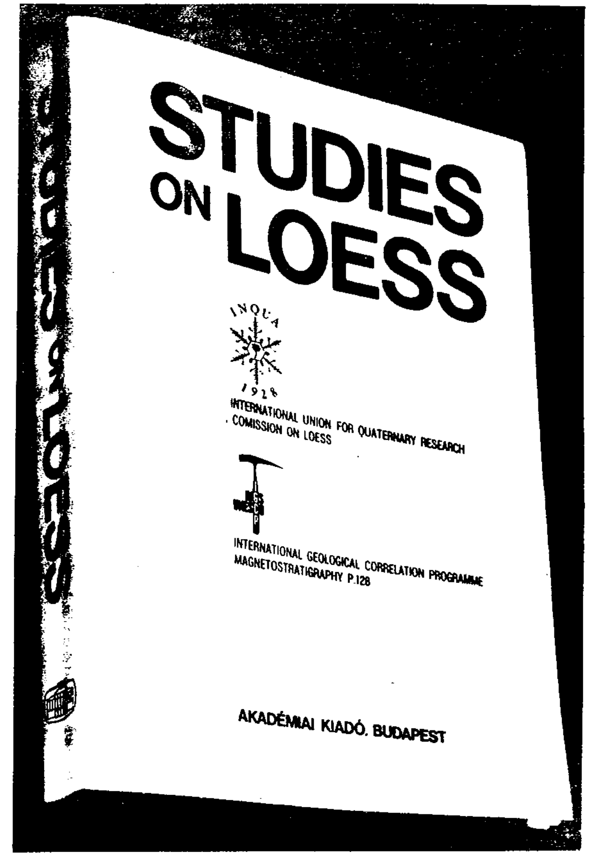
LOESS PROFILES OF MENDE

LOESS PROFILE OF PAKS

LOESS PROFILE OF DUNAKÖMLŐD

LOESS PROFILE OF DUNAFÖLDVÁR

KEY SITES OF INFUSION LOESS OF THE GREAT HUNGARIAN PLAIN



11th Sedimentological Congress

The 11th Sedimentological Congress will be held at McMaster University, Hamilton, Ontario, Canada from the 22nd to the 28th August 1982. Of particular interest to LL readers will be Symposium 16 - Aeolian Sediments and Processes; anyone wishing to participate (loess papers would be welcome) should contact one of the Chairmen:

Dr M.E. Brookfield
Dept. of Land Resource Science
University of Guelph
Guelph, Ontario, CANADA N1G 2W1

Dr T.S. Ahlbrandt
McAdams, Roux, O'Connor Associates
300 Equitable Building
730 Seventeenth Street
Denver, COLO. 80202, U.S.A.

This is the proposed outline of Symposium 16 as circulated:

Eolian sediments and processes (Earth plus other planets)

1. The sediment.
   Grain size, composition, textures, etc.

2. Processes
   (a) Dynamics of eolian erosion transportation and deposition.
   (b) Chemical and biological processes. Hydrology.
   (c) Diagenesis. Soils (e.g. Loess soils).

3. Recent eolian features.
   (a) Erosional - morphology, formation, etc.
   (b) Depositional - morphology, internal and external features including classifications for both.
   (c) Relationships of features to atmospheric structure, dynamics and wind regimes.

4. Associations of eolian features in natural environments (Studies on parts or all of recent eolian environments).
   (a) Associations in different types of environment, e.g., hot lowland deserts, cold mountain deserts, around ice sheets.

5. Eolian deposits and man.
   (a) Archeology.
   (b) Land use. Desertification and sand control. Agriculture.

6. Ancient eolian sequences.
   (a) Recognition.
   (b) Ancient examples, e.g., (1) Reconstruction of bedforms; (2) Development of an ancient desert; (3) Comparison of recent and ancient deserts.
   (c) Significance of ancient eolian sequences, e.g., reconstruction of paleoclimates, relationship to tectonics, etc.
   (d) Economic aspects.
      (1) Mineral deposits.
      (2) Oil and gas, e.g. reservoir properties.
      (3) Miscellaneous, e.g., building stone.

PUBLICATIONS 5

2nd Benelux Colloquium on Geomorphological Processes

A series of papers from the 2nd Benelux Colloquium has appeared in Earth Surface Processes and Landforms, Vol. 6, No. 3-4, May-August 1981; three of these touch directly on loess (and several of the others indirectly).

Response of loess materials to simulated translocation by water: micromorphological observations. H.J. Mücher, J. De Ploey and J. Savat. ESP & L 6, 331-336, 1981.

(Re)deposition of loess in southern Limbourg, The Netherlands. 1. Field evidence for conditions of deposition of the Lower Silt Loam complex. W.J. Vreeken and H.J. Mücher. ESP & L 6, 337-354, 1981.

2. Micromorphology of the Lower Silt Loam complex and comparison with deposits produced under laboratory conditions. H.J. Mücher and W.J. Vreeken. ESP & L 6, 355-365, 1981.

Pacific Science Association

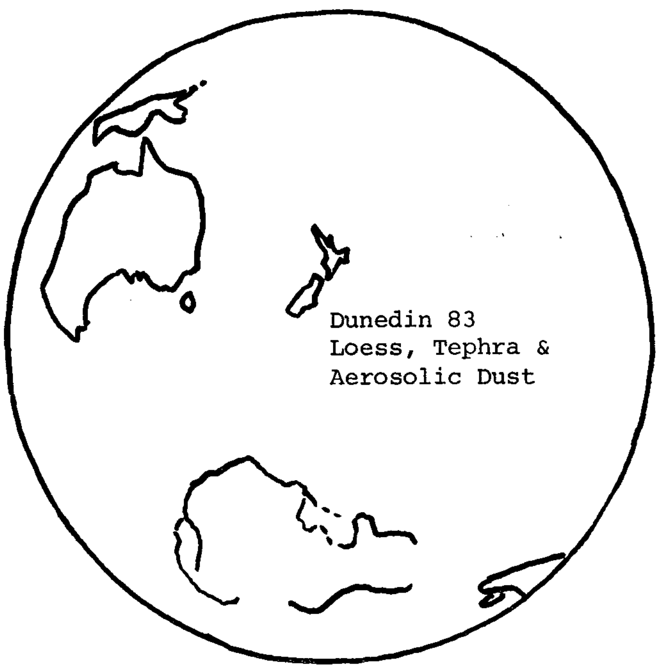
15th PACIFIC SCIENCE CONGRESS

Dunedin, New Zealand. 1-11 February 1983

Under the auspices of Section B Solid Earth Sciences, a discussion meeting will be held on the topic of:

LOESS, TEPHRA AND AEROSOLIC DUST : QUATERNARY AIRFALL DEPOSITS IN THE CIRCUM-PACIFIC REGION

Papers are invited for this symposium. Contact: Dr Ian Smalley, Soil Bureau, D.S.I.R., Lower Hutt, New Zealand, or Mr John Bruce, Soil Survey Office, D.S.I.R., Private Bag, Gore, New Zealand. This symposium is a regional meeting of the INQUA Loess Commission.

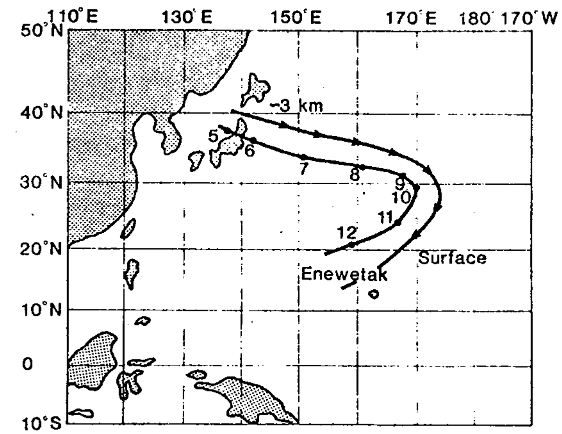


Dust

Long-range atmospheric transport of soil dust from Asia to the tropical North Pacific: Temporal variability. R.A. Duce, C.K. Unni, B.J. Ray, J.M. Prospero and J.T. Merrill. Science 209, 1522-1524, 26 September 1980.

Extract:
Statistical compilations of meteorological observations show the dust storm activity is widespread, especially in central China where there are extensive loess deposits, and in the arid and desert regions of western China. Indeed, the Takla Makan Desert appears to be one of the dustiest places in the world.

Fig. 2. The idealized trajectory of the air reaching Enewetak about 12 May 1979 is shown by the outer line, progressing from a 3-km elevation to the surface between 5 and 12 May. The center position of the anticyclone is shown by the dot for each day in the period.



Atmospheric transport of soil dust from Africa to South America. J.M. Prospero, R.A. Glaccum and R.T. Nees. Nature <u>289</u>, 570-572, 12 February 1981.

India

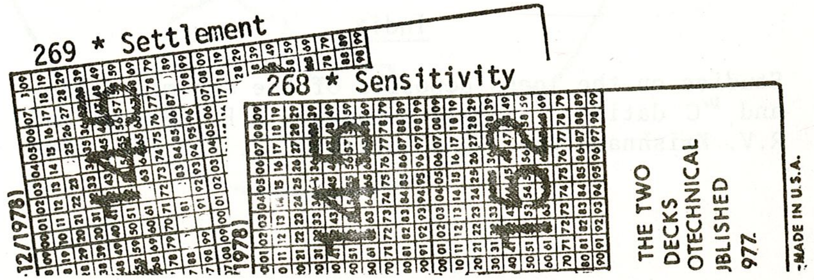
Studies on the loess deposits of the Kashmir Valley and ^{14}C dating. Sheela Kusumgar, D.P. Agrawal and R.V. Krishnamurthy. Radiocarbon <u>22</u>, 757-762, 1980.

Extract:

The loess consists entirely of brown granular silts which do not show any depositional structure. The loess is well-graded and has a medium grain size ranging from 10µ to 50µ (Agrawal and others, in press). Scanning electron microscopy of these sediments shows clear loessic features (Pant, Agrawal, and Krishnamurthy, 1978). These loessic sediments possess the property to remain stable even in a vertical cutting (Bhatt, 1976).

In the southwestern (Pir Panjal) side of the Kashmire valley, these loessic deposits have 2 to 3 distinct palaeosols (at some sites we suspect there are more than 3 palaeosols) within them. The north-eastern part also contains 2 to 3 palaeosols within the loessic deposits 30 to 40 m thick, just above the gravel bed, whereas on the Himalayan side the loessic thickness is only 5 to 10 m and the deposit overlies the lacustrine beds of the Upper Karewa.

These loessic deposits apparently formed during the last glacial period which was marked by low temperatures and general aridity. The palaeosols within the loess, however, suggest relatively warmer and wetter climate, during which there was no fresh deposition and climatic conditions that favored soil formation. Our aim was to date these distinctive palaeosol forming events. Towards this end, palaeosol samples were collected from both flanks of the valley, the Himalayan and the Pir Panjal. The Himalayan side sites are Burzahom, Garhi, Olchibagh and Saki Paparian and the sites of Puthkahah, Pakharpur and Tsarar Sharif are on the Pir Panjal flank .... ^{14}C dates of the palaeosols are given in table 1.



Loboa loboi see also *Paracoccidioides loboi* [fungus]
lobster
local-authority areas
local government
local immunity see immunity, local
local planning
location of production
location theory see also spatial equilibrium analysis
loci
loco weed
locomotion see gait see movement
locundioside
Locusta [arthropod]
Locusta migratoria [arthropod]
Locustana [arthropod]
Locustana pardalina [arthropod]
lodging
loess soils
log breakdown methods
logarithmic sprayers
logging
logging arches and wheels
logging machines
logging saws
logging shears see also shears, logging
logs
Lolium [plant]
Lolium see also ryegrass [plant]
Lolium annuum [plant]
Lolium multiflorum [plant]
Lolium perenne [plant]
Lolium perenne see also ryegrass [plant]
Lolium remotum [plant]
Lolium rigidum [plant]
Lolium temulentum [plant]
long-chain fatty acids see fatty acids, long chain
long-term credit
long-term experiments see also experiments, long-term
longan see also *Nephelium longana*
longevity
Longidorus [helminth]
Longidorus africanus [helminth]
Longidorus caespiticola [helminth]
Longidorus cohni [helminth]

Lonicera see honeysuckle [plant]
Lonicera japonica [plant]
loofah see also *Luffa*
looplure
loose housing
loosening
Lophodermium [fungus]
Lophodermium pinastri [fungus]
Lophotocarpus [plant]
Lophotocarpus guyanensis [plant]
loquat see also *Eriobotrya japonica*
Loranthus [plant]
Loranthus cordifolius [plant]

lordosis
lorries
Lorryia [arthropod]
Lorryia turrialbensis [arthropod]
losses
losses from soil systems
Lotononis [plant]
Lotononis bainesii [plant]
lotus see also *Nelumbium* see also *Nelumbo*
Lotus see birdsfoot trefoil [plant]
Lotus angustissimus [plant]
Lotus corniculatus see birdsfoot trefoil [plant]
Lotus tenuis [plant]
Lotus uliginosus [plant]
Lovoa [plant]
Lovoa trichilioides [plant]
low-cost technology se... appropriate techn...
low-fat milk
low-fat products
low-frequency ra...
low income area... favoured are...
low-income area... favoured area...
low-lactose milk
low-moor soils
low-volume sprayers see sprayers, low volume
low-volume spraying see spraying, low volume
Lower Palaeozoic soils
Lowe's syndrome
lowland areas
Loxosceles [arthropod]
Loxosceles arizonica [arthropod]
Loxosceles laeta [arthropod]

Lucilia caesar [arthropod]
Lucilia cuprina [arthropod]
Lucilia illustris [arthropod]
Lucilia sericata [arthropod]
Lucilia viridiceps see *Orthellia timorensis* [arthropod]
Lucuma [plant]
Lucuma see *Calocarpum* [plant]
Lucuma mammosa [plant]
Lucuma mammosa see sapote [plant]
Ludwigia [plant]
Ludwigia adscendens [plant]

Ludwigia leptocarpa [plant]
Ludwigia octovalvia [plant]
Ludwigia perennis [plant]
Luffa see loofah [plant]
luliberin
luminescence
lumpy skin disease virus
lunar soils
Lunaria [plant]
lung
lungworms
lupin see also *Lupinus*
lupin meal
lupinosis
Lupinus see lupin [plant]
Lupinus albus [plant]
Lupinus angustifolius [plant]

Lupinus arboreus [plant]
Lupinus argenteus [plant]
Lupinus cosentini [plant]
Lupinus luteus [plant]
Lupinus polyphyllus [plant]
...ation
...g hormone see
... hormone
...g hormone see
...c activity
...opic hormone see luteotropin
luteotropin see also luteotropic hormone
lutoids
lutropin see ICSH
Lutzomyia [arthropod]
Lutzomyia flaviscutellata [arthropod]
Lutzomyia intermedia [arthropod]
Lutzomyia longipalpis [arthropod]

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LOESS LETTER 6

This is a special issue of Loess Letter to mark the occasion of the 11th INQUA Congress in Moscow in August 1982; it was produced by Marjolane Ball, Heather Simmonds and Ian Smalley at Soil Bureau, Taita, New Zealand and printed by the New Zealand Government Printer in Wellington. The next issue, LL7, will be a special issue to celebrate the 11th International Sedimentological Congress to be held in Hamilton, Canada, 22-28 August 1982. Items relating to 'Loess as a Sediment' would be particularly well received. LL8 will be the third successive special issue - it will be for the Pacific Science Congress to be held in Dunedin, New Zealand, 1-11 February 1983 (see advert. on p.40 for initial details of the Loess Symposium). In LL7 we hope to highlight the 'Studies on Loess' published by the Hungarian Academy of Sciences; have a look at the 'Bibliography of Agriculture' as a source of loess references; discuss some interesting results on loess soil productivity from the 1980 report of the Rothamsted Experimental Station; and provide further insights into the exciting world of loess.