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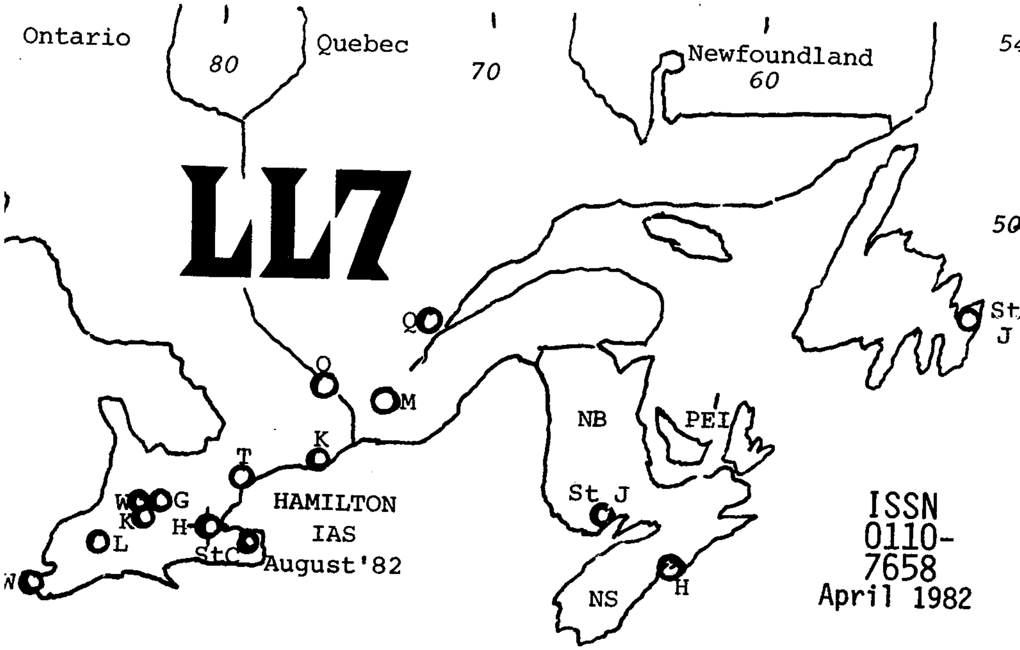

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LOESS AS A SEDIMENT

A Special Issue of Loess Letter to mark the occasion of the XIth International Sedimentological Congress in Hamilton, Ontario, Canada: 22-28 August 1982

LOESS LETTER

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Announcement: International Workshop on the Late Cenozoic Palaeoclimatic Changes in Kashmir and Central Asia to be held in Ahmedabad, India: 19-23 October 1982 - see p.8 for more details.

PUBLICATIONS 1

Rothamsted Experimental Station; Report for 1980, Part 1 (published in June 1981), Lawes Agricultural Trust, Harpenden.

Extract (p.247):
Effect of soil type on 1979 yields of winter wheat. Soil series for 630 fields in the 1979 ICI Ten Tonne Club Survey (made available by Mr J.D. Hollies of ICI Ltd) were identified from Soil Survey maps, inferred from geological maps or established by visits to farms. Yields of wheat at these sites ranged from 11.7 to 3.6 t ha^{-1}, mean 6.9 t ha^{-1}. Yields of 10 t ha^{-1} or more were achieved at only 15 sites, on Bromyard, Teme, Marshborough, Beccles, Hanslope, Thorner, Sherborne, Hook, Park Gate, Blacktoft, Adventurers, Burlingham and Hall Series. It is notable that loess forms all or part of the profile in 46% of these soils, but only in 18% of the total 630 named soils.

For series with seven or more sites, the mean yields ranged from 9.2 to 5.4 t ha^{-1}. The range of yields within series also varied widely, however, for example Hanslope series (42 sites) range 10.4-4.5 and Sherborne series (28) 10.2-4.4. The wide ranges imply that many soils are capable of yields of over 10 t ha^{-1} in appropriate circumstances, but that the ease with which this may be achieved varies. Thus in the survey Batcombe series gave moderate yields, mean 6.3 and range 7.5-5.0 t ha^{-1}, whereas a 1979 wheat experiment on Batcombe series at Rothamsted gave a 16-plot mean yield of 11.0 t ha^{-1}.

Mean values were also calculated for higher soil classes and for soils of different texture. Ground water gley soils had a mean yield of 7.4 t ha^{-1}, Peat soils 7.3, Brown soils 7.0, Surface water gley soils and Pelosols 6.7, and Lithomorphic soils (all Rendzinas) 6.6 t ha^{-1}. Within the Brown soils, stagnogleyic brown earths (mean 6.1 t ha^{-1}), yielded much

less than the other typical brown earths (7.5). Soils with coarse loamy over gravelly texture, mainly Hall series, had a mean yield of 8.8 t ha^{-1}, peaty soils 7.3, fine silty soils 7.2, fine loamy over clayey soils 6.9, and clayey soils 6.6. Silty soils gave mean yields of only 6.4 t ha^{-1}, but these were mainly shallow silts over chalk (Rendzinas) and the relatively small yields may depend more on shallowness than texture. The good yields on fine silty soils and the large proportion of loessic soils giving over 10 t ha^{-1} show the value of silt as a soil component providing that the soils are deep enough to give adequate available water. (Catt, Weir and Rayner)

Burrin, P.J., 1981. Loess in the Weald. Proc. Geol. Ass. 92, 87-92.

Extract (pp.89-91):
The loess of S.E. England is considered to be the tail end of the classic North European loess deposits (Zeuner, 1959; Perrin, Davies & Fysh, 1974) produced during and after the last (Devensian-Weichselian) glaciation, the sediments being distributed by aeolian processes associated with anticyclonic conditions centred over Scandinavia (Lill & Smalley, 1978). The interpretation of the fine-grained alluvium of the Rivers Ouse and Cuckmere as derived from aeolian sediments would explain where much of the loessal material in the Weald may be found and also substantiates an earlier suggestion that such sediments probably exist in the floodplain deposits of English rivers (Catt, 1977). Mapping and subsurface investigation in the Ouse and Cuckmere Basins indicate that only relatively small amounts of loessial materials survive on the slopes and interfluves, for much of this sediment appears to have been removed and reworked by processes of widespread solifluction, colluviation and fluvial erosion.

Wen Qizhong, Yu Suhua, Gu Xiongfei and Lei Jianquan. 1981. A preliminary investigation of rare earth elements (REE) in loess. Geochimica, for 1981, No. 6, pp.151-157.

Abstract (p.157):
REE oxides in loess are estimated to amount to about 200 ppm. The REE distribution patterns in loess and its clay fraction are characterized by the enrichment of rare earth elements of the Ce family.

The REE distribution patterns of loess in the middle Huangho (Yellow River) Valley are consistent with those of sands from the Tengeli desert, probably indicating the consistency of their material sources.

The REE distribution patterns are similar to each other in the clay fractions of Malan loess everywhere in the middle Huanghe Valley, indicating the homogeneity in their composition.

Close to the average value of the earth's crust, the REE distribution patterns in loess and its clay fraction are similar to that of sedimentary rocks (e.g., North American shales), but different from that of chondrites. It seems to show that large amounts of loessic material were transported from the provenance region by moving water into sedimentary systems after it had been separated from its precursor, and then transported by wind to where it is now distributed.

Dictionnaire des sols

Plaisance, G. and Cailleux, A. 1981. Dictionary of Soils. Translated from the French, published for the United States Department of Agriculture and the National Science Foundation by Amerind Publishing Co. Pvt. Ltd., New Delhi, India. (Original version published in 1958 by La Maison Rastique Publishers, Paris.) Pages 602-603 contain an interesting entry on loess and some related terms which we reproduce here.

Il en restera assez pour t'enterrer.

[The earth bears well the wolves.
I shall not take all on my soles
There will be enough left to bury you.]
(A wife to her husband.) (Franche-Comté).

— *Qui est-ce qui mange tout ce que les autres ne veulent pas? c'est la terre.* [Who eats everything that the others do not want? The earth.] (Savoie).

— See **blanc, noir, fertile.**

LODO m. (Span.). Mud.

LOÉ. See **luex.**

LOESS m. [ETYM. Indo-Eur. root **lu* to disengage, release. OHG *los* disengaged, incoherent, *lösen* to loosen, detach. — Cf. Swiss *losch* thin, loose.] Loess. — **1.** (Germ., Rhineland) Silty earth, easy to crumble and to till, neither too clayey nor too sandy. — **2.** GEOL. The same, with the exception of volcanic ashes and alluvial valley-bottom silts. — **3.** Certain geologists further restrict the meaning only to loess containing limestone, others only to loess deposited by the wind; these restrictions are contrary to the etymological and popular meanings, and have in addition the disadvantage of excluding from loesses earths which have the same properties. All that follows applies to the broad geological meaning 2, i.e. including non-calcareous, or non-eolian, loessial silts. — Loess is found on slopes or at the foot, or on plateaus, sometimes even in caves. It is abundant and thick in northern France, on the plains, and rarer in mountain regions. The usual thickness is from 0.5 to 10 m. In China, it reaches 30 m. It is light yellow, and crumbles into powder. The most frequent mineral (outside volcanic regions) is quartz, followed by calcite, the feldspars and the clay minerals. The $CaCO_3$ content ranges from 0 to 33%. The non-carbonate fraction has the following composition: SiO_2, 72 to 82%; Al_2O_3, 6 to 10%; Fe_2O_3, 1 to 6; CaO, 0.8 to 1; Na_2O, 0 to 1; K_2O, 1 to 2; P_2O_5, 0.1 to 0.4. On slopes, the erosion of loessial soils is intense, especially where storms are frequent, among other places in the Midi of France. — GRANULOMETRY: The dominant fraction is silt. Median grain size around 0.025 mm. In places, a few intercalated pebbles. According to Malycheff they are from 50 to 100 microns, according to Bordes, they contain over 70% elements larger than 50 microns, with 15% smaller than 2 microns. Edelman characterizes them by the place of a dot on a graph; over 50 microns: less than 10%; 10 to 50 microns: 65 to 90%; less than 10 microns: 10 to 20%. Loess is formed in cold, periglacial climates, by deposition of dusts brought by the wind from steppe regions, sometimes conjointly with snow (niveo-eolian). After its deposition, it may have been taken up again by solifluction (frequent), or carried by flowing water toward the depressions. — AGRONOMY. The loesses are admirable arable earths (wheat, beets): porous soils, often rich in calcium carbonate, but bad forest soils. They give brown soils or leached soils. The percolating waters

decalcify the upper horizon, which then becomes a loam **(lehm).**
— Graindor distinguishes: *True loess:* over 15% $CaCO_3$; *loess:* from 5 to 15%; *loessic silt:* 1 to 5%; *loessoid silt:* less than 1%. — See **éolien, poupée, poussière, sol** à escargots (*Schneckelhauselboden*). — SYN. Central Asia *tourpak.*

Loess altéré. Weathered loess. It is usually leached, decalcified. It passes to loam **(lehm).**

Loess ancien. Ancient loess. Deposited before the last glacial epoch.

Loess dégradé. Degraded loess. For certain authors: non-calcareous or slightly calcareous silt [to be avoided]. — See **dégradation.**

Loess déluvial. Loess fallen on the edges of ravines [not in common use].

Loess durci or *à bancs durcis.* Hardened loess or loess with hardened beds. An alternation of loose loess and the same material consolidated by a calcareous cement.

Loess non sableux. Non-sandy loess. Loess with less than 30% coarse, fraction greater than 0.05 mm.

Loess d'origine glaciaire. Loess of glacial origin. Loess which has been transported by the glaciers, before being taken up again and accumulated by the wind. Often there has been, between the two, a phase of transport by the waters of melting glaciers. In this case, the loess is of fluvio-glacial origin. — Ex. the present-day loess (eolian silts) of Iceland.

Loess primitif. Primitive loess. A thick and intact or little-modified deposit of loess on horizontal surfaces. — The opposite of *secondaire.* It is preferable to say: *in situ.*

Loess récent. Recent loess. Deposited during the last glacial epoch, or during its withdrawal.

Loess sableux. Sandy loess. The coarse (>0.05 mm) fraction of which forms over 30%.

LOESSIFICATION f. The hypothetical transformation of a fine-grained parent rock into loess. This hypothesis, conceived by Berg, is completely contradicted by modern observation in Iceland, and by Quaternary phenomena in Europe and America. On the other hand, it is true that the in-place weathering of certain schists and other fine rocks gives a fine earth which is easily disintegrated. The persistence of the beds or of the original cleavability distinguishes it from loess.

LOESSIQUE. See limon.

LOESSLEHM (Germ.). Loam resulting from the decalcification of a loess.

LOESSMÄNNCHEN (Germ.). [ETYM. Germ. *loess* silt which is easily disintegrated and *männchen* small man.] A limestone concretion of small human shape, in loess. — SYN. *Lehmkindel, Loesskindchen, Lösskindel.*

LOESSOIDE. See limon.

LOFFA f. Blackish peaty soil.

LOI. Law. See **Darcy, Poiseuille, Stokes, Vageler-Alten.**

International Workshop on the Late Cenozoic Palaeoclimatic Changes in Kashmir and Central Asia: 19-23 October 1982, Ahmedabad, India.

Theme 4 of the Workshop concerns palaeoclimatic studies on the loess of Central Asia, China, Kashmir and Potwar. Papers and contributions to the Workshop are invited and should be sent as soon as possible to the convener: Dr D.P. Agrawal, Physical Research Laboratory, Ahmedabad 380 009, India. The following papers are tentatively assigned to Theme 4:

Palaeoclimatic studies on the loess of Central Asia, China, Kashmir and Potwar.

IV.19. Distribution, stratigraphy and pedogenesis of the Kashmir loess. R.K. Pant et al.

IV.20. Clay mineralogical studies on the Kashmir loess. S.K. Tandon et al.

IV.21. Thermoluminescence and ^{14}C dating of windborne sediments. A.K. Singhvi, Y. Sharma, D.P. Agrawal and S. Kusumgar.

IV.22. Palaeo-ecological and archaeological data from the Potwar loess. B. Allchin et al.

IV.23. Palaeoclimatic studies on the Chinese loess. Liu Teng Sheng et al.

IV.24. Palaeomagnetic dating of the Chinese loess. Li Hua-Mei.

IV.25. Pedogenesis of the Tadjik loess and palaeoclimatic change. S.P. Lomov and A.Y. Dodonov.

IV.26. Palynological studies on the Tadjik loess. M. Pakhomov et al.

Bibliography of Agriculture

From 1975 onwards the Bibliography of Agriculture has been published by the Oryx Press (Suite 104, 2214 North Central, Phoenix, Arizona 85004, U.S.A.). An annual subject/author cumulation is published every year and this gives access via the LOESS heading to a range of

interesting literature. For other keywords, consult the 'Thesaurus of Agricultural Terms' published by Oryx in 1976. The Bibl. of Ag. annual cumulation is an index to literature of agriculture and allied sciences cited in the monthly issues of the Bibliography. The cumulation must be used in conjunction with the main entry sections of the monthly issues in order to provide the required references. Access is also available to Bibliography entries via. AGRICOLA (AGRICultural-On-Line-Access), the computerised bibliographic data files distributed by the USA National Agricultural Library. We reproduce a section of the annual cumulation for 1979 (Volume 43) in order to give a general idea of the topics covered by the Bibliography.

ıeedle tissues of *lodgepole* **pine** [Pinus contorta].

er harvesting in *lodgepole* **pine** [Pinus contorta]
ıagement, snow hydrology, water yield manage-

ıne [Pinus contorta] forest [Utah, effects of forest

torta latifolia] management to prevent mountain
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ıtation in **thinned** *lodgepole* pine [Pinus contorta
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ɔroving the resistance of rye to *lodging* [**Abstract**

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ı for seed in breeding nurseries. 117934
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LODOICEA
The double coconut [*Lodoicea* **maldivica**]. 127722
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Contribution to the characterization of *Loess* **Black** soil from the vicinity of Halle/Saale (Etzdorf) and recommendations for the design of a sprinkler irrigation regime. 059974
The influence of the solid phase density on the air and water capacities of **brown** *loess* soils. 049355
Geological environments of the *loess* in **China.** 072678
On the need for amelioration in **compacted** *loess* and loam soils. 060361
The influence of the geological structure and of the substratum relief on the configuration of *loess* **cover** in the area of the western part of the Naleczow Plateau. 011530
Loess **deposits** associated with deserts. 072621
Homogeneity of granulometric composition of *loess* **deposits** [Includes soil description and erosion processes Lower Volga area]. 102754
Fossil soils in *loess-like* **deposits** of the north-east of Eurasia. 132694
Occurrence of calcareous sinter under the *loesses* in the **environs** of Bogoria. 011529
Repeated generation of ephemers in the *loess* **foothill** desert of Turkmenistan. 108126
Paleogeography of the Pleistocene and *loess* **formation** in the Ciscaucasia. 092600
Composition and properties of *loess* and **fossil** soils in the area of Kok-Tube. (near Alma-Ata). 112737
Results of an 18-year hyper-Thomas phosphate comparison test on a Lower **Franconian** *loess* soil. II. The effect of long standing, various high hyper- and Thomas phosphate fertilization on the enrichment of soils with phosphates, determined from the DL-, CAL- and water extraction methods. 011922
Materials to the absolute chronology of the *loesses* of **Grazeda** Sokalska. 011528
The water balance of a *loess* **Grey** Brown Podzolic soil under winter wheat and fallow conditions. Computer models and their experimental verification. 036805
Wind-aligned drainage in *loess* in **Iowa.** 123102
On the correlations between growth performance and nutrition state of younger spruce trees (Picea abies (L.) Karst.) on *loess* **loam** sites. 044913
Determination of compressibility of *loess-like* **loams** [for planning reservoir constructions]. 082622
Correlation between above-ground phytomass production and the chlorophyll content in the vegetation of a "Loszpusztaret" in field experimentation and in conditioned situations [*loess* **meadow**, Salvio-Festucetum rupicolae pannonicum]. 055288
Characteristics of the heavy minerals from the *loesses* of the **Naleczow** Plateau. 011527
Evaluation of the potassium situation of river loam soil in comparison with sea clay, river clay, *loess*, and **sandy** soil. 036718
Comparative characteristics of the microstructure of Chernozem soils developed on *loesses* and **shales** in the Donets Basin. 082706
Effect of irrigation with a mixture of wastewater, Saale river water and semi-liquid manure on the yield of sugarbeets, Italian ryegrass [Lolium multiflorum] and winter wheat on a *loess* l **site** [East Germany]. 012199
Effective soil tillage for winter barley and winter wheat on *loess* **sites.** 012099
Profile structure of the toposequence of soils on a *loess* **slope** with fossile soil. 049274
Influence of different amounts of cattle compost on yield, sugar quality, and digestion quality of sugarbeets [grown] on *loess* **soil**, 1975-1977 [Soil amendments]. 024201
Loss of lime from *loess* **soil** and its influence on crop yields [Leaching]. 036720
Quality of dark air-cured tobacco cultivated on the *loess* **soil** under irrigation conditions.

PUBLICATIONS 2 - 'STUDIES ON LOESS'

As promised in LL6 we devote some space to a further consideration of this important publication. For those of you who missed LL6 this is a special issue of Acta Geol. Acad. Sci. Hungar. (Vol. 22, Nos. 1-4) published by Akademiai Kiado in Budapest. The contents (45 papers) were listed in LL6 and here in LL7 we have a more detailed look at a few papers. It is impossible to do justice to the entire collection of papers, so we reproduce parts of just five. They have been chosen to give a wide geographical representation of research on loess (and 'loess as a sediment' as far as possible). Papers are from the Ukraine, France, Israel, India and New Zealand. Most of the papers in the volume are from Hungary and it can be recommended as a fairly complete guide to what is going on in loess in Hungary. Marton Pecsi, President of our Commission, is the editor.

Acta Geologica Academiae Scientiarum Hungaricae, Tomus 22 (1–4), pp. 35–62 (1979)

PLEISTOCENE LOESSES AND FOSSIL SOILS OF THE UKRAINE

By

M. F. Veklich

GEOGRAPHICAL RESEARCH INSTITUTE OF THE UKRAINIAN ACADEMY OF SCIENCES, KIEW

More than 70 key sites were analysed in detail and another 1000 profiles were investigated in the Ukraine in order to provide a general description of the Pliocene and Pleistocene stratigraphy (Table 1) and to outline the paleogeographical stages of development. We have studied in detail Pleistocene soils (also some Pliocene soils) the flora and mollusc fauna of these fossil soils, reconstructed the paleoclimatic conditions of loess formations and paleolandscapes for the whole area of the Republic (in 17 subrayons). Adopting the principles of the URMSK we have undertaken a correlation program of the Quaternary deposits, including loess formations.

The Ukrainian loess series are investigated today in 70 main profiles (Fig. 1) and at more than a thousand additional sites. Subaeral loess formations predominate in these series both in volume and distribution. The other major group of formations are of aqueous origin (mainly alluvium).

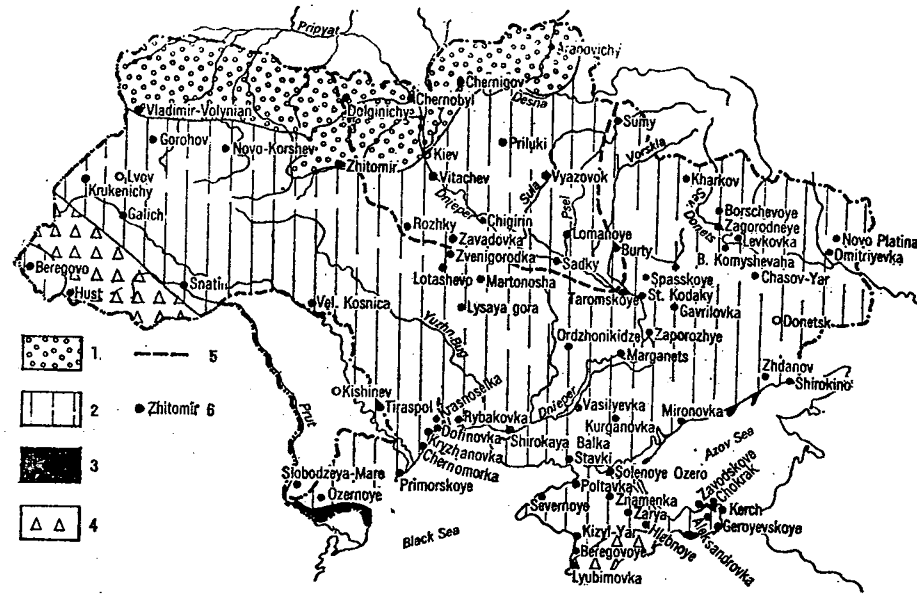


Fig. 1. **Location of main Ukrainian loess profiles investigated by the Paleogeography Section of the Academy of Sciences of the Ukr. S.S.R. Pleistocene sediments: 1. loess formation; 2. mountainous formation; 3. glacial plain formation; 4. sea-terrestrial formation; 5. boundary of maximum glaciation; 6. main profiles**

Volynskiy in the Zhitomirskoye Poles'ye etc.). Loess overlies less than ten percent of the total area of the Ukrainian Poles'ye.

A thin blanket of "stony loess" covers the relatively gentle slopes of the Crimean and Carpathian Mountains up to a height of 500–700 metres in the Crimean Mountains though sometimes they are also found on mountain pastures at a height of 1100–1200 m.

On the shelf areas of the Black Sea loess formations were discovered in bore-hole samples in a fifty kilometres wide zone adjoining the shoreline that separates the mouth of the Dnieper from the Danube delta. They are present at some other places as well, and cover the basin of the Azov Sea, for example. At the bottom of the sea-basins the loess formations are overlain by Holocene sea and newer lake-sea euxenite sediments.

The loess and fossil soil formations together with other lithogenetic groups of Pleistocene continental sediments form a separate geological rock formation, the so called loess formation.

According to our calculations the total area occupied by loess formations takes up 479 thousand square kilometres, or eighty percent of the Ukrainian territory (10 and others). Others consider this figure to be somewhat less.

LITHOSTRATIGRAPHIE ET CHRONOSTRATIGRAPHIE DES LOESS DE HAUTE NORMANDIE

Par

J. P. LAUTRIDOU

CENTRE DE GÉOMORPHOLOGIE DU C.N.R.S., CAEN

Seven loessic sequences have been defined under the Weichselian loess. Their age is: Middle Pleistocene. The older is sandy (end of Lower Pleistocene or, beginning of Middle Pleistocene). The older interglacial paleosols are very leached and rubified, the younger (Elbeuf I—IV) correspond to a «sol brun lessivé» like the post-Weichselian soil.

La couverture loessique des plateaux de Haute-Normandie est importante: l'épaisseur des limons atteint en moyenne six mètres (fig. 1), mais elle décroît vers l'Est à partir de Rouen et vers l'Ouest (Basse-Normandie). Ce manteau éolien constitue avec le Nord et l'Alsace l'ensemble le plus puissant de France.

La première recherche a consisté à définir le dernier cycle éolien périglaciaire et à l'intégrer dans la chronologie nordique: en effet la chronologie alpine est insuffisante et la position géographique de la Normandie nous amène à nous rapprocher des systèmes chronologiques de l'Angleterre et des Pays-Bas.

I. Les loess du Weichselien

Nous avons maintes fois présenté cette séquence (LAUTRIDOU, 1973, 1974, 1976) que nous rappellerons ici sommairement. Au-dessus du sol brun lessivé éémien on observe dans la coupe type de Saint-Romain (fig. 1) trois formations: un limon argileux et deux loess. Grâce à la présence de niveaux diagnostic nous pouvons, par l'intermédiaire du Nord de la France, nous corréler avec les loess et sables de Belgique et des Pays Bas (LAUTRIDOU, SOMME, 1974). Le sol brun lessivé de base est identique au sol éémien de *Rocourt:* nous l'appelons «*sol de Saint-Romain*» à l'Ouest, et «sol I d'Elbeuf» à l'Est. Le limon argileux sus-jacent qui remanie le paléosol éémien par gélifluxion passe latéralement à un ou deux horizons humifères de type «sol de Warneton» en Belgique ou Stillfried A d'Europe Centrale: il correspond donc au Weichsélien ancien. Les loess sont divisés en deux par un niveau d'érosion jalonné par des petites langues de gélifluxion très caractéristiques qui définissent en Belgique le «*niveau de Kesselt*» entre les deux limons pléniglaciaires.

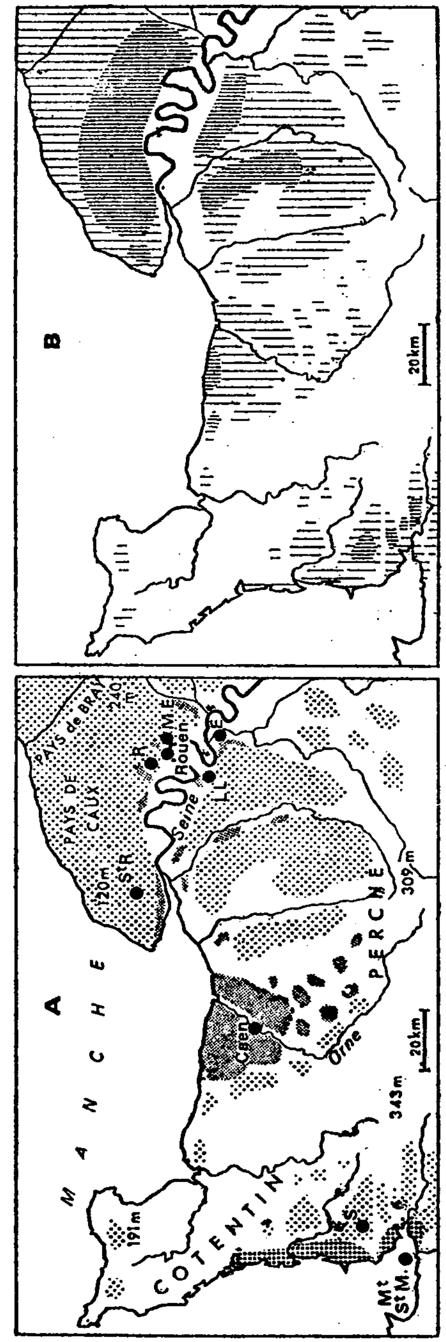


Fig. 1. A = carte de faciès des loess; B = carte d'épaisseur des loess; 1. sables éoliens; 2. loess calcaires; 3. limon à doublets; 4. épaisseur inférieure à 4 mètres; 5. épaisseur supérieure à 4 mètres (d'après COUTARD, HELLUIN, LAUTRIDOU, OZOUF, PELLERIN); St R = Saint-Romain; R = Roumare (et Bosc-Hue); LL = La Londe; ME = Mesnil-Esnard

STRATIGRAPHY OF THE NETIVOT SECTION IN THE DESERT LOESS OF THE NEGEV (ISRAEL)

By

H. J. Bruins,

DEPT. OF SOIL SCIENCE AND GEOLOGY,
ɔRICULTURAL UNIVERSITY, WAGENINGEN

D. H. Yaalon

DEPT. OF GEOLOGY,
THE HEBREW UNIVERSITY, JERUSALEM

Loessial deposits, up to 12 m thick, form a continuous cover in the NW-Negev. The dust was not and is not deposited in a periglacial environment, but in a relatively warm semi-arid desert fringe. Therefore, soil development could take place continuously during the slow accumulation of the loessial sediments. The rate of dust deposition is on the average 0.1 mm/year, based on present day dust accumulation measurements and on a single C-14 date. The stratigraphy of the Netivot section is dominated by 6 outstanding paleosols (Calciorthids), easily recognisable through the presence of white calcium carbonate nodules. The lithostratigraphy of the loessial sediments is characterized by cyclic variations in the coarse silt and clay content. This cyclic pattern of both paleosols and granulometry is thought to reflect climatic fluctuations within a semi-arid range. More evidence from other sections in the desert fringe of the Negev is needed to substantiate these preliminary conclusions. A paleomagnetic survey of the section did not reveal any reversed polarity.

Introduction

Netivot is situated in the midst of the climatically very sensitive desert ɒge of the northern Negev (Fig. 1). Over a north-south distance of just) km the mean annual rainfall decreases from more than 500 mm near Tel ·iv to less than 100 mm near El-Arish at the Negev-Sinai border. This gave ɩson to expect that even small climatic changes might have been recorded the loessial sediments under consideration.

Origin of the Desert Loess

Range (1922) was the first to describe loess in the Land of Israel and nsidered it aeolian in origin. Picard (1943) acknowledged the wide distribu-ɔn of genuine loess in the Gaza-Beersheva basin and stressed the occurrence fluviatile redeposited loess along the wadis. Yaalon and Dan (1974), in a ·ry useful paper, showed the distribution and geomorphology of virtually all .e loessial deposits occurring in Israel. Ravikovitch (1953) found that the ay content in soils along a 40 km long trajectory, from the sand dunes at the

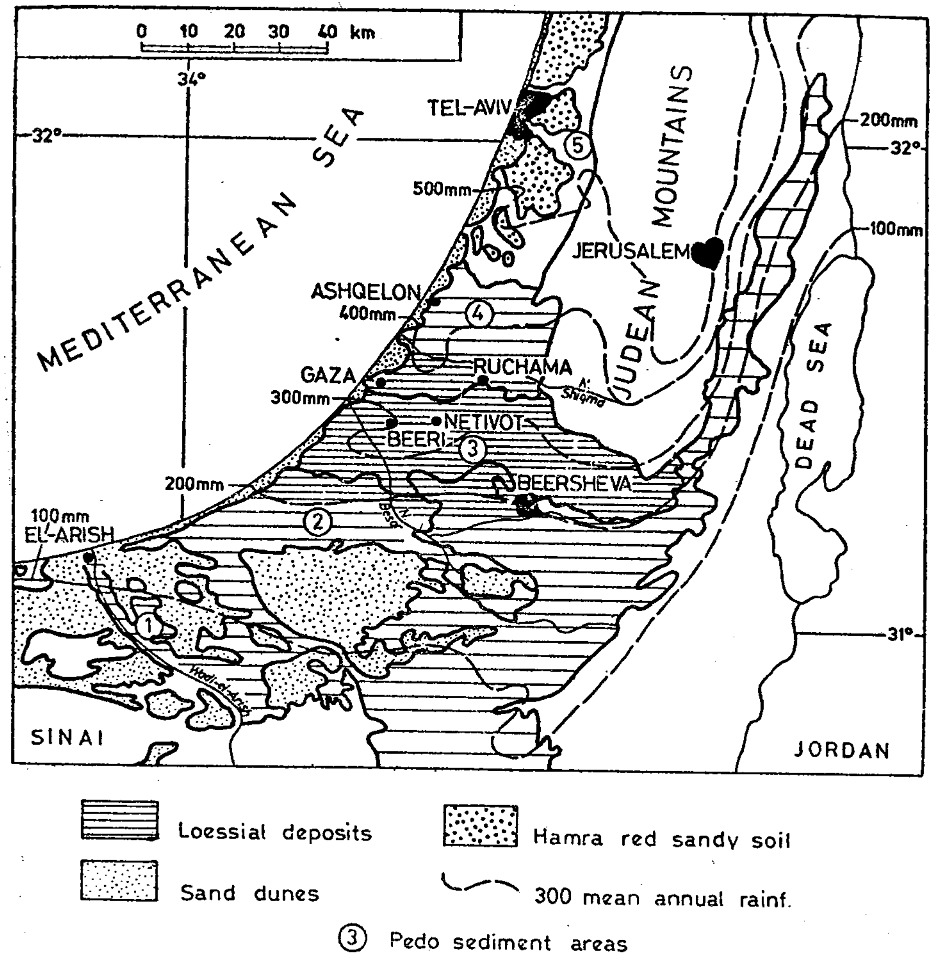


Fig. 1. Quaternary sediments in Israel

Negev-Sinai border northeastward, increases very regularly from 2% to 37%. This he explained by the aeolian origin of the deposits, the source being mainly the Sinai desert. Yaalon (1969) pointed out that, in a desert environment, seasonal deposits of fines in wadis, alluvial fans and plains are a major source of deflatable material which is subsequently deposited as loess in the semi-arid periphery of the desert. In a periglacial environment essentially the same process has been reported: Péwé (1951) observed a dust storm in Alaska by which fine glacial debris was deflated from floodplains of glacial-drainage streams and transported by winds to adjacent flats and uplands over an area of about 780 square kilometers.

CHRONOSTRATIGRAPHY OF LOESSIC AND LACUSTRINE SEDIMENTS IN THE KASHMIR VALLEY, INDIA

By

D. P. Agrawal, R. V. Krishnamurthy, Sheela Kusumgar, V. Nautiyal

PHYSICAL RESEARCH LABORATORY, AHMEDABAD

R. N. Athavale,

NATIONAL GEOPHYSICAL RESEARCH INSTITUTE, HYDERABAD

C. Radhakrishnamurthy

TATA INSTITUTE OF FUNDAMENTAL RESEARCH, BOMBAY

In the Kashmir valley (33° 30′ to 34° 30′ N., 74° 10′ to 75° 30′ E.) the Quaternary geological record is preserved in the form of exposed Karewas (ancient lake beds), capped by loess. At a few sites the Neolithic settlements are located on the loess surface. The loess exhibits three paleosol formations, probably representing warmer climatic fluctuations and the top-most paleosol the final stabilization of the loess. Radiocarbon dates for the top-most paleosol are 18500 yrs. B.P., while those for the two lower paleosols are greater than 40 000 yrs. B.P. Preliminary paleomagnetic measurements on 85 samples covering 60 metres of the Upper Karewas, immediately below the loess, show normal direction, and probably are younger than 700 000 B. P., as forming part of the Brunhes epoch. The data are discussed in the global perspective of the late Quaternary climatic changes. Further studies are in progress to resolve the problem of stratigraphy in the region.

The Kashmir valley (Long. 74°—75°30′ E., Lat. 33°30′—34°30′ N.) has a uniquely preserved record of the Late Cenozoic sediments. The main aim of our multidisciplinary studies is to reconstruct the Late Cenozoic paleoenvironmental changes in the valley in a time-frame. Here we report some of our results on the chronostratigraphy of these sediments employing ^{14}C, U/Th and paleomagnetic techniques. Before discussing the results, we give below the relevant geological and paleontological data.

Geology

The Kashmir valley (Fig. 1), spread in a NW—SE direction and surrounded by the Himalayan ranges on the NE and the Pir Panjals on the SW, occupies more than 5000 sq. km. area. The Pir Panjal rose up by several hundred meters during the Plio-Pleistocene which blocked the natural drainage, thus giving rise to a large lake. During the II interglacial, due to a tectonic breach, the lake was drained out (de Terra and Paterson, 1939).

The valley witnessed a series of glacial and interglacial events and the resultant sediments filled the basin. The Pleistocene uplifts of the Pir Panjal

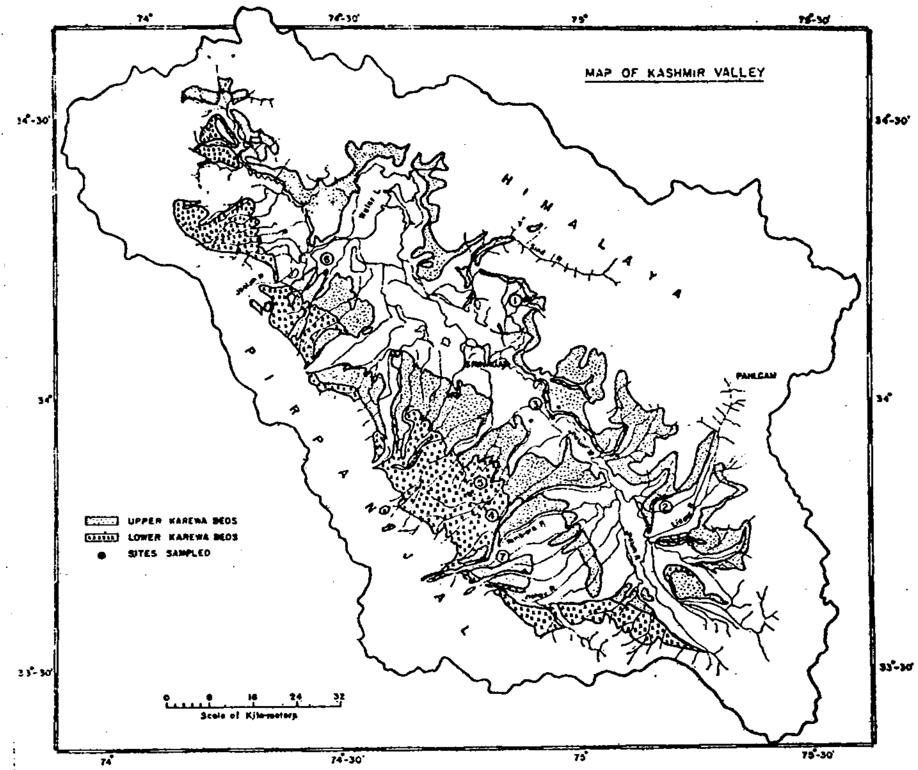


Fig. 1. Map showing sampling locations and Karewa distribution in the Kashmir valley. Sites: 1. Burzahom; 2. Saki Paparian; 3. Olchibagh; 4. Pakharpur; 5. Tsrar Sharif; 6. Puthakh; 7. Hirpur

made the lake shift and shrink towards the Himalayan side and the lake sediments on the Pir Panjal side to rise up. The exposed lake sediments are called *Karewas*, a term derived from the local dialect, but now accepted in the geological literature.

These lacustrine-cum-glacio-fluvial Karewa sediments are now exposed on the margin of the valley, resting over the Paleozoic and Triassic basal rocks. Three lithologic units can be recognised in these sediments: the Lower Karewa, the Upper Karewa and the Loess. The Lower and Upper Karewas (relict lake sediments) are separated by the II glacial moraine and outwash. A systematic account of these Quaternary sediments was first published by de Terra and Paterson (1939). Subsequently short reports have appeared on these problems (Bhatt, 1975; Joshi et al., 1974; Farooqui and Desai, 1974). We have in general followed here de Terra and Paterson's scheme, but have given an independent status to the loessic deposits. The Lower and Upper Karewas are quite distinct as indicated in Table 1.

LOESS DEPOSITS IN THE SOUTHERN PART OF THE NORTH ISLAND OF NEW ZEALAND: AN OUTLINE STRATIGRAPHY

By

J. D. G. Milne, I. J. Smalley

DSIR SOIL BUREAU, LOWER HUTT, NEW ZEALAND

The loess in the southern part of the North Island has particular stratigraphic value because it can be mapped in relation to interglacial raised marine benches and to river terraces of cold climate origin, and because it contains time planes in the form of layers of tephra, the oldest of which has been dated at 230 000 years B.P. (230 ka).

Introduction

Loess is widespread in New Zealand and significant deposits occur in both f the major islands. However, until very recently, the thicker and more ob- ious deposits in the South Island have received much more attention than the ss spectacular deposits of the North Island. Surficial deposits on the central art of the North Island tend to be dominated by volcanic materials which ave been ejected during Quaternary activity by both rhyolitic and andesitic ype volcanoes. Conditions were suitable in the southern part of the North sland, during the colder parts of the Quaternary, for substantial loess deposits form and these appear to have great stratigraphic value. The presence of atable layers of volcanic material within the loess columns gives very adequate bsolute dates, certainly down as far as the Mount Curl tephra at 230 Ka 30 000 years B.P.).

Sample Loess Columns

Figure 1 shows sampling sites on the North Island. The sample columns iscussed here are all located to the south of the dividing line placed by McCraw 1975) between the loesses derived from quartzofeldspathic sediments and esses derived mainly from volcanic materials (tephras). In loess region 2 four tes are considered: Mount Curl, Table Flat and Kimbolton in the Rangitikei iver valley, and Craigs Flat in the Hutt river valley near Upper Hutt. Large iameter (15 cm) undisturbed cores were obtained from each site — supplement- d by 7.5 cm cores at greater depths at some sites.

Five loesses ~~can be~~ distinguished above the Mount Curl tephra (see Figs 2—4). They were named by Milne (1973a) with respect to the terraces of the Rangitikei river on which they were investigated. Many paleosols and volcanic ash layers are not easily detected by eye but their positions have been established by tests on cores; the parameters tested were dry bulk density,

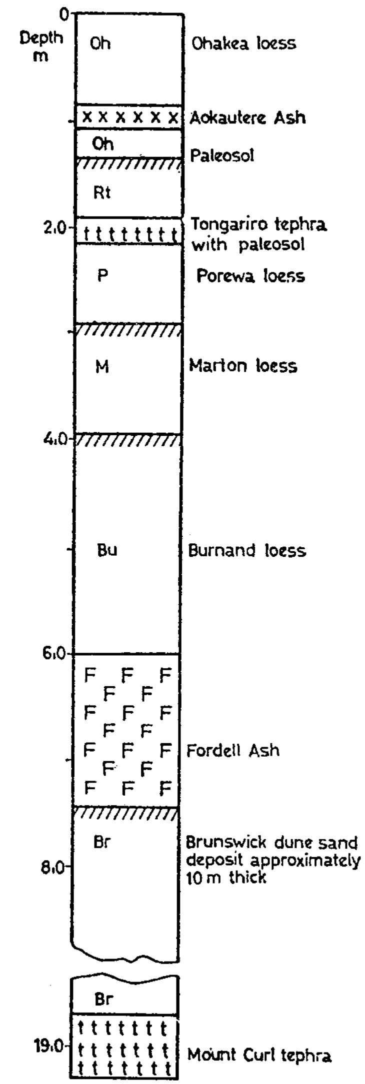
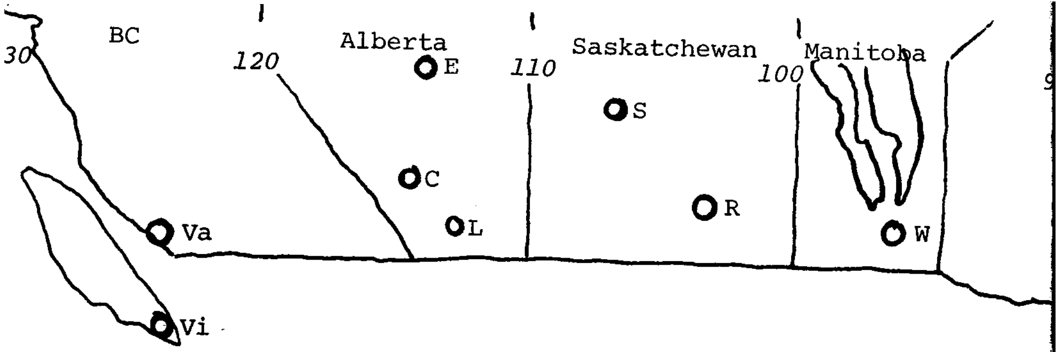


Fig. 2. **Mount Curl loess column**



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