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Two Types of Loess – Two Sets of Origins: The Danubian and Ukrainian Loesses Compared

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Donaubecken
Löss

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Zusammenfassung

Geochemische Untersuchungen an Lössablagerungen in Südosteuropa lassen offensichtlich unterschiedliche Herkunftsgebiete des äolischen Ausgangsmaterials für die Lösse in Serbien, Rumänien und in der Ukraine erkennen. Für die serbischen Lösse kommt überwiegend die Schwemmebene der Donau, und damit das danubische Einzugsgebiet, als Herkunftsgebiet in Frage, was den Zusammenhang zwischen dem alpidischen Vergletscherungssystem und den Lössen im Donauraum unterstreicht. Hingegen scheint der Löss der Ukraine vorwiegend aus dem Einzugsgebiet des Fennoskandischen Inlandeises zu stammen.

Abstract

Recent geochemical investigations indicate discernable differences between loesses from Serbia, Romania and Ukraine. The Serbian loess fits the definition of mountain loess; the Ukraine material is seen as glacial/ice-sheet loess. European loess appears to divide into glacial loess to the east and mountain loess to the west. The loess in the Danube basin appears to be definitely mountain loess; old ideas of glacial input should perhaps be discounted.

1. Introduction

BUGGLE et al. (2008) made a study of three sets of loess samples: from Batajnica/Stari Slankamen, Voyvodina, Serbia [B-SS]; from Mircea Voda, a site on the Dobrudja plateau in Romania [MV]; and from Stary Kaydaky, about 2 km south of Dniepropetrovsk City in Ukraine [SK]. On the basis of a whole range of geochemical tests they discovered that these three loess regions were remarkably distinctive. We are mostly concerned with the Serbian B-SS and Ukrainian SK samples, the most widely separated geographically, and, it would appear, the most distinctly separated in terms of mode of origin.

BUGGLE et al. (2008) suggested that the B-SS Voyvodina loess was derived from Danubian alluvial material, and that the SK Ukrainian material was from glaciofluvial sediments related to the Fennoscandinavian ice sheet. It would appear that B-SS is "mountain" loess and the SK loess is "glacial/ice-sheet" loess. It has been suggested that these are the two major types of loess and that the great bulk of the World's loess deposits can be divided between these two categories. It has further been proposed that there are only two major glacial/ice-sheet deposits in the World: those in Central North America and those comprising the

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USWR loess – the great loess sheets in Ukraine and southwestern Russia. The SK loess falls nicely into the USWR loess.

2. The Differences

If the very simplest classification/division is applied, Europe appears to be divisable neatly into two loess zones: to the east is the USWR loess – the glacial loess; to the west is mostly mountain loess – i.e. the Danubian deposits and Alpine derived deposits associated with the Rhine. Now that the loess in Belgium and the UK is widely regarded as Alpine material transported by the proto-Rhine it is difficult to locate any significant glacial loess in western Europe. The "northern band" may still exist. The northern band gained credence when loess in Europe was seen as a "periglacial accumulation"; if the glacial link is weakened it may be that the northern band loses its identity. The loess in Poland has been characterised as glacial loess but looked at from a geomorphological viewpoint it looks much more like mountain loess – derived from the mountains to the south rather than from the glaciers to the north.

The loess under consideration is classic, primary loess – the "Urloess" of PECSI & RICHTER (1996, p. 130). The B-SS loess is absolutely classical west European loess (in the sense that mountain = west and glacial = east) and it represents such a fantastic deposit because many great rivers bring mountain material into the Voyvodina region. Great rivers also supply the USWR loess and deliver glacial material across a widespread region. What really distinguishes the loess deposits is the formation mechanism for the original particles. The classification event occurs before the long river transportation and before the aeolian elevation and deposition. BUGGLE et al. (2008) provide striking support for the concept of the importance of loess "material".

Thirty years ago SMALLEY & LEACH (1978) reviewed loess origins for the Danube basin loess; they made what BUGGLE et al. called a review of the geomorphodynamic system of the region and its relation to loess deposition. Their proposals need to be examined in the light of the BUGGLE et al. results, in particular since they tended to overemphasize the role of glaciation and the formation of glacial/ice-sheet loess. The Carpathian mountains were neglected as sources of loess material and attempts were made to force glacial material from the "northern band" into the Danube basin system. This approach should be reversed; the dominant material in the Danube basin is mountain loess (as defined by SMALLEY & DERBYSHIRE [1990]) and not glacial loess. A much more satisfactory picture of loess material origin and disposition is gained if this approach is taken.

3. Conclusions

The SMALLEY-LEACH idea that the Sava is not a loess material supplying river, because it is far from glacial fringes, is wrong. The Sava is a loess supplying river, and it supplies mountain loess; it has obvious mountain connections. The Voyvodina district is rich in loess material because so many rivers carry loess material into this region. BUGGLE et al. mentioned the role of the River Inn in passing, but did not investigate. It seems reasonable to predict that the Inn loess will be similar to the B-SS loess; the Danube basin can be seen as a large but fairly homogeneous system (although it may be that Alpine and Carpathian contributions can be distinguished). SMALLEY & LEACH saw it in this light and the 1978 paper appears to have been the first basinwide study (proposed by MARTON PECSI, then President of the INQUA Loess Commission). But SMALLEY & LEACH only reviewed the data and made proposals and suggestions; BUGGLE et al. have produced some remarkable and revealing geochemical results, which point the way forward in investigating the origins of loess material and loess deposits.

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