



Aeolian dust in Europe: African sources and European deposits

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Here we present a conceptual model for the provenance and dispersal patterns of small dust that falls on Europe. Generally its sources are in North Africa, and it is distributed across all Europe. Several key sources can be distinguished: 'Sahelian' dust comes largely from the old Lake Chad region- this is a clay-rich unimodal material; 'Saharan' dust comes from the great sand sheets- it contains small monomineralic particles and may have a bimodal size range.

Three simple deposition zones can be recognised; a D1a zone where sufficient dust is deposited to form a discrete soil layer (not well classified as a Rendoll), in the extreme south of Europe; a D1b zone where the airborne dust simply provided a silty admixture to soil systems- across Middle Europe; and a northern zone D1c where the dust is a fugitive cloud, but very occasionally forms noticeable deposits.

Two particle formation methods can be noted; particle control in Sahelian dust is via the sedimentation in the original lake. This gives an open structure which can be modelled using a simple Monte Carlo approach. The open structure ensures that only small particles are produced; size control is via particle packing. A chipping mechanism can produce fine quartz particles from sandy deserts. The aeolian energy is, by and large, not sufficient to cause major impact fracturing but small mineral chips can be produced in the small dust size (fine and very fine silt) which go into high level suspension and travel to Europe and beyond.

The Saharan material can have a wider, more variable size distribution than the Sahelian material. The Canary Islands 'loess' is largely Sahelian material; the Cape Verde Islands deposits, from the nearby sandy regions, are Saharan deposits. Large dust has fallen on Europe, and produced widespread loess deposits. Large dust is essentially an 'in-continent' deposit; small dust comes from outside- from Africa.