Geophysical Research Abstracts
Vol. 12, EGU2010-9080, 2010
EGU General Assembly 2010


# Periglacial deserts of the last glacial epoch in West Siberia and Eastern Europe

Svetlana Timireva (1) and Andrei Velichko (2)

(1) Institute of Geography, Russian Academy of Sciences, Moscow, Russia (stimireva@mail.ru), (2) Institute of Geography, Russian Academy of Sciences, Moscow, Russia (paleo_igras@mail.ru)

Detailed studies of the late glacial sediments on the West Siberian Plain (the Ob' drainage basin, north of 60° N) provided evidence of a stage of active eolian processes preceding that of paludification, the latter not becoming dominant until the early Holocene. Numerous wells drilled within peatlands and wetlands in the region revealed layers of sand immediately under the peat. To elucidate the sand genesis, we applied a morphoscopic analysis of quartz sand grains.

Our studies in West Siberia were concentrated within three regions different in their geology and morphology: 1 – northern flatlands formerly flooded by marine transgressions (known as Kazantsevo and Tobolsk); 2 – Siberian Uplands (Uvaly); 3 – Khanty-Mansy fluvial plain. An analysis of quartz grain morphoscopy from sand sampled in all the three regions has shown a stable proportion of grains with matted surface and close to spherical configuration. Such a combination of characteristics strongly suggests eolian transportation in subaerial environments to be the leading factor of the grain modeling.

Anyway, there is a certain differentiation between the grains from those three regions. Thus, the northern region, along with typical eolian grains perfectly rounded (up to 80%) and matted (up to 70%), displays a noticeable proportion of grains modeled under conditions of transgressions, with a sizeable influx of glacial-marine and iceberg-rafted material.

Quartz sand grains obtained from wells drilled on the Siberian Uplands differ essentially in morphology from those of the northern region as they are absolutely dominated by grains of eolian origin. Degree of grain dullness reaches its peak – 97%, with roundness up to 85%.

The southern region displays dominance of eolian grains with admixture of slightly matted ones. Typically, however, both roundness and dullness are rather high – (up to 82% and 72% respectively). Such a morphological diversity may be attributed to the region location within a zone of deep depressions where fluvial and lacustrine processes alternated with arid phases since the middle Paleogene.

So, variations in quartz grains morphology reflect difference in sequence of natural events in individual regions. Nevertheless, they cannot mask the general features common to all the three areas and indicative of a phase of potent eolian activities at the final stage of sand formation. 14C dated samples from the base of peatlands permit to place this phase at the end of lateglacial time.

In Eastern Europe, melting water of the retreating ice sheet formed a vast lacustrine-alluvial region composed of sand. Drilling on wetlands revealed sandy deposits underlying the bog and limnic series (beginning of the latter formation dates from ∼12000 yr BP). Quartz grains from the sands are noted for high degree of roundness (80–87%) and dullness (up to 83%). Practically all the grains show well-pronounced traces of prolonged processing by wind (micro- and larger depressions on the surface). Judging from the grain configuration and surface character, they were repeatedly subjected to eolian transportation.

Hence, the morphoscopic data provide reason for suggestion about eolian processes essentially gaining in importance since LGM; as follows from radiocarbon dating, the considered eolisation phase terminated within a cold lateglacial interval (as late as Younger Dryas). Morphologically, the sand grains are similar to those of desert; it is conceivable that landscapes not unlike to cold deserts existed in Eastern Europe and West Siberia during the lateglacial, which agrees well with palynological data. Farther south loess accumulation took place, the desert areas being probably an important source of the dust particles.