

The lacustrine ocean. Particles and sediments of Lake Baikal

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Озеро Байкал (Озеро Байкал) is the deepest (1647 m) and by volume the largest (23'020 KM³) lake on earth, stretching over an area of 31'500 KM² with about 300 tributaries, supplying annually 65 KM³ of water to the lake. Since 1996 Lake Baikal became an UNESCO World Heritage Site. During the last years the *Sediment Factory* of this extraordinary lacustrine basin has been in specific focus of a number of Russian and internationally funded research projects (BICER, BDP, GEOPASS, DARWIN, CONTINENT, VERTEX) to study particle formation and sediment distribution. The ocean-like, tectonically active pull-apart basin developed a multitude of different morphological features during its 25 million years old history, such as large deep basins with wide, flat central plains; pelagic underwater ridges and platforms; over-steepened slopes; extensive delta areas; shallow, subsidiary basins.

Three main sources provide the sediment material for the deposits of Lake Baikal: (i.) autochthonous, biogeneous, pelagic material (e.g. algal remains, spiculae); (ii.) material generated by slope failure-events and provided by long distance ranging turbidity currents; (iii.) influx of clastic material from tributaries. To a lesser extent ice-rafting, aeolian transport and wind/wave action may also contribute to the depositional processes.

So far, five general sedimentological features have been distinguished for Lake Baikal [1] (see figure 1):

- delta (fan) deposits near the mouths of the large tributaries (1)
- hemi-pelagic, diatom-rich muds intercalated by numerous turbidites within the large deep basins (2)
- sandy/silty, shallow-water deposits within the side-basin of Maleo More (3)
- diatom-rich, pelagic mud and clay deposits atop underwater ridges and platforms (4)
- diminished, highly oxidized, Fe/Mn-rich sediments of Zavarotny sub-basin (5)

Results of long-term sediment trap experiments show large annual and seasonal dynamics of particle fluxes in the lake, which is ice-covered every year for 4-5 months. Minimum fluxes during winter months may develop into maximum flux rates of up to 5'500 mg m⁻²d⁻¹ during periodic summer-diatom blooms ("Melosira-years"). Surprisingly high settling velocities of at least 74 m d⁻¹ have been observed, when large amounts of suspended particle were efficiently erased from the water column down to the >1400 m deep lake floor.

[1] Vologina, E.G. and M.Sturm (2009) *Russian Geology and Geophysics* **50**, 1-6.

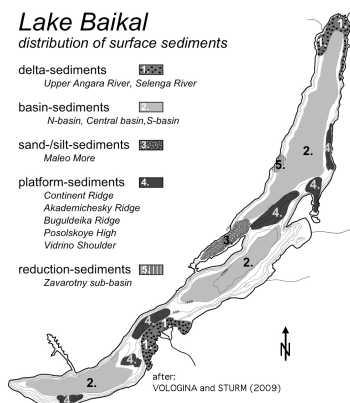


Figure 1: Distribution of surface sediments in Lake Baikal (modified from [1])