

This material is inert and not as easily remineralized as the organic matter reaching the lake bottom in winter.

18.4.3 ORGANIC MATTER

The total flux of organic matter is, on average (Table 18.7), very similar in the top and bottom traps. However, lability is different. In Table 18.A9 of the appendix, the CO₂-partial pressure (pCO₂) for the cups at recovery was calculated (Kempe, 1975) using the average composition of Lake Baikal water given in Table 18.2 and the measured pH values. In the upper trap, CO₂ pressures reached 70000 ppmv (T1), compared to an atmospheric pressure of 350 ppmv. While in the lower trap values were one order of magnitude lower and reached only 6700 (B9) ppmv. Recalculating the pressures for the amount of dissolved CO₂ (Table 18.A9, appendix), concentrations of up to 4.5 mmol l⁻¹ and up to 0.4 mmol l⁻¹ in the upper and lower trap are found. If one compares the amounts of CO₂ with the carbon flux preserved as particulate matter in the traps (Figure 18.10a; Tables 18.A7, 18.A8 and 18.A9 in the appendix), then it is apparent that in some of the cups with small C_{org} fluxes up to ten percent of the carbon was present as dissolved free CO₂. However, in the cups with large C_{org} fluxes, the free CO₂ amounted to only a few percent. Because of diffusion of CO₂ out of the cup and degassing after recovery a sizable loss of carbon from the samples is possible, the size of which cannot be reconstructed. Because of this insecurity, the organic matter flux has not been corrected for dissolved CO₂. When comparing CO₂ with organic matter flux, it is apparent that - apart from a CO₂ increase with time - the large fluxes in September and January to April caused high free CO₂ values (Figure 18.10a). In the lower trap higher CO₂ values were associated with the high winter fluxes but also with the sample of May which has a relatively low C_{org} flux.

Calculating the Redfield ratio for the cup samples (Figure 18.10b; Tables 18.A8, 18.A9, appendix) it becomes clear that the lower trap had very constant values. Its C/N values were close to the Redfield C/N ratio of 7. The N/P ratio was, however, only half as large as the Redfield ratio (7.6 on average compared to 15 for Redfield), illustrating that the remineralization of nitrogen was twice as effective as that of phosphorus and that lake sediments become a trap for phosphorus in excess of the biogenic N/P ratio. In the upper trap much larger changes of the atomic ratios occurred, including a couple of puzzling C/N values with ratios below 1. It can only be assumed that large amounts of ammonium were adsorbed to the freeze-dried samples, therefore causing an offset of the C/N ratios. Similarly the N/P ratios showed large changes: high relative nitrogen concentrations occurred in October and November and May and low relative nitrogen concentrations in winter. We face the problem that we do not know which samples contained more fish than others. Therefore the upper trap results have to be treated with caution.

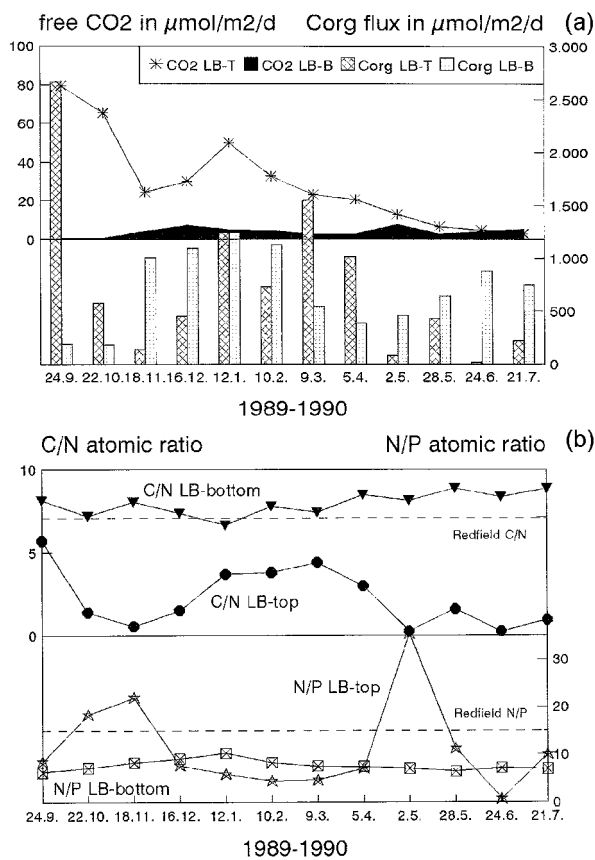


Figure 18.10 (a) Comparison of the free CO₂ with the particulate organic carbon and (b) comparison of the C/N and N/P ratios in both Lake Baikal traps. The C/N and N/P ratio is calculated using the sum of the analyzed dissolved and particulate nitrogen and phosphorus species. For carbon no correction for remineralization loss was made.

18.4.4 SEM INVESTIGATIONS

In addition to the geochemical analyses, the larger particulate samples were inspected visually under a scanning electron microscope (SEM). In the upper trap significant seasonal changes were found. The prominent flux peak in September consisted of unstructured organic matter, while the flux maxima in winter were dominated by *Stephanodiscus* sp. (Figure 18.11a) and that in summer by *Melosira baikalensis* frustules (Figure 18.11b). In the samples of the bottom trap, frustules of *Stephanodiscus* sp. and *Melosira baikalensis* were found throughout the year,

underscoring the conclusion that this material was largely supplied by resuspension.

(a)

(b)

Figure 18.11 Scanning electron microscope pictures of the two principal diatoms contributing to extensive blooms in Lake Baikal: (a) *Stephanodiscus* sp. blooming in November and January/February and (b) *Melosira baikalensis* blooming in June.

18.5 CONCLUSIONS

Vertical particle fluxes in Lake Baikal have two maxima: one in winter and a smaller one in summer. The winter peak came as a surprise: it occurred while the lake is ice-covered. Both maxima occurred in the top and in the bottom trap, but the bottom trap received 5 times as much material. The composition of the intercepted material showed that the vertical particle flux in Lake Baikal had two sources: (i) resuspended sediment rich in lithogenics (45% of total) and opal (38%) and carrying an organic matter component (13%) which was relatively inert; and (ii) biogenic matter produced in the surface layer. This matter was dominated by organic matter (74%) and opal (25%) and was highly labile. Apparently a larger part of this material reached the floor of Lake Baikal during winter, when the organic matter in the lower trap released more nutrients and was apparently more labile, than in summer. SEM investigations showed that the particle flux can be differentiated into six seasons:

1. In autumn, material with a large percentage of organic matter of a very labile nature sinks. It may be associated with a bloom of flagellates.
2. In late autumn and early winter, a moderate particle flux peak is caused by a bloom of the diatom *Stephanodiscus* sp., which produced moderately high opal flux rates in the top trap in November.
3. In mid-winter, diatom contributions diminish and flagellates may become more dominant causing high overall fluxes in December and January.
4. In late winter (February), another *Stephanodiscus* bloom occurs, causing high opal and moderate organic matter fluxes. Apparently *Stephanodiscus* needs more light than other planktonic organisms which cause the mid-winter bloom, and is therefore most active at the beginning and end of the winter.
5. In spring (March-May), the flux is again dominated by organic matter and decreases from the overall flux peak in March to very low fluxes in May. This is the period when the ice cover finally breaks.
6. In summer (June-July), a secondary flux peak occurs, which is derived from a bloom of the diatom *Melosira baikalensis*. The settling particles carry very high opal concentration, and low amounts of organic matter. This bloom is most probably caused by the thermal stratification of Lake Baikal in summer.

The overall settling rate amounted to $11.5 \text{ g m}^{-2} \text{ y}^{-1}$ in the upper trap and to $57 \text{ g m}^{-2} \text{ y}^{-1}$ in the lower trap. The latter values (assuming a density of 2 g cm^{-3}) correspond to a sedimentation rate of roughly 0.03 mm y^{-1} . Assuming a porosity of 60% of the sediment weight (characteristic for the upper decimeters of sediment; see Wong et al., 1991) we find a sedimentation rate of 0.1 mm y^{-1} for the central basin of Lake Baikal. This is less than the geologically assumed rate of 0.3 mm y^{-1} (see above), but is in accordance with mass fluxes calculated from ^{137}Cs and ^{210}Pb measurements (Edgington et al., 1991) which vary from $30 \text{ g m}^{-2} \text{ y}^{-1}$ ($= 0.16 \text{ mm y}^{-1}$) to $180 \text{ g m}^{-2} \text{ y}^{-1}$ ($= 0.74 \text{ mm y}^{-1}$) for basin stations.

Our data show that 7.6 times as much opal is intercepted by the lower trap than by the upper trap. Assuming opal to be a conservative tracer, (i.e., neglecting dissolution), resuspension must concentrate sediments from an area almost 8 times as large as the bottom of the lake because the flux at a depth of 400 m (and assumed to be representative of the new production of diatom frustules) amounts to only $2.9 \text{ g m}^{-2} \text{ y}^{-1}$ compared to $22 \text{ g m}^{-2} \text{ y}^{-1}$ near the lake bottom. This large opal flux is in accordance with the common occurrence of diatomite layers in Lake Baikal sediments (e.g. Wong et al., 1991).

If the opal argument is accepted, then the organic matter intercepted by the lower trap must also derive from an at least 8 times larger area. As the organic matter fluxes between both traps is almost similar, one must conclude that only 1/8 of the organic matter passing the upper trap can reach the lower trap; i.e., roughly $1 \text{ g m}^{-2} \text{ y}^{-1}$ (or ca. $0.6 \text{ gC m}^{-2} \text{ y}^{-1}$) - roughly $7 \text{ g m}^{-2} \text{ y}^{-1}$ (or ca. $4 \text{ gC m}^{-2} \text{ y}^{-1}$) must respired in between. This is only a very tentative conclusion because it rests on the assumption that resuspension of organic matter follows the resuspension of opal at similar rates and that the carbon in the upper trap is representative of the real flux at that depth, neglecting the losses caused by intruding fish and CO_2 degassing and the possible input by trapped swimmers.

In comparison with the TOC concentrations measured in Lake Baikal sediments of between 1.1 and 3.2% (Wong et al., 1991), the sediment of the lower trap contained a higher proportion of organic carbon; i.e., ca. 7%. This suggests that some of the carbon which reaches the lake bottom is in fact still labile and can be respired within the time frame of bioturbation (i.e., within several years to decades). The C/N values of the sediments range from 6 to 7 in the central basin (Wong et al., 1991); i.e., they match the range of C/N ratios of between 6.6 and 8.9 in the lower trap.

It is interesting to note that CaCO_3 is present in the settling sediments in spite of the large pCO_2 especially in the top trap. CaCO_3 amounts to 7.8% of the flux in the upper trap and to 2% in the lower trap with very similar total flux rates. For comparison, Wong et al. (1991) commonly found CaCO_3 concentrations in sediments of between mostly 1–2% (always < 10%). They suggest that this carbonate is clastic in origin. One could argue that this may not be true because carbonate should behave like opal and lithogenic matter; i.e., we should find higher fluxes in the lower trap than in the top trap. Because of the significant carbonate fluxes in the top trap, one could alternatively assume that it is formed in the water column. This could occur at a rate of $0.9 \text{ g m}^{-2} \text{ y}^{-1}$ of which $0.36 \text{ g m}^{-2} \text{ y}^{-1}$ would be calcium. Therefore as much as $11000 \text{ t Ca y}^{-1}$ could be extracted in the entire lake. This compares with a total Ca input of (compare concentrations in Table 18.2) $1.15 \cdot 10^6 \text{ t y}^{-1}$. Thus the present CaCO_3 settling rate would extract only roughly 1% of the available Ca and would not be noticed in overall budget calculations. At present, we therefore cannot finally conclude what the source or the sources of the CaCO_3 in the Lake Baikal sediments are.

18.6 ACKNOWLEDGMENTS

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18.7 REFERENCES

- Aldredge, A. L. and M. W. Silver (1988) "Characteristics, dynamics and significance of marine snow", *Prog. Oceanogr.*, **20**, 41–82.
- Artyoshkov, E. V., F. A. Letnikov and V. V. Ruzhich (1990) "The mechanisms of formation of the Baikal Basin", *J. Geodynamics*, **11**, 277–291.
- Asper, V. L (1987) "Measuring the flux and sinking speed of marine snow aggregates", *Deep-Sea Res.*, **34**, 1–17.
- Belova, N. A., B. F. Lut, L. P. Loginova and G. K. Khusevich (1983) "Sediment formation in Lake Baikal", *Hydrobiologia*, **103**, 281–285.
- Chen, C. T. and F. J. Millero (1986) "Precise thermodynamic properties for natural waters, covering only the limnological range", *Limnol. Oceanogr.*, **31**, 657–662.
- Degens, E. T., S. Kempe, A. Lein and Y. Sorokin (eds) (1992) *Interactions of Biogeochemical Cycles in Aqueous Systems*, Mitt. Geol.-Paläont. Inst. Univ. Hamburg No. 72, 289 pp.
- Edgington, D. N., J. V. Klump, J. A. Robbins, Y. S. Kusner, V. D. Pampura and I. V. Sandimirov (1991) "Sedimentation rates, residence times and radionuclide inventories in Lake Baikal from ¹³⁷Cs and ²¹⁰Pb in sediment cores", *Nature*, **350**, 601–604.
- Eklund, H. (1965) "Stability of lakes near the temperature of maximum density", *Science*, **149**, 632–633.
- Falkner, K. K., C. I. Measures, S. E. Herbelin and J. M. Edmond (1991) "The major and minor element geochemistry of Lake Baikal", *Limnol. Oceanogr.*, **36**, 413–423.
- Gardner, W. D., K. R. Hinga and J. Marra (1983) "Observation on the degradation of biogenic material in the deep ocean with implications on accuracy of sediment trap fluxes", *J. Mar. Res.*, **41**, 195–214.
- Grasshoff, K. (1983) "Determination of nitrite", in K. Grasshoff, M. Ehrhardt and K. Kremling (eds) *Methods of Seawater Analysis*, 2. ed., Verlag Chemie, Weinheim, 139–142.
- Honjo, S. (1980) "Material fluxes and modes of sedimentation in the mesopelagic and bathypelagic zones", *J. Mar. Res.*, **38**, 53–97.
- Honjo, S. and K. W. Doherty (1988) "Large aperture time-series sediment traps: design objectives, construction and application", *Deep-Sea Res.*, **35**, 133–149.
- Ittekkot, V., R. R. Nair, S. Honjo, V. Ramaswamy, M. Bartsch, S. J. Manganini and B. N. Desai (1991) "Enhanced particle fluxes in Bay of Bengal induced by injection of water", *Nature*, **351**, 385–387.
- Kempe, S. (1975) "A computer program for hydrochemical problems in karstic water", *Ann. de Spéléologie*, **30/4**, 699–702.
- Koroleff, F. (1983a) "Determination of phosphorus", in K. Grasshoff, M. Ehrhardt and K. Kremling (eds) *Methods of Seawater Analysis*, 2. ed., Verlag Chemie, Weinheim, 125–139.

- Koroleff, F. (1983b) "Determination of ammonia", in K. Grasshoff, M. Ehrhardt and K. Kremling (eds) *Methods of Seawater Analysis*, 2. ed., Verlag Chemie, Weinheim, 150–157.
- Koroleff, F. (1983c) "Determination of silicon", in K. Grasshoff, M. Ehrhardt and K. Kremling (eds) *Methods of Seawater Analysis*, 2. ed., Verlag Chemie, Weinheim, 174–187.
- Kozhov, M. M. (1963) *Lake Baikal and its Life*, W. Junk, Publishers, Den Haag, 344 pp.
- Liebezeit, G. (1992) "Water and porewater chemistry of Lake Baikal Central Basin Station" in E. T. Degens, S. Kempe, A. Lein and Y. Sorokin (eds) *Interactions of Biogeochemical Cycles in Aqueous Systems*, Mitt. Geol.-Paläont. Inst. Univ. Hamburg No. 72, 41–52
- Logatchev, N. A. and Y. A. Zorin (1987) "Evidence and causes of two stage-development of the Baikal-Rift", *Tectonophysics*, **143**, 225–234.
- Mortlock, R. A. and P. N. Froelich (1989) "A simple method for the rapid determination of biogenic opal in pelagic marine sediments", *Deep-Sea Res.*, **36**, 1415–1426.
- Müller, P. J., E. Suess and C. A. Ungerer (1986) "Amino acids and amino sugars of surface particulate and sediment trap material from waters of the Scotia Sea", *Deep-Sea Res.*, **33**, 819–838.
- National Geographic, (1981) *Atlas of the World*, Nat. Geogr. Soc., Washington, 383 pp.
- Nikolaev, V. G., L. A. Vaniakin, V. V. Kalinin and V. Y. Milanovsky (1985) "The sedimentation section beneath Lake Baikal", *Int. Geol. Rev.*, **27**, 449–459.
- Schaumburg, M. (1994) *Der vertikale Partikelfluß im Baikal See*, unpublished Diplom thesis, University of Hamburg, 78pp.
- Scholz, C. A., K. D. Klitgord, D. R. Hutchinson, U. S. Ten Brink, L. P. Zonenshain, A. Y. Golmshtok and T. C. Moore (1993) "Results of 1992 seismic reflection experiment in Lake Baikal", *EOS*, **74**(41), 465, 469–470.
- Shanks, A. L. and J. D. Trent (1980) "Marine snow: Microscale nutrient patches", *Limnol. Oceanogr.*, **224**, 850–854.
- Urrere, M. A. and G. A. Knauer (1981) "Zooplankton fecal pellet fluxes and vertical transport of particulate organic material in the pelagic environment", *J. Plankton Res.*, **3**, 369–387.
- Votintsev, K. K. (1985) "Main features of the hydrochemistry of Lake Baikal water resource" engl. transl. *J. Vodnye Resurcy*, **12**, 106–116.
- Wefer, G., E. Suess, W. Balzer, G. Liebezeit, P. J. Müller, C. A. Ungerer and W. Zenk (1982) "Fluxes of biogenic components from sediment trap deployment in circumpolar waters of the Drake Passage", *Nature*, **299**, 145–147.
- Weiss, R. F., E. C. Carmack and V. M. Koropalov (1991) "Deep water renewal and biological production in Lake Baikal", *Nature*, **349**, 665–669.
- Williams, J. D. H., J.-M. Jaquet and R. L. Thomas (1976) "Forms of phosphorus in surficial sediments of Lake Erie", *J. Fish. Res. Bd. Canada*, **33**, 413–429.
- Wong, H. K., K. Anton, W. von Haugwitz, S. Kempe and W. Michaelis (1991) "Geologische Entwicklung und das rezente Sedimentationsregime im Baikalsee", Final Rep. Project MFG 0081/6 to the BMFT, unpublished, Hamburg, 192pp.
- Zonenshain, L. P. and L. A. Savostin (1981) "Geodynamics of the Baikal Rift Zone (BRZ) and plate tectonics of Asia", *Tectonophysics*, **76**, 1–45.

18.8 APPENDIX

Table 18.A1 Data for cupwaters from the upper Lake Baikal trap (LB-T; 396 m depth).

Cup	pH	Cond. mS cm ⁻¹	Loss* %	Si µg l ⁻¹	P µg l ⁻¹	NO ₂ µg l ⁻¹	NH ₄ mg l ⁻¹
T1	5.85	10.59	94.7	31.64	3.57	41.20	203
T2	5.95	3.76	98.2	9.97	3.43	8.12	184
T3	6.36	0.93	99.6	4.47	2.36	2.37	34.4
T4	6.27	2.79	98.7	21.59	2.17	9.44	125
T5	6.05	6.74	96.7	25.81	2.98	14.98	184
T6	6.25	3.78	98.2	14.37	2.23	8.52	162
T7	6.40	8.26	95.9	28.63	1.54	14.95	202
T8	6.45	3.43	98.3	18.18	2.96	11.00	161
T9	6.65	0.75	99.7	15.39	1.29	2.19	25
T10	6.94	1.74	99.2	20.68	2.85	5.21	124
T11	7.08	0.18	99.9	35.16	4.72	4.40	8.8
T12	7.31	0.35	99.9	0.26	3.33	4.43	122
T13	7.19	2.84	98.6	-	-	-	-
m	6.52	3.50	98.3	18.84	3.04	7.79	138

Table 18.A2 Data for cupwaters from the lower Lake Baikal trap (LB-B; 1582 m depth).

Cup	pH	Cond. mS cm ⁻¹	Loss* %	Si µg l ⁻¹	P µg l ⁻¹	NO ₂ µg l ⁻¹	NH ₄ mg l ⁻¹
B1	7.97	1.36	99.4	67.7	0.41	0.006	0.63
B2	7.97	2.23	98.9	50.5	0.12	0.229	0.33
B3	7.15	1.53	99.3	51.0	0.16	0.131	4.18
B4	6.89	1.67	99.2	53.1	0.04	0.629	6.68
B5	7.04	0.74	99.7	55.5	0.04	0.160	14.13
B6	7.13	0.65	99.7	68.0	0.09	0.520	6.88
B7	7.33	1.48	99.3	49.8	0.32	0.142	5.17
B8	7.32	1.17	99.5	46.1	0.09	0.011	1.07
B9	6.87	2.03	99.0	66.5	0.06	-	0.05
B10	7.31	1.71	99.2	64.0	0.71	0.091	0.69
B11	7.17	1.85	99.1	68.5	0.08	0.252	0.45
B12	7.05	1.87	99.1	28.7	0.24	-	1.22
B13	8.04	0.125	100.0	-	-	-	-
m	7.33	1.42	99.3	55.77	0.19	0.363	3.13

Table 18.A3 Phosphorus and nitrogen fluxes and remineralization ratios for upper Lake Baikal trap (LB-T; 396 m depth).

Cup	P flux remin. mg m ⁻² d ⁻¹	P flux part. mg m ⁻² d ⁻¹	P rem. %	N flux NH ₄ + NO ₂ μmol m ⁻² d ⁻¹	N flux part. μmol m ⁻² d ⁻¹	N rem. %	N/P atomic ratio
T1	0.063	1.64	3.6	197.5	266.3	42.6	8.4
T2	0.062	0.64	8.8	185.9	228.0	44.9	18.3
T3	0.041	0.32	11.4	33.5	222.0	13.1	21.9
T4	0.038	1.22	3.0	126.0	184.2	40.6	7.6
T5	0.052	1.77	2.9	179.3	160.6	52.7	5.8
T6	0.041	1.27	3.1	163.4	31.1	84.0	4.6
T7	0.028	2.32	1.2	204.5	144.4	58.6	4.6
T8	0.054	1.44	3.6	163.2	173.2	48.5	7.0
T9	0.023	0.24	8.7	25.3	274.7	8.4	35.4
T10	0.052	0.72	6.7	125.3	154.0	44.9	11.2
T11	0.086	2.87	2.9	8.9	56.3	13.7	0.7
T12	0.061	0.30	16.9	123.0	110.3	52.7	10.0

Table 18.A4 Phosphorus and nitrogen fluxes and remineralization ratios for the lower Lake Baikal trap (LB-B; 1584 m depth).

Cup	P flux remin. mg m ⁻² d ⁻¹	P flux part. mg m ⁻² d ⁻¹	P rem. %	N flux NH ₄ + NO ₂ μmol m ⁻² d ⁻¹	N flux part. μmol m ⁻² d ⁻¹	N rem. %	N/P atomic ratio
B1	7.2	0.11	6.1	0.616	22.9	2.63	6.2
B2	2.2	0.11	2.0	0.423	25.2	1.65	7.1
B3	2.8	0.47	0.6	4.120	121.4	3.28	8.2
B4	0.7	0.51	0.14	6.748	142.1	4.53	9.0
B5	0.7	0.57	0.12	13.831	174.2	7.36	10.2
B6	1.6	0.55	0.29	7.155	138.4	4.92	8.2
B7	5.8	0.30	1.9	5.277	68.8	7.12	7.5
B8	1.6	0.19	0.84	1.085	44.4	2.38	7.4
B9	1.1	0.25	0.44	0.051	57.0	0.09	7.0
B10	12.9	0.34	3.6	0.733	71.8	1.01	6.4
B11	1.5	0.46	0.32	0.554	105.1	0.52	7.1
B12	4.4	0.38	1.14	1.233	83.7	1.45	6.9

Table 18.A5 Solid phase fluxes from the upper Lake Baikal trap (LB-T; 396 m depth).

Cup	Weight <1 mm mg	Total flux mg m ⁻² d ⁻¹	Opal flux mg m ⁻² d ⁻¹	Org. mat. flux mg m ⁻² d ⁻¹	CaCO ₃ flux mg m ⁻² d ⁻¹	Lithogenics flux mg m ⁻² d ⁻¹
T1	1104.5	77.5	0.58	79.90	7.68	-10.66
T2	263.5	19.17	1.39	17.35	1.76	-1.15
T3	78.3	5.49	5.38	4.22	0.83	-4.90
T4	364.4	25.57	4.34	13.66	3.01	4.70
T5	664.1	46.60	5.35	37.39	1.71	2.66
T6	356.3	25.93	17.07	21.97	3.00	-15.99
T7	766.0	55.74	4.08	46.48	5.62	-0.45
T8	469.9	34.19	2.27	30.50	1.65	-0.18
T9	57.5	4.19	1.01	2.42	0.23	0.55
T10	253.1	18.42	5.12	12.97	2.52	-1.02
T11	581.7	44.40	34.70	5.12	0.85	1.67
T12	296.8	21.60	14.90	6.67	0.68	-0.60

Table 18.A6 Solid phase fluxes from the lower Lake Baikal trap (LB-B; 1582 m depth).

Cup	Weight <1 mm mg	Total flux mg m ⁻² d ⁻¹	Opal flux mg m ⁻² d ⁻¹	Org. mat. flux mg m ⁻² d ⁻¹	CaCO ₃ flux mg m ⁻² d ⁻¹	Lithogenics flux mg m ⁻² d ⁻¹
B1	572.8	40.19	14.45	5.72	1.00	19.02
B2	486.8	35.44	11.67	5.50	2.57	15.64
B3	3072.5	215.58	67.00	30.27	1.79	116.51
B4	3389.6	237.83	89.86	32.88	2.78	112.34
B5	4081.5	286.84	106.87	37.50	18.62	123.86
B6	3242.3	235.90	91.36	33.97	1.57	109.00
B7	1509.3	109.80	40.12	16.47	1.65	51.58
B8	1077.3	78.39	27.80	11.57	1.76	37.25
B9	1301.0	94.67	31.34	13.89	0.63	48.76
B10	1835.5	133.60	51.22	19.30	2.45	60.55
B11	3081.6	222.20	96.17	26.43	0.93	100.70
B12	2612.0	190.05	100.67	22.52	2.70	63.96

Table 18.A9 Free CO₂ in the Lake Baikal traps (LB-T: 392 m; LB-B: 1582 m depth).

Cup	PCO ₂ ppmv	CO ₂ μmol l ⁻¹	CO ₂ μmol/ m ⁻² d ⁻¹	Cup	pCO ₂ ppmv	CO ₂ μmol l ⁻¹	CO ₂ μmol/ m ⁻² d ⁻¹
T1	70000	4530	79.4	B1	526	34.3	0.60
T2	55600	3600	65.4	B2	526	34.3	0.62
T3	21600	1400	24.5	B3	3500	228.5	4.01
T4	26600	1720	30.2	B4	6370	416	7.29
T5	44200	2860	50.1	B5	4510	294	5.16
T6	27900	1800	32.8	B6	3660	239	4.35
T7	19700	1280	23.2	B7	2310	150	2.72
T8	17600	1140	20.7	B8	2360	154	2.80
T9	11100	717	13.0	B9	6670	436	7.93
T10	5680	368	6.7	B10	2418	150	2.72
T11	4120	266	4.8	B11	3340	218	3.97
T12	2420	156	2.8	B12	4400	288	5.24

ppmv: The pressure CO₂ exerts if the solution is exposed to air

CO₂ in μmol l⁻¹: the amount of free CO₂ in solution at the *in situ* temperatures of 3.5 and 3.2 °C in the upper and lower traps, respectively.

CO₂ flux = CO₂ μmol l⁻¹ x 0.25 l / 0.509 m² / 28 (or 27) days