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Title:
Lake El`gygytgyn water and sediment balance components overview and its implications for the sedimentary record

By G. Fedorov, M. Nolan, J. Brigham-Grette, D. Bolshiyanov, G. Schwamborn, and O. Juschus

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1) General comments:

Summary
The paper attempts a water and sediment balance of Lake El'gygytgyn. Lake El'gygytgyn seems to be a very unique lake system, both regarding its present limnology and past sediment archive. Monitoring the hydrology and sediment balance of the lake is quite a challenge, given its remote location in the arctic, the extreme weather conditions and the highly dynamic nature of its tributaries and outflow (including temporal blocking and changing river beds). As a consequence, the presented water and sediment balance is based on just a few monitoring dates without continuous gauge stations on the rivers, which leads to high uncertainty.

Evaluation
In a normal edition of CP I would not recommend the manuscript for publication given (i) its focus on a very specific lake system without transferable aspects, (ii) its presentation of a water and sediment balance without any new tools and without a clear connection to the current limnology or sedimentation in the lake and (iii) the small data set which leads, at best, to a first estimate of the water and sediment balance. However, in a special issue "Initial results from lake El'gygytgyn, western Beringia: first time-continuous Pliocene-Pleistocene terrestrial record from the Arctic" it is important to discuss the current water and sediment balance, even if existing data are poor. As a result, I suggest the manuscript for publication in the mentioned special issue of CP, if my comments below are considered.

Suggested Improvement
I suggest overworking the manuscript regarding the following main points (see "specific comments" section below for details):

- Title: Change the title to make clear that these are first results that need to be refined with future monitoring campaigns.
- Structure: As it is now, aspects of sediment balance and water balance are mixed throughout the manuscript. I suggest a clear separation, both in the "methods" and in "results and discussions"
- Material: Sampling/Measuring approaches should be clarified (e.g., it is not clear how sediment load was determined)
- Methods: Many assumptions are made in the balances. These should be clearly stated already in the methods section.
- Validity of results: The uncertainty in the balances is large; it must be described at least qualitatively in the "Results and Discussion" or the "Conclusions" section

2) Specific comments

page	lines	
Title		
3978		I suggest changing the title to something like "Preliminary water and sediment balance of Lake El`gygytgyn" or similar (the preliminary nature of the results should be stressed)
Abstract		
3980		I suggest adding more of the results in numbers (e.g., length of the snowmelt-period, how many tons of sediment from incoming streams, % of balance for outflow and aeolian input). In addition I suggest adding one sentence naming the main uncertainties of the results.
	7-8	the regressive lake level is not shown in this work. rephrase

page	lines	
1 Introduction		
3980	9	I assume that 175 m is the maximal depth, please clarify.
	14-20	I did not understand why liquid precipitation is once 73 mm and once 126 mm, since same reference is given.
	25-end	other flow measurements are cited. Given the sparse data from own measurements I suggest incorporating these data in the presented water balance....or, if not useable it should be stated.
3982	3-7	The explanation could be moved to paragraph above; maybe add lagoons on inlets that are mentioned in section 3.6
2 Methods		
general		I suggest splitting water balance (equation and sections 2.1 to 2.5 plus 2.8) from sediment balance (add equation, sections 2.6 + 2.7)
3981	10-17	The correct equation is $dV/dt = Y1 + Y2 + P + Z1 - Z2 - E - Y$ This equation is valid for (i) the annual balance, assuming there is no change in water level from year to year (note that this assumption contradicts your statement of the generally receding lake level) and (ii) for the calculations for shorter periods, where observed changes in water level are considered.
3982	section 2.1	i) Clarify calculation method to arrive at annual flow from the three measurements (interpolation between measured points?, what was done before first and after last measurement?) ii) Clarify assumptions (e.g., a) measurements at outflow and 1-3 measurements at tributaries are representative for annual flow, b) year 2003 is representative for average situation, c) unit area discharge is transferable to minor streams). -> note (here or in discussion or conclusions section): (i) flow measurement, even if perfectly done, results in an error of at least 10-20 %,(ii) the three measurements differ by more than 50 % for the outflow and by order of magnitudes for tributaries. So just by arriving one day earlier or later the result will greatly change, (iii) Precipitation is very different from year to year (Fig. 5), so even if one year was measured perfectly, one would have an uncertainty in average flow of at least 50 %.
	section 2.2	Clarify assumptions: e.g., snow fall into lake before it is frozen is negligible (or is it considered within liquid precipitation?), precipitation range 2001-2009 is representative....
3984	section 2.4	give some more info on the data by Sokolov (since work is in Russian). If the meteo stations also measured humidity, wind speed and temperature a second estimate of evaporation could be calculated. A third estimate could be based on potential evaporation from the NCEP/NCAR-reanalysis (also published in the special issue)
	section 2.5	river level measurements (shown in Fig 2) are not mentioned; reference point for river level is important, otherwise Fig.2 is hard to understand
	sed-section	Before starting existing sediment sections, state equation for sediment balance used (e.g., $V*dC/dt = Qin,i * Cin,i$ + aeolian input + autochthonous sediment production – net sedimentation – Qout * C, where C is concentration of suspended particles in the lake; again it is assumed that left side of equation is zero). Questions: - is it assumed that there is no autochthonous sediment production (algal sedimentation, calcite precipitation, etc)? - is it not possible to quantify current annual sedimentation from top section of mentioned sediment cores or the short sediment cores described in a different paper of this special issue (I guess the cores were dated somehow)? That would give an important indication to validate the presented 2003-balance, respectively discuss the role of autochthonous sediment production. If available I suggest adding an extra section here.

page	lines	
3984	section 2.6	1) clarify measurement: Was sediment on the filter plus the turbidity after filtration considered? What filter size was used? How were the filters dried (freeze-dried?)? How did you calculate remaining particles from turbidity (if this was done)? Was this a relevant share of TSS? 2) clarify calculation: how were annual loads calculated?
	section 2.7	In the "results + discussion" section, summer load is also discussed but calculations cannot be followed by reader. I suggest explaining the estimation approach used there in this section.
	section 2.8	this section should be moved up to water balance. Hydraulic residence time of lakes is often referred to as Volume/outflow (without evaporation), to be applicable for substance balances.

3 Results and Discussion

	General	- as stated above I suggest splitting this section in water balance and sediment balance to be clearer for the reader - I suggest that results for annual balances and for shorter time periods considered are summarized in two tables, one for water and one for sediment (instead figure 4 could be deleted in my view). The table for the water balance should (at least) contain the following 7 columns: time period, dV/dt (this is zero for annual but not for the time periods regarded in section 3.4), inflow, rainfall on lake surface, surface outflow, evaporation, groundwater in/outflow from balance.
3985	14-16	The river level in Fig. 3 is hard to understand; in my understanding it does not make sense that the river has a higher level than the lake (if it does make sense, please explain). I assume the two level measurements had a different reference point. If this is the case please add this information to the figure legend and the method section.
3986	5-20	Please give the value of the unit area discharge used for calculation.
	27-next p	isn't the ice under the snow mainly frozen lake water with respective suspended matter? In that case it should not be counted for aeolian input.
3987	4-6	Given very high uncertainty, recalculation with 10% smaller lake area does not make sense, unless there is a good basis for the 10 %
	19-22	it is not clear how the 4-5 % were reached (based on Baltic or with factor from winter?). Please explain here or under methods.
3988	section 3.3	Discuss nature of 2003 (since the balance is based on 2003 data) by comparing 2003 rainfall with average rainfall and standard deviations.
3988/89	section 3.4	- very interesting calculations, but sometimes difficult to follow. If all the numbers are given in a table (as suggested above) this will be easier and text can be simplified. - it is interesting that underground outflow is higher at higher lake level than in summer, which supports your assumption that groundwater outflow is predominantly through the "dike" blocking the river, as is said at the end of this section. I suggest to make that link clearer within this section (e.g., simply refer to new table).
3991	section 3.6	This section is not really based on results from this study; could also be moved to introduction or to methods. Comment: at receding lake level one would expect that heavy storm events during snow melt would also wash away lagoon sediment, at least fine particles.

4 Conclusions

	General	I find that the conclusions summarize main aspects of water and sediment dynamics very well. I suggest adding one point where main uncertainties of this balance are given and future monitoring is suggested which could help to reduce the uncertainty.
3992	19-21	I would expect that this trapping is of rather temporary nature with erosion during snowmelt and rain storms washing away the trapped material at least every few years? Then this would be of minor importance for sediment

interpretation. Maybe explain a bit more in detail or add a sketch (here or for section 3.6).

Tables & Figures

Tables	Add two tables for water and sediment balance (as suggested above)
Fig. 1	Add date of snow thickness measurement to legend; maybe add one or two bathymetric lines
Fig. 2	Legend should say whether the two lines have same reference point (I expect they don't, see comment above)
Figs 5	From 2006-2008, summer temperature is lowest at 5 cm depth (if I decipher the color code correctly), probably an instrument error? Please double-check data.

3) Technical corrections

Below a few technical suggestions. I am not a native English speaker, so please feel free to rephrase.

page	**line**	
3979	2-3	…of the hydrologic **and sediment** balance ~~and sediment flux into and out of~~ Lake El'gygytgyn.....
	4-5	....ca. 3.6 ~~Ma~~ **million years ago**....
	9	st**r**eams
	11	....compensated **in mass** by **atmospheric deposition, which in turn contributes only few % to the total sediment balance....**
3980	4	.... baseline to ~~inform us concerning~~ **interpret** the sensitivity....
	10	**one** outlet
	24	....at its ~~the~~ head...
3981	3	.... and **less than 1m^3 s^{-1}** in **all the** inlet streams ~~less than 1m^3 s^{-1}~~.
	16	underground **outflow**
3982	10-13	~~Thus, we can calculate~~ **Finally,** the **average** seasonal unit area discharge for the entire drainage basin **(**except of the lake itself**) was calculated**. The total seasonal water runoff is calculated as the **basin-average** seasonal unit area discharge multiplied by total watershed area.
3983	3	groundwater (one word)
	9-11	At Lake El'gygytgyn however, both positive and negative portions of the water balance **can have unknown groundwater components. As a result, the contribution of underground in- or outflow to the water balance was estimated jointly as the difference between the known terms of the equation.**
3985	3-4	During the summer 2003 water and sediment discharge was measured **three times** at the head of the Enmyvaam River and in selected inlet streams around the Lake El'gygytgyn basin~~ three times on~~.
3986	3	I do not understand "tracked" here...
	13	...than ~~that~~...
	17	The total **annual** water yield...
3987	7-8	The aeolian sediment supply during summer is unknown~~, because we were not prepared and equipped for this type of complicated measurements~~.
	23-28	there is no benefit in comparing a lake with the ocean...in my opinion this paragraph could be skipped
3989	25	....aufeis **on Enmyvaam River** (....
3990	15	....beneath the **river outlet**...
	20	...estimate the ~~period of the Lake water exchange~~ **average hydraulic residence time of the lake at** ~~to~~ about 100 yr....
3991	3-4	This process~~e, certainly,~~ influences....
3992	17	....indicating that ~~by volume~~ little~~, if any,~~ of the sediment **volume** eroded within the crater is escaping through the **river** outlet ~~river~~.
3993	1	gap missing before "We"
	20	Leni**n**grad

Tables & Figures

Fig. 1	Numbers of snow depth are very small
Fig 2,3,4,6	Numbers and titles on axes are too small
Fig5	colors are difficult to distinguish, particularly for temperature; maybe test different color combinations