Dear Dr. Klaus Arpe,

The paper tries to find connections between the river discharges of 2 main rivers in Siberia and the atmospheric circulation. It is well written and I enjoyed reading it and found is inspiring. I would recomment accepting it for printing it even if it far from reflecting a breakthrough in science.

Thank you very much for your review comments on the original manuscript. We have revised the manuscript according to your comments. Our point-by-point replies are as follows.

I would add a plot in the introduction of topograpy and catchment areas to set the scene, like the attached file Fig_K1_oro. The Fig.1 provided in the manuscript, showing nearly the same, has too much information and the essentials are not easily to be seen.

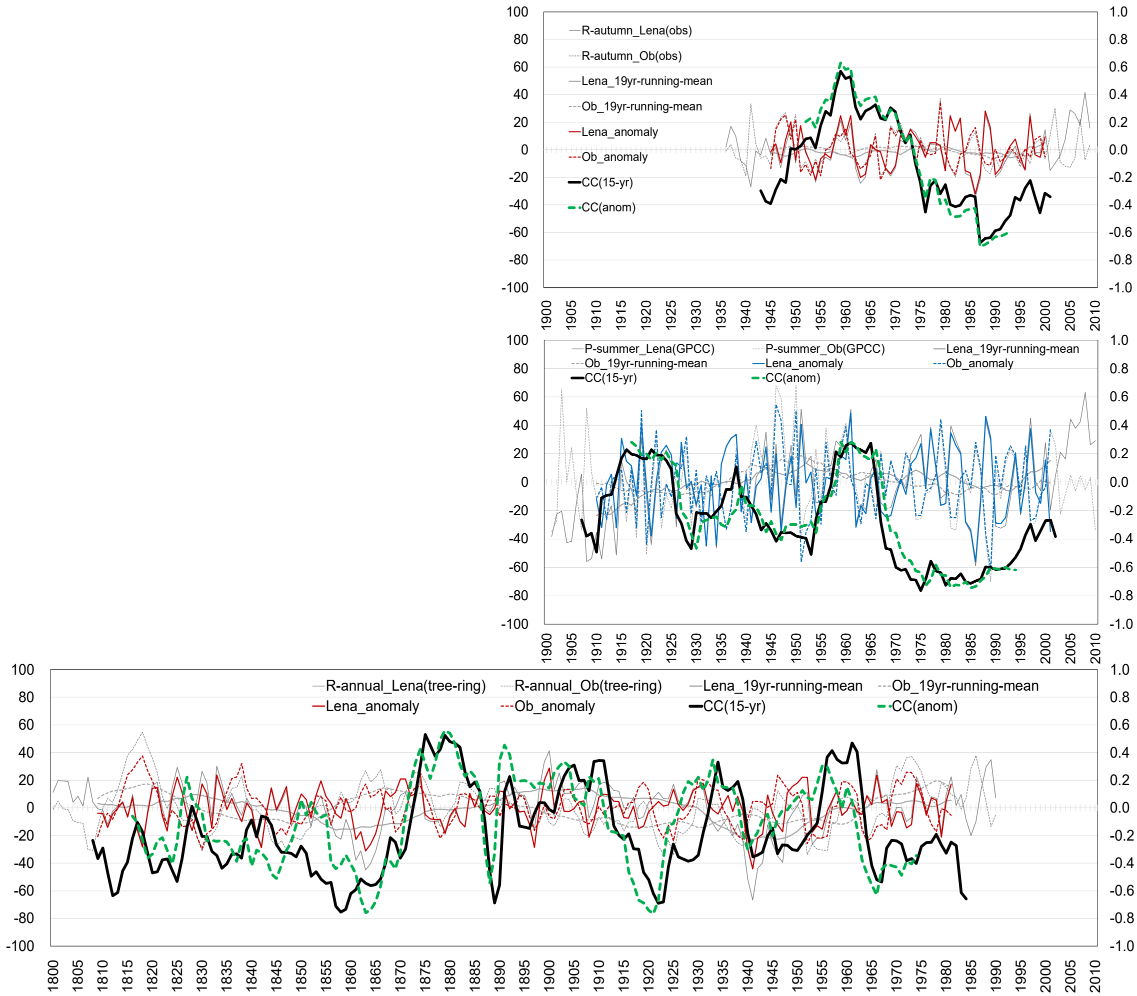
As advised, we deleted vector and remade Figure 1 simply.

I further suggest to add some Teleconnection maps (correlation maps) between the discharge or the precipitation over the catchment areas and the precipitation at each grid point as attached File figK2.jpg and FigK3.jpg for the Lena and figK4.jpg and figK5.jpg for the Ob. as suggested in the manuscript, I averaged the precipitation from June to September for such a comparison with the August to November river discharge. It shows nicely the catchment areas (figK2 and FigK4), though the higher correlations between river discharge and precipitation extend a little further, for the Lena to the SE and for the Ob beyond the Ural mountains but no connections between the 2 rivers. I am using the anomaly correlation, i.e. taking away a long term mean from each time series because in meteorology we are mostly interested in the deviations from the climatological mean. For convenience I use the mean of the whole time series provided. The values are given in the plots in % for clarity with less digits to be printed. I wonder if the definition of correlation has changed during the last 40 years, since I wrote most of my programs. Modern papers show always very high values of > 0.9 while here the best values are> 0.7 and in most of my publications I am happy to reach correlations of up to 0.4.

As you confirmed by the horizontal maps, the variation in P over the Lena river basin is basically related to the R of the Lena and the Ob river is the same when using data during the whole period. That is the same as the positive correlation between the P and R as shown in previous studies (Fukutomi et al. 2003, Serreze et al. 2003, Oshima et al. 2015). However, the first point here is a difference in the relationship (correlation) between the Lena and Ob in each of the epochs. That means that the Rs/Ps of Lena and Ob sometimes show negative correlation and occasionally positive correlation or no correlation in the other period (Figure 2). Fukutomi et al. (2003) revealed the strong negative correlation between the Ps/Rs of the Lena and Ob Rivers during 1980s to mid-1990s. The associated precipitation anomaly maps were shown in Figure 6 of Fukutomi et al. (2003), and we described about those in the third paragraph of the Introduction. The second point of our finding in this study is that such negative correlation frequently seen during the past two centuries based on the tree-ring-reconstructed Rs (Figure 2c) and then we discussed about the associated atmospheric circulation over the region. About those points, we modified some descriptions in the Abstract and the first paragraph of the Summary.

I tried also to reproduce the anti-correlation between the Ob and Lena in the 1970/1980s, but could not find anything in the precipitation like that although Fig.2b of the manuscript shows quite a few events like that. Plotting time series of precipitation over the Ob and Lena catchment areas with a running 19 year mean shows for the Ob a steady decline of precipitation since the early 1950s while the Lena keeps its mean nearly for the whole period. This might be the reason for the negative correlation between both rivers shown in Figure 2a and b since 1970, when the area mean precipitation drops below its long term mean.

The time period of the anti-correlation (negative correlation) is not in the 1970/1980s, but from 1980s to mid-1990s. When we remove the 19-year running mean from the time-series of Figure 2a-c, the correlations (black lines in Figure 2) do not change so much, as confirmed by the following figures. Additionally, we made minor revisions in Figure 2.



The main outcome in the paper is that the Ob discharge variability, and that of the Lena are not related to each other. The question is of course why do we expect such a relation. If both rivers would have a common forcing that could be expected. A strong large scale forcing all over the world is ENSO, which even reaches the Baltic Sea but does not seem to reach the 2 rivers. My attached plots FigK3 and FigK5 show clearly that when there is a major event of precipitation in one of the catchment areas, it is likely that the whole catchment area is affected but restricted to one catchment area, with no connection to the other catchment area perhaps enhaced by the mountain range between them. With this statement one has to be careful as one has to take the method of precipitation analysis into account. The method looks for each grid point into 4 directions to find the nearest observational station and makes then a weighted (by the distance) average. In FigK7_stat_dens one can see that the station density, provided by GPCC, in Siberia is very low, especially between both catchment areas, so all grid points within one catchment area will get higher weights to observations within that catchment area. This figure explains as well why in FigK3 and K5 the restriction to the catchment area is stretching for the Ob past the Ural and for Lena towards the SE as these are areas with a higher station density.

Related to the previous second comment, the main outcome of this study is not the no relationship between the Lena and Ob, but the Rs of the Lena and Ob frequently show negative correlation. While, when analyzing during the whole period, the R of the Lena (Ob) related to the P over the Lena (Ob) river basin, but the Ps over the Lena and Ob sometimes indicate a negative correlation as in the cases of 1980s and mid-1990s. Please see Figure 6 of Fukutomi et al. (2003). About the main outcome of our study, we modified some descriptions in the Abstract and the first paragraph of the Summary.

As you mentioned, in terms of the observation station density over Siberia, it is a concern and discussed in previous studies (e.g., Serreze and Barry, 2005: The Arctic Climate System.

Cambridge University Press, Section 6.1, 148-152). Oshima et al. (2015) investigated the correspondence among components of the water balance by using several datasets based on the independent data sources. We compared discharges from the observation station nearest the river mouth, P-E estimated from meteorological data (specific humidity and wind) of several reanalyses on the basis of the atmospheric water balance method, and P based on satellite and station observations for the three Siberian rivers (Lena, Yenisei, Ob). The results indicated good correspondences in balance and variation. The long-term averages of R and P-E were comparable in magnitude and the P was strongly correlated with R and P-E for each of the individual rivers. Of course, we should be a careful to discuss quantitatively about the P, but the above results indicated that the P dataset from the GPCC and other precipitation products (e.g., PREC/L, APHRODITE) are useful to examine the interannual variation in this region. We added some explanation about the P dataset in the second paragraph of Section 2 "Data and analysis methods".

Coming back to why do we expect a relation between both rivers? I think it is our inability to imagine the wast extends of the areas in Siberia. Already Napoleon and Hitler fell victim of this inability even for Eurpean Russia.

It is not so difficult to understand that. We demonstrated that, over the summertime Siberia, the east-west seesaw pattern of large-scale atmospheric circulation frequently emerges as natural internal variability. This east-west seesaw pattern affects opposite influence on the Ps over the Lena and Ob. When the cyclonic anomaly emerges over eastern Siberia, that atmospheric circulation anomaly induces convergence of moisture flux and then increases the P and R of the Lena river. Simultaneously, the anticyclonic anomaly emerges over western Siberia and induces divergence of moisture flux, then decreases P and R of the Ob river, and vice versa. This results in out-of-phase of the Ps/Rs between the two rivers. We modified the explanation in the third paragraph of the Introduction.

Here some comments in detail:

page 3 line7: Salehard in the datset by Duemenil et al it is called Salekhard, also looking at google map only Salekhard is known

As described in the manuscript, we used the ArcticRIMS data where the station is named as "Salehard" and we employed that name instead of "Salekhard". Because it is easy to find the used data on the ArcticRIMS website (http://rims.unh.edu/data/station/list.cgi?col=1).

page 4 line 6: you could mention that in

Arpe K., Leroy S. A. G., Wetterhall F., Khan V., Hagemann S. and H. Lahijani: Prediction of the Caspian Sea Level using ECMWF seasonal forecasts and reanalysis. Theor Appl Climatol DOI 10.1007/s00704-013-0937-6, 2013 the Volga river discharge has been successfully estimated from the water budget calculations using ERA interim data and there they use a minimum of 3 month delay between precipitation events and river discharge events, longer in winter.

Thank you for introducing other example of seasonal time lag between R and P. This kind of seasonal time lag may be seen in seasonally frozen rivers. We referred this paper in the last paragraph of Section 2 "Data and analysis methods".

page 7 line 11: do you really mean dumping not damping?

I made a typo. That is "damping". Thank you very much for your careful review.