Earth Syst. Dynam. Discuss.,
https://doi.org/10.5194/esd-2017-54-RC1, 2017

Earth System Dynamics
Discussions
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EGU

Interactive comment on "Influence of atmospheric internal variability on the long-term Siberian water cycle during the past two centuries" *by* Kazuhiro Oshima et al.

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Received and published: 19 October 2017

The paper tries to find connetions 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.

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.

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Discussion paper

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.

I tried also to reproduce the anti-correlation between the Ob and Lena in the 1970/1980s, but could not find anythng 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 meanshows 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 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.

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.

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

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 Volgariver discharge has been successfully estimated from the water budget calculations using ERAinterim data and there they use a minimum of 3 month delay between precipitation events and riverdischarge events, longer in winter.

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

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