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Climate of the Past Discussions

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Interactive Comment

# *Interactive comment on* "Palaeostages of the Caspian Sea as a set of regional benchmark tests for the evaluation of climate model simulations" *by* A. Kislov et al.

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We are grateful to prof. Arpe for thorough reading of our paper and valuable comments, the majority of which really need to be account for. To discuss comments let us divide them into several groups. 1. /What is Q? And why k is the factor 0.7?/ We admit, this is really our mistake. Fortunately, it does not influence the result. The text shall be corrected in the way as follows.

Pages (Lines) 5057 (8) A total of 80% of the river discharge comes from the Volga River (Q). We can consider Q$\sim$kQin where k$\sim$0.7 .

5058 (5) We can connect the average values of Qout and the average runoff of the



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Volga River as follows: Qout = $\mu$Q0, where $\mu\sim$1/k; otherwise, the Qin has to be considerably different from the Qout.

5058 (8) dh/dt=$\mu$Qo/fo (Q-Q0)/Q0

Why k equals 0.7? Because "the contribution of the subsurface runoff into the sea is less than 20 % {practically less than 10% !}. A total of 80% of the river discharge comes from the Volga River." Hence, (1-0.1)x0.8$\approx$0.7

2. /Why we only consider the influence of river runoff volume on the sea level, without taking into account other components of the water balance? The high evaporation over the CS in June to August 2010, is that random? /

First of all, the CS is described by the simple lake model within the climate models. That does not permit the correct evaluation of water balance components. This is a source of different errors (and they were discussed in the review).

We believe the approach developed in this paper permits to avoid at least a part of these problems. Principal result is depicted by equation /4/ (5058 (13)) and it implies that the CS level changes depend on the accumulated departures of Volga River runoff. On the other hand we acknowledge the important role of evaporation as well. We do agree with important contribution of evaporation changes to the CS level variations during individual years. However, an analysis of the time series of observation shows that it has fluctuated randomly (5058 (1-2) ) on the interannual time-scale. High correlation of the curves on the Fig. 2 demonstrates that long-term variations of the CS level originate from river-runoff changes especially for epochs of large CS level changes. We again stress in paper that "for shorter periods, the evaporation variability over the CS itself has clear impacts (Arpe et al., 2012)" (5058 (22)). In this situation it is important to be sure that the climate models reproduce the same mechanism, which implies the variability of river runoff volume as the predominant factor of lake level changes. Implicit verification of this fact is established by comparison of the SDSs. Their difference in different models does not important thing, but importantly that everywhere there is the fact “»”.

3. /What are the main differences between the models? Arpe et al 2000 found a connection with ENSO and the CSL changes, has CNRN a better simulation of the ENSO variability. /

We are aware of the above result, but we have also to take into account that connection between the CS level and ENSO variability is not reproduces by observations data. The mentioned ECHAM3 result needs further confirmation. Therefore we consider that such judgements premature and limit ourselves to demonstration of modeling results.

4. /C3344 - C3345/ We do agree that number of phrases need to be clarified

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Interactive comment on Clim. Past Discuss., 8, 5053, 2012.