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Climate of the Past Discussions

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 confirm again that we do not reject the importance of evaporation from the surface of the sea in its water budget (by the way, it is needed to take into account both evaporation and precipitation over the sea). Apart from, according to our new estimations from GEBCO and SRTM3 models (see manuscript), at the Caspian Sea stages -26 m (before 1930s) and -29 m (mid-1970s) the CS area was 444.2 and 386.0 km2 respectively, which makes the total range of 13%, or ±6.5% relative to the present stage. Our results are based on instrumental records. They have clearly demonstrated with unusually for geophysical research high correlation coefficients that long-term fluctua-

tions of the Caspian Sea level were driven predominantly by changes of the Volga River runoff. Incidentally, the fact that the correlation coefficients are the same for different time periods means that the integral influence of implicitly included into the equation /4/ characteristics (evaporation and precipitation over the sea area, subground runoff, contribution of other rivers) was the same for principally different background conditions. These facts confirm our method. The approach, embodied by formulae /4/, has been exploited for a long time and there is a numerous of papers to have shown trends in the CS level changes were caused by changes of the Volga River runoff (Michailov and Povalishnikova, 1998; Kosarev et al, 1996; Nikolaenko, 1997; Meleshko, Golitcin, et al, 1998, Isaev, Klimenko, et al., 1995, Kislov and Sourkova, 1998, and many others). In fact, the figure in prof. Arpe's second comment supports it: his black curve is well described by the red curve. This is quite natural for closed lakes with large drainage basin (Ac): in the case of the Caspian Sea (As shall depict its area) the ratio Ac/As = 6.7 at present and varied in the range 2.5 - 13.0 during MIS 2-3 (see p.5061 of the manuscript). Therefore, contribution of runoff layer in the lake catchment cause much higher than changes providing by effective evaporation (evaporation mines precipitation) from the lake. Also, some indirect data exists to support the idea that catchment water outputs is the dominant factor of the CS level changes. We are demonstrating the Figure 1 (Isaev, Klimenko, et al., 1995) denoting the connection between the CS level changes and time behavior of specific weather index (Klimenko index). In the first third of the twentieth century the "dry" processes were dominated that eventually led to a decrease of the Volga flow and lower the CS level. Since the mid 60's there was a sharp increase of the frequency of so-called "rainy" processes and the level (with some delay) increased. Concerning the CS level and ENSO, there is a lot of publications demonstrating the absence of the ENSO influence on the weather anomalies over the East European Plane, Siberia and Central Asia region (for example, see, please, well-known maps depicting the regions exposed to the El Nino/La Nina influence). This connection does not mention in the Assessment report of climate change and its impacts over the territory of Russia (2008). On the other hand, if specific types of random samples were made, low correlation was found, especially for the cold season (see, for example, Bushev and Lebedev, 2000). Ambiguity of interpretation is explained, perhaps, by the next fact. According to modern concepts, the teleconnection of the ENSO and midlatitudes climate is not a straightforward process. The causal nonlinear chain is realized through the propagation of planetary waves and their interaction with the circumpolar vortex, with complex influence of solar activity turning on or off the teleconnection (Haynes et al., 1991). This process is not understood in detail, and it is reproduced differently by different GCMs (Kryjov and Park, 2007).

References Assessment report of climate change and its impacts over the territory of Russia. Moscow, Roshydromet, 2008. Bushev, V.I. and Lebedev, M.M. On the probabilistic response of the northern hemisphere atmosphere to ENSO. Oceanology, 40, 573-681, 2000 (in Russian). Haynes et al. On the “Downward Control” of extratropical diabatic circulations by eddy-induced mean zonal forces. J.Atmos.Sci., 48, 651-678, 1991. Isaev, A.A., et al. Frequency of “rainy” and “dry” synoptic processes over the Volga River catchment and the Caspian Sea water budget during its different stages. Bulletin of Moscow State University, Ser.5, 1, 70-77, 1995 (in Russian). Kislov, A. and Sourkova, G.V. Simulation of the Caspian Sea level changes during last 20000 years. Palaeohydrology and Envionmental Change. Chapter 17. John Wiley & Sons, 1998, Chichester. 235-246. Kosarev, A.N., et al. Features of hydrology of the northern part of the Caspian Sea. Bulletin of Moscow State University, Ser.5, 2, 47-53, 1996 (in Russian). Kryjov, V.N., Park, C.-K. Solar modulation of the El-Niño/Southern Oscillation impact on the Northern Hemisphere annular mode. - GeophysicalResearch Letters, 34, 2007. L10701, doi:10.1029/2006GL028015. Meleshko, V.P., Golitcin, G.S., et al. Calculation of water budget components over the Caspian Sea basin based on ensemble of GCMs. Atmosphere and Ocean Physics, 34, 591-599, 1998 (in Russian). Michailov, V.N. and Povalishnikova, E.S. Once more on the causes of the Caspian Sea level fluctuations during the 20th century. Bulletin of Moscow State University, Ser.5, 3, 35-38, 1998 (in Russian). Nikolaenko, A.V. On long term variations of the Caspian Sea. Water Recourses, 24, 261-265, 1997 (in Russian, but articles of this journal are

translated to English).

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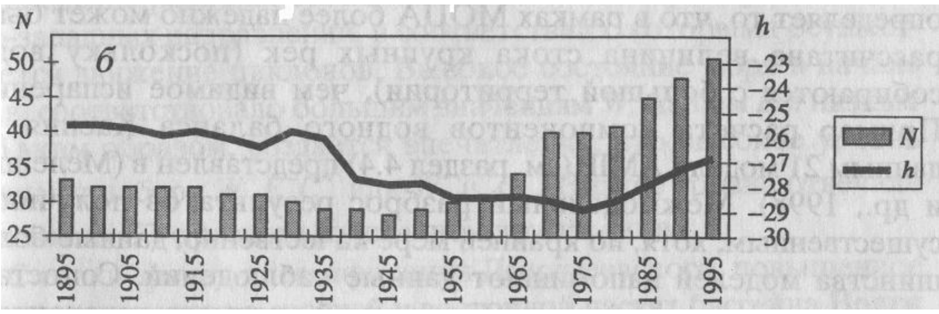

Fig. 1. Figure 1. Number of “rainy” synoptic processes (N) over the Volga River catchment and the Caspian Sea level changes (h).