



Impact of Atlantic Multidecadal Variability on Caspian Sea level

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The variations of the Caspian Sea level (CSL), the largest closed water reservoir in the world, which is very sensitive to climate variability are determined by water cycle changes integrated over the huge (more than 3 million square km) watershed area. After a dramatic fast decline in the 1930s and an even more devastating increase since the 1970s, the CSL remained relatively stable. However, the recent CSL data indicate again a tendency to a decrease amounting to about 0.5 m since the maximum in 1995. Many different factors have been previously proposed to contribute to CSL change. Here, we analyze the impact of Atlantic Multidecadal Variability (AMV), the major low-frequency climate variability mode in the North Atlantic that has been found to affect regional and global climate. A numerical experiment with a coupled climate model was performed to simulate solely the effect of the AMV on climate by imposing periodically varying ocean heat convergence anomalies in the North Atlantic and Arctic. The results reveal a significant positive correlation of precipitation over the Caspian Sea watershed with the AMV. An estimate of the interdecadal variations of the annual Volga river discharge related to the AMV amount to 40 cubic kilometers per year which is comparable to the largest observed changes during the 20th century. This indicates a significant role of the AMV in driving CSL. The results imply a potential decadal predictability for CSL.