North Atlantic Oscillation signals in the series of Beyşehir lake-levels (Turkey)

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Abstract. The North Atlantic Oscillation (NAO) is one of the major sources of interannual atmospheric variability over the Northern Hemisphere. In this study, we examined the variability of lake-levels of Lake Beyşehir in time-scale (period) domain using continuous wavelet transform (CWT) and global wavelet spectrum (GWS). The long winter (December, January, February and March) lake-level series and NAO index (NAOI) series were subjected to the wavelet transform. We constructed the NAOI series between 1960 and 2002 in relation to the lake-level recording period. The wavelet transforms of the NAOI time series presented as a three-dimension diagram showed different periodicities occurring in various time intervals. In short, we identified four main objects in this diagram during the above period. The center of the light tone regions in the diagram of CWT of Lake Beyşehir is located somewhere in the grid defined by a time band 1963-1979 and a scale band 5-year to 26-year. These long periodicities are coherent with the classical NAO winter peaks. In order to discover significant periodicities in Beyşehir lake-levels, we also calculated the GWS of the CWT. For the mid-term periodicities, the global spectrum magnitudes of Lake Beyşehir increased from 0.5-year to 10-year scale level. Although the periodicities more than 10-year scale level were detected, explaining significant relations between the NAO and these long-term periodicities remains a challenging task. The secondary cyclogenesis in eastern Mediterranean provides a physical linkage between the NAO (known as a key provider of precipitation to the Middle East region) and climatic surface variables in Turkey.

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