The Role of Air-Sea Interaction in the Precipitation Variability of the Southern Black Sea Coast

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The Black Sea, though an inland water mass, is still large enough to influence the climate of the land surrounding it. This effect is most pronounced over its southern coast, due to the dominance of northerly winds, as well as to isolation and orographic lifting caused by the North Anatolian mountain chain. The outcome is a year-round wet climate over the region, even during drought events known to have occurred in the neighboring Mediterranean and continental climate areas. In this study, we try to quantify the role of air-sea interaction in the rainfall variability of the southern Black Sea coast, based on a simple analysis of precipitation, air and sea surface temperature series of the region. Our preliminary results show, a) that there are statistically significant negative correlations between air temperature and precipitation series for the months of October to April for the extreme southeastern coast, b) that there are statistically significant negative correlations between air temperature and precipitation series for some of the months between October and April for the entire southern coast, c) that some of these correlations are enhanced, or even extend beyond April when the temperatures of preceding months are included in the analysis as well (lagged correlations). We argue that enhanced rainfall in response to lower temperatures of the same month, and higher temperatures of the previous months (a distinct trait of the Black Sea climate), is a clear indication of the intense air-sea interaction in the region. Sea surface temperatures operate as a memory for the air temperature of preceding months, as one would expect. Our results are perhaps most important for paleoclimate interpretations for the Black Sea area, since increased or reduced air-sea interaction may have had even more dramatic impacts during certain periods in the past.

Keywords: Black Sea, precipitation, temperature, air-sea interaction, correlation