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Title: Climate study on mesoscale cyclones in the Black Sea Region

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Abstract:

The paper is a climatic study of the Black Sea mesoscale cyclones, which can influence regional climate variability and in some cases can lead to rather drastic changes in weather conditions. For instance, an anomalously intense mesoscale cyclone, possessing all visible features of a tropical hurricane, was detected over the Black Sea in September 2005. Such quasi-tropical cyclones had not been observed over the Black Sea before September 2005. So, a special research was conducted in order to determine the frequency of quasi-tropical cyclogenesis events in the Black Sea Region. For this purpose we used data on surface wind fields with 25km-spatial and 1hr-temporal resolution for 40-yr period. The data was obtained using regional climate model PRECIS initialized with the ERA-40 re-analysis data.

It was found in that there were about 250 well-defined mesoscale cyclones over the Black Sea in the period of 1958 - 1996, but none of them was as intense and long lived as the Black Sea quasi-tropical cyclone detected in September 2005.

Also, it was found that there are two main types of mesoscale cyclones in the Black Sea Region, which form over the sea near the Crimean coast and near the Caucasian coast. According to their place of origin these mesoscale cyclones were called Caucasian and Crimean respectively.

Statistical characteristics of Caucasian vortexes were investigated. On particular, their lifetime is ~ 10 hours, horizontal scale is ~ 100 km, vertical scale is 1.5 - 2 km, and surface wind speed is 5 - 10 m/s. The Caucasian vortexes are characterized by a pronounced diurnal cycle: the vortexes observed the most at night, around 0300 LT (Local Time), and the least at midday. Also, the Caucasian vortexes are also characterized by a seasonal cycle: they appear mostly in July and August and practically absent in winter.
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