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Precipitation variability in Romania and the North Atlantic Oscillation

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In this paper was studied the influence of the atmospheric circulation in the North Atlantic region, expressed as the North Atlantic Oscillation (NAO), on the precipitation amounts from 28 Romanian meteorological stations. At each of this stations were calculated the simultaneous and the delay correlations with lags from 1 to 12 months between the NAO index and the monthly precipitation from December-March 1938-1987. The correlations are mostly negative. The strongest correlations were obtained with the simultaneous NAO from January and February, at stations in western, southern and north-eastern Romania. The spatial distribution of the monthly precipitation from December to March points out a large variability over Romania, due to the shape and massiveness of Carpathians Mountains. The monthly mean amounts of precipitation decrease from the northwest to the southeast of Romania's territory, reaching the greatest values in the mountainous area. The precipitation is more abundant in January and March with positive NAO index and in December and February with negative NAO index. The dependence of the Romanian precipitation on altitude was examined and tested by using simple and higher order of multiple statistical regression models. The best correlation was found in a 4th degree polynomial function, both for the months with positive and negative phase of the NAO. The relationship between precipitation and altitude is stronger in the months with positive NAO index then in the months with negative NAO index. The inter-annual variability of the connection between the NAO index and the monthly precipitation was also investigated by using data recorded at Bucharest. The results show significant negative simultaneous correlations between the amounts of precipitation and the NAO index in January, February and March. Some statistically significant delay correlations can be useful in precipitation forecasting: NAO in February is a good predictor for the precipitation variability in following June and January, NAO in November for the precipitation in

following August, NAO in September for the precipitation in following October, and NAO in October for the precipitation in following November. Finally, the frequency of the Hess-Brezowsky weather types was taken into consideration and their connection to the NAO index was examined. A strong positive correlation was obtained for the frequency of westerly airflows and a strong negative correlation resulted for the north-easterly airflows. These findings are in good concordance with the atmospheric zonal and meridional flows, which characterize the positive NAO phase and the negative NAO phase, respectively.