



Comparative analysis of near-present and future synoptic conditions and their contribution to precipitation in central Greece

Theodore S. Karacostas (1), Dimitrios Bampzelis (1), Symela Karipidou (1), Ioannis Pytharoulis (1), Ioannis Tegoulis (1), Stergios Kartsios (1), Stylianos Kotsopoulos (1), and Nikoletta Pakalidou (2)

(1) Aristotle University of Thessa, Dept. of Meteorology and Clima, Thessaloniki, Greece (karac@geo.auth.gr), (2) School of Chemical Engineering and Analytical Science, Faculty of Engineering and Physical Sciences, The University of Manchester, Manchester, M3 9PL, UK

The objective on this study is to identify and categorize the daily synoptic circulation patterns encountered between the two periods, in near-present (2001-2010) and future (2041-2050), over the greater area of central and northern Greece, under the "DAPHNE" project (www.daphne-meteo.gr). The followed up statistical analyses and comparisons are focus on the demonstration of the differences in the frequency of occurrences of the synoptic situations between the two time periods, aiming at mitigating drought in central Greece by means of Weather Modification. Actually, within the context of the project, the daily synoptic circulation patterns encountered during the near-present ten-year period are identified and classified according to Karacostas et al. (1992) synoptic classification, into ten distinct synoptic conditions, based on the isobaric level of 500hPa. A similar procedure is adopted for the future period 2041-2050, by developing the mid-tropospheric synoptic circulation patterns through the RegCM3 regional climate model, under the IPCC scenario A1B.

Results indicate that certain differences exist between near-present and future frequency distribution of occurrences of the synoptic situations over the study area. The northwest (NW) and southwest (SW) synoptic circulation patterns remain the most frequent synoptic conditions observed for both examined periods. The low pressure system activity over the area exhibit significant decrease during the future period, as it is depicted from the inter-comparison of the frequencies of the closed low (L-2) and cut-off low (L-3) systems. On the other hand, the unorganized synoptic conditions, which are mostly identified as high-low patterns (H-L), appear to increase considerably. The frequencies of zonal flow (ZON) and those of synoptic conditions associated with the presence of high-pressure system over the area, that is (H-1) and (H-2), remain almost unchanged between the two periods.

The impact of the aforementioned differences in the frequencies of the synoptic conditions during the future period is examined on a yearly and seasonal basis. The contribution of each synoptic condition on the annual precipitation amounts are estimated for the near-present period, which coupled with the altered frequencies of the synoptic conditions for the future period, result to the future projected annual precipitation amounts. Possible decrease in precipitation amounts is indicated during the future period, as a result of the reduction in the frequencies of certain synoptic conditions associated with high amount of precipitation during the near-present conditions.

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