# The atmospheric conditions over Europe and the Mediterranean, favouring snowfall events in Athens, Greece

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The study aims at revealing the atmospheric conditions over Europe and the Mediterranean, favouring snowfall in Athens. Specifically, the structure and the evolution of the atmospheric circulation over Europe are examined, for the 60 cases of snowfall in Athens, during the period 1958-2001. The data used are: i) 3-hourly meteorological observations recorded at the meteorological station of Hellenikon airport, provided by the Hellenic National Meteorological Service and ii) 2.5x2.5 grid point data of atmospheric pressure, 850hPa and 500hPa air temperature, 500hPa geopotential height and 1000-500hPa thickness over Europe for the period 1958-2001, obtained from the ECMWF ERA40 Reanalysis Project, covering the area 10°W-40°E and 30°-60°N.

For each one of the 60 snowfall events, the patterns of atmospheric pressure, 850hPa and 500hPa air temperature, 500hPa geopotential height and 1000-500hPa thickness are constructed, by using 273 grid point values. The patterns refer to the day before the event (D-1), the first day of the event (D) and the day after the end of the event (END). Then, the sets of the above variables are standardized and unified in three data matrices (for the D-1, D and END day). Next, Factor Analysis is applied on each of the three data matrices, in order to reduce their dimensionality. 11 factors are revealed for each matrix accounting for about 85

The 60 cases are grouped into 5 clusters that reveal the main 3-dimensional evolution of the atmospheric structure over Europe favouring the occurrence of snowfall events in Athens. The main common characteristic among the 5 clusters is a N-NE surface flow over Athens during D day, associated with the presence of a low pressure system over Cyprus and an anticyclone over Europe. The differences refer mainly to: i) the exact position of the anticyclone center and the cold air mass and ii) the time evolution of the synoptic systems in the middle and the lower troposphere.