



Vb cyclones synchronized with the North Atlantic-/Arctic Oscillation

Michael Hofstätter (1) and Günter Blöschl (2)

(1) Central Institute of Meteorology and Geodynamics, Vienna, (2) Institute of Hydraulic Engineering and Water Resources Management, Vienna University of Technology; Centre for Water Resource Systems

Vb cyclones typically emerge in the Western Mediterranean and propagate to the Northeast into Central Europe. This study explores the temporal characteristics of Vb cyclone occurrence based on cyclone tracks identified at the atmospheric levels of Z700 and SLP, using JRA-55 reanalysis data for the period 1959-2015. The risk of Vb occurrence was significantly high in the 1960s and has remained at a lower level since then. Vb cyclones do not occur fully randomly according to a Poisson point process. Eleven well separated and distinct clusters as well as eleven hiatus periods are identified, with average occurrence rates of 21.5yr⁻¹ and 5.2yr⁻¹, respectively. During the event of Vb, the large scale atmospheric circulation is changed into a state favouring the development of successive Vb cyclones. Clustering is very prominent in the case of Genoan Vb cyclones in summer as well as those Vb cyclones developing over the Iberian Peninsula or the North African Coast in winter. Superposition of the polar and the subtropical jet stream over the Western Mediterranean is identified as a main feature at the onset of Vb cyclones. Vb cyclone occurrence appears to be synchronized with the NAO (at Z500) and AO (at Z1000). Clusters have occurred when both NAO and AO were negative. This relation applies to Western Mediterranean cyclones not following a Vb track as well, however to a much weaker extent. In contrast, Vb cyclone frequency was particularly low from 1988 to 1997 during a sustained positive phase of both NAO and AO.