

Extreme precipitation associated with Vb cyclones under climate change conditions

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The expression Vb pathway refers to cyclones crossing the Mediterranean region before reaching central Europe. The term was introduced by the German meteorologist van Bebber, who developed a classification for European cyclones based on their path (van Bebber, 1891). Vb cyclones are especially hazardous if they remain stationary over eastern central Europe, as they can transport humid air masses from the Mediterranean towards central Europe.

For this study an objective method has been developed to identify Vb cyclones associated with extreme precipitation from a cyclone catalogue generated by an automatic cyclone detection and tracking algorithm. The procedure has been tested using the ERA40 reanalysis datasets and was found to identify most historical hazardous Vb events. The algorithm was then applied to 3 ensemble simulations of the ECHAM5 MPIOM model forced with 20th century and A1B scenario greenhouse gas concentrations for the period 1960-2100. The simulations show a decrease in the total number of Vb cyclones. The decrease in the number of Vb cyclones associated with extreme precipitation also decreases but at a lower rate (i.e. the percentage of Vb cyclones associated with strong precipitation increases). At the same time, the precipitation amount linked to the most severe Vb cyclones increases.