EMS Annual Meeting Abstracts
Vol. 15, EMS2018-10-3, 2018

The relationship between wind and pressure fields over the broader Adriatic Region in CORDEX Climate Change Scenarios

Andreina Belušić (1), Ivan Güttler (2), Bodo Ahrens (3), Anika Obermann-Hellhund (3), Damjan Jelić (1), Otília Anna Megyeri (1), and Maja Telišman Prtenjak (1)

(1) University of Zagreb, Faculty of Science, Department of Geophysics, Zagreb, Croatia (abelusic@gfz.hr), (2) Meteorological and Hydrological Service (DHMZ), Zagreb, Croatia, (3) Institut für Atmosphäre und Umwelt, Goethe Universität Frankfurt, Frankfurt am Main, Germany

Near-surface wind and pressure data over the Adriatic region are examined in present-day and future climate conditions for two greenhouse gas scenarios (RCP4.5 and RCP8.5) in an ensemble of high-resolution (0.11˚) CORDEX simulations. We focus on regional daily wind over the Adriatic domain and and sub-daily features of well-known regional winds: Bora and Sirocco. The analysis reveals strong sensitivity of the climate change signal in the simulated wind flow to (i) the choice of the particular global climate model that provides boundary conditions and (ii) the analyzed locations over the Adriatic region. A multi-model ensemble-based assessment due to the intermodel spread in the results is required since the spread between the simulations is mostly comparable to the order of magnitude of the changes in ensemble median. Results for the 21st century projections indicate that the changes in synoptic activity have an impact on the wind field on the (sub)-daily time scale. The changes in the wind characteristics have been connected with weather type classification (12 categories) based on pressure pattern and humidity. We found a reduction in number of cyclonic Bora events and enhancement in number of Sirocco events in northern Adriatic in winter season, accompanied with an increase in pressure in the middle of 21st century. Overall the mean wind speed during Bora and Sirocco events is reduced, while the wind speed 99th percentile is enhanced in winter season. This could be due to the northward shift of winter cyclones whereas Sirocco expands along the northern Adriatic. In summer season we found an increase in number and mean wind speed of moderate NNE-ENE flows. Analysis implies more thermally-induced flows probably caused by weakening of the Azores High, consequently allowing the land breeze formation.