

EGU2020-7159

<https://doi.org/10.5194/egusphere-egu2020-7159>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Components of past cold mega-droughts and modern warm dry events in central Europe could interfere constructively in the future

Monica Ionita-Scholz¹, Mihai Dima², Viorica Nagavciuc^{1,3}, Patrick Scholz¹, and Gerrit Lohmann¹

¹Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Paleoclimate Dynamics, Bremerhaven, Germany (monica.ionita@awi.de)

²Faculty of Physics, Bucharest University, Bucharest, Romania

³Faculty of Forestry, Ștefan cel Mare University, Suceava, Romania

Mega-droughts are notable manifestations of the American Southwest, but not so much of the European climate. By using long-term hydrological and meteorological observations, as well as paleoclimate reconstructions, we show that central Europe has experienced much longer and severe droughts during the Spörer Minimum (~AD 1400 – 1500) and Dalton Minimum (~AD 1770 – 1850), than the ones observed during the 21st century. These two mega-droughts appear to be linked with a weak state of the Atlantic Meridional Overturning Circulation (AMOC) and enhanced winter atmospheric blocking activity over the British islands and western part of Europe, associated with reduced solar forcing and explosive volcanism. In contrast with these mega-droughts, present-day extreme dry events in Europe are mainly related to high temperature levels. Since numerical simulations indicate a future slowdown of AMOC in a globally warming world, we argue that these two forcing factors for droughts, weakening ocean circulation and temperature increase, could interfere constructively in the future. Consequently, this will potentially lead to an increase in the frequency of hot and dry summers, especially over the central part of Europe, posing enormous challenges to governments and society.