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Expected Change of the Key Agrometeorological Parameters in Central Europe between 2025 and 2050.

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Growth and development of field crops are connected to the environment via a combination of linear and non-linear responses and are strongly affected by the weather and climate conditions. Extreme weather events that are a natural cause of climate variability such as drought or heat waves can also have severe consequences for crops. In the same time key field operations (i.e. sowing and harvest) are significantly affected by the weather conditions and this factor also might play key role in the yield quantity and quality in a given season. There has been number of studies investigating the relationships between meteorological variables and crop yields (or other parameters e.g. quality) using field experiments, regional statistical data or crop models of various complexity. The same or slightly modified methodologies were used in the assessment of the climate change impacts on the crop production. However as most of the studies focused on the crop development and productivity, they paid only limited attention to changes in the frequency of potentially damaging events (e.g. heat stress days) or overall weather conditions that under real-world conditions play a significant role in determining profitability of a given season (e.g. rain presence/absence during optimum harvest dates).

The main aim of this analysis was to investigate effect of climate change on the selected agrometeorological characteristics with a pronounced influence on the overall site suitability for crop production including **i)** length of growing season and interannual variability of this parameter; **ii)** probability of occurrence of late/early frosts; **iii)** number days suitable for sowing during spring/autumn sowing windows ; **iv)** number of days suitable for harvesting during harvest period; **v)** snow cover presence/absence during days with Tmin $<$ -5˚C and -15˚C and **vi)** number of days during anthesis with daily maximum temperature over 32 and 35˚C.

The study area included key agricultural regions in north-eastern Austria (22 weather stations) and south-eastern part the Czech Republic (25 weather stations) with weather stations spread evenly across the territory between 150 up to 700 m a.s.l. The database included daily data of daily maximum and minimum air temperatures, precipitation and solar radiation that underwent thorough quality control and homogenization prior to its use using the AnClim software package. Based on the 1961-2000 observations 99 years long synthetic weather series were prepared by stochastic weather generator M&Rfi both for the present and future climate. In order to estimate the uncertainty in the future characteristics of the growing season a wide range of GCMs provided for the Fourth Assessment Report (4AR) was used, including ECHAM, HadCM, NCAR-PCM and CSIRO. The GCM based projections were based on the three SRES scenarios (i.e. A2 and B1) taking into account two levels of climate system sensitivity (CS). The values of the evaluated agrometeorological characteristics were calculated at the individual stations and were eventually interpolated over the territory depending on the parameter involved.

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