



## Development of seasonal climate indices for agriculture in Finland

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Seasonal climate forecast products offer useful information for farmers supporting them in planning and making decision in their management practices, such as crop choice, planting and harvesting time, water management, etc. Driven by the need of stakeholders for tailored seasonal forecast products we aimed to assess the applicability of seasonal forecast outputs in agriculture and to develop and test a set of seasonal climate indices for this sector in Finland. This work is part of the ERA4CS INDECIS project and contributes to the development of tailored climate information adapted to the needs of end-users.

The developed seasonal climate indices are based on the SEAS5 reforecast datasets provided by ECMWF. The parameters used are the 2-meter temperature, total precipitation, 10-meter wind speed and soil moisture forecasts. In order to improve the skill of the seasonal forecast data, the variables used were first bias adjusted and evaluated using the open source R package, climate4R, and the ERA5 reanalysis dataset as reference. The indices selected for agricultural applications were defined in cooperation with the Finnish end-users. Besides the widely applied indices, such as mean temperature, growing degree days, cold spell duration, total precipitation, mean and maximum wind speed, new sector-oriented indices have been also considered, i.e. growing season progress, soil moisture anomaly and dry spell. The seasonal indices were computed with various lead times (up to 3 months) from the reforecast data and evaluated against those calculated from ERA5 reanalysis. The performance of the indices was estimated using standard verification methodologies. The developed seasonal climate indices and the result of their reliability assessment are presented for discussion. This new seasonal forecast products tailored for agriculture are produced using real forecast data and delivered to stakeholders for testing purposes during summer 2019-spring 2020.