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Global Changes of Köppen-Trewartha Climate Zones Derived from RegCM CORDEX-CORE Simulations

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The analysis of climate patterns can be performed for each climatic variable separately or the data can be aggregated using e.g. a kind of climate classification. The advantage of such method, in our case Köppen-Trewartha classification, is putting together the most important variables, i.e. temperature and precipitation, considering not only annual means, but through monthly values the annual cycle as well. These classifications usually correspond to vegetation distribution in the sense that each climate type is dominated by one vegetation zone or eco-region. Climate classifications represent a convenient tool for the assessment and validation of climate models and for the analysis of simulated future climate changes.

The results of RegCM driven by selected CMIP5 simulations (mostly HadGEM, MPI and NorESM) produced within the CORDEX-CORE experiment over nine CORDEX domains are analysed. Validation based on ERA-Interim driven runs compared to CRU database (E-OBS for higher resolution in Europe) shows reasonable agreement in the Northern hemisphere with a tendency towards wetter and colder climate types in North America. Worse representation in Southern hemisphere is observed, mainly in Australia (lack of desert type). Through the analysis of the control experiments together with the performance of driving GCMs we can assess the sources of the biases in present conditions as well as the added value, which comes mainly from better representation of topography in higher resolution and thus appearance of mountaineous tundra type, as well as better representation of coastal regions and thus separating maritime subtypes. Finally, for two scenarios RCP8.5 and RCP2.6 we show the projections of the individual types' area changes, mainly decline of boreal and polar types, their shift to the higher latitudes and altitudes, increase of temperate, subtropical and dry climates. Magnitude, and in some cases (temperate climate) even the sign of change is largely dependent on the region and driving model.