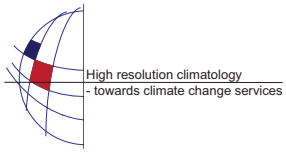
EMS Annual Meeting Abstracts
Vol. 7, EMS2010-1-4, 2010
10th EMS / 8th ECAC



The COST733cat software: An example on surface ozone concentrations in Central Europe

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In the framework of the COST733 Action "Harmonisation and Applications of Weather Types Classifications for European Regions" an evaluation of circulation type classifications (CTCs) for observed summer surface ozone concentrations is performed. First, the main characteristics of the circulation classification methodologies in terms of pattern frequencies are addressed using the baseline COST 733 catalogue (cat 2.0), a product of the new cost733class software. In a second step, the probabilistic Brier skill score is used to quantify the explanatory power of all classifications in terms of the maximum 8 hourly ozone concentrations exceeding the 120 μg/m3 threshold, this based on ozone concentrations from 130 Central European measurement stations. Evaluation results averaged over all stations indicate generally higher performance of CTCs with a higher number of types. Within the subset methodologies with similar number of types, there is no indication that a specific methodology (predefined thresholds, principal component analysis, leader algorithms and optimization algorithms) is superior in the overall skill score performance. This is further elaborated by exploring additional capabilities of the cost733class software. Sensitivity experiments are performed using different domain sizes, input variables, seasonally-based classifications and multiple-day sequencing. As an illustration, also conditioned (towards e.g. temperature) CTCs with various weights are derived and tested similarly. All results exploit a physical interpretation by adapting the environment-to-circulation approach, providing more detailed information on specific synoptic conditions prevailing on days with high surface ozone concentrations. Although this research cannot bring forward a favorable methodology for this kind of applications, the results presented here can provide a basic user support with respect to the cost733class software and the development of a more user- or application-specific CTC approach.