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On the effect of domain size on the relationship between circulation types and surface climate

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Circulation type classifications are often used for analysing the link between large-scale atmospheric circulation and surface climate (e.g. within statistical downscaling studies). Evaluation and comparison studies that have been performed within the framework of the EU COST Action 733 "Harmonisation and Applications of Weather Type Classifications for European regions" have shown that apart from methodological differences among varying classification concepts the relationship between circulation types and surface climate parameters is largely dependent on a number of „boundary conditions" that are independent of the respectively applied classification method (e.g. number of designated circulation types, atmospheric level to which the classification is applied).
In this contribution the effect of varying domain size on the relationship between circulation types and surface climate parameters is investigated on the basis of a set of automated circulation type classifications from the COST 733 database of circulation classfications.
To this end several circulation classifications (threshold based approaches, PCA-based methods, leader and optimization algorithms) have been applied iteratively to domains of differing size, each of them centered over a specific „target domain" of fixed size within the North-Atlantic European region. Based on the resulting circulation type catalogues and surface climate data for the respective „target domains" (daily gridded and station data for temperature and precipitation) varying evaluation metrics have been calculated in order to quantify the performance of each classification depending on the size of the domain used for classification.