Authors: Pavel KLAPKA, Marian HALÁS
Title: Conceptualising patterns of spatial flows: Five decades of advances in the definition and use of functional regions.
Abstract: Some fifty years in the development of ideas about the definition and use of functional regions are elaborated in this article, as an introduction to this Special Issue of the Moravian Geographical Reports. The conceptual basis for functional regions is discussed, initially in relation to region-organising interactions and their behavioural foundations. This paper presents an approach to functional regions which presumes that such regions objectively exist and that they are based on more or less tangible processes (however, a different view of regions is also briefly described). A typology of functional regions is presented and the development of methods for finding a definition of functional regions is discussed, as well as a typology for these methods. The final part of this article stresses the importance of functional regions in geographical research, and introduces some emerging new prospects in the study of functional regions.

Authors: Samo DROBNE, Mitja LAKNER
Title: Intramax and other objective functions: The case of Slovenia
Abstract: The use of different objective functions in hierarchical aggregation procedures is examined in this paper. Specifically, we analyse the use of the original Intramax objective function, the sum-of-flows objective function, the sum-of-proportions-to-intra-regional-flows objective function, Smart's weighted interaction index, the first and second CURDS weighted interaction indices, and Tolbert and Killian's interaction index. The results of the functional regionalisation have been evaluated by self-containment statistics, and they show that the use of the original Intramax procedure tends to delineate operationally the most persuasive and balanced regions that, regarding the intra-regional flows, homogeneously cover the analysed territory. The other objective functions give statistically better but operationally less suitable results. Functional regions modelled using the original Intramax procedure were compared to the regions at NUTS2 and NUTS3 levels, as well as to administrative units in Slovenia. We conclude that there are some promising directions for further research on functional regionalisation using hierarchical aggregation procedures.

Authors: Lucas Martínez-Bernabeu, José Manuel Casado-Díaz
Title: Delineating zones to increase geographical detail in individual response data files: An application to the Spanish 2011 Census of population
Abstract: Due to confidentiality considerations, the microdata available from the 2011 Spanish Census have been codified at a provincial (NUTS3) level except when the municipal (LAU 2) population exceeds 20,000 inhabitants (a requirement that is met by less than 5% of all municipalities). For the remainder of the municipalities within a given province, information is only provided for their classification in wide population intervals. These limitations, hampering territorially-focused socio-economic analyses, and more

specifically, those related to the labour market, are observed in many other countries. This article proposes and demonstrates an automatic procedure aimed at delineating a set of areas that meet such population requirements and that may be used to re-codify the geographic reference in these cases, thereby increasing the territorial detail at which individual information is available. The method aggregates municipalities into clusters based on the optimisation of a relevant objective function subject to a number of statistical constraints, and is implemented using evolutionary computation techniques. Clusters are defined to fit outer boundaries at the level of labour market areas.

Authors: Martin ERLEBACH, Martin TOMÁŠ, Petr TONEV
Title: A functional interaction approach to the definition of meso regions: The case of the Czech Republic
Abstract: The definition of functional meso regions for the territory of the Czech Republic is articulated in this article. Functional regions reflect horizontal interactions in space and are presented as a useful tool for various types of geographical analyses, and also for spatial planning, economic policy designs, etc. This paper attempts to add to the discussion on the need to delineate areal units at different hierarchical levels, and to understand the functional flows and spatial behaviours of the population in a given space. Three agglomerative methods are applied in the paper (the CURDS regionalisation algorithm, Intramax, and cluster analysis), and they have not been used previously in Czech geography for the delineation of functional meso regions. Existing functional regions at the micro-level, based on daily travel-to-work flows from the 2001 census, have served as the building blocks. The analyses have produced five regional systems at the meso level, based on daily labour commuting movements of the population. Basic statistics and a characterisation of these systems are provided in this paper.

Authors: Pavel KLAPKA, Marian HALÁS, Pavlína NETRDOVÁ, Vojtěch NOSEK
Title: The efficiency of areal units in spatial analysis: Assessing the performance of functional and administrative regions.
Abstract: An attempt to provide a procedure for the assessment of the efficiency of various regional systems for the purposes of spatial analysis is presented in this paper. Functional regions as well as approximated functional regions and the existing administrative regions in the Czech Republic are evaluated, as examples of regional systems to be compared and assessed. Functional regions and approximated functional regions are defined according to the adjusted third variant of the CURDS regionalisation algorithm, using the latest knowledge on the operation of the constraint function. The comparisons of individual regional systems are based on LISA maps and particularly on the assessment of regional variability, including the measures of internal homogeneity and external variability in the regional systems.

Authors: Michael OLSSON
Title: Functional regions in gravity models and accessibility measures

Abstract: Accessibility measures are useful for studies in Economic Geography. For example, accessibility to potential customers can be used in a study of firm behaviour. In such a study, it would be relevant to consider where potential customers live. This can be accomplished by splitting the accessibility measure into three parts: accessibility within the municipality, in other municipalities within the functional region, and in other regions. Many studies have proved this to be a very useful way to incorporate the spatial structure of the economy into economic studies. This paper deals with the issue of finding the distance-friction parameters needed to calculate such accessibility measures. There is a particular distance-friction parameter for interaction within the municipality, between municipalities within the functional region, and between regions. One way to find the distance-friction parameters is to solve a constrained gravity model, in which the functional regions are used as constraints. Both the models and the optimisation procedures in matrix form, and the Matlab programs used in the research are presented. The spatial constraints are gradually introduced into the models, which empowers the researcher to make such adjustments on their own. The data set used is available for downloading, and the reader can then try the models before creating a data set of their own.