At the end of the 19th century, the first investigations of urban climate were conducted in Berlin, Germany. These studies explored the climatic differences between urban and rural areas (Kratzer, 1937). The most famous book is that of Benedikt Pater Albert Kratzer, published in 1937 (Kratzer, 1937).

At the end of the 1960s, climate analysis was generally accepted. An important study of that time is the analysis of the urban heat island of Freiburg (Nübler, 1979), a city in complex terrain, where the first car traverses were carried out. The impacts of the regional wind system “Höllentäler” on the urban climate of Freiburg have been analysed several times (Ernst, 1995, Gross, 1988).

Starting in the 1970’s, the Municipal Organisation of the Ruhr Area (located in State of North Rhine-Westphalia, the most densely populated region of Germany) analysed the climate characteristics of several towns and cities (Stock and Beckräge, 1983, Stock, 1992). In the 1980s a comprehensive research project called “STADTKLIMA BAYERN” (Urban Climate of Bavaria) was performed in several cities in southern Germany, which made use of different investigation methods (e.g. thermal imaging, temporary stations, car traverses, vertical soundings; for details see Mayer, 1988). After the re-unification of Germany, several cities in the former German Democratic Republic were analysed in terms of urban climate using remote sensing (especially thermal imaging) and the construction of synthetic climate function maps (VDI, 1988; Helbig et al., 1999). A more recent investigation is the project STUTTGART 21 (Baumüller, 2000), which analysed the urban climate situation of the city of Stuttgart. In Berlin, another project (BERLIOZ) that focussed on the air pollution of Berlin and its surrounding suburbs (Becker et al., 2002; Corsmeier et al., 2002).

Nowadays, urban climatology is part of environmental meteorology under the aegis of the Expert Committee Environmental Meteorology (UMET) of the German Meteorological Society (www.dmg-ev.de). Several institutions of German universities carry out research projects concerning urban climate. The projects mainly focus on the urban heat island, general analysis of urban climate questions and problems, development of urban climate modelling, urban bioclimate and air pollution modelling, application methods of urban climate results for urban planning, physical modelling of urban climate, and climate change in urban areas (Mayer and Matzarakis, 2003). Emphasis is also given to the effects of cold air drainage flows (Weber and Kuttler, 2004), and country breezes (Barlag and Kuttler, 1991), and their effect on the urban climate conditions (Kuttler, 2004a, 2004b). In recent years, the importance of air pollutants and greenhouse gases (particularly particulate matter and CO2) in urban areas, as well as their temporal and spatial quantification in terms of climate change and urban air quality, is of interest to scientists (Jung et al. 2003; Helbig and Kuttler 2004). Beside the universities, several consulting companies offer their services in urban climatology and provide job opportunities for urban climatologists. They provide not only regular services but play a vital role in the development of models (Moldenhauer, 2004) and new methods (Röckle et al., 2003). Additionally, several working groups of the German Weather Service focus on research into urban climate (Jendritzky et al., 1994).

In recent years, the modelling of meso- and microscale conditions in urban areas in terms of the thermal and air pollution component of the urban climate has improved in quality. The models...
ENVI-met, METRAS, MISKAM, UBIKLIM and RayMan are good examples. Figure 1 illustrates the application of urban climate software tools (Matzarakis et al., 2000). A listing with explanations of these urban climate models and tools can be found on the International Urban Climate Website (www.stadtklima.de or www.urbanclimate.net). In Germany, the Internet and new media technologies are widely used to disseminate urban climate information. Examples are the International Urban Climate Website (www.stadtklima.de) (see the March, 2004 edition of this Newsletter) and the results from the STUTTGART21 investigations (www.stadtklima-stuttgart.de). Figure 2 shows an online calculation of the wind field of the city of Stuttgart.

In Germany the strong focus of urban climate research on applied urban climatology including human-biometeorology is partly because of the legal restriction that “climate and air pollution” issues have to be implemented in regional and urban planning projects (Matzarakis, 2001; Mayer and Matzarakis, 2003). Guidelines regarding the implementation of data on climate and pollution have been published by the German Engineering Society. An important development in this area is the Climate Booklet for Urban Development, published by the Interior Ministry of Baden-Württemberg (Figure 3). This booklet achieved a high degree of recognition as a decision-making and technical aid for zoning and planning both within and outside the state of Baden-Württemberg. The impetus for this booklet was an amendment to Germany’s existing Federal Building Law with its new requirements for consideration of climatic conditions in zoning and planning. The booklet has been translated into Japanese, Portuguese and English (www.staedtebaulicheklimafibel.de).

The Expert Committee on Environmental Meteorology organizes the METTOOLS conference every three years. From the last conference, which was held in October 2003 in Essen (METTOOLSV), a special issue of the Meteorologische Zeitschrift has been published. In addition, a special issue of PROMET, a journal of the German Weather Service, has been published in 2003. Together, these provide an overview of the state of environmental meteorology, including urban climatology, in Germany. The special issue is available online via the website of the German Meteorological Society (www.dmg-ev).

Future research aims to focus on the quantification of urban climate effects and their implications for environmental policy and climate change issues (Matzarakis et al., 1998; Mayer and Matzarakis, 2003). Traditional urban climate issues, such as the assessment of the effects of urban climate on humans in terms of heat stress or extreme events (Matzarakis, 2001) as well as air pollution assessment with human-biometeorological methods (Mayer et al., 2004) have been carried out. Using economic values to quantify urban effects will be important for policy purposes and be of considerable scientific interest.

On a global scale, the high degree of urbanisation will urge both scientists and planners to create cities with an improved climate and less air pollution at the meso- and micro-scales. In addition, it will be of interest how to make urban climate results available for urban planners and other professionals like architects. Emphasis will also be placed on the identification of optimised urban structures and low budget urban climate modifica-
tions in order to quantify and create ideal climatic living conditions in cities. In order to reduce the urban heat island the focus will also be set on urban micro climate modelling and urban planning modification.

The examples specified above are not necessarily complete. They reflect only the personal opinions and views of the author.

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