Berichte des Meteorologischen Instituts der Albert-Ludwigs-Universität Freiburg

Nr. 18

Helmut Mayer and Andreas Matzarakis (eds.)

5th Japanese-German Meeting on Urban Climatology

Albert-Ludwigs-University of Freiburg, Germany
October 2008

Freiburg, March 2009



ISSN 1435-618X

Copyright reserved, particularly rights of reproduction, distribution and translation

Self-publishing company of the Meteorological Institute, Albert-Ludwigs-University of Freiburg, Germany

Print: Printing office of the Albert-Ludwigs-University of Freiburg

Editor: Prof. Dr. Helmut Mayer

Meteorological Institute, Albert-Ludwigs-University of Frei-

burg

Werthmannstr. 10, D-79085 Freiburg, Germany Tel.: +49/761/203-3590; Fax: +49/761/203-3586

e-mail: meteo@meteo.uni-freiburg.de

Documentation: Ber. Meteor. Inst. Univ. Freiburg Nr. 18, 2009, 357 pp.

Editorial

In continuation of the well-known conference series "Japanese-German Meeting on Urban Climatology", the Meteorological Institute, Albert-Ludwigs-University of Freiburg, hosted the 5th Japanese-German Meeting on Urban Climatology. The 1st Japanese-German Meeting on Urban Climatology was held in Karlsruhe in September 1994, the 2nd in Kobe, Japan, in September 1997, the 3rd in Essen, Germany, in October 2000 and the 4th in November 2005 in Tsukuba and Nagano in Japan.

Under the subject "Applied urban climatology meets the challenge of climate change", the 5th Japanese-German Meeting on Urban Climatology took place from 6-8 October 2008 in the auditorium of the Albert-Ludwigs-University of Freiburg and included excursions to Basel (9 October 2008) and Stuttgart (10-11 October 2008). The excursions were organised by (i) the Institute of Meteorology, Climatology and Remote Sensing, Department of Environmental Sciences, Basel University (Switzerland) and (ii) the City of Stuttgart, Office of Environmental Protection, Department of Urban Climate, Germany.

105 scientists from 13 countries attended the 5th Japanese-German Meeting on Urban Climatology. Most were from Japan (42) and Germany (31) followed by Hong Kong (6), Korea (6), The Netherlands (5), Switzerland (5), Hungary (3), P.R. China (2) and Canada, Chile, New Zealand, Russia and Spain (by 1).

The oral and poster presentations at the auditorium of the Albert-Ludwigs-University of Freiburg were subdivided into the fields

- urban heat island,
- urban air flow,
- urban air pollution,
- blue and green,
- urban modelling,
- energy and fluxes,
- urban biometeorology,
- urban design and planning,
- impacts of climate change on urban climate.

All 85 scientists, who contributed to the 5th Japanese-German Meeting on Urban Climatology by an oral or a poster presentation, were invited to submit an extended abstract for the proceedings of this meeting.

In its present form, the report contains 51 extended abstracts. The authors have the sole responsibility for the contents of their extended abstracts.

Helmut Mayer and Andreas Matzarakis (eds.)

Contents

Editorial	3
M. MORIYAMA, K. NAKAYA, T. TANAKA: The analysis of urban heat island based on the comparison between present and potential natural air temperature	9
K. MASUMOTO: Urban heat island in OSAKA CITY - distribution of "NETTAIYA" and "MOUSHOBI" degree hours and characteristics of air temperature	15
C. REN, E. NG, X. AN: Review of urban heat island research in Hong Kong	21
N. TERUI, D. NARUMI, Y. SHIMODA: Study on the analysis of the cause of an urban heat island phenomenon through reproducing the past condition	27
J. UNGER, B. BALÁZS, T. GÀL: Simulation of urban heat island patterns applying satellite derived 2D surface parameters	33
H. TAKEBAYASHI, M. MORIYAMA: Characteristics of land and sea breeze by upper weather data analysis	39
Y. MASUDA, H. TAKEBAYASHI, M. MORIYAMA: Study on wind environment influenced by urban block properties in the street canyon	45
U. REUTER, R. KAPP, U. VOGT: The influence of pedestrian crossings over a city highway in Stuttgart on air pollution and noise	51
I. HARADA, D. KATAOKA, M. MIYAZAKI, T. ICHINOSE, H. KUZE: Measurement of atmospheric pollutants using differential optical absorption spectroscopy (DOAS) with a PC projector light source	57
D. NARUMI, Y. SHIMODA, A. KONDO: Effects of urban temperature rise on photochemical oxidant concentrations	65
A. MELKONYAN, W. KUTTLER: Analysis of predominantly non-meteorological influences on air pollution in North Rhine-Westphalia, Germany	73
K. SASAKI, M. UCHIDA, A. MOCHIDA, H. YOSHINO, A. KIKUCHI, Y. TABATA: Field measurement on thermal environment in and around biotope with pond and planted area	79
F. MATSUMOTO, T. ICHINOSE, Y. SHIRAKI, I. HARADA: Climatological study of mitigation on thermal environment by a large restoration of inner-city river - a case of Cheong-Gye Stream in Seoul City	87
S. KANEMOTO, Y. MATSUSHITA, M. MORIYAMA, H. TAKEBAYASHI: An observation study on the degradation of the heat island mitigation effect by damage to the grass in "Grass Parking"	95
F. MATSUMOTO, T. MIKAMI, Y. FUKUOKA: Effects of urban heat island on flowering dates of Somei Yoshino (cherry tree) - A case study in the wards area of Tokyo	101

M. NABESHIMA, M. NISHIOKA, M. NAKAO: Characteristics of the green coverage in the central urban area of Osaka City	107
Y. SHIRAKI, A. KONDOH, A. HIGUCHI: The effect of an urban environment on the precipitation	113
Y. YAMAZOE: Recent change of amount of vapor according to time in Tokyo	119
H. YODA, H. KITAYAMA, A. HAGISHIMA, K. TANAKA: Field measurements about cooling effect of a river in Fukuoka City	125
A. MOCHIDA, A. HAGISHIMA, J. TANIMOTO, T. MARUYAMA, A. KIKUCHI, Y. TABATA, Y. KIKUCHI: CFD Prediction of flow around car-shaped molds using vehicle canopy model	131
A. KIKUCHI, A. MOCHIDA, H. YOSHINO, H. WATANABE: Field measurement on thermal environment and turbulent diffusion of air pollutants in urban street canyons to investigate the influences of roadside trees and moving automobiles	139
Y. ASHIE, K. CHO, T. KONO: Large-scale CFD simulation of heat island phenomenon in Tokyo's 23 wards using the Earth Simulator	147
Y. KAWAMOTO, R. OOKA: Development of urban climate analysis model using MM5 incorporating an urban canopy model	151
H. SUGAWARA, K. NARITA, I. MISAKA, H. YOKOYAMA: Sensible heat flux measurement using scintillometry over urban area	159
K. MOURI, H. OBA, A. MOCHIDA, H. WATANABE, H. YISHINO: Zoning for the effective use of urban ventilation to mitigate urban warming based on heat balance analysis of urban space	165
A. YOSHIDA, Y. SHIMAZAKI, S. KINOSHITA: Estimation of thermal sensation in urban space	173
V. CHENG, E. NG, C. CHAN, B. GIVONI: An experiment of urban human thermal comfort in hot and humid sub-tropical city of Hong Kong under high density urban morphological conditions	179
Y. SHIRAKI, T. ICHINOSE, F. MATSUMOTO, J. LU, K. HANAKI: Attempt to evaluate thermal environment in the area with a lack of urban spatial information database	185
Y. GENCHI, T. IHARA, Y. OKANO: Analysis of disturbed sleep due to urban heat island phenomenon in 23 wards of Tokyo	191
H. MAYER, L. KATZSCHNER, M. BRUSE, C. DREY: Planning related investigations on human thermal comfort in urban quarters: joint research project KLIMES	197
J. HOLST, P. DOSTAL, F. IMBERY, H. MAYER: Influence of street design on the heat perception by citizens during hot summer days	205

H. MAYER, S. KUPPE, J. HOLST, F. IMBERY, A. MATZARAKIS: Human thermal comfort below the canopy of street trees on a typical Central European summer day	211
S. LENZHOLZER: Long-term microclimate experience in urban public spaces in The Netherlands	221
Á. GULYÁS, A. MATZARAKIS, J. UNGER: Differences in the thermal bioclimatic conditions on the urban and rural areas in a southern Hungarian city (Szeged)	229
G. JENDRITZKY, G. HAVENITH, R. de DEAR, P. WEIHS, E. BATCHVAROVA: <i>The uiversal thermal climate index UTCI</i>	235
N. KÁNTOR, Á. GULYÁS, L. ÉGERHÁZI, J. UNGER: Objective and subjective aspects of an urban square's human comfort – case study in Szeged (Hungary)	241
TP. LIN, A. MATZARAKIS, YW. LIU: Outdoor thermal comfort acceptable range and campus microclimate in hot-humid region	247
Y. YOSHIDA, T. ICHINOSE: Research and development of the information system for building-regional environmental evaluation	253
T. TANAKA, K. YAMAZAKI, M. MORIYAMA: Urban environmental climate map for supporting urban planning related works in local government: case study of Sakai City	259
E. NG, C. REN, L. KATZSCHNER: Urban climatic studies for hot and humid tropical coastal city of Hong Kong	265
A. MATZARAKIS, H. MAYER: Learning from the past: Urban climate studies in Munich	271
A. MATZARAKIS, H. MAYER: Dependence of urban climate on urban morphology	277
L.A. CÁRDENAS-JIRÓN, L. MORALES SALINA, E. GONZÁLES RODRIGUEZ: Measurements of solar irradiance flux on building envelope at university campus during spring season	283
C. ENDLER, A. MATZARAKIS: Climate and tourism potential in Freiburg	291
M. IWASAKI, K. YAMAZAKI, T. TANAKA, M. MORIYAMA, H. TAKEBAYASHI: Making urban environmental cimate map in Osaka City - recommendation map for urban planning	297
M. MORIYAMA, T. TANAKA: Example of Osaka region: urban environmental climate maps and plans for the future	303
S. HUTTNER, M. BRUSE, P. DOSTAL: Using ENVI-met to simulate the impact of global warming on the microclimate in Central European cities	307
W. KUTTLER, S. WEBER: Urban climate and global climate change - a case study of the 'Ruhr area', Germany	313

T. IHARA, K. YAMAGUCHI, Y. KIKEGAWA, Y. OHASHI, Y. ENDO, Y. GENCHI: Mitigation effects on urban heat islands and global warming by architectural cladding technologies	NCHI: 321
P.I. KONSTANTINOV: Simulation of temperature regime of the Moscow region in XXI century	329
F. THOMSEN, A. MATZARAKIS: Climate change and heating/cooling degree days in Freiburg	339
Program of the 5 th Japanese-German Meeting on Urban Climatology	345