Editorial

Challenges in Applied Human Biometeorology

Andreas Matzarakis 1,2,*, Sorin Cheval 3, Tzu-Ping Lin 4 and Oded Potchter 5

1 Research Centre Human Biometeorology, Deutscher Wetterdienst, Stefan-Meier-Str. 4, 79104 Freiburg, Germany
2 Chair of Environmental Meteorology, Institute of Earth and Environmental Sciences, Albert-Ludwigs-University Freiburg, 79085 Freiburg, Germany
3 National Meteorological Administration, 97 Bucharest-Ploiești Ave., RO013686 Bucharest, Romania; sorin.cheval@afahc.ro
4 Department of Architecture, National Cheng Kung University, No.1 University Rd., East Dist., Tainan 701, Taiwan; lin678@gmail.com
5 Department of Geography, Beit Berl College, Beit Berl 44905, Israel; potchter@post.tau.ac.il

* Correspondence: Andreas.Matzarakis@dwd.de; Tel.: +49-69-8062-9600

Facing the impacts of climate change and urbanization, adaptation and resilience to climate extremes have become important issues of global concern. A better understanding of the interaction between environmental changes and human health are particularly critical in both improving the built environment in urban areas, and establishing appropriate strategies on behalf of living quality and human welfare.

To discuss recent advances and future directions in applied human biometeorology, the “Symposium on Challenges in Applied Human Biometeorology”, organized by the Chair of Environmental Meteorology, Albert-Ludwigs-University Freiburg, in collaboration with Research Centre Human Biometeorology, German Meteorological Service, Freiburg, and the Society for the Promotion of Human Biometeorological Research in Germany was held at Albert-Ludwigs-University Freiburg on 2–3 March 2020. More than 90 experts, researchers, and science officers from over 35 nations participated in this symposium and gave keynote speeches, presenting the latest research results, and sharing their experiences in communicating science. The symposium demonstrated that to succeed in delivering services to society, we need an interdisciplinary scientific diagnosis, and the establishment of universal criteria to assist and guide more concrete implementations and professional communication, in order to boost the participation of young and junior research fellows. The symposium was supported with travel grants available for participants from less developed countries. The Tromp Foundation and International Association for Urban Climate supported several awards. The symposium was supported in addition by MDPI and the Society for the Promotion of Human–Biometeorological Research in Germany.

The symposium gathered not only international experts and researchers in different fields, but was well attended by young/junior generations interested in becoming more involved. As Andreas Matzarakis (it was his 60th birthday on that day) mentioned in his closing remarked, “Bringing in and helping more young people to join the field of human biometeorology is the most important challenge”. This addressed the inheritance of research ambitions, and also indicated the fact that research fellows are working diligently in different positions/organizations, and still keep within the circle of close academic connection.

This Special Issues addresses several aspects in human biometeorology, from basic research and questions, to complex and specific applications in human biometeorology.

The general aspects, which include the development of analysis methods, with different tools such as the R programing language, are presented [1], as are the emotional
associations that people have to common weather words and to selected terms that appear in weather communications [2].

Since the middle of the 20th century, it has been very common to analyze the effects of weather and climate on humans based on simple and complex indices in the context of heat and cold. Therefore, many indices exist, and can be applied for the general analysis of historical data, [3], recent climate [4,5], and climate change scenarios [6], but also for specific phenomena and cases [7], or specific events such as heat [8] or sport events [9]. New methods of quantification for the input data and the development of new methods (resp. new indices) show the necessity and importance of these kinds of research and studies [10,11].

The complex interactions between temperature and respiratory and ischemic heart mortalities, and their relationship to the thermal environment, are shown for Germany [12]. The heat exposure at screen-level, for an impact-based forecasting and warning service for heat-wave disasters, is also of interest [13]. Long-term temperature-related mortality in Helsinki in the urban and rural context was studied [14].

The connection of Lisbon’s urban climate and the local weather types by thermal period are worthy of investigation [15], as are spatial patterns of heat exposure in Tel Aviv [16]. A more complex approach for the combination of thermal environment and air quality conditions during running events is shown for southern Taiwan [17].

Finally, artificial intelligence methods are applied in “Importance Evaluation Based on Random Forest Algorithms: Insights into the Relationship between Negative Air Ions Variability and Environmental Factors in Urban Green Spaces” [19].

We thank the authors and reviewers for their contributions to this Special Issue, and hope that the articles will be helpful to scientist working in this emerging and growing field of human biometeorology.

Conflicts of Interest: The authors declare no conflict of interest

References
1. Charalampopoulos, I. The R Language as a Tool for Biometeorological Research. Atmosphere 2020, 11, 682, doi:10.3390/atmos11070682.
2. Stewart, A. Affective Normative Data for English Weather Words. Atmosphere 2020, 11, 860, doi:10.3390/atmos11080860.
3. Mistry, M. A High Spatiotemporal Resolution Global Gridded Dataset of Historical Human Discomfort Indices. Atmosphere 2020, 11, 835, doi:10.3390/atmos11080835.
4. Banc, Ş.; Croitoru, A.; David, N.; Scripcă, A. Changes Detected in Five Bioclimatic Indices in Large Romanian Cities over the Period 1961–2016. Atmosphere 2020, 11, 819, doi:10.3390/atmos11080819.
5. Zeng, D.; Wu, J.; Mu, Y.; Deng, M.; Wei, Y.; Sun, W. Spatial-Temporal Pattern Changes of UTCI in the China-Pakistan Economic Corridor in Recent 40 Years. Atmosphere 2020, 11, 856, doi:10.3390/atmos11080858.
6. Demiroglu, O.; Saygili-Araci, F.; Pacal, A.; Hall, C.; Kurnaz, M. Future Holiday Climate Index (HCI) Performance of Urban and Beach Destinations in the Mediterranean. Atmosphere 2020, 11, 911, doi:10.3390/atmos11090911.
7. Antoniadis, D.; Katsoulas, N.; Papanastasiou, D. Thermal Environment of Urban Schoolyards: Current and Future Design with Respect to Children’s Thermal Comfort. Atmosphere 2020, 11, 1144, doi:10.3390/atmos11111144.
8. Anjos, M.; Lopes, A.; Lucena, A.; Mendonça, F. Sea Breeze Front and Outdoor Thermal Comfort during Summer in Northeastern Brazil. Atmosphere 2020, 11, 1013, doi:10.3390/atmos11091013.
9. Wu, Y.; Graw, K.; Matzarakis, A. Comparison of Thermal Comfort between Sapporo and Tokyo—The Case of the Olympics 2020. Atmosphere 2020, 11, 444, doi:10.3390/atmos1105444.
10. Chen, Y.; Chen, W.; Chou, C.; Matzarakis, A. Concepts and New Implements for Modified Physiologically Equivalent Temperature. Atmosphere 2020, 11, 694, doi:10.3390/atmos11070694.
11. Staiger, H.; Matzarakis, A. Accuracy of Mean Radiant Temperature Derived from Active and Passive Radiometry. Atmosphere 2020, 11, 805, doi:10.3390/atmos11080805.
12. Schlegel, I.; Muthers, S.; Mucke, H.; Matzarakis, A. Comparison of Respiratory and Ischemic Heart Mortalities and their Relationship to the Thermal Environment. Atmosphere 2020, 11, 826, doi:10.3390/atmos11080826.
13. Yi, C.; Yang, H. Heat Exposure Information at Screen Level for an Impact-Based Forecasting and Warning Service for Heat-Wave Disasters. Atmosphere 2020, 11, 920, doi:10.3390/atmos11090920.
14. Ruuhela, R.; Votsis, A.; Kukkonen, J.; Jylhä, K.; Kankaanpää, S.; Perrels, A. Temperature-Related Mortality in Helsinki Compared to Its Surrounding Region Over Two Decades, with Special Emphasis on Intensive Heatwaves. *Atmosphere* 2021, 12, 46. https://doi.org/10.3390/atmos12010046

15. Reis, C.; Lopes, A.; Correia, E.; Fragoso, M. Local Weather Types by Thermal Periods: Deepening the Knowledge about Lisbon’s Urban Climate. *Atmosphere* 2020, 11, 840, doi:10.3390/atmos11080840.

16. Mandelmilch, M.; Ferenz, M.; Mandelmilch, N.; Potchter, O. Urban Spatial Patterns and Heat Exposure in the Mediterranean City of Tel Aviv. *Atmosphere* 2020, 11, 963, doi:10.3390/atmos11090963.

17. Yu, S.; Matzarakis, A.; Lin, T. A Study of the Thermal Environment and Air Quality in Hot–Humid Regions during Running Events in Southern Taiwan. *Atmosphere* 2020, 11, 1101, doi:10.3390/atmos11101101.

18. Vitt, R.; Laschewski, G.; Bais, A.; Diémoz, H.; Fountoulakis, I.; Siani, A.; Matzarakis, A. UV-Index Climatology for Europe Based on Satellite Data. *Atmosphere* 2020, 11, 727, doi:10.3390/atmos11070727.

19. Luo, L.; Sun, W.; Han, Y.; Zhang, W.; Liu, C.; Yin, S. Importance Evaluation Based on Random Forest Algorithms: Insights into the Relationship between Negative Air Ions Variability and Environmental Factors in Urban Green Spaces. *Atmosphere* 2020, 11, 706, doi:10.3390/atmos11070706.