

Preface

Radan Huth, Christoph Beck, Ole Einar Tveito

Angaben zur Veröffentlichung / Publication details:

Huth, Radan, Christoph Beck, and Ole Einar Tveito. 2010. "Preface." *Physics and Chemistry of the Earth, Parts A/B/C* 35 (9-12): 307–8. <https://doi.org/10.1016/j.pce.2010.06.005>.

Preface

This special issue brings a collection of papers that were presented at the conference “Advances in Weather and Circulation Type Classifications & Applications,” which took place in Krakow, Poland, October 22–25, 2008. It was organized by the Jagellonian University in Krakow and the regional branch of the Institute of Meteorology and Water Management. Great thanks go to the main local organizers, Zbigniew Ustrnul and Agnieszka Wypych, whose efforts and friendliness contributed considerably to the success of the conference.

The event was organized as a mid-term conference of the COST733 Action “Harmonisation and Applications of Weather Type Classifications for European Regions”. This COST Action is a five year activity, running in 2005–2010, which has involved more than 60 scientists from 23 countries participating in the Action. Classifications of circulation patterns are in the centre of its attention. The main objective of the Action is to achieve a general numerical method for assessing, comparing and classifying typical synoptic situations in the European regions. In order to achieve this rather ambitious goal, the action will also enhance the knowledge on linkages between the atmospheric circulation, weather, climate, and environmental variables by identifying suitable criteria/indicators to weather types, analysing the strengths and weaknesses of individual classification methods for different applications, and providing tools for comparison and evaluation of different circulation classifications.

Thirty-six oral presentations, of which three were keynote introductory talks and eight were solicited, and 43 posters were presented at the conference. They covered a truly wide range of studies in (not only) atmospheric sciences where classifications play an important role. The topics ranged from the theory, methodology, and development of classifications through their evaluation to applications in climatology, meteorology, air pollution and human health, hydrology, and even more specific and ‘exotic’ areas. Although the main emphasis was put on classifications of circulation patterns, classifications of other kinds found their place in the scientific programme as well.

Fifty papers based on the presentations at the conference were submitted, of which 29 have finally been published in this issue. Given that several other conference contributions have been published elsewhere in the meantime, one can see that a large portion of conference presentations found their way to scientific journals.

In this editorial, we do not present a review of the field of classifications and their applications in the atmospheric sciences because this subject has been reviewed in sufficient detail recently (Huth et al., 2008). Instead, we provide a brief introduction into the content of the issue.

The special issue opens by the keynote paper by Jolliffe and Philipp (2010), presenting several ideas in cluster analysis, which recently emerged in statistical literature, that have potential for being applied in the atmospheric sciences. Several theoretical and methodological papers follow: Richman and Adrianto (2010) present the kernel principal component analysis to the climatological and meteorological community and apply it to classification and regionalization of sea level pressure. Reusch (2010) presents several examples to illustrate the potential of self organizing maps (SOMs), while Guentchev and Winkler (2010) introduce the concept of a two-tier classification. Spekat et al. (2010) develop a classification that build the circulation types on their impacts on climatic variables.

The following five papers are devoted to the database of classifications of circulation patterns that has been developed within the COST733 Action. The database is described in detail by Philipp et al. (2010), while its in-depth evaluation is provided by Beck and Philipp (2010). Huth (2010), Tveito (2010), and Schiemann and Frei (2010) present three different approaches to a climatological evaluation of the classifications with respect to temperature and precipitation.

Perhaps the largest portion of papers is devoted to applications of classifications in climatology and meteorology – in two fields that cannot be strictly distinguished from each other. The introduction to this part is provided by the keynote paper by Jacobbeit (2010), reviewing climatological applications of classifications and stressing the need for a proper use of classification methods (and multivariate statistical methods in general). Cahynová and Huth (2010) discuss relationships between circulation classifications and climate variability and trends. Ustrnul et al. (2010) investigate effects of circulation types on temperature while Casado et al. (2010), Lupikasz (2010), and Twardosz (2010) deal with circulation effects on precipitation, in the latter paper even on an hourly scale. Kotarba (2010) analyzes relationships between circulation types and cloudiness determined from satellites; Pineda et al. (2010) examine a much more localized phenomenon, lightnings, in relation to circulation types. Kašpar and Müller (2010) and Müller and Kašpar (2010) study synoptic-scale patterns and the role they play in moisture transport and production of heavy rains. The climatological part of the issue is finalized by the classification of deep cyclones by Bielec-Bakowska (2010).

The keynote paper by Bárdossy (2010) reviews the applications of circulation classifications in hydrology. Another example of hydrological application, this time specific to droughts, is brought by Fleig et al. (2010). Three following papers, Leśniok et al., Stefan et al. (2010), and Lykoudis et al. (2010), examine from different points of view atmospheric pollution and the degree to which it

is determined by atmospheric circulation. A specific application of air-mass classifications in studies of human health and mortality is presented by *Kyselý and Huth (2010)*. Finally, *Kassomenos (2010)* and *Rasilla et al. (2010)* demonstrate the utility of circulation classifications in the characterization of the occurrence of wild fires.

This special issue could not appear without a substantial help of individual reviewers of the papers. It is our pleasure to thank to all of them (in alphabetical order): C. Achberger, E. Agosta, C. Anagnostopoulou, L. Axell, A. Bardossy, J. Bartholy, A. Bartzokas, P. Beggs, R. Benestad, P. Bissolli, H. Björnsson, J.B. Bremnes, A. Buis-hand, M. Cahynová, M.J. Casado, J. Cassano, H. Celle-Jeanton, U. Dayan, L. de la Torre, M. Demuzere, F. Doblas-Reyes, M. Dolinar, M. Donat, M. Erpicum, P. Esteban, R. Fealy, D. Fereday, C. Goodess, L. Gottschalk, S. Greene, A. Hannachi, I. Hanssen-Bauer, M. Hart, P. Hope, J. Jaagus, J. Jacobeit, I. Jolliffe, S. Jourdain, P. Kassomenos, F. Kreienkamp, T. Krennert, J. Kyselý, H. Lange, I. Levy, M.-L. Linder-son, C. Lolis, S. Lykoudis, N. MacDonald, H. Mächel, P. Maheras, L. Makra, J. Martin-Vide, T. Nanni, Ø. Nordli, A. Palazoglu, M. Pasqui, A. Philipp, R. Pongracz, P. Post, C. Prudhomme, C. Ramis, A. Ramos, D. Rasilla, D. Reusch, M. Richman, L. Rouil, J. Saenz, R. Schiemann, A. Serrano, A. Spekat, K. Stahl, S. Stefan, J. Sweeney, K. Tolika, R. Tomozeiu, R. Trigo, Z. Ustrnul, S. Vicente-Serrano, P.C. Werner, J. Wibig, J. Winkler.

Classifications are one of major tools used in synoptic climatology. We believe that this special issue well documents the variety of methodological approaches as well as their utility in a wide range of applications, and that readers will enjoy it.

References

- Bárdossy, A., 2010. Atmospheric circulation pattern classifications for South-West Germany using hydrological variables. *Phys. Chem. Earth* 35, 498–506.
- Beck, C., Philipp, A., 2010. Evaluation and comparison of circulation type classifications for the European domain. *Phys. Chem. Earth* 35, 374–387.
- Bielec-Bakowska, Z., 2010. A classification of deep cyclones over Poland (1971–2000). *Phys. Chem. Earth* 35, 491–497.
- Cahynová, M., Huth, R., 2010. Circulation vs. climatic changes over the Czech Republic: a comprehensive study based on the COST733 database of atmospheric circulation classifications. *Phys. Chem. Earth* 35, 422–428.
- Casado, M.J., Pastor, M.A., Doblas-Reyes, F.J., 2010. Links between circulation types and precipitation over Spain. *Phys. Chem. Earth* 35, 437–447.
- Fleig, A.K., Tallaksen, L.M., Hisdal, H., Stahl, K., Hannah, D.M., 2010. Inter-comparison of weather and circulation type classifications for hydrological drought development. *Phys. Chem. Earth* 35, 507–515.
- Guentchev, G.S., Winkler, J.A., 2010. A two-tier atmospheric circulation classification scheme for the European–North Atlantic region. *Phys. Chem. Earth* 35, 341–351.
- Huth, R., 2010. Synoptic-climatological applicability of circulation classifications from the COST733 collection: first results. *Phys. Chem. Earth* 35, 388–394.
- Huth, R., Beck, C., Philipp, A., Demuzere, M., Ustrnul, Z., Cahynová, M., Kyselý, J., Tveito, O.E., 2008. Classifications of atmospheric circulation patterns: recent advances and applications. *Trends and Directions in Climate Research*, vol. 1146. *Ann. N. York Acad. Sci.*, pp. 105–152.
- Jacobbeit, J., 2010. Classifications in climate research. *Phys. Chem. Earth* 35, 411–421.
- Jolliffe, I.T., Philipp, A., 2010. Some recent developments in cluster analysis. *Phys. Chem. Earth* 35, 309–315.
- Kašpar, M., Müller, M., 2010. Variants of synoptic-scale patterns inducing heavy rains in the Czech Republic. *Phys. Chem. Earth* 35, 477–483.
- Kassomenos, P., 2010. Synoptic circulation control on wild fire occurrence. *Phys. Chem. Earth* 35, 544–552.
- Kotarba, A.Z., 2010. Satellite-derived cloud climatology over high elevation areas based on circulation types: a 2007 analysis of the Tatra Mountains. *Phys. Chem. Earth* 35, 462–468.
- Kyselý, J., Huth, R., 2010. Relationships between summer air masses and mortality in Seoul: comparison of weather-type classifications. *Phys. Chem. Earth* 35, 536–543.
- Leśniok, M., Małarzewski, Ł., Niedźwiedz, T., 2010. Classification of circulation types for Southern Poland with an application to air pollution concentration in Upper Silesia. *Phys. Chem. Earth* 35, 516–522.
- Lupikasza, E., 2010. Relationships between occurrence of high precipitation and atmospheric circulation in Poland using different classifications of circulation types. *Phys. Chem. Earth* 35, 448–455.
- Lykoudis, S.P., Kostopoulou, E., Argiriou, A.A., 2010. Stable isotopic signature of precipitation under various synoptic classifications. *Phys. Chem. Earth* 35, 530–535.
- Müller, M., Kašpar, M., 2010. Quantitative aspect in circulation type classifications – an example based on evaluation of moisture flux anomalies. *Phys. Chem. Earth* 35, 484–490.
- Philipp, A., Bartholy, J., Beck, C., Erpicum, M., Esteban, P., Fettweis, X., Huth, R., James, P., Jourdain, S., Kreienkamp, F., Krennert, T., Lykoudis, S., Michalides, S.C., Pianko-Kluczynska, K., Post, P., Rasilla Álvarez, D., Schiemann, R., Spekat, A., Tymvios, F.S., 2010. Cost733cat – a database of weather and circulation type classifications. *Phys. Chem. Earth* 35, 360–373.
- Pineda, N., Esteban, P., Trapero, L., Soler, X., Beck, C., 2010. Circulation types related to lightning activity over Catalonia and the Principality of Andorra. *Phys. Chem. Earth* 35, 469–476.
- Rasilla, D.F., García-Codron, J.C., Carracedo, V., Diego, C., 2010. Circulation patterns, wildfire risk and wildfire occurrence in continental Spain. *Phys. Chem. Earth* 35, 553–560.
- Reusch, D.B., 2010. Nonlinear climatology and paleoclimatology: capturing patterns of variability and change with self-organizing maps. *Phys. Chem. Earth* 35, 329–340.
- Richman, M.B., Adrianto, I., 2010. Classification and regionalization through kernel principal component analysis. *Phys. Chem. Earth* 35, 316–328.
- Schiemann, R., Frei, C., 2010. How to quantify the resolution of surface climate by circulation types: an example for Alpine precipitation. *Phys. Chem. Earth* 35, 403–410.
- Spekat, A., Kreienkamp, F., Enke, W., 2010. An impact-oriented classification method for atmospheric patterns. *Phys. Chem. Earth* 35, 352–359.
- Stefan, S., Necula, C., Georgescu, F., 2010. Analysis of long-range transport of particulate matters in connection with air circulation over Central and Eastern part of Europe. *Phys. Chem. Earth* 35, 523–529.
- Tveito, O.E., 2010. An assessment of circulation type classifications for precipitation distribution in Norway. *Phys. Chem. Earth* 35, 395–402.
- Twardosz, R., 2010. An analysis of diurnal variations of heavy hourly precipitation in Kraków using a classification of circulation types of southern Poland. *Phys. Chem. Earth* 35, 456–461.
- Ustrnul, Z., Czekierda, D., Wypych, A., 2010. Extreme values of air temperature in Poland according to different atmospheric circulation classifications. *Phys. Chem. Earth* 35, 429–436.

Managing Guest Editor

Radan Huth

Institute of Atmospheric Physics, Prague,

Czech Republic

E-mail address: huth@ufa.cas.cz

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Augsburg, Germany

Guest Editor

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