

Space-Time Dynamics of Extreme Floods

S^PA^TE

Edition 5

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Newsletter

www.spate-floods.com

Three more years of funding for SPATE

Dear colleagues and followers of the SPATE research unit,

We can start the New Year with wonderful news: the Deutsche Forschungsgemeinschaft (DFG) decided on their session of the senate at December 6th, 2019, that our research unit will be funded for three more years. In particular, all seven subprojects were evaluated as having done very good work in the first phase of funding and will continue their work until May 2023. With this evaluation, we will start even more enthusiastically with our plans for next year. We developed six task forces that will pool the specific competences of experts from several subprojects to summarize the results of the first phase and to transfer their results into methodological developments in the second phase. Topics range from deterministic modelling of extreme floods to new statistical methodologies to specify upper tails. But not only we will continue our research, but we are also very happy that many of our PhD students from the first phase will support us as senior researchers in the second phase. Additionally, some of our former senior researchers now become (co-)project leaders.

In this edition we will present the newest research results and give some insight in the plans for future.

We hope you find some interesting research in this newsletter for you!

On behalf of the whole SPATE-project, with kind regards,

Svenja Fischer and Andreas Schumann

Members of the SPATE-project

Dr. Svenja Fischer, Prof. Dr. Andreas Schumann, Philipp Bühler
Subproject 1 (Ruhr-University Bochum)

Prof. Dr. Bodo Ahrens, Dr. Cristina Primo Ramos, Amelie Krug
Subproject 2 (Goethe-University Frankfurt)

Dr. Sergiy Vorogushyn, Prof. Dr. Bruno Merz, Dr. Heidi Kreibich, Dr. Björn Guse, Sophie Ullrich, Luzie Wietzke
Subproject 3 (GFZ Potsdam)

Prof. Dr. Ralf Merz, Larisa Tarasova
Subproject 4 (UFZ Halle/Saale)

Prof. Dr. András Bárdossy, Dr. Jochen Seidel, Faizan Anwar
Subproject 5 (University of Stuttgart)

Prof. Dr. Günter Blöschl, Dr. Andrea Kiss, David Lun
Subproject 6 (Technical University of Vienna)

Prof. Dr. Uwe Haberlandt, Dr. Anne Fangmann, Ross Pidoto, Luisa Thiele
Subproject 7 (Leibniz University Hannover)

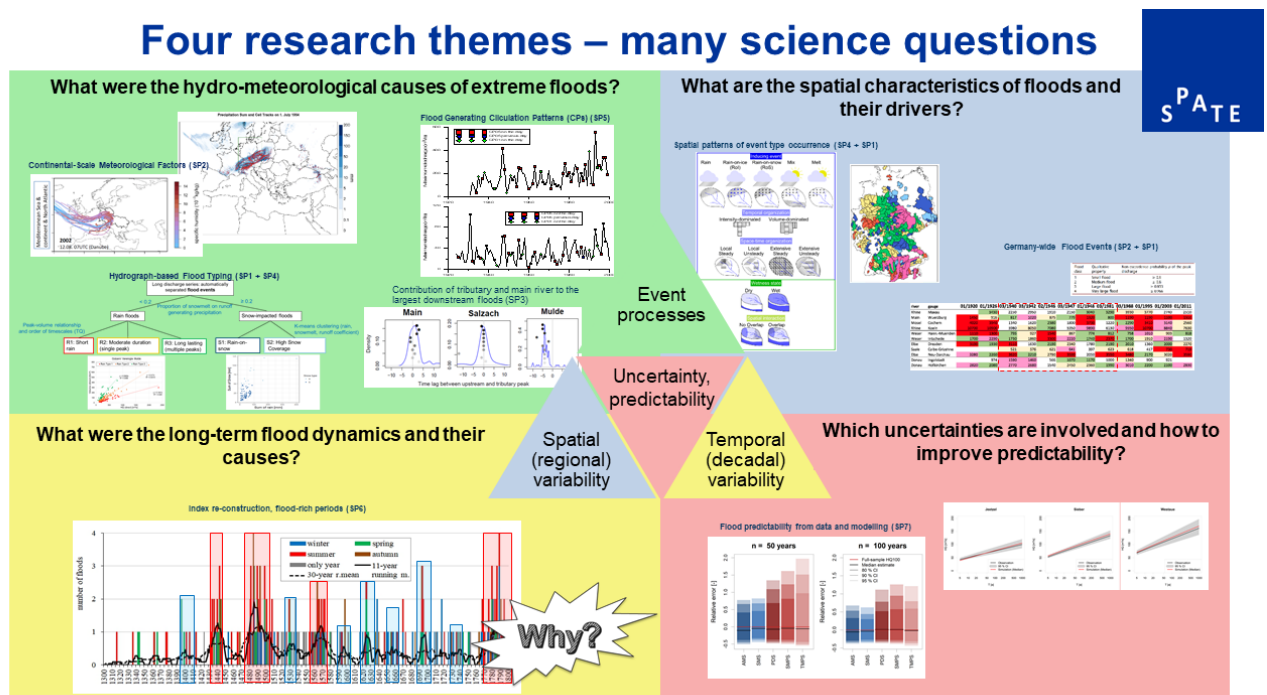


Members of the research unit SPATE at the first SPATE-symposium in Halle

Evaluation of SPATE for the second phase of funding

At October 2nd 2019, the SPATE research unit presented their work to reviewers and the DFG. Six international experts in hydrology and especially on floods came to Bochum to evaluate the work of the first phase of funding as well as the proposals for the second period. The day started with a presentation by our spokesman, Andreas Schumann, who gave an overview of the results so far, our cooperation, publications and future plans as well as the development of our early career scientists and the support for all female researchers. Highlights of each project were shown as well as the most significant joint works in each of the four cluster themed groups: events, space, time and uncertainty. For events, SP2 evaluated very interesting meteorological factors responsible for Central European floods based on the new Re-analysis data set SPATE-4DAS. Together with the circulation patterns of SP5, flood generating processes could be identified that were connected to the flood typologies of SP1 and SP4. For the space cluster SP4 and SP1 used these typologies to identify spatial patterns of flood types, while SP1 and SP2 used long-term data on snowmelt to describe the nature of Germany-wide floods. “Long-term” was also the focus of the time cluster, where historical time series were evaluated concerning flood-rich and flood-poor periods by SP6. Uncertainty of the given models was investigated by SP7. The reviewers asked many questions on the results and future plans and a fruitful discussion took place. Many additional input was given by the reviewers, e.g. possible simulation of rainfall patterns. In the afternoon, each of our subprojects presented their results and future work in a detailed poster. Here, discussions with the reviewers and our PhD- and PostDoc-Students were possible and greatly adopted. The highlights of our first funding phase are available at our website www.spate-floods.com.

Four research themes – many science questions



Offered professorships, honours, awards

Larisa Tarasova (SP4), Stefano Basso (SP4), Carine Poncelet and Ralf Merz (SP4) have received the 2018 WRR Editors' Choice Award for the publication: Tarasova, L., S. Basso, C. Poncelet, and R. Merz. "Exploring controls on rainfall-runoff events: 2. Regional patterns and spatial controls of event characteristics in Germany." *Water Resources Research* 54, no. 10 (2018): 7688-7710.

The article "Timescale-based flood typing to estimate temporal changes in flood frequencies" by Svenja Fischer, Andreas Schumann and Philipp Bühler (all SP1) was selected as featured article by the editors of the *Hydrological Sciences* journal and is made free-to-view at <https://think.taylorandfrancis.com/featured-article-hydrological-sciences/>.

Publications

1) Publications in journals

Published since last newsletter:

Di Baldassarre, G., Sivapalan, M., Rusca, M., Cudennec, C., Garcia, M., **Kreibich, H. (SP3)**, Konar, M., Mondino, E., Mård, J., Pande, S., Sanderson, M. R., Tian, F., **Viglione, A. (SP6)**, Wei, J., Wei, Y., Yu, D. J., Srinivasan, V., **Blöschl, G. (SP6)** (2019): Socio-hydrology: Scientific Challenges in Addressing a Societal Grand Challenge. *Water Resources Research*, doi:10.1029/2018WR023901.

Bertola, M., **Viglione, A. (SP6)**, and **Blöschl, G. (SP6)** (2019): Informed attribution of flood changes to decadal variation of atmospheric, catchment and river drivers in Upper Austria, *Journal of Hydrology*, 577, doi:10.1016/j.jhydrol.2019.123919.

Blöschl, G. (SP6), Hall, J., **Viglione, A. (SP6)**, Perdigão, R.A.P., Parajka, J., **Merz, B. (SP3)**, **Lun, D. (SP6)**, Arheimer, B., Aronica, G.T., Bilbashi, A., Boháč M., Bonacci, O., Borga, M., Čanjevac, I., Castellarin, A., G.B. Chirico, P. Claps, N. Frolova, D. Ganora, L. Gorbachova, A. Gül, J. Hannaford, S. Harrigan, M. Kireeva, **A. Kiss (SP6)**, T.R. Kjeldsen, S. Kohnová, J.J. Koskela, O. Ledvinka, N. Macdonald, M. Mavrova-Guirguinova, L. Mediero, **R. Merz (SP4)**, P. Molnar, A. Montanari, C. Murphy, M. Osuch, V. Ovcharuk, I. Radevski, J.L. Salinas, E. Sauquet, M. Šraj, J. Szolgay, E. Volpi, Wilson, D., Zaimi, K., Živković, N. (2019): Changing climate both increases and decreases European river floods. *Nature*; published online: <https://doi.org/10.1038>

Brázdil, R., **Kiss, A. (SP6)**, Luterbacher, J., Nash, D. (2019): The extreme drought of 1842 in Europe as described by both documentary data and instrumental measurements. *Climate of the Past* 15, 1861-1884.

Fischer, S., Schumann, A., and Bühler, P. (all SP1) (2019): Timescale-based flood typing to estimate temporal changes in flood frequencies. *Hydrological Sciences Journal* 64(15).

Kelemen, F.D., **Primo, C. (SP2)**, Feldmann, H., and **Ahrens, B. (SP2)** (2019): Added value of atmosphere-ocean coupling in a century-long regional climate simulation. *Atmosphere*, 10(9), 537. <https://doi.org/10.3390/atmos10090537>

Kiss, A. (SP6) (2019): Droughts, dry spells and low water levels in late medieval Hungary (and Slavonia) III: Potential dry spells and the drought of (1516-)1517. *Journal of Environmental Geography* 12/3-4, 53-67.

Pothapakula, P.K., **Primo Ramos, C., and Ahrens, B. (both SP2)** (2019): Quantification of information exchange in idealized and climate system applications. *Entropy*, 21(11), 1094. <https://doi.org/10.3390/e21111094>

Primo, C. (SP2), Kelemen, F.D., Feldmann, H., and **Ahrens, B. (SP2)** (2019): A regional atmosphere-ocean climate system model (CCLMv5.0clm7-NEMOv3.3-NEMOv3.6) over Europe including three marginal seas: on its stability and performance. *Geosci. Model Dev.*, 12, 5077–5095. <https://doi.org/10.5194/gmd-12-5077-2019> (OA)

2) Publications in anthologies, book contributions and chapters

Brázdil, R., **Kiss, A. (SP6)**, Reznickova, L., Barriendos, M. (2019): Droughts in historical times in Europe, as derived from documentary evidence. In: Herget, J., Fontana, A. (eds.): *Palaeohydrology - traces, tracks and trails of extreme events*. Springer 2019, pp. 65-96.

Fischer, S., Schumann, A., (both SP1) and Fried, R. (2019): Hochwasser: Nahe am Wasser gebaut? In: Krämer, W., and Weihs, C., (eds.): *Faszination Statistik - Einblicke in aktuelle Forschungsfragen und Erkenntnisse*, Springer.

Kiss, A. (SP6), Pribyl, K. (eds.) (2019): *The Dance of Death in Late Medieval and Renaissance Europe: Environmental Stress, Mortality and Social Response*. Routledge, 272 p.

Kiss, A. (SP6), Piti, F., Sebők, F., Teiszler, É. (2019): Food crises in fourteenth-century Hungary: indicators, causes and case studies. In: Bauch, M., Schenk, G. (eds). *The Crisis of the 14th Century. Teleconnections between Environmental and Societal Change? Das Mittelalter. Perspektiven mediävistischer Forschung* 13, De Gruyter 2020, pp. 100-129.

Kiss, A. (SP6) (2019): A dynamic interplay of weather, biological factors and socio-economic interactions: late 15th-century-early 16th-century crises in Hungary. In: Kiss, A., Pribyl, K. (eds.): *The Dance of Death in late medieval and Renaissance Europe: Environmental stress, mortality and social response*. Routledge, pp. 125-145.

Talks

1) Invited talks:

Ahrens, B. (SP2): Coupled Regional Climate Modelling - Added Value? Kolloquium, Leibniz-Institut für Ostseeforschung IOW, Warnemünde, Germany, 11th Dec. 2019.

Haberlandt, U. (SP7) and Shehu, B.: Reconstruction of space-time precipitation fields for data poor periods using information from data rich periods. STAHy 2019 International Workshop, Nanjing, China, 19-20 October 2019.

Kiss, A. (SP6): Floods in the medieval Carpathian Basin. Annual conference (Jahrestagung) of the GWZO entitled „Mensch – Umwelt – Katastrophe. Wahrnehmung und Wirkungsgeschichte im östlichen Europa von der Spätantike bis in die Gegenwart“. Leibniz-Institut für Geschichte und Kultur des östlichen Europa (GWZO), Leipzig, Germany, 17-18 June 2019.

Kiss, A. (SP6): “Beyond the bridgemasters’ accounts” Winters, weather extremes, Danube high and low flows in the Pressburg accounts: the 15th-16th centuries. CRIAS-PAGES (scientific) workshop, Leipzig, Germany, 7-8 October 2019.

Kiss, A. (SP6): Working with historical droughts in Central Europe: Sources, reconstructions and methodological challenges. Scientific workshop entitled “WATERMARKS - Interdisciplinary Workshop on Drought and Adaptation during the Little Ice Age (1300 – 1850 AD).” Barcelona, Spain, 24-25 October 2019.

2) Other talks on conferences

Ahrens, B. (SP2): On recent advances and open issues in coupled systems modelling. Talk at 6th Med-CORDEX Workshop, Toulouse, France, 25--29th Nov. 2019

Fischer, S. (SP1): A stochastic event generator considering different flood types. StaHy International Workshop 2019, Nanjing, China, 19-20 October 2019.

Kiss, A.(SP6), Blöschl, G. (SP6): Floods in the medieval Carpathian Basin. 27th IUGG General Assembly in Montreal, July 2019.

Kiss, A. (SP6): Consequence or coincidence? Droughts, “pagan” attacks and locust invasions in medieval Hungary. “Boundaries in/of Environmental History” Biannual conference of the European Society of Environmental History (ESEH). Tallinn, Estonia, 21-25 August 2019.

Primo, C. (SP2), Kelemen, F.D., Feldmann, H. and Ahrens, B. (SP2): A Regional Climate Atmosphere-Ocean System over Europe for the 20th Century and its Impact Describing Regional Climate Change. EMS Annual Meeting 2019, Copenhagen, Denmark.

Purr, C., E. Brisson, B. Ahrens (SP2): Temperature scaling of convective cell characteristics in present and future conditions. Talk at 6th Med-CORDEX Workshop, Toulouse, France, 25--29 Nov. 2019.

Tarasova, L. (SP4), Basso, S. (SP4), Viglione, A., Merz R. (SP4): Ingredients of Runoff Events: Regional Differences between Small and Large Floods. System Risk Conference, Potsdam, Germany, 17-19 September 2019.

Ullrich, S. (SP3), Hegnauer, M., Dung, N.V., de Bruijn, K.M., Merz, B. (SP3), Kwadijk, J. and Vorogushyn, S. (SP3): Comparative Evaluation of Two Types of Stochastic Weather Generators coupled to Hydrological Models for Peak Discharge Estimation. 27th IUGG General Assembly in Montreal, July 2019.

3) Poster

Guse, B. (SP3), Wietzke, L. (SP3), Viglione, A. (SP6), Merz, B. (SP3) and Vorogushyn, S. (SP3): What is the Role of Flood Wave Superposition for the Severity of Extreme Floods. 27th IUGG General Assembly in Montreal, July 2019.

Guse, B. (SP3), Merz, B. (SP3), Wietzke, L. (SP3), Ullrich, S. (SP3), Viglione, A. (SP6) and Vorogushyn, S. (SP3): Role of flood wave superposition for the severity of large floods. System-Risk Conference 2019, Flood hazard and risk: Interactions, temporal changes and system approaches, Potsdam, Germany, 17-19 September 2019.

Krug, A. (SP2), Pothapakula, P.K., Primo, C. (SP2), Ahrens, B. (SP2): Water vapour source regions of extreme flood events in Central Europe. EMS Annual Meeting 2019, Copenhagen, Denmark, 07-11 September 2019.

Lun, D. (SP6), Fischer, S. (SP1), Viglione, A. (SP6), Blöschl, G.(SP6): Detection of flood-rich and flood-poor periods in hydrological time series, 27th IUGG General Assembly in Montreal, July 2019.

Metin, A.D., Dung, N.V., Schröter, K., Guse, B. (SP3), Kreibich, H. (SP3), Vorogushyn, S. (SP3), Merz, B. (SP3): What is the role of spatial dependency in regional flood risk estimation? System-Risk Conference 2019, Flood hazard and risk: Interactions, temporal changes and system approaches, Potsdam, Germany, 17-19 September 2019.

Ullrich, S. (SP3), Hegnauer, M., Dung, N.V., de Bruijn, K.M., Merz, B. (SP3), Kwadijk, J. and Vorogushyn, S. (SP3): Comparative Evaluation of Two Types of Stochastic Weather Generators for synthetic Precipitation Estimation in the Rhine basin. System-Risk Conference 2019, Flood hazard and risk: Interactions, temporal changes and system approaches, Potsdam, Germany 17-19 September 2019.

Thesis

Domin, I. (2019): A mechanistic-stochastic approach to study controls of step changes in river catchments. Master thesis, Technische Universität Dresden. Supervisors: S. Basso (SP4) and N. Schütze.

Risto, D. (2019): Downscaling an Ensemble-based Reanalysis for the Danube Flood 1899. Master Thesis, Goethe Universität Frankfurt am Main. Supervisors: Ahrens, B. and Primo, C. (both SP2).

Visits

Björn Guse (SP3) has visited the Wageningen University for one week (21.-25. October 2019).

Larisa Tarasova (SP4) visited SP7 in Hannover on 23rd of September to discuss the prospects of using event typology to derive mixed distributions for flood frequency analysis.

Luisa Thiele (SP7) has attended PUB 2019 Summer School 1.-5.7.2019 in Vienna.

Workshops, Conferences

Svenja Fischer, early career representative of IAHS-ICSH, organized the first ever Early Career Day at StaHy 2019, Nanjing, China, 18.-20.10.2019.