sPATE

Newsletter

Space-Time Dynamics of Extreme Floods

Edition 11

Coordinator: Prof. Dr. Andreas Schumann

Ruhr-University Bochum
Institute of Hydrology, Water Resources Management and Environmental Engineering
D – 44801 Bochum

Phone: +49 (0)234 / 3224693

Fax: +49 (0)234 / 3214153

E-Mail: andreas.schumann@rub.de

www.spate.ruhr-uni-bochum.de

The (happy) ending

Dear colleagues and followers of the SPATE research unit,

We can hardly believe it ourselves, but the six years we spent together in our research unit are now actually over. Even though some of the projects will still have some remaining time, the time of joint meetings, exchange and research has unfortunately come to an end. It has been a wonderful six years and the opportunity to work together on a topic with a solid group of people over such a long period of time has brought us and our research very far. We are proud that over 150 publications have been produced during this time and many more are ready for publication. Our SPATE members have attended conferences all over the world (and virtually everywhere due to the Covid19 pandemic) and presented our findings. It is only through this long period of continuous collaboration that many large projects could be nailed, as our collaborative publications show. And our members have also developed during this time, through doctorates, habilitations and through honours.

This issue once again shows all that has been achieved. We are particularly proud of our final symposium in Vienna, entitled “The Future of Flood Research – Expectations on Scientific Developments in the Next 10 Years”. Not only our members presented there, but also wonderful invited speakers. More than 80 attendees listened to very interesting talks and the feedback on this event was consistently positive.

We are convinced that we have brought research in the field of extreme floods a bit further forward. But of course, this is not the end. Through the work in the research group, contacts have been made that will be continued in the future. Many new ideas are already ready to be implemented in the future. Even if no longer within the framework of SPATE, we will continue to hear from our researchers!

But now it is time to say thank you. Thank you to all our members in SPATE who have made the time in the research group so enriching. Their commitment, their ideas and their spirit of research have made this project group what it is. We would also like to thank the German Research Foundation DFG, whose funding has made this research group possible. And we thank all those who have supported our project, through discussions, through joint research, or simply by following our work.

It was a wonderful time!

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
Subproject 1 (Ruhr-University Bochum)

Prof. Dr. Bodo Ahrens, Christian Czakay, Mostafa Hamouda
Subproject 2 (Goethe-University Frankfurt)

Dr. Sergiy Vorogushyn, Prof. Dr. Bruno Merz, Dr. Björn Guse, Elena Macdonald, Luzie Wietzke
Subproject 3 (GFZ Potsdam)

Prof. Dr. Ralf Merz, Dr. 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. Miriam Bertola, Dr. David Lun
Subproject 6 (Technical University of Vienna)

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

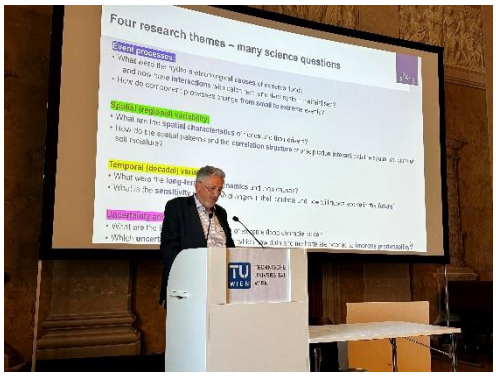
Members of the research unit SPATE at the SPATE-Meeting in Hannover, April 2022.

The Future of Flood Research - Expectations on Scientific Developments in the Next 10 Years

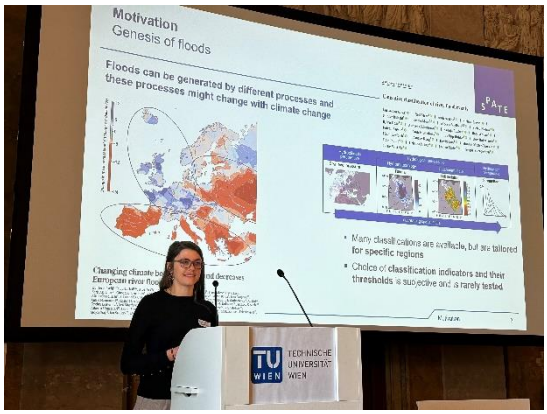
Final Symposium of the DFG Research Unit „Space-time Dynamics of Extreme Floods"

TU Vienna, 23 April 2023, Festsaal, Karlsplatz 13, Vienna, Austria

To celebrate the six years of our research group and to present to the scientific community what we have achieved during these years, the SPATE research group invited to the final symposium in Vienna on April 23. Right before the EGU, this was the opportunity to get in the mood for a week full of new impressions and research questions. With the title "The Future of Flood Research", we also took a look at the future: how will research continue, what are the current topics and what are the future challenges? But of course, we didn't want to discuss these questions only in the research group. Instead, we also invited eight leading scientists in flood research to present current issues and results.



The symposium met with an incredible response. More than 80 people from six continents fought their way through the crowds of participants in the Vienna Marathon early Sunday morning and gathered in the Festsaal of the TU Wien. The symposium was opened by our speaker Andreas Schumann, who gave a short overview of the work of the research group. Afterwards, the subprojects presented in small highlight lectures what six years of joint research can bring. After a little refreshment with schnitzel and pasta, the expert presentations began.



Richard Vogel (Tufts University), Elena Volpi (University Roma Tre), Ashish Sharma (University New South Wales), Christian Onof (Imperial College London), Pedro Chaffe (Federal University of Santa Caterina), Manuela Brunner (ETH Zurich), Jery Stedinger (Cornell University) and Attilio Castellarin (University Bologna) provided insights into the latest research results and also highlighted questions that hydrology will have to answer in the coming years. The engaged participants enriched the afternoon with many questions and discussions. The day concluded with a panel discussion on the future of flood statistics. Can deterministic hydrology without statistics or vice versa be the solution to future problems? Or do the different disciplines need to work more closely together in the future? And what changes should we make to the training of young scientists to best position them for the future? All these questions were lively discussed with panelists Günter Blöschl, Gregor Laaha, Richard Vogel and Ross Woods, moderated by Andreas Schumann and Svenja Fischer. And even if we cannot give

any conclusive answers, it was clear from this symposium that we can look to the future of flood research with good cheer if so many people are committed to it.

The SPATE group would like to sincerely thank all participants at the symposium who made this closing unique for us. Many thanks also to our invited speakers who enriched the day with their presentations and impulses. And also a thank you to our colleagues from Vienna, David Lun, Miriam Bertola and Günter Blöschl, who took over the on-site organization and booked this beautiful ballroom for us.

Final reports of SPATE available as theme volume in open access journal

We are happy to announce that a final report of each subproject on what has been achieved in the last six years within the project will be released as a theme volume in the German journal “Hydrologie und Wasserbewirtschaftung”. This way, we want to ensure that our scientific results are not only available to the scientific community but also to stake holders and practitioners. Each subproject has prepared 10 to 15 pages that summarizes the main results of the project and highlight the path of research the project followed. Each article is peer-reviewed by two reviewers and the final publication will obtain a DOI such that it is citable. The journal “Hydrologie und Wasserbewirtschaftung” is one of the most read journals among practitioners and all articles are open access. Therefore, we ensure that our results find their way into practice. More information can be found at https://www.hywa-online.de/ .

Publications

1) Publications in journals

Published since last newsletter:

Basso, S., Merz, R. (SP4), Tarasova, L. (SP4), Miniussi, A. (2023): Extreme flooding controlled by stream network organization and flow regime. Nature Geoscience.

Bárdossy, A. (SP5) (2023). Changing correlations: a flexible definition of non-Gaussian multivariate dependence. Stochastic Environmental Research and Risk Assessment. DOI: 10.1007/s00477-023-02408-1

Blöschl, G. (SP6) (2022). Three hypotheses on changing river flood hazards. Hydrology and Earth System Sciences, 26(19), 5015-5033.

Fischer, S. (SP1), Lun, D. (SP6), Schumann, A. (SP1), Blöschl, G. (SP6) (2022): Detecting flood-type-specific flood-rich and flood-poor periods in peaks-over-threshold series with application to Bavaria (Germany). Stochastic Environmental Research and Risk Assessment. DOI: 10.1007/s00477-022-02350-8

Fischer, S. (SP1), Schumann, A. (SP1) (2023): Generation of type-specific synthetic design flood hydrographs. Hydrological Sciences Journal. doi.org/10.1080/02626667.2023.2195560.

Krug, A., Aemisegger, F., Sprenger, M., Ahrens, B. (SP2) (2022): Moisture sources of heavy precipitation in Central Europe in synoptic situations with Vb-cyclones. Climate Dynamics.

Merz, R. (SP4), Miniussi, A., Basso, S., Tarasova, L. (SP4) (2022): More complex is not necessarily better in large scale hydrological modelling - A model complexity experiment across the contiguous United States, Bulletin of American Meteorological Society.

Pesce, M., Viglione, A. (Mercator-fellow), Hardenberg, J., Tarasova, L. (SP4), Basso, S., Merz, R. (SP4) (2023). Regional multi-objective calibration for distributed hydrological modelling: a decision tree based approach. Special Issue: IAHS2022 – Hydrological sciences in the Anthropocene: Variability and change across space, time, extremes, and interfaces.

Saavedra, F., Musolff, A., von Freyberg, J., Merz, R. (SP4), Basso, S., Tarasova, L. (SP4) (2022): Disentangling Scatter in Long-Term Concentration-Discharge Relationships: the Role of Event Types. Hydrology and Earth System Sciences.

Tarasova, L. (SP4), Lun, D. (SP6), Merz, R. (SP4), Blöschl, G. (SP6), Basso, S., Bertola, M. (SP6), ... Kumar, R. (2023). Shifts in flood generation processes exacerbate regional flood anomalies in Europe. Communications Earth & Environment, 4(1), 49.

Wang, H., Merz, R. (SP4), Yang, S., Tarasova, L. (SP4), Basso, S. (2023): Emergence of Heavy Tails in Streamflow Distributions: the Role of Spatial Rainfall Variability. Advances in Water Resources.

Accepted:

Snizhko, S., Bertola, M. (SP6), Ovcharuk, V., Shevchenko, O., Didovets, I., Blöschl, G. (SP6) (2023). Climate impact on flood changes – an Austrian-Ukrainian comparison. Journal of Hydrology and Hydromechanics.

Pre-Prints:

Pidoto, R. and Haberlandt, U. (both SP7) (2023): A semi-parametric hourly space-time weather generator, Hydrol. Earth Syst. Sci. Discuss.

2) Popular sciences publications:

News & Views article by David, C.H., Frasson, R.P.d.M. Blame the river not the rain (2023) in Nature Geoscience (https://doi.org/10.1038/s41561-023-01163-w) featuring the paper by Basso, S., Merz, R. (SP4), Tarasova, L. (SP4), Miniussi, A. (2023): Extreme flooding controlled by stream network organization and flow regime.

New way to predict river flood risk could help prepare for disasters in New Scientist (https://www.newscientist.com/article/2367089-new-way-to-predict-river-flood-risk-could-help-prepare-for-disasters/) featuring the paper by Basso, S., Merz, R. (SP4), Tarasova, L. (SP4), Miniussi, A. (2023): Extreme flooding controlled by stream network organization and flow regime.

Talks

1) Invited talks:

Bertola, M. (SP6), Viglione, A. (Mercator-fellow), Lun, D. (SP6), and Blöschl, G. (SP6): Flood changes in Europe: from detection to attribution. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-5595.

Fischer, S. (SP1), and Schumann, A. (SP1): Scale Dependence of Stochastic-Deterministic Flood Statistics. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Tarasova L. (SP4), Ahrens, B. (SP2), Hoff, A. (SP2), and U. Lall, Forecasting the monthly severity of widespread flooding in Germany using dilated convolutional neural networks conditioned by large-scale climatic indexes. . EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

2) Other talks at conferences:

Ahrens, B. (SP2), Leps, N.: On the Challenge of Convection Permitting Precipitation Simulations: Results from Idealised Experiments. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023

Ahrens, B. (SP2), Czakay, C. (SP2), Hamouda (SP2), Hoff, A., Pothapakula, P. K.: On the role of the Mediterranean Sea in Vb-cyclone precipitation. First MedCyclones Workshop and Training School, Univ. of Athens, 27 Jun - 1. Jul 2022

Ahrens, B. (SP2), Czakay, C. (SP2), Hamouda (SP2), Hoff, A., Pothapakula, P. K.: On the role of the Mediterranean Sea in Vb-cyclone precipitation. MedCLIVAR, Marrakesh, Morocco, 4 -8 Oct. 2022

Basso, S., Merz, R. (SP4), Tarasova, L. (SP4), Miniussi, A.: Foreseeing the propensity of rivers to extreme floods. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Bertola, M. (SP6), Haas, M., Komma, J., and Blöschl, G. (SP6): Comparative analysis of historical flood events in the Danube and Main River catchments between 1845 and 1950, HydroCarpath International Conference, Vienna, 24 Nov 2022.

Fischer, S. (SP1): Zur Fortschreibung des DWA-Merkblattes 552 „Ermittlung von Hochwasserwahrscheinlichkeiten“. Tag der Hydrologie 2023, Bochum, Germany, 22-23 March 2023.

Haberlandt, U., Thiele, L.-B., Pidoto, R. (all SP7) (2023): Ein Framework für die abgeleitete Hochwasserstatistik mit Wettergenerator und hydrologischer Modellierung. Tag der Hydrologie 2023, Bochum, Germany, 22-23 March 2023.

Haberlandt, U., Thiele, L.-B. (both SP7), Sharma, A. (2023): Investigation of factors leading to extreme floods by space-time simulation of rainfall and runoff. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Hamouda, M. (SP2), Ahrens, B. (SP2): Convective Contribution During Vb-Cyclones. Workshop ``Klimaextreme in CMIP6-Klimaprojektionen für Hessen, Rheinland-Pfalz, Niedersachsen und Sachsen''. Mainz, Germany, 2 Mar. 2023

Hamouda, M. E. (SP2), Ahrens, B. (SP2): Synoptic Setting of Extreme Mediterranean Cyclones in Present and Warmer Climate. AGU Fall Meeting, Chicago, 2022

Hamouda, M. E. (SP2), Ahrens, B. (SP2): On The Convective Precipitation Contribution during Vb-events. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Hamouda, M. E. (SP2), Czakay, C. (SP2), Ahrens, B. (SP2): On The Role of Convection during Vb-events in present and warmer climate. HyMET FA DMG – Bonn, Germany 9-10 May 2023.

Lun, D. (SP6), Fischer, S. (SP1), Viglione, A. (Mercator-fellow), and Blöschl, G. (SP6): Attribution of flood changes with time series in the presence of autocorrelation: Modifications for Spearman‘s Rho and Kendall‘s Tau. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Lun, D. (SP6), Fischer, S. (SP1), Viglione, A. (Mercator-fellow), and Blöschl, G. (SP6): Attribution of flood changes with a time series in the presence of autocorrelation: Modifications for Spearman‘s Rho and Kendall‘s Tau, HydroCarpath International Conference, Vienna, 24 Nov 2022.

Macdonald, E. (SP3), Merz, B. (SP3), Guse, B. (SP3), Nguyen, V. D., Guan, X., and Vorogushyn, S. (SP3): Heavy tail controls along the flood process cascade. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Merz, B. (SP3), Farrag, M., Guan, X., Guse, B. (SP3), Han, L., Kreibich, H., Nguyen, D., Sairam, N., Schröter, K., and Vorogushyn, S. (SP3): Spatially consistent flood risk assessment for Germany. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Merz, R. (SP4), Miniussi, A., Basso, S., Tarasova, L., (SP4): More Complex is Not Necessarily Better in Large-Scale Hydrological Modeling. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Mushtaq, S., Miniussi, A., Merz, R. (SP4), Tarasova, L. (SP4), Marra, F., Basso, S.: Combining runoff generating mechanisms and the Metastatistical Extreme Value approach to predict extreme floods in catchments with strong discontinuities in the flood frequency curve. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Pidoto, R., Haberlandt, U. (both SP7) (2023): A CP conditioned weather generator. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Schumann, A. (SP1): Ergebnisse der DFG-Forschungsgruppe „Räumliche- und zeitliche Dynamik Extremer Hochwasser- SPATE“. Tag der Hydrologie 2023, Bochum, Germany, 22-23 March 2023.

Tarasova L. (SP4) and U. Lall: The value of large-scale climatic indexes for forecasting the severity of widespread flooding using dilated convolutional neural networks, AGU Fall Meeting, Chicago, 2022

3) Talks for faculty seminars:

Tarasova L. (SP4): Monthly flood forecasting using dilated Convolutional Neural Networks, Research Seminar at Columbia University, New York, NY, November 2022

Tarasova L. (SP4): Monthly flood forecasting using dilated Convolutional Neural Networks, Research Seminar at Joint Research Center – European Commission, Ispra, Italy, July 2023

4) Poster

Bertola, M. (SP6), Castellarin, A., Valtancoli, E., Viglione, A. (Mercator-fellow), Blöschl, G. (SP6): Analisi delle curve di inviluppo regionali delle portate di piena in Europa, Giornate dell'idrologa della Società Idrologica Italiana, Genova, 9-11 Nov 2022, 2022.

Tarasova, L. (SP4), Aala, S., Ribbe, L., and R. Kumar. Effects of space-time dynamics of precipitation on the timing and shape of runoff events. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Thiele, L.-B. (SP7), Salehfard, G., Spadari, G. E., Haberlandt, U. (SP7) (2023): Representation of different flood types in rainfall-runoff modelling. EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.

Theses

Salehfard, G. (2022): Representation of different flood types (SP4 types) in rainfall runoff modelling with the hydrological model HBV, Master Thesis, Leibniz Universität Hannover.

Spadari, G. E. (2023): Representation of different flood types (SP1 types) in rainfall runoff modelling with the hydrological model HBV, Master Thesis, Leibniz Universität Hannover.

Workshops, Conferences

AGU Fall Meeting 2022: Session Hydrometeorological extremes: Prediction, Simulation, and Change Conveners: M. Brunner, L. Hunning, G. Villarini, L. Tarasova (SP4).

EGU General Assembly 2023: HS2.4.3 Space-time dynamics of floods: processes, controls, and risk. Conveners: L. Tarasova (SP4), W. Farmer, M. Lompi, D. Paprotny, N. Sairam.

EGU General Assembly 2023: HS 3.4: Advanced geostatistics, clustering and classification for water, earth and environmental sciences. Conveners: S. Fischer (SP1), N. Dogulu, V. A. Godoy, J. Gomez-Hernandez, G. Heuvelink, A. Menafoglio, G. Papacharalampous. Co-sponsored by IAHS-ICSH.

Gordon Research Seminar (Discussion Leader: L. Tarasova (SP4)): New Hampshire, USA, 2023

Visits

Larisa Tarasova (SP4) has visited the Department of Earth and Environmental Engineering, Columbia University in the City of New York, NY, USA in November 2022.

Luisa Thiele (SP7) has visited the Department Catchment Hydrology at UFZ in Halle (SP4) in June 2023.