

Space-Time Dynamics of Extreme Floods

S^PA^TE

Edition 3

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Newsletter

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Halftime of the SPATE-project

Dear followers of the SPATE research group,

Now we reached the halftime of our project, but unless many great sport events we do not even consider a break. Instead, the research in our project continues on high level as can be seen by the many publications and conference talks of our members. We are especially proud that our younger members and PhD students are so hardworking in presenting their research and discuss their new methods with other colleagues. This spirit of research also was present at our cluster meeting at the Goethe-University in Frankfurt in late October. Again, many new research topics were presented and fruitful discussions and upcoming cooperation started. With many highly relevant events for our research group, like the EGU General Assembly 2019 and the IUGG Meeting 2019, where several SPATE-members contributed sessions and symposia, the next months will be used to spread our research to a broader community. Moreover, also our next symposium is planned, where we will have remarkable guests enlightening us with interesting talks on their actual research topics. We are happy to confirm the participation of Jürgen Kurths (PIK), Uwe Ulbrich (FU Berlin) and Ross Woods (University of Bristol). But also the next steps of our project will have to be planned since the evaluation will take place in early October 2019.

Hence, the upcoming year will be full of new challenges for our project but we are sure that a lot of interesting research will origin from these.

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

Svenja Fischer and Andreas Schumann

Members of the SPATE-project

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

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

Prof. Dr. Bruno Merz, Dr. Heidi Kreibich, Dr. Sergiy Vorogushyn, Dr. Björn Guse, 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. Alberto Viglione, Dr. Andrea Kiss, David Lun
Subproject 6 (Technical University of Vienna)

Prof. Dr. Uwe Haberlandt, Stefan Plötner, Ross Pidoto
Subproject 7 (Leibniz University Hannover)



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

October 2018:
First Cluster meeting in Frankfurt

In October 2018 the first cluster meeting of the SPATE research group took place at the Senckenberg Biodiversity and Climate Research Center in Frankfurt/Main hosted by the subproject 2. The aim of this meeting was the collection of research in our project according to the cluster themes and a combination of the work so far. For this purpose, the talks were separated into the four cluster themes Event Analysis, Spatial Variability, Temporal Variability and Uncertainty. Each subproject distributed its research results into these four categories, such that the highest possible coherence of the talks could be obtained. It became very clear that many cooperation resulted in interesting results so far. For example, the spatial analysis of large flood events by subproject 1 has been combined with the meteorological circumstances for these events by subproject 2 to obtain information in how far the probability of Germany-wide floods decreases. Or the event characterization of subproject 4 has been used by subproject 3 to detect spatial patterns. But also common topics like the correct model for the simulation of snowmelt



have been discussed deeply and different pros and cons have been compared. Here, the different expertise of the project once again has been useful for the subprojects. But also future research has been in the focus of the meeting and further research has been discussed within the project. As a result we can note that every cluster has benefited much by the contributions of the

subprojects. Completing the meeting, a detailed matrix has been developed where all upcoming cooperation has been noted. One of the greatest strengths of SPATE became obvious, since every subproject had planned cooperation with at least two other subprojects. This synergy of diversity will certainly lead to many new interesting research results.

Publications

1) Publications in journals

Accepted:

Akhtar, N., **Krug, A. (SP2)**, Brauch, J., Arsouze, T., Dieterich, C., **Ahrens, B. (SP2)** (2018): European Marginal Seas in a regional atmosphere-ocean coupled model and their impact on Vb-cyclones and associated precipitation. *Climate Dynamics*.

Pothapakula, P.K., **Primo Ramos, C. (SP2)**, **Ahrens, B. (SP2)** (2018): Quantification of information exchange in idealized and climate system applications. *Climate Dynamics*.

Published since last newsletter:

Blöschl, G. (SP6), Komma, J., Nester, T., **Rogger, M. (SP6)**, Salinas, J.L., and **Viglione, A. (SP6)** (2018): Die Wirkung des Waldes auf Hochwässer (The effect of forests on floods), *Wildbach- und Lawinenverbau* 181, 288-296, ISBN:978-3-9504159-5-7.

Di Baldassarre, G., **Kreibich, H. (SP3)**, **Vorogushyn, S. (SP3)**, Aerts, J., Arnbjerg-Nielsen, K., Barendrecht, M., Bates, P., Borga, M., Botzen, W., Bubeck, P., De Marchi, B., Llasat, C., Mazzoleni, M., Molinari, D., Mondino, E., Mård, J., Petrucci, O., Scolobig, A., **Viglione, A. (SP6)**, and Ward, P. J. (2018): Hess Opinions: An interdisciplinary research agenda to explore the unintended consequences of structural flood protection. - *Hydrology and Earth System Sciences*, 22, 5629-5637. DOI: <http://doi.org/10.5194/hess-22-5629-2018>

Duethmann, D. and **Blöschl, G. (SP6)** (2018): Why has catchment evaporation increased in the past 40 years? A data-based study in Austria. *Hydrology and Earth System Sciences* 22, 5143-5158 <https://doi.org/10.5194/hess-22-5143-2018>.

Fischer, S., and **Schumann, A. (both SP1)** (2018): A distribution-free ordinal classification of floods based on moments. *Hydrological Sciences Journal*, doi: 10.1080/02626667.2018.1525614.

Gao, M., Li, H-Y., Liu, D., Tang, J., Chen, X., Chen, X., **Blöschl, G. (SP6)**, and Leung, L.R. (2018): Identifying the dominant controls on macropore flow velocity in soils: a meta-analysis, *Journal of Hydrology* 567, 590-604. doi: <https://doi.org/10.1016/j.jhydrol.2018.10.044>

Kuil, L., Carr, G., Prskawetz, A., Salinas, J.L., **Viglione, A. (SP6)**, and **Blöschl, G. (SP6)** (2018): Learning from the Ancient Maya: Exploring the Impact of Drought on Population Dynamics, *Ecological Economics*, doi:10.1016/j.ecolecon.2018.10.018.

Metin, A.D., Dung, N.V., Schröter, K., **Guse, B. (SP3)**, Apel, H., **Kreibich, H. (SP3)**, **Vorogushyn, S. (SP3)**, and **Merz, B. (SP3)** (2018): How do changes along the risk chain affect flood risk?. *Nat. Hazards Earth Syst. Sci.* 18, 3089-3108, <https://doi.org/10.5194/nhess-19-3089-2018>.

Parajka, J., Bezak, N., Burkhart, J., Hauksson, B., Holko, L., Hundecha, Y., Jenicek, M., Krajci, P., Mangini, W., Molnar, P., Riboust, P., Rizzi, J., Sensoy, A. Thirel, G., and **Viglione, A. (SP6)** (2018): Modis Snowline Elevation Changes During Snowmelt Runoff Events in Europe, *Journal of Hydrology and Hydromechanics* 67(1), 101-109, doi:10.2478/johh-2018-0011.

Pfeil, I., Vreugdenhil, M., Hahn, S., Wagner, W., Strauss, P., and **Blöschl, G. (SP6)** (2018): Improving the seasonal representation of ASCAT soil moisture and vegetation dynamics in a temperate climate. *Remote Sensing* 10, 1788; doi:10.3390/rs10111788

Pugliese, A., Persiano, S., Bagli, S., Mazzoli, P., Parajka, J., Arheimer, B., Capell, R., Montanari, A., **Blöschl, G. (SP6)**, and Castellarin, A. (2018): A geostatistical data-assimilation technique for enhancing macro-scale rainfall-runoff simulations, *Hydrology and Earth System Sciences* 22, 4633-4648, <https://doi.org/10.5194/hess-22-4633-2018>

Quinn, N., **Blöschl, G. (SP6)**, **Bárdossy, A. (SP5)**, Castellarin, A., Clark, M., Cudennec, C., Koutsoyiannis, D., Lall, U., Lichner, L., Parajka, J., Peters-Lidard, C.D., Sander, G., Savenije, H., Smettem, K., Vereecken, H., **Viglione, A. (SP6)**, Willems, P., Wood, A., Woods, R., Xu, C.-Y., Zehe, E., (2018): Joint Editorial: Invigorating Hydrological Research through Journal Publications, *Ecohydrology*, 11(6), e2016, doi:10.1002/eco.2016 (and other journals).

Széles, B., Broer, M., Parajka, J., Hogan, P., Eder, A., Strauss, P., and **Blöschl, G. (SP6)** (2018): Separation of scales in transpiration effects on low flows: A spatial analysis in the Hydrological Open Air Laboratory. *Water Resources Research* 54, <https://doi.org/10.1029/2017WR022037>.

Tarasova, L. (SP4), Basso, S. (SP4), Zink, M., and Merz, R. (SP4) (2018): Exploring controls on rainfall-runoff events: 1. Time-series-based event separation and temporal dynamics of event runoff response in Germany, *Water Resour. Res.*, doi:10.1029/2018WR022587.

Tarasova, L. (SP4), Basso, S. (SP4), Poncelet, C., and Merz, R. (SP4) (2018): Exploring controls on rainfall-runoff events: 2. Regional patterns and spatial controls of event characteristics in Germany, *Water Resour. Res.*, doi:10.1029/2018WR022588.

Volpi, E., Di Lazzaro, M., Bertola, M., **Viglione, A. (SP6)** and Fiori, A. (2018): Reservoir Effects on Flood Peak Discharge at the Catchment Scale, *Water Resources Research*, 54, doi:10.1029/2018WR023866

2) Publications in anthologies, book contributions and chapters

Schulte, M., and **Schumann, A. (SP1)** (2018): *Statistische Bewertung der Hochwasserkoinzidenz zur Planung des technischen Rückhalts*. Heimerl, S., Meyer, H. (ed.): Vorsorgender und nachsorgender Hochwasserschutz - Ausgewählte Beiträge aus der Fachzeitschrift WasserWirtschaft Band 2, Springer.

Schulte, M., and **Schumann, A. (SP1)** (2018): *Bewertung der Hochwasserschutzwirkung und des Restrisikos von Speichern mit multivariaten Ansätzen*. Heimerl, S., Meyer, H. (ed.): Vorsorgender und nachsorgender Hochwasserschutz - Ausgewählte Beiträge aus der Fachzeitschrift WasserWirtschaft Band 2, Springer.

Xu, Z., Peng, D., Sun, W., Pang, B., Zuo, D., **Schumann, A. (SP1)**, and Chen, Y. (2018): Preface: Innovative Water Resources Management in a Changing Environment – Understanding and Balancing Interactions between Humankind and Nature. *Proceedings of the IAHS*, 379, 463-464.

3) Software

Bühler, P., Fischer, S., (both SP1) and Händel, L.: "FloodR: Separation of Flood Event and Event Precipitation", R package version 0.1, www.github.com/PhilippBuehler/FloodR.

Talks

1) Invited talks:

Callau Poduje, A. C. (SP7): Modeling of precipitation in a high temporal resolution. Visit to Ljubljana University in Slovenia - 06.09.2018.

Fischer, S., and Schumann, A. (both SP1): Why defining and characterising flood events is useful, at Joint Workshop on Event Definition and Characterization (Vienna, Austria, 9-11.08.2018).

Tarasova, L., Basso, S., and Merz, R. (all SP4): Event definition and characterization: rainfall-runoff events, at Joint Workshop on Event Definition and Characterization (Vienna, Austria, 9-11.08.2018).

2) Other talks on conferences:

Purr, C., Brisson, E., Ahrens, B. (SP2): Lagrangian evaluation of characteristics of convective precipitation clusters. CORDEX FPS Convection Annual Meeting, Lisbon, Portugal, 21--22 Nov. 2018.

3) Poster

Primo, C. (SP2), Kelemen, F.D., Obermann, A., Ahrens, B.: The effect of coupled marginal seas on precipitation extremes and heat waves in 20th century CCLM simulation. CLM Assembly, Karlsruhe, Germany, 18-21 Sept. 2018.

Thesis

Bienstein, L. (2018): Abschätzung des Anteils der Schneeschmelze an Hochwasserabflüssen des Mittelgebirges, Master thesis, Ruhr-University Bochum, Germany. Supervisors: S. Fischer and A. Schumann (both SP1).

Bühler, P. (2018): Ableitung statistisch begründeter, nach Saison und Ereignistyp differenzierter Hochwasserganglinien, Master thesis, Ruhr-University Bochum, Germany. Supervisors: S. Fischer and A. Schumann (both SP1).

Hennig, L. (2018): Climatic and landscape controls on flood frequency curves of rivers, Master Degree dissertation, University of Technology Carolo-Wilhemina Braunschweig, Germany. Supervisors: S. Basso (SP4), B. Schröder-Esselbach.

Lohmann R. (2018): Hochwasser durch Schneeschmelze - ein seltener werdendes Phänomen? Bachelor thesis, Goethe University Frankfurt am Main. Supervisors: B. Ahrens (SP2).

Visits

Philipp Bühler (SP1) and Larisa Tarasova (SP4) participated at the Summer School "Prediction of Runoff in ungauged basins", 02 – 06 July 2018 in Vienna, Austria, which was held by Günther Blöschl and Alberto Viglione (both SP6) among others.

Philipp Bühler (SP1), Luzie Wietzke (SP3), Stefano Basso (SP4) and David Lun (SP6) participated at the Joint Workshop on Event Definition and Characterization, 09-11 July 2018 in Vienna, Austria, which was organized by Alberto Viglione (SP6) with talks from Svenja Fischer (SP1) and Larisa Tarasova (SP4) among others.

Stefan Plötner (SP7) visited SP1 in Bochum during 19-21 September 2018 to work on the stratified flood frequency analysis using flood types.

Ross Pidoto (SP7) visited SP5 in Stuttgart between 27th and 31st of August to work on the classification of circulation patterns based on rainfall events.

The working group from the TU Vienna (SP6, Günther Blöschl, Alberto Viglione, David Lun and others) visited SP3 in Potsdam during 15.-19 October 2018 for joint work on flood risk assessment, event attribution, flood-rich/flood-poor periods and flood wave superposition.

Workshops, Conferences

EGU General Assembly 2019, 08-12 April, Vienna, Austria

Several Sessions at the next EGU General Assembly are organized by members of the SPATE-project.

HS1.2.12: Flood Statistics – going beyond the observation horizon

Convener: Svenja Fischer, Co-conveners: András Bárdossy, Andreas Schumann, Ross Woods

HS2.4.2: Space-time dynamics of floods: processes, controls, and risk

Convener: William Farmer, Co-conveners: Heidi Kreibich, Luis Mediero, Alberto Viglione, Sergiy Vorogushyn

HS3.2: Spatio-temporal and/or geostatistical analysis of hydrological events, extremes, and related hazards

Convener: Emmanouil Varouchakis, Co-conveners: Gerald A. Corzo P., A.B. Bárdossy, Dionissios Hristopoulos, Svenja Fischer