

Waves to Weather



Newsletter Jul/Sep 2019

Welcome once again to a W2W Newsletter! Our second 4-year phase has just begun and new PhD students and post-docs are starting. There are still a few positions available on our website, so do pass the link to anyone who might be interested. Preparations are underway for the Kick-off meeting in November, where we will all have a chance to get acquainted, maybe for the first time. But the scientific work has not paused - we were very proud to host a major international conference, the 19th Cyclone Workshop, for the first time outside of North America. This was an excellent forum for our young scientists to interact with colleagues from all over the world and a great motivation to get started on Phase 2.

George Craig

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If you have any questions or comments about this newsletter or W2W in general, we would be happy to hear from you!

Upcoming events

The **Kick-off meeting of W2W - Phase 2** will take place from November 4th – 6th 2019 in Eibelstadt close to Würzburg, Germany. Confirmed international guests are: Andy Brown (ECMWF), Juliana Dias (ESRL, NOAA), Rupert Klein (Freie Universität Berlin), Susan van den Heever (Colorado State University) and Nedjeljka Zagar (Universität Hamburg). The program with information on the venue is available here:

<http://www.wavestoweather.de/meetings/kick-of-meeting-nov2019>

Additional information on upcoming events can be found here:

<http://www.wavestoweather.de/meetings>

Please contact us if you have any questions.

News

Open positions

Five positions are still open within the second funding phase of W2W. You can find more information here:

<https://www.wavestoweather.de/positions>

Please forward the information to whoever might be interested.

Scientific Advisory Board (SAB)

A Scientific Advisory Board has been established at the start of Phase 2 to assure the quality of W2W as a whole, to monitor the progress at regular intervals and to provide advice to help achieve the goals of scientific excellence and optimal use of the synergies available in W2W. The SAB members serve for a four-year term and are:

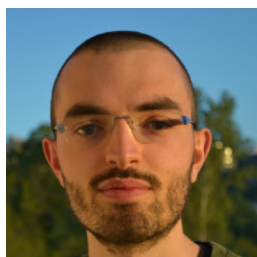
- **Ron McTaggart-Cowan** (Canadian Meteorological Centre): chairperson
- **Carolyn Reynolds** (Naval Research Laboratory): member with expertise in RA-A
- **Susan van den Heever** (Colorado State University): member with expertise in RA-B
- **Tim Hewson** (ECMWF): member with expertise in RA-C
- **Michael Morgan** (University of Wisconsin): member with link to WWRP

You can read more about the structure of W2W here:

https://www.wavestoweather.de/about_us

PhD defenses

We would like to congratulate the W2W PhD students who defended their PhD recently and we wish them all the best for their future:

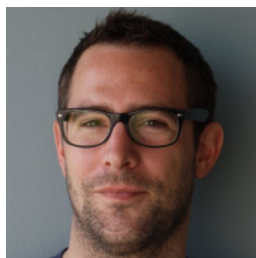


Enrico Di Muzio (project C3) defended his PhD on July 5th 2019.



Florian Baur (project B3) defended his PhD on July 25th 2019.

Professorship



Martin Weissmann (project A3) accepted a professorship at the University of Vienna, Austria, starting on January 1st 2020. Congratulations, and all the best in your new position!

W2W Special Collections

- A Special Online Collection of the Quarterly Journal of the Royal Meteorological Society has been set up for W2W. You can browse the articles that are part of the collection here:
[https://rmets.onlinelibrary.wiley.com/doi/toc/10.1002/\(ISSN\)1477-870x.W2W](https://rmets.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1477-870x.W2W)
- You can also browse the W2W articles in the W2W AMS Special Collection here:
<https://journals.ametsoc.org/topic/w2w>

New Copernicus Journal “Weather and Climate Dynamics” (WCD)

This journal is now ready for submissions. Chief editors are Camille Li, Stephan Pfahl and Heini Wernli. Michael Riemer, Christian Grams, Thomas Birner and Peter Knippertz are part of the editorial team.

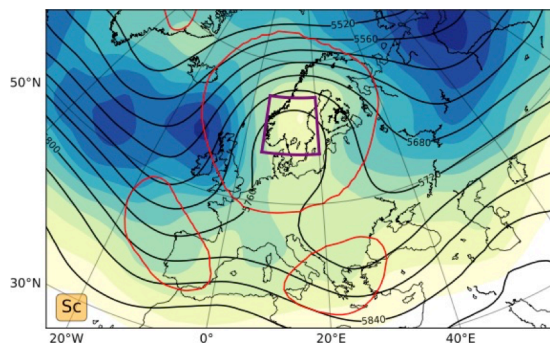
More information is available here:

<https://www.wavestoweather.de/news/weather-and-climate-dynamics>

Research Highlights

Here are some examples of recently published research from W2W.

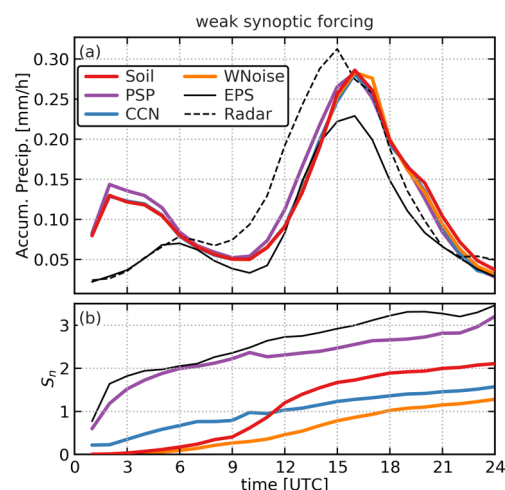
1. Processes determining heat waves across different European climates (P. Zschenderlein, A. H. Fink, S. Pfahl and H. Wernli)



This study presents a comprehensive analysis of different processes leading to heat waves in Europe. Employing backward trajectories, three clusters with coherent thermodynamic characteristics and vertical motions are identified. In two of the three clusters, subsidence is of first order importance for high near-surface temperatures, whereas the third cluster is primarily heated diabatically due to surface sensible heat fluxes. Especially western Russia is largely affected by remote surface fluxes, whereas the British Isles are largely affected by subsidence and adiabatic warming.

Read the full article: <https://doi.org/10.1002/qj.3599>

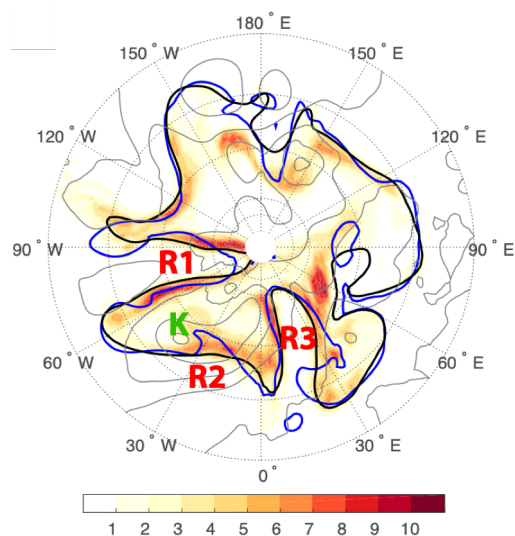
2. Relative contribution of soil moisture, boundary layer and microphysical perturbations on convective predictability in different weather regimes (C. Keil, F. Baur, K. Bachmann, S. Rasp, L. Schneider, and C. Barthlott)



The spatial variability of precipitation in perturbed-parameter ensembles exhibits clear differences whereas the total amount of daily precipitation is hardly changed. Soil moisture heterogeneity primarily introduces variability during convection initiation causing a steeper increase in normalized rainfall spread prior to the onset of afternoon precipitation. The stochastic boundary layer perturbations (PSP) lead to the largest spatial variability impacting precipitation from initial time onwards with an amplitude comparable to the operational ensemble spread.

Read the full article: <https://rmets.onlinelibrary.wiley.com/doi/pdf/10.1002/qj.3607>

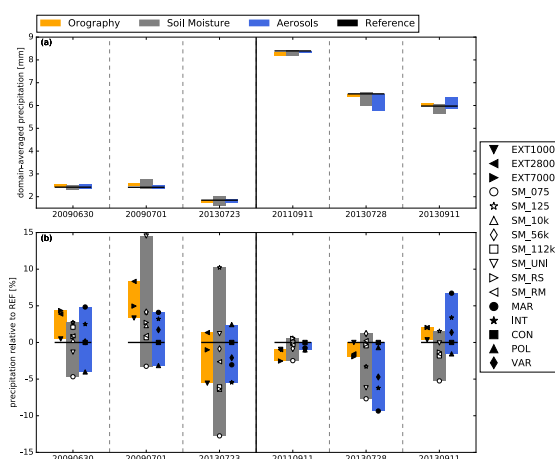
3. Processes governing the amplification of ensemble spread in a medium-range forecast with large forecast uncertainty (M. Baumgart and M. Riemer)



This study provides a process-based perspective on the amplification of forecast uncertainty in ensemble forecasts. A tendency equation for the ensemble variance of potential vorticity (PV) is derived, partitioned into the contributions from individual processes, and applied to a case from the North Atlantic Waveguide and Downstream Impact Experiment. This case exhibits large forecast uncertainty and several hotspots of large ensemble PV variance can be identified (yellow-red shading in the figure). The amplification of PV variance is, on average for the midlatitudes of the Northern Hemisphere, dominated by nonlinear tropopause dynamics. Locally, however, other processes can dominate the variance amplification as, e.g., in the region where tropical storm Karl interacts with the Rossby wave pattern during extratropical transition (labels K and R2 in the figure). In this region, the variance amplification is dominated by differences in the moist-baroclinic cyclone development.

Read the full article: <https://doi.org/10.1002/qj.3617>

4. Relative impact of aerosol, soil moisture, and orography perturbations on deep convection (L. Schneider, C. Barthlott, C. Hoose and A. I. Barrett)



This study addresses the relative impact of orography, soil moisture, and aerosols on precipitation over Germany in different weather regimes. The impact of these perturbations is found to be higher for weak large-scale forcing than for strong one. Furthermore, aerosols and soil moisture are both of similar importance for precipitation forecasting, which indicates that their inclusion in operational ensemble forecasting should be assessed in the future.

Read the full article: <https://www.atmos-chem-phys.net/19/12343/2019/>

Additional publications relevant to W2W are listed here:

<http://www.wavestoweather.de/publications>

Past activities

African Science for Weather Information and Forecasting Techniques (SWIFT) and Young Earth System Scientists (YESS) Summer School (Kumasi, Ghana, 21 July – 2 August 2019)

Peter Knippertz and Andreas Fink volunteered to lecture at this year's SWIFT and YESS Summer School. The major focus this time was on weather prediction at time scales ranging from a few days to seasonal. Every day started with a weather discussion presented by forecasters from Africa. The weather analyses and forecasts were based on the African Synthetic Analysis and Forecast (WASA/F) approach outlined in the first Forecasters' Handbook for West Africa (see Cornforth *et al.* 2019, <https://doi.org/10.1175/BAMS-D-16-0273.1>) to which Peter and Andreas contributed substantially.

Peter and Andreas gave lectures and trainings on West African weather systems and the use of data from ground and upper-air observing networks. There were intensive discussion and interactions between the African Early Career Scientists who took the opportunity to discuss their research with senior scientists in their field.



Participants of the SWIFT-YESS summer school during a field excursion to Lake Bosumtwi near Kumasi, Ghana. The lake is one of the youngest meteorite impact crater on Earth and the lake level allows paleo-climate reconstructions. The lake level had fallen substantially since 2008 also indicating a current drying at the West African Guinea coast (Photo: A. H. Fink)

For more information, visit:

<https://www.wavestoweather.de/outreach/swift-summer-school-2019>

19th Cyclone Workshop (Seeon, Germany, 29 September – 4 October 2019)

For the first time since its creation in 1979, the Cyclone Workshop was held outside of North America. The original motivation for this exception was the 100th anniversary of the Bergen School (J. Bjerknes, 1919), which provided fundamental conceptual models for the dynamics and life cycles of extratropical cyclones. The **19th Cyclone Workshop** took place from **29th September to 4th October 2019** at Kloster Seeon near Munich.

Organizational and financial support for the workshop was provided by W2W, mostly to support the participation of 26 early career scientists from overseas. Overall, 125 participants from 15 countries attended the workshop.

After an excellent historical account of the Bergen School by Thomas Spengler, the presentations covered topics focused on structure, dynamics, hazards, and predictability of extratropical and tropical cyclones, and the role of non-conservative processes in shaping these characteristics. Further sessions addressed the characteristics of cyclone precursors, such as the stratospheric vortex, the jet stream, Rossby waves, and polar tropopause vortices, and tropical-extratropical interactions. Evening sessions featured poster sessions and two panel discussions.

The overall highlight of this workshop, however, was ample time for discussion during which the Cyclone Workshop community could clarify questions, reconcile results achieved by different approaches, and identify overarching science questions that may provide guidance for research efforts over the next years.



Participants of the 19th Cyclone Workshop, October 2nd 2019. Photo: Audine Laurian

For more information, visit:

<https://www.wavestoweather.de/meetings/19th-cyclone-workshop>

Seminars and guest program

Information about previous guest scientists invited by W2W is posted here:

<http://www.wavestoweather.de/guest>

Past and upcoming W2W seminars are listed here:

<http://www.wavestoweather.de/seminars>

The seminars and colloquium are broadcasted live using **Adobe Connect**. If you would like to receive a link to listen to the presentation, please contact us.

Outreach and equal opportunity (EO) activities

TV interview on heavy rainfall in the news

Andreas Fink has been featured in the TV show "Landesschau Baden-Württemberg" (SWR3) and talked about heavy rainfall and its predictability. You can watch the video here:

<https://www.wavestoweather.de/outreach/interview-landesschau-swr3>

Summer program "Mädchen machen Technik"

This program is organized by the Technical University of Munich every year. School girls between 10 and 16 years old are invited to universities and departments to discover how exciting and challenging research in natural science and engineering can be.

This year, seven school girls between 12 and 14 years old visited the meteorological institute in Munich for a two-day workshop from September 4th - 5th 2019. They discussed weather phenomena and their connection with each other, highlighting the complexity of the atmosphere dynamics. They then performed little experiments with balloons, hot and cold water, and much more, to learn about pressure, temperature, clouds, convection and the Coriolis force. They were then able to visualize some of the phenomena in the lab and on the roof where they got a tour of the instruments. The day ended with two short presentations given by Master students about studying and doing research at the institute, and about the possibility to study abroad for a year or more with the ERASMUS exchange program. The focus of the second day was on numerical weather forecasting (NWF) and climate change. The participants discovered the challenges of NWF during a team activity, as they computed their own temperature forecast based on the Forecast Factory (<https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/wea.670>). The participants interviewed a few colleagues working at the institute about their everyday life and found the experience very insightful. The last activity was a role play where the participants representing either an industrialized or a developing country had to negotiate to reach the 2-degree goal for global temperature. The workshop ended in a lecture hall where the participants filled out a feedback questionnaire and left notes on the blackboard for the students starting mid-October.



Experiments with temperature, pressure, etc. (top, left), lab experiment to visualize the Coriolis force (top, center), group performing the lab experiment (top, right), message left by the participants on the blackboard of a lecture hall (center, left), group picture on the roof of the institute (center, right), group picture in the lecture hall (bottom, left), home-made thermometers (bottom, center), and lunch break outside of the institute (bottom, right).

Thank you to all the volunteers who made this workshop possible!

To read more about this event and, e.g., about the program, visit:

https://www.wavestoweather.de/equal_opportunity/activities/maedchenmachentechnik2019

Meeting with German TV weather presenters

On September 17th 2019 Peter Knippertz met some TV weather presenters in Frankenberg. He gave a presentation to inform them about ensemble post-processed weather forecasts. The dialogue between the two communities is exciting.



Participants of the meeting in front of the historical city hall of Frankenberg in Hessen. Photo: Frank Böttcher.

To read more about this, visit:

<https://www.wavestoweather.de/outreach/meeting-tv-presenters-2019>

Public lecture on the limits of weather forecasts

On September 24th 2019 Tilmann Gneiting gave a public lecture in Karlsruhe on a mathematical perspective on the limits of weather forecasts (in German: “Grenzen der Wettervorhersage – eine mathematische Perspektive”).

To read more about this event, visit:

<https://www.wavestoweather.de/outreach/presentation-gneiting-2019>

EO measures in W2W

- Read about the EO committee:
http://www.wavestoweather.de/equal_opportunity/contact
- Read about the EO measures offered in W2W:
http://www.wavestoweather.de/equal_opportunity/eo_measures
- Read about the EO measures and activities already implemented:
http://www.wavestoweather.de/equal_opportunity/activities

Past issues of this newsletter are available here:

http://www.wavestoweather.de/outreach/quarterly_newsletter

Summer's highlight



*Part of a mesoscale convective system over Weßling, close to Munich, during a hail episode in June 2019.
Photo: Thomas Birner*

Contact

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