

Waves to Weather



Newsletter Apr/Jun 2023

Unfortunately, this newsletter comes with some bad news. Our proposal for the final phase of funding was unsuccessful. Despite the very positive comments of the reviewers, there was less money available in this round, and so W2W will end in June 2024. Nevertheless, a nine-year program is more than enough time to get something done, and we are not finished yet! As we move forward into the final year, we plan to highlight some of our achievements and legacy, but for now it's business as usual with lots of new science, meetings, and education activities.

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

- A joint **SPARC DynVar - SNAP meeting on "The Role of Atmospheric Dynamics for Climate and Extremes"** will take place from 9-13 October 2023 at the LMU in Munich. It is co-organized by W2W. For more information, visit: <https://www.wavestoweather.de/meetings/sparc-snap-2023>
- The final **W2W Annual Meeting** will take place on 27-28 November 2023 in Landau. Read more here: <https://www.wavestoweather.de/meetings/w2w-ann-meet-2023>

Additional information on upcoming events can be found here: <http://www.wavestoweather.de/meetings>

News



Benedikt Schulz defended his PhD on 17 May 2023. Congratulations for your excellent transdisciplinary work within W2W! We wish you all the best with your future career steps.



Edward Groot defended his PhD on 22 May. Congratulations for your excellent oral exam, and all the best for your postdoc at the University of Oxford!



Hyunju Jung defended her PhD on 26 May 2023. Congratulations, and good luck with your next career steps!



Congratulations, **Annika Oertel** for your junior group “INVACODA” at KIT with DWD. You can find out more about INVACODA here: <https://www.wavestoweather.de/news/oertel2023>



Since 1 April 2023, **Annette Miltenberger** is Junior Professor at JGU-Mainz. Congratulations, Annette!
Read more about her research group here: <https://clouds-aerosols-dynamics.ipa.uni-mainz.de/>

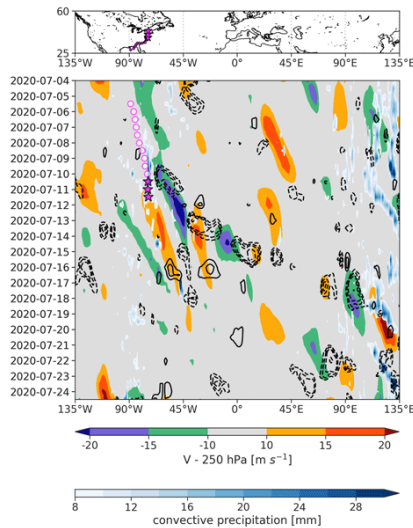


Congratulations, **Sebastian Lerch** for your recently funded **Transfer Project** with KNMI on the “**Development of a deep learning prototype for operational probabilistic wind gust forecasting**”! Read more: https://www.wavestoweather.de/research_areas/phase2/t04

Research Highlights

Here are some examples of recently published research from W2W.

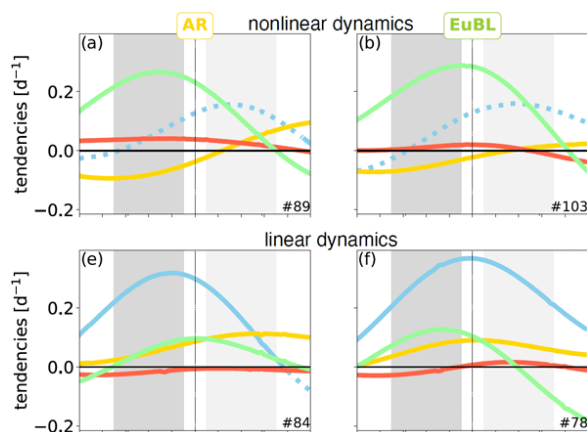
1. Investigation of links between dynamical scenarios and particularly high impact of Aeolus on numerical weather prediction (NWP) forecasts (A. Martin, M. Weissmann and A. Cress)



Global wind profiles from the Aeolus satellite mission are an important recent substitute for the Global Observing System, showing an overall positive impact on numerical weather prediction forecasts. This study highlights atmospheric dynamic phenomena constituting pathways for significant improvement of Aeolus for future studies, including large-scale tropical circulation systems and the interaction of tropical cyclones undergoing an extratropical transition with the midlatitude waveguide.

Read the full article: <https://doi.org/10.5194/wcd-4-249-2023>

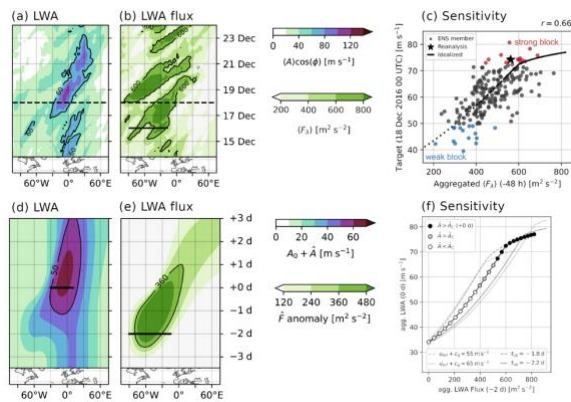
2. Similarity and variability of blocked weather-regime dynamics in the Atlantic–European region (F. Teubler, M. Riemer, C. Polster, C. Grams, S. Hauser and V. Wirth)



Weather regimes govern an important part of the sub-seasonal variability of the mid-latitude circulation. The year-round dynamics of blocked regimes in the Atlantic European region are investigated in over 40 years of data. We show that the dynamics between the regimes are on average very similar. Within the regimes, the main variability – starting from the characteristics of dynamical processes alone – dominates and transcends the variability in season and types of transitions.

Read the full article: <https://doi.org/10.5194/wcd-4-265-2023>

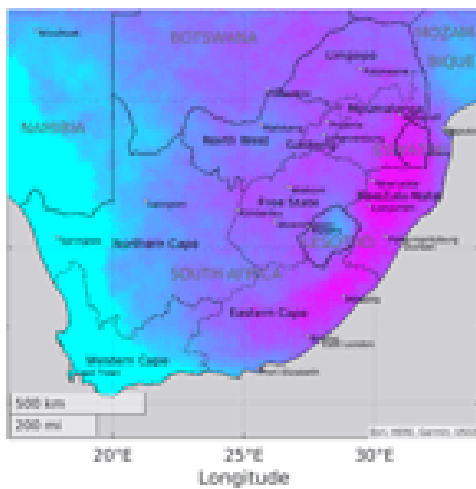
3. The Onset of a Blocking Event as a “Traffic Jam”: Characterization with Ensemble Sensitivity Analysis (C. Polster and V. Wirth)



We investigated the development of a winter European block to evaluate the possible relevance of the “traffic jam” mechanism for the flow transition. 200 members of a medium-range ensemble forecast of the blocking onset period are analyzed. Diagnostic evidence points to a traffic jam onset on 17 December 2016. Block development is sensitive to upstream Rossby wave activity up to 1.5 days prior to its initiation and consistent with expectations from the idealized theory.

Read the full article: <https://doi.org/10.1175/JAS-D-21-0312.1>

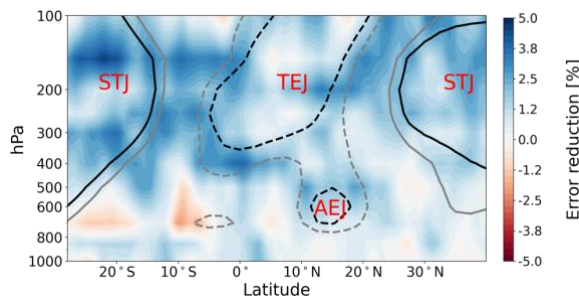
4. Characteristics of hail hazard in South Africa based on satellite detection of convective storms (H. J. Punge, K. M. Bedka, M. Kunz, S. D. Bang and K. F. Itterly)



We have estimated the probability of hail events in South Africa using a combination of satellite observations, reanalysis, and insurance claims data. It is found that hail is mainly concentrated in the southeast. Multivariate stochastic modeling of event characteristics, such as multiple events per day or track dimensions, provides an event catalogue for 25 000 years. This can be used to estimate hail risk for return periods of 200 years, as required by insurance companies.

Read the full article: <https://doi.org/10.5194/nhess-23-1549-2023>

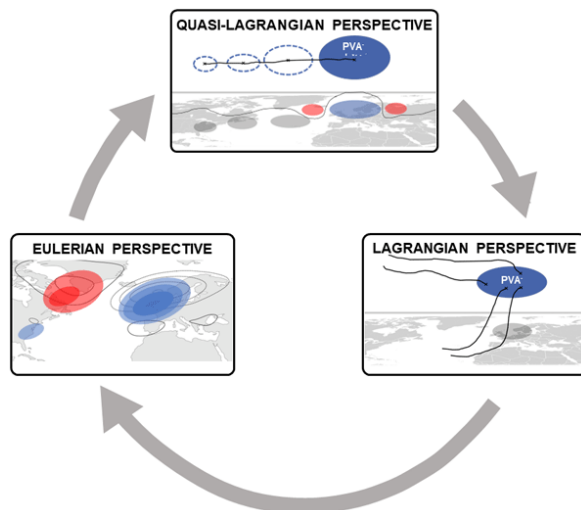
5. Impact of Aeolus wind lidar observations on the representation of the West African monsoon circulation in the ECMWF and DWD forecasting systems (M. Borne, P. Knippertz, M. Weissmann, A. Martin, M. Rennie and A. Cress)



We investigate the impact of Aeolus wind observations on the operational forecasting systems of ECMWF and DWD during the West African Monsoon. In general, the assimilation of Aeolus improves the prediction of zonal winds, especially for lead times above 24h. These improvements are related to changes in the structure of the African Easterly Jet (AEJ) and the Tropical Easterly Jet (TEJ). We identify an orbital-dependent bias, causing diurnal variations in the zonal wind speed, which can be corrected by means of a temperature-dependent bias-correction. Overall, this study highlights the benefits of Aeolus wind observations for weather forecasting in West Africa.

Read the full article: <https://doi.org/10.1002/qj.4442>

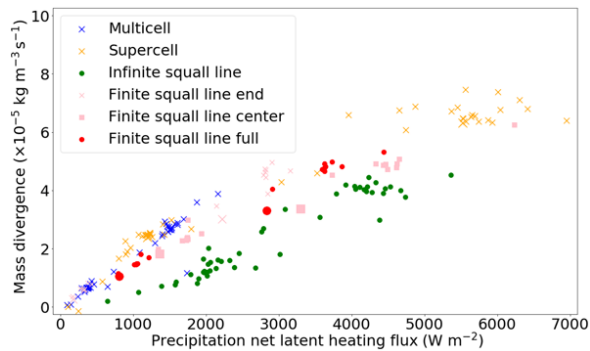
6. Towards a holistic understanding of blocked regime dynamics through a combination of complementary diagnostic perspectives (S. Hauser, F. Teubler, M. Riemer, P. Knippertz and C. Grams)



Blocking describes a flow configuration in the midlatitudes where stationary high-pressure systems block the propagation of weather systems. This study combines three individual perspectives that capture the dynamics and importance of various processes in the formation of a major blocking in 2016 from a weather regime perspective. In future work, this framework will enable a holistic view of the dynamics and the role of moist processes in different life cycle stages of blocked weather regimes.

Read the full article: <https://doi.org/10.5194/wcd-4-399-2023>

7. Divergent convective outflow in large-eddy simulations (E. Groot and H. Tost)



It is shown that the outflow from cumulonimbus clouds or thunderstorms in the upper troposphere and lower stratosphere in idealized high-resolution simulations (LESs) depends linearly on the net amount of latent heat released by the cloud for fixed geometry of the clouds. However, it is shown that, in more realistic situations, convective organization and aggregation (collecting mechanisms of cumulonimbus clouds) affect the amount of outflow non-linearly through non-idealized geometry.

Read the full article: <https://doi.org/10.5194/acp-23-6065-2023>

Additional publications relevant to W2W are listed here:
<http://www.wavestoweather.de/publications>

Past activities



Participants of the joint workshop in Ingolstadt

The **workshop on scale interactions, data-driven modeling, and uncertainty in weather and climate** was jointly organized by the CRC 181 “Energy transfers in Atmosphere and Ocean” (<https://www.trr-energytransfers.de>) and W2W. It took place at the Mathematical Institute for Machine Learning and Data Science (<https://www.ku.de/en/mids>) in Ingolstadt from 27-30 March 2023.

The workshop was attended by about 80 participants from both CRCs, as well as by international scientists from the US, Italy and the UK (ca. 50 in person and ca. 30-50 online). The topics covered were: uncertainty quantification and predictability, parametrizations and structure-preserving and invariant-conserving schemes, data-driven modeling and machine learning, data assimilation, waves in atmosphere and ocean, as well as wave-vortex interactions. Guest speakers included Rosimar Rios-Berrios (NCAR), Ted Shepherd (Univ. Reading) and Michael Gil (ENS, UCLA). The Early Career Scientists were active participants, e.g., they chaired the sessions.

The poster session on the first evening was very lively and the different communities (weather, climate, mathematics, ocean science, atmospheric science) met and discussed common methods and challenges, in an attempt to link recent advances in these areas and present new developments in the underlying theories, methods, and parameterizations. The poster session took place in a historical building, which served as a main building of the first University in Bavaria (later LMU) from 1503 till 1800.

In addition to the poster session, the participants had plenty of occasions to exchange about their results during coffee breaks, as well as during social events that included the conference dinner and a visit of the medical museum (<https://www.dmm-ingolstadt.de/>). If

you are familiar with Mary Shelley's book, you will remember that Victor Frankenstein's studied in Ingolstadt at the University of Natural Sciences.

Childcare was organized during the meeting for two children of participants.

You can read more about this meeting here:

<https://www.wavestoweather.de/meetings/joint-workshop2023>



Participants of the 100th anniversary of MIM on 30 March 2023

The **Meteorological Institute in Munich** celebrated its **100th anniversary** with an academical afternoon in the main building of the LMU on **30 March 2023**.

The Vice President for Research Hans van Ess (LMU) opened the event. Hans Volkert (DLR) then presented the genealogy of the institute, from its creation to today. Thomas Birner (LMU) presented the long history of stratospheric and upper tropospheric research at the institute and Bernhard Mayer (LMU) introduced the audience to the research on solar radiation performed at the institute. Roger Smith (former LMU) closed the first part of the event by presenting his perspective as a leading scientist for more than 20 years at the institute. After a short break, Sarah Jones (DWD) held the guest lecture and highlighted the many scientific outputs achieved at the institute, in close collaboration with weather services such as DWD. Markus Rapp (DLR) presented the continuous and fruitful collaborations between DLR and the institute, and George Craig (LMU) finally emphasized the importance of teaching and the major role of students in the life of the institute, highlighting W2W as a unique structure to advance fundamental research on the predictability of weather. To close the afternoon, former students of the institute reported

on their experience in the 70's and later, pointing to a very friendly and constructive atmosphere at the institute throughout the years. A buffet finally took place in the *Lichthof*, allowing the 150 participants coming from all parts of Germany and from all life stages to get to know each other, to reconnect, and to exchange memories or updates about the institute.

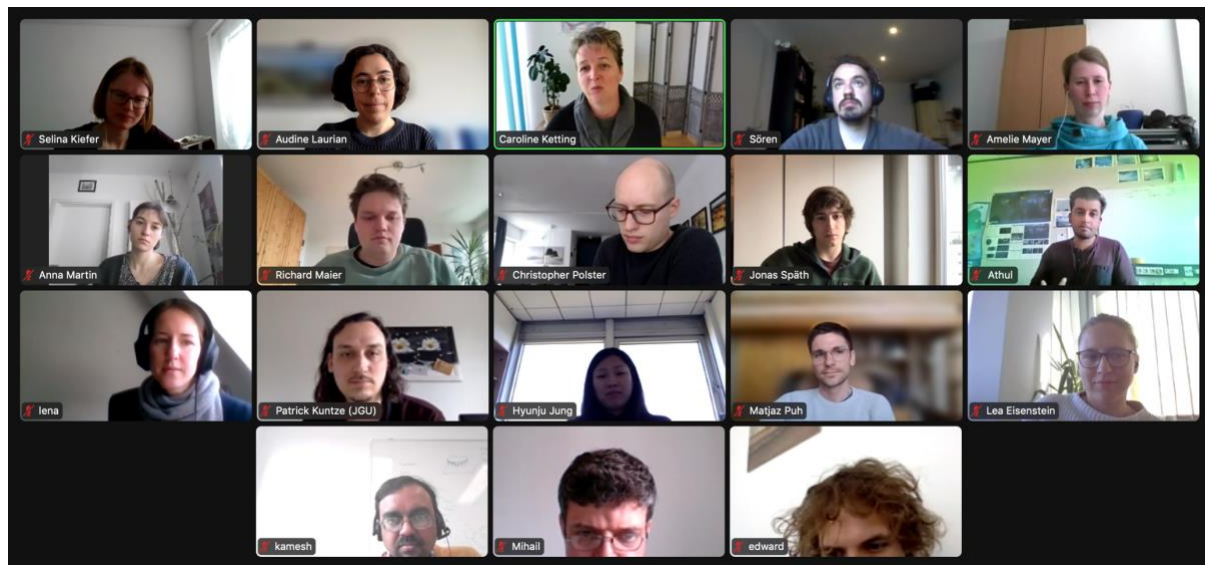
This was a great party! Thank you to all the organizers, and to all the participants for making it so instructive, friendly and fun!

For more information, including a press release by the LMU, visit:

<https://www.wavestoweather.de/meetings/mim-anniversary2023>

Videos of the presentations are available here:

<https://www.youtube.com/playlist?list=PL4buFsbtsNQs3c45zu7Nw4YoCRVhLvmmv>

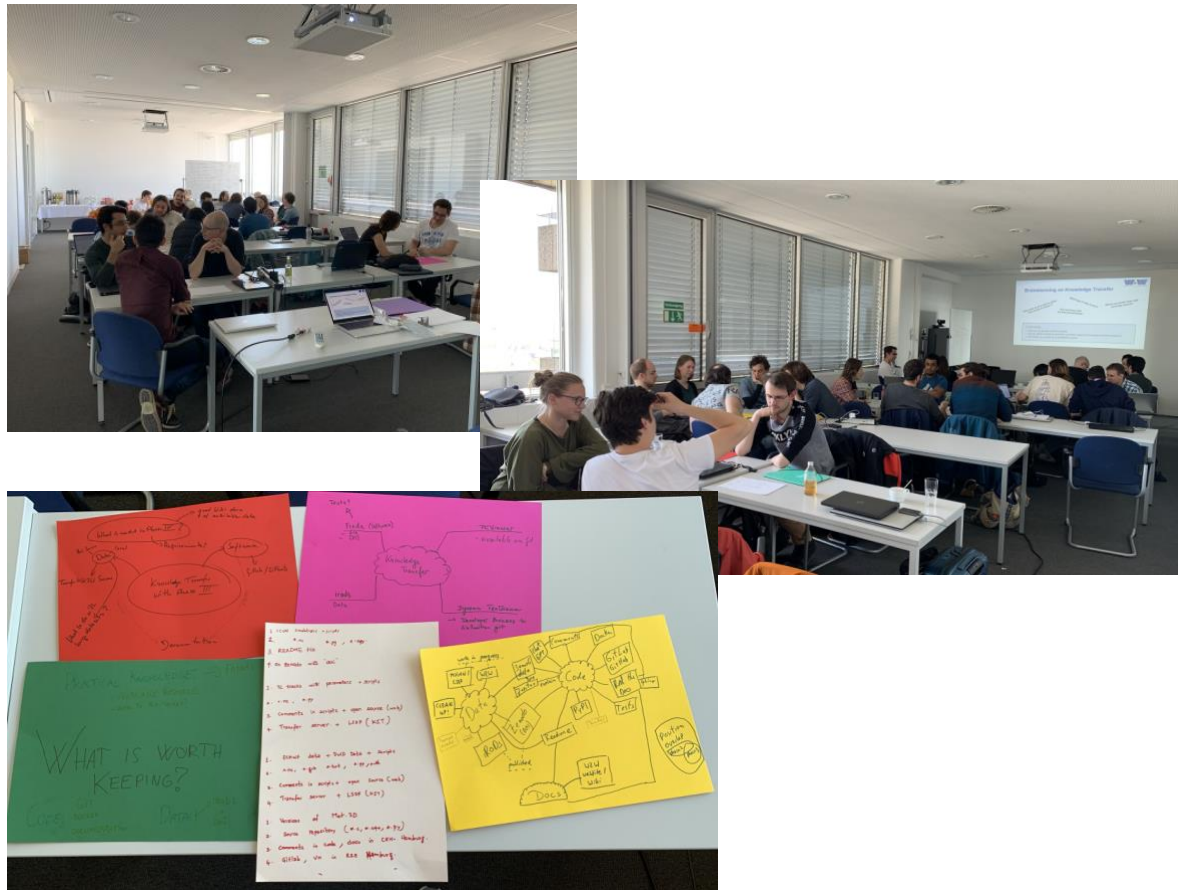


Participants of the career workshop on 14 April

The second part of the **career workshop on “Applying successfully, for academics with non-academic ambitions”** took place on 14 April 2023, online (see a summary of the first part in the previous issue of this newsletter). It focused on the oral application and in particular on the job interview. The coach, Caroline Ketting introduced the different steps in, and the related challenges and pitfalls of a typical job interview to eighteen participants from LMU, KIT, JGU and UHH. A practical exercise with mock interviews in small groups led to eye-opening feedback, and insightful suggestions from the hiring perspective by the coach. For more information, visit: <https://www.wavestoweather.de/meetings/career-workshop-2023>

Report on the 2023 ECS Annual Meeting in Hamburg (by R. Maier, H. Yung and S. Schmidt)

From 3-5 May 2023, a total of 22 ECS from Karlsruhe, Mainz, Munich and Hamburg met in Hamburg for the final ECS meeting of Phase 2. The main topic of the meeting was knowledge transfer to the ECS in Phase 3. To this end, we first held a brainstorming session in which we discussed what kind of results and tools we want to pass to the ECS in Phase 3, where these data and results are currently located, how and whether they are documented, and how one can currently access them.



Discussions during the knowledge transfer brainstorming session and some outputs

Being an essential part of archiving code, Oriol Tinto then refreshed our knowledge of Git and tested our skills via a fully interactive game that involved playing through a series of puzzles using Git commands.

The next day was built around two workshops organized by Maicon Hieronymus. The first of them focused on providing software using Docker containers. These include all the necessary dependencies of a code in such a way that a user no longer has to worry much about how to get the software in question to run. Hence, they would have made a significant contribution to an as easy as possible software transfer between Phases 2 and 3. In his second workshop, Maicon also briefly introduced Git CI, which allows the setup of automated tests for software in Git. Overall, Maicon had prepared so much material and especially hands-on sessions that we didn't manage to work through all of it. We might offer his two sessions again as a longer online workshop in the coming weeks. In between Maicon's two sessions, Prof. Dr. Felix Ament gave us a brief overview of the Meteorological Institute of the University of Hamburg, which included a tour to the university's wind

tunnels as well as a walk on the roof of the 20-story “Geomatikum” building, which is also where the group photo was taken.



Visit of the wind tunnel of the University of Hamburg



View from the roof of the 20-story Geomatikum building. If you look closely, you can see the Elbphilharmonie concert house, the “Michel” church, the harbor, and much more.

The last day of the meeting was also dedicated to knowledge transfer. Hyunju Jung had prepared a document to help foreign students get started within W2W. In groups, we supplemented this document with our own experiences. Afterwards, Christopher Polster held another interactive session on how to nicely and cleanly document code, which, of course, again would have helped to make code more accessible to ECS in Phase 3. After a final session, in which open questions of the Steering Group were discussed, the meeting ended. A few ECS stayed in Hamburg for a few more hours to watch the grand entry parade of the 834th Hamburg Harbor Birthday from the plaza of the Elbphilharmonie. All in all, the atmosphere throughout the entire meeting was great and it was nice to see how the group has grown together over the past four years despite all the challenges and virtual meetings in Phase 2.



Group picture on the roof of the "Geomatikum"

For more information, visit: <https://www.wavestoweather.de/meetings/ecs-ann-meet-may2023>

The **North Atlantic Waveguide, Dry Intrusion and Downstream Impact Campaign** (NAWDIC) is an international effort for an airborne field campaign focusing on atmospheric dynamics. Its overarching aim is to advance our understanding of the synoptic- to micro-scale dynamical and physical processes associated with the triggering of severe wind gusts, heavy precipitation, and cold air outbreaks in the North Atlantic, Euro-Mediterranean region and of their representation in numerical weather prediction models. Led by a team from IMK-TRO at KIT, and supported by W2W, NAWDIC is scheduled to take place in winter 2025/2026.

To advance the preparation of the deployment of the German “High Altitude and long-Range Aircraft” (HALO) during NAWDIC and to foster the NAWDIC-HALO community, instrument scientists as well as atmospheric scientists from 7 research institutes gathered for a **one-day workshop** at IMK-TRO on **12 May 2023**. Talks on the planning status of NAWDIC helped to update everybody about the aims of the campaign. Talks dedicated to instruments onboard HALO provided valuable information for the design of flight strategies. Key outcome of the workshop is that a community is now formed around the NAWDIC-HALO component consisting of scientists from various institutions and universities in Germany and beyond. Furthermore, an agreement has been reached regarding the instrumentation for NAWDIC-HALO and the design of the roadmap towards the actual campaign implementation. A next major step will be the international coordination of further NAWDIC components, which will be part of a follow-up workshop at ECMWF in Reading on 30 June 2023.

For more information about the past workshop, visit:

<https://www.wavestoweather.de/meetings/nawdic-workshop-2023>

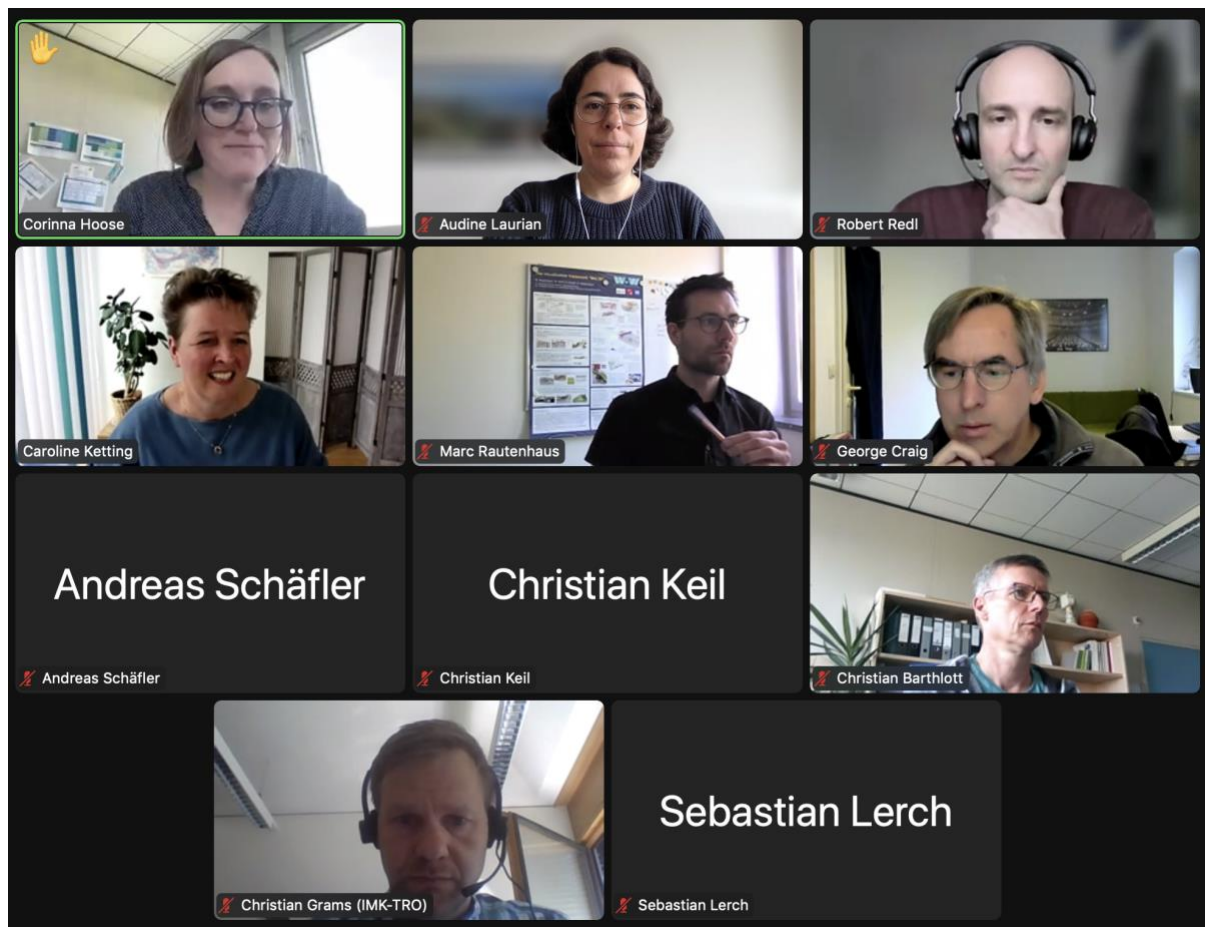


NAWDIC participants on 12 May 2023 at KIT

A workshop on “fair recruitment: finding and hiring the right colleagues” was offered to all PIs in W2W, as well as to external young group leaders from W2W institutes on 15 May 2023, online. The coach, Caroline Ketting (<https://www.kettingcoaching.com>) raised awareness and reminded the participants about the different phases of recruiting, e.g. writing the job offer, identifying the right candidates, preparing and structuring the job interviews, being aware of issues related to equality, diversity, disabilities, and cultural differences, and welcoming successful applicants at the institute.

The exchange of experience between project leaders from different university and institutes was very useful. A common questionnaire will be used for all upcoming job interviews at all W2W locations.

For more information, visit: <https://www.wavestoweather.de/meetings/workshop-fair-recruit-2023>



Participants of the workshop on 15 May 2023

Talia Tamarin-Brodsky (MIT) visited the Institute for Atmospheric Physics in Mainz from 13-18 May 2023, and in particular Volkmar Wirth (JGU), Christian Grams (KIT) and the related project staff. They presented their current research and discussed future collaborations within and outside of W2W.

Read more about Talia: <https://www.wavestoweather.de/guest/talia-tamarin-brodsky>

Dan Kirshbaum (McGill University; W2W Fellow with expertise in Research Area B) visited the meteorological institute at LMU in Munich from 26 June to 2 July. In addition to fruitful discussions with W2W PhD students, W2W PIs, as well as colleagues from the institute, Dan enjoyed some Bavarian specialties.



Dan, George and Christian at a Biergarten on 25 June 2023

Read more about Dan here: <https://www.wavestoweather.de/guest/dan-kirshbaum>

Seminars and guest program

Daniel Kirshbaum (McGill University; W2W Fellow) will visit the Institute of Meteorology and Climate Research at KIT from **3-6 July**, and the Institute for Atmospheric Physics in Mainz from **7-11 July 2023**. He will then give a colloquium in Karlsruhe on **4 July 2023** on “Observations of boundary-layer convergence lines in the southern Great Plains (USA)”. His hosts are Christian Keil (LMU), Christian Barthlott (KIT) and Annette Miltenberger (JGU).

Read about the **W2W Fellows program** here:

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

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>

Most seminars and colloquium are broadcasted live. If you would like to receive a link to listen to the presentation, please contact us.

Communication

Dissemination

Past issues of the newsletter

Past issues of this newsletter are available here:

https://www.wavestoweather.de/communication/dissemination-activities/publications/quarterly_newsletter

Outreach

Mainzer Tag der Meteorologie

To celebrate the World Meteorological Day on 23 March 2023, the Institute for Atmospheric Physics (IAP) at JGU in Mainz has organized an open day called “Mainzer Tag der Meteorologie” on 25 March 2023. A few hundred visitors of all ages attended the event. The program offered by scientists in W2W and at IAP included radiosonde launches, insights into the use of AI for climate modeling, and presentations about climate and weather studies and research at the institute. The visitors were offered cake and there was a kids’ corner organized. The feedback was very positive. Read more:

<https://www.wavestoweather.de/communication/outreach-activities/open-day-schools/open-day-jgu-2023/>



Rotating tank showing flow patterns. Photo: P. Reutter.

“Weather Day” in the Deutsches Museum

The collaboration between the Deutsches Museum and W2W continues to develop. On 6 May 2023, W2W scientists and colleagues from the meteorological institute offered about 10 different activities to the general public. During this special “Weather Day”, which lasted from 10am-4pm, ca. 200 visitors learned about clouds by listening to a presentation by Bernhard Mayer, they manipulated a radar located on the roof of the meteorological institute to better observe clouds (with Gregor Köcher and Leonie von Terzi), they took part in experiments about atmospheric flow dynamics and the chaos in the atmosphere (with Jonas Späth, Annika Stenzl and Thomas Birner), they learned about rainbows and other optical phenomena in the atmosphere (with Anna Weber, Lea Volkmer and Veronika Pörtge), they playfully learned about photons and the challenge of producing solar energy (with Richard Maier and Mihail Manev), they learned about the need for ensemble forecasts and statistics to predict weather using the MeteoFlipper designed by Federico Grazzini, and they constructed their own instruments with the help of Britta Seegebrecht and Audine Laurian. This was a successful, exciting and fun day for the visitors, and in particular for families.

Thank you to all the volunteers who made this day possible, and thank you to the museum staff for their support and enthusiasm.

To find out more about this event, visit:

<https://www.wavestoweather.de/communication/outreach-activities/open-day-schools/weather-day-2023>



Constructing a thermometer (top left), explaining optical phenomena (top center), explaining chaos in the atmosphere using a double pendulum (top right), explaining clouds (center row, left), playing a Monte-Carlo game about solar radiation (center row, center), explaining radar observations of clouds (bottom row).

Open Day 2023 at KIT

At the Open Day 2023 at KIT on 17 June 2023, W2W scientists and colleagues from KIT and from the Center for Mathematics in the Sciences, Engineering and Economics (MathSEE) offered activities for visitors at Campus North. Christian Grams and Sebastian Lerch gave an overview of the history of weather prediction from heuristics to artificial intelligence in a talk about the “Quiet revolution of weather prediction”, and visitors were able to compute a weather forecast themselves as part of the “Richardson’s forecast factory”, a game organized by Lea Eisenstein and Nina Horat.

To read more, visit:

<https://www.wavestoweather.de/communication/outreach-activities/open-day-schools/open-day-kit-2023>



Nina Horat explaining the game about the “Richardson’s forecast factory”. Photo: Aarti Singh (KIT)

Presentation in the Deutsches Museum

Bernhard Mayer will give a presentation within the seminar series “Wissenschaft für jedermann” at the Deutsches Museum in Munich on 20 September 2023.

For more information visit: <https://www.wavestoweather.de/communication/outreach-activities/presentations-general-public/deutsches-museum-sep-2023>

Equal opportunity (EO) activities

On the importance of role models for women in STEM fields, by Audine Laurian

Three female master students in STEM¹ fields at LMU, TUM, and Heidelberg University (Elina Köster, Karina Houska and Alexandra Beikert) were facing challenges and disadvantages related to unconscious biases in their working group and scientific environment. They decided to share their experience and to connect with other women² in STEM. They organized a rather spontaneous 2h-workshop on 22 February 2023 at the Faculty of Physics at the LMU for students in mathematics, physics, and computer science. Bachelor students, Master's degree students and early-stage PhD candidates met and exchanged their personal stories and challenges. This networking event was surprisingly well attended and it was so successful that a few participants decided to organize a second networking event, this time to stress the importance of role models.

Four enthusiastic female students from the Faculty of Physics at the LMU (Sophie Häfele, Beatrice Nettuno, Bianca Buturca and Yoanna Borisova) organized a workshop called "Women in STEM - Inspiring paths for all" on 16 May 2023. Inspired by a poster exhibition by the German Physical Society called "Lise Meitner and "her daughters": Women physicists introduce themselves"³, they designed posters about their own female role models in STEM fields, covering many decades, countries, and disciplines. To open the workshop, Beatrice Nettuno presented gender statistics in STEM fields at LMU, as well as statistics about the importance of role models in shaping the career of young STEM scientists in Germany. Two keynote speakers were then invited to share their personal view on the topic.

Audine Laurian presented the inspiring stories of STEM scientists in W2W and in other international research programs featured in the comic books "Of course!" and "Of course!2". This project highlights the passion and determination of the interviewed role models (male and female) in making their work environment more open and their own career more fulfilling. Networking has been crucial to make this project successful. What these role models have in common is: the awareness that a situation is discriminating for a minority, the strength and the creativity to propose alternatives, and the consistency to pursue their passion doing research.

Amelia Bayo (ESO) then introduced herself and her inspiring career path. In a very humble way, she highlighted the many inspiring mentors she met in Spain, Chile, the US and Germany, highlighting the role of each of them in shaping her career, and her personality. For example, one passionate scientist made her change her research interests from mathematics to astrophysics, a second mentor showed her how to become an independent researcher, a third mentor highlighted the ingredients for a successful grant and encouraged her to apply to her dream job, because "if you don't try, you will surely not get it".

These role models have a few elements in common, namely support from their family, friends or colleagues, luck or ability to recognize opportunities when they appear, passion for their field of research, and ability to grow and learn from their mistakes.

¹ science, technology, engineering, and mathematics

² "women" addresses everyone who is perceived as female, or identifies as female or gender-nonconforming.

³ https://www.dpg-physik.de/veroeffentlichungen/publikationen/lise-meitner?set_language=en

More than 90 students (male and female) from physics, mathematics, computing sciences, and astrophysics attended this workshop. The presentations triggered many questions from the audience and friendly and exciting discussions followed at the poster session.

This event was a great networking opportunity for early career scientists, and it hopefully inspired a few of them to continue in STEM fields!

Read more here:

https://www.wavestoweather.de/equal_opportunity/activities/womeninstem-may2023/



Amelia Bayo presenting some of her mentors



Audine Laurian presenting inspiring scientists at LMU

Girls' Day 2023

This outreach event for school girls took place on 27 April 2023 Germany wide.

At the meteorological institute in Munich, eleven scientists including Kirsten Tempest and Bernhard Mayer introduced twelve girls between 11 and 14 years old to weather and weather forecasting during a workshop called "The weather: wind, clouds and science" (in German: "Das Wetter: Wind, Wolken und Wissenschaft"). Bernhard Mayer opened the event by presenting the institute and the diverse areas of research. The participants then played a "Monte Carlo game" to learn about solar radiation, and weather and climate in general. Each participant played the role of a photon, starting from to the top of the atmosphere and aiming at reaching a solar panel. In order to avoid being absorbed, the photon (i.e. the participant) had to answer questions about weather, climate, etc. The participants then played the "Forecast Factory", a game in which each participant is a grid point of a numerical weather prediction model forecasting the temperature in Germany. Each participant computes the temperature at this grid point for a few time steps, communicating with neighbors to exchange information about boundary conditions. The resulting temperature forecast is then compared to the "real" model forecast. This great team work highlights the challenges of NWP and the effects of error growth on a forecast. After a lunch break, the school girls visited the roof instruments. They then visited a poster exhibition about role models in STEM fields, reading inspiring stories featured in the comic book "Of course!". They then learned about the need for ensemble forecasts by playing with the "Meteo Flipper" constructed by Federico Grazzini. This game is a vertical wooden board with nails that deviate marbles as they roll down so that the marbles land "randomly" into "sunny", "cloudy", "snowy" prediction boxes (see photo below). The day ended by a visit of the institute and the interview of a few scientists about their everyday life at work.

A participant wrote: "A take-home message for me is that women also have the opportunity to become professors and achieve something great in science. "



Participants in Munich

In Mainz, Isabelle Prestel, Amelie Mayer and Marius Thomas welcomed 12 girls from 5th – 6th grade for a workshop called “What do you need to forecast the weather?” at the Institute for Atmospheric Physics. The aim of the workshop was to find out how weather predictions are made and what the key ingredients are. Peter Spichtinger opened the workshop and presented the various meteorological topics and research interests at the institute. After providing a short explanation of how weather prediction works, the girls then engaged in a discussion about the upcoming weather conditions, thereby introducing the important meteorological variables that need to be measured to run a weather prediction.

To measure these variables, they build their own thermometer and windmill. Despite facing some challenges during the calibration process of the thermometer, the girls worked hard and did their best. They also got the opportunity to test their windmills with a regular ventilator since the wind channel was under repair.

After a refreshing lunch break at the Botanical Garden, the girls visited the rooftop instruments. They then had a look at the cloud chamber, where they could touch a cloud. This gave them a chance to see firsthand how meteorological data is collected.



Participants in Mainz

At the Institute of Meteorology and Climate Research at KIT, a workshop called "Vom Wetter zum Unwetter" (in English: "From weather to extreme weather") was offered to eleven girls who wanted to learn more about the profession of meteorologist. Hans Schipper from the Süddeutsches Klimabüro introduced the participants to how weather actually develops, how a forecast is made and how climate change influences extreme events. Various natural disasters were then discussed using pictures and the participants assessed how serious the consequences of each disaster can be for the population and the economy. After a lunch break in the canteen, the girls carried out various experiments in groups on greenhouse effect, convection, ice formation in clouds, droplet formation and air humidity measurements. The highlight of this session was the successful attempt to form ice on pine cones with supercooled water. The workshop ended with a few tips on excursion destinations with a meteorological background. It was an exciting experience for everyone.



Activities at KIT

Thank you to all the volunteers who made this Girls' Day an exciting and fun one again!

Read more about the workshops offered by W2W here:

https://www.wavestoweather.de/equal_opportunity/activities/girlsday-2023

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

Spring's highlight



Sahara dust stripes in Munich on 15 March 2022. Photo composite: Leonhard Scheck

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