

Welcome to another edition of the Waves to Weather Newsletter! Our second phase is in full swing, and we are especially happy that life is returning to normal, so that field campaigns and in-person meetings are taking place. I would also like to draw your attention to an overview paper that we have recently published in the Bulletin of the American Meteorological Society with some scientific achievements from the first phase, along with our view of the most important challenges for the next few years. This is linked below, along with our usual selection of activities and highlights.

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 W2W Early Career Scientists will take part in an online **workshop on time management** on 8th October and 22nd October 2021.
Read more about this event here:
<https://www.wavestoweather.de/meetings/time-manag-2021>
- An online W2W **Career Workshop** is organized by and for the ECS on 20th and 21th October 2021. Alumni and project leaders will be invited to share their experience about staying in academia, working in industry, applying for positions, finding funding, etc. To read more about this event, visit:
<https://www.wavestoweather.de/meetings/career-workshop-2021>
- The 7th **W2W Annual Meeting** will take place from 8 – 10th November 2021 in a hybrid format. Confirmed keynote speakers include: Jill Johnson (Univ. of Sheffield), Douglas Parker (Univ. Leeds), Carolyn Reynolds and Ron McTaggart-Cowan. Further guests include the other SAB members.
For more information, visit:
https://www.wavestoweather.de/meetings/annual_meeting2021
- The **W2W Early Career Scientists** will hold their **Annual Meeting** from 6-8 December 2021. For more information visit:
https://www.wavestoweather.de/meetings/ecs-meeting-dec_2021
- A **W2W women workshop** will take place early 2022 and will cover topics such as general strategies (how to deal with the imposter syndrome, what to do if a

colleague appears to be biased, etc.), voice training and a panel discussion with the women PIs and the ECSs in W2W.

For more information, visit:

<https://www.wavestoweather.de/meetings/women-workshop-2022>

- A **W2W hands-on workshop** will take place on 4 September 2022, on the Sunday before the EMS Annual Meeting in Bonn, to showcase the tools developed in W2W to the scientific and operational communities. Save the date and stay tuned!

Visit: <https://www.wavestoweather.de/meetings/hands-on-workshop-sep2022>

Additional information on upcoming events can be found here:

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

News

New transfer project

The new transfer project T2 **“Towards seamless prediction of extremes” (TEX)** has been granted by the DFG, starting 1 September 2021 and for a period of 3 years. Christian Grams, Federico Grazzini and George Craig will work together with colleagues from ECMWF and ARPAE-SIMC Emilia-Romagna to expand the work achieved in the first transfer project T1 across Europe and to include temperature extremes in addition to precipitation extremes. The goals are to identify the dynamical drivers of these extreme temperature and precipitation events and to use this information to extend predictability into the 10-30 day forecast range.

Congratulations, dear T2 team!

Learn more about this new project here:

https://www.wavestoweather.de/research_areas/phase2/t02



Juliane Rosemeier (A2 project, JGU) left W2W end of August 2021. She received a Walter Benjamin stipend from the DFG and will move to Exeter. Her new project is a mixture of topics she has addressed in her PhD and new challenging topics. A short description of her new project is available here: <https://gepris.dfg.de/gepris/projekt/>.

Juliane wrote:

“I would like to take this opportunity to say thank you for the numerous offers and opportunities for professional development that I had as a member of the W2W community. Now is the time to go my own way a little more independently. I'm looking forward to the upcoming tasks and will certainly benefit from the experience I was able to gain in W2W.”

Congratulations, Juliane! Good luck, and enjoy your new scientific and international challenges!



Maurus Borne currently takes part in the Joint Aeolus Tropical Atlantic Campaign (JATAC) in Cape Verde. He joined the DLR's AVATART team on Sal Island to validate the quality of Aeolus wind information using radiosondes. Read more here:

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



Follow W2W on **Twitter!**

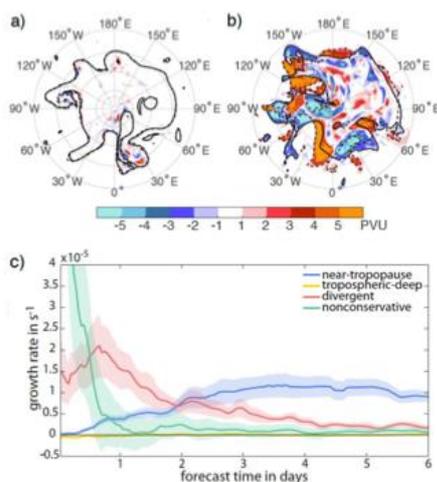
<https://twitter.com/WavesToWeather>

W2W has currently 159 followers, only about 10% of them are from W2W.

Research Highlights

Here are some examples of recently published research from W2W.

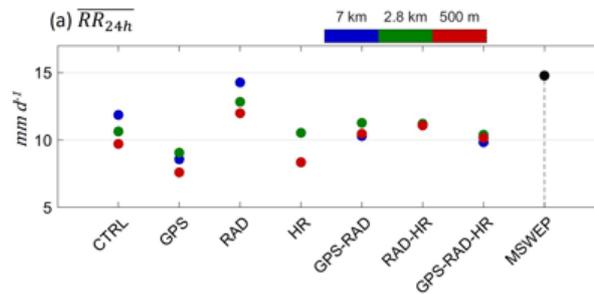
1. Waves to Weather: Exploring the limits of predictability of weather (G. C. Craig, A. H. Fink, C. Hoose, T. Janjić, P. Knippertz, A. Laurian, S. Lerch, B. Mayer, A. Miltenberger, R. Redl, M. Riemer, K. I. Tempest and V. Wirth)



This article presents the motivation for Waves to Weather (W2W), the most important and challenging scientific questions in predictability of weather addressed in W2W and some key results and how they have influenced our understanding of predictability. The key role of interdisciplinary research linking atmospheric scientists with experts in visualization, statistics, numerical analysis, and inverse methods is highlighted, as well as innovative programs for training and support of early career scientists, and to support education, equal opportunities, and outreach.

Read the full article: <https://doi.org/10.1175/BAMS-D-20-0035.1>

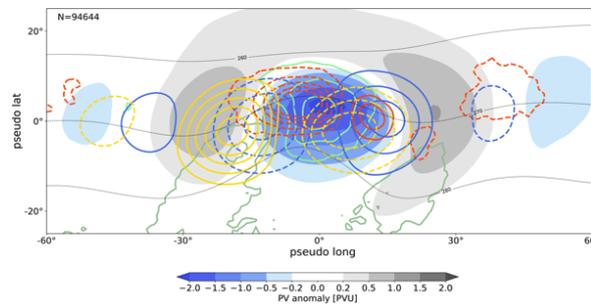
2. The impact of GPS and high-resolution radiosonde nudging on the simulation of heavy precipitation during HyMeX IOP6 (A. Caldas-Alvarez, S. Kodayer and P. Knippertz)



This paper investigates the impact of nudging high- and low-resolution radio soundings (HR and RAD, respectively) and 10-minute estimates of column water vapor based on Global Positioning System (GPS) data into simulations of heavy precipitation events over France and Italy performed with the Consortium for Small-scale Modeling (COSMO) model. Results show that the additional observations cannot compensate for errors in the model dynamics and physics. The control simulation with COSMO (CTRL) has a positive atmospheric moisture bias prior to precipitation onset but a negative bias in rainfall (cf. CTRL with observations from MSWEP), such that the nudging of GPS data further reduces total precipitation (cf. CTRL with GPS). The good performance of the RAD experiment is mostly due to one sounding from Nîmes, illustrating the large impact of individual observations in highly unstable environments. Using different model grid spacings (blue: 7km, green: 2.8km, red: 500m) has an overall small impact with the highest resolution tending to yield the lowest rainfall (i.e. the largest negative bias).

Read the full article: <https://doi.org/10.5194/wcd-2-561-2021>

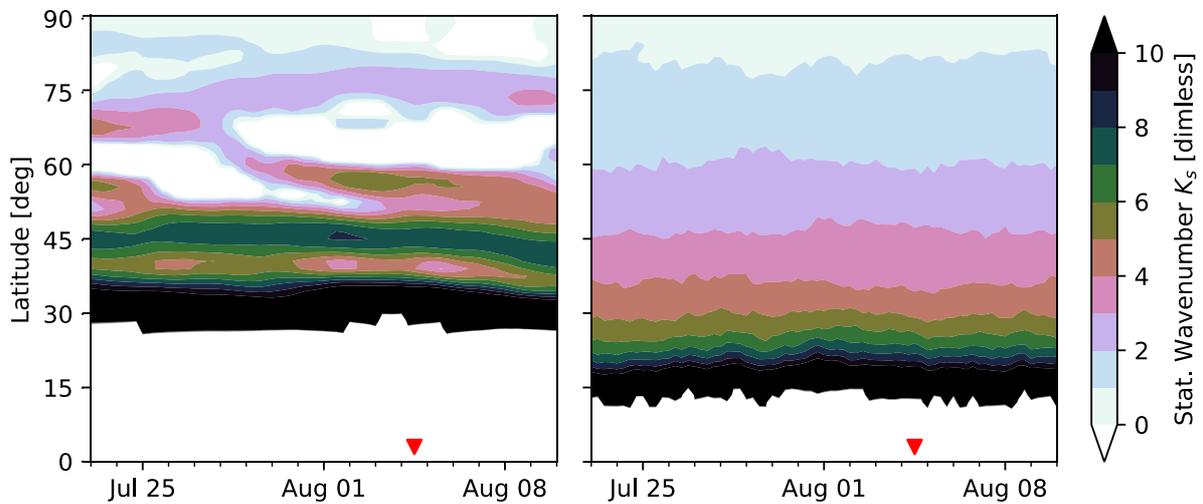
3. Potential-vorticity dynamics of troughs and ridges within Rossby wave packets during a 40-year reanalysis period (F. Teubler and M. Riemer)



Rossby wave packets impact all aspects of midlatitude weather systems, from their climatological distribution to predictability. Case studies suggest an important role of latent heat release in clouds. We revisit the dynamics of Rossby wave packets in the Northern Hemisphere during the ERA5 period (1979–2017) in a quantitative, piecewise PV tendency framework. Nonconservative processes are explicitly diagnosed. The role of the divergent flow, by which moist processes most prominently impact the evolution of RWPs, is explicitly accounted for in this framework. On average, the impact of moist processes is substantially different between troughs and ridges and dry conceptual models of wave packet dynamics should be extended.

Read the full article: <https://doi.org/10.5194/wcd-2-535-2021>

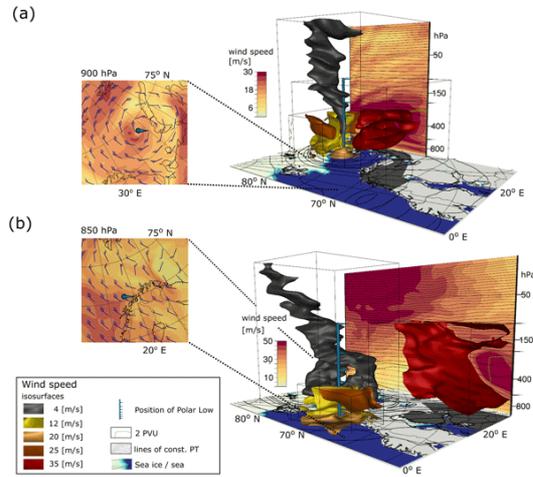
4. The problem of diagnosing jet waveguidability in the presence of large-amplitude eddies (V. Wirth and C. Polster)



Understanding strong undulations of the mid-latitude jet-stream is important, because they are sometimes associated with extreme weather. Several previous publications have suggested that episodes with strong undulations can be caused by a jet that acts as a circumglobal waveguide. In this paper we argue that these results are likely to be based on a misinterpretation and that the causality may be almost the other way around: large jet undulations can render the traditional waveguide diagnostic inappropriate and, thereby, fake strong circumglobal waveguidability. We suggest a novel diagnostic that tries to circumvent the problem. Our work implies that the results from previous publications need to be carefully re-evaluated in order to avoid misinterpretation in the future.

Read the full article: <https://doi.org/10.1175/JAS-D-20-0292.1>

5. Interactive 3-D visual analysis of ERA5 data: improving diagnostic indices for marine cold air outbreaks and polar lows (M. Meyer, I. Polkova, K.R. Modali, L. Schaffer, J. Baehr, S. Olbrich and M. Rautenhaus)



Recent advances in visual data analysis are well suited to gain insights into dynamical processes in the atmosphere. Within W2W, novel methods for three-dimensional (3-D) interactive visual data analysis are developed and integrated into the open-source visualization framework Met.3D (<https://met3d.wavestoweather.de/met-3d.html>). In this study, we apply Met.3D to investigate marine cold air outbreaks (MCAOs) and polar lows (PLs) in the recently released ERA5 reanalysis data. Our study aims at revealing 3-D perspectives on MCAOs and PLs in ERA5 and at improving diagnostic indices to capture these weather events in long-term assessments on seasonal and climatological timescales.

Read the full article: <https://doi.org/10.5194/wcd-2-867-2021>

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

Past activities

W2W ICON development meeting (6th July 2021)

A first W2W ICON development meeting took place on 6th July 2021. About twenty ECS and PIs from all three research areas and the Z2 project gathered to discuss the current activities. The discussion focused on the infrastructure within W2W, the new ICON lines of development and where W2W developments could fit, and the establishment of a convenient way of communication between the participants to increase cooperation within W2W.

Swabian MOSES Campaign (May - July 2021)

On 20 July, several W2W early career scientists (ECS) and project leaders, together with scientists from DWD (SINFONY project) took part in the Swabian MOSES showcase event. For the ECS, it was a precious opportunity to directly hear from senior scientists how they organize a field campaign and what aspects are important to consider when selecting a location for measurement, especially for a radar installation.



W2W participants of the Swabian MOSES showcase event on 20 July 2021

Kompaktseminar Numerik (8-10 September 2021)

On 8-10 September a group of 21 scientists met at the Pfalzakademie Lambrecht to discuss mathematical aspects of various W2W projects. Among the participants were four PIs of W2W and their PhD students and postdocs, several of which are among the ECS in W2W. The workshop was part of the annual "Kompaktseminar" series organized by the Numerical Analysis group at JGU since 1999, and it was the third one with financial support by W2W (the previous ones took place in 2016 and 2018).

The individual talks at the meeting dealt with partial differential equations governing the dynamics of the atmosphere, including the question of how to quantify the uncertainty in the outcome, if some of the parameters are only vaguely known. Within a proper stochastic setting the formulation of this problem easily becomes so high dimensional that novel and very specific means of discretization have to be developed to achieve a reasonable accuracy. Other presentations focused on proper parameterizations of cloud processes, of ice clouds in particular, and their influence on structural properties of these clouds on larger length scales. Some of the talks also focused on inverse problems and on tools like ensemble Kalman filters to reconstruct unknown parameters "on the fly" while doing a numerical simulation with parallel data assimilation.

Many of the speakers expressed their gratitude to eventually be able to present their latest work to a "real audience" in person, others (new ECS in particular) pointed out that they haven't seen some of their office neighbors "in real" before - without wearing a mask.

We were fortunate that the workshop took place during a splendid "late summer" week, although we had to challenge the various weather apps until the very last minute to be sure of avoiding a thunderstorm during the traditional hike (see photo). In the end it stayed sunny and didn't rain at all.

Making a long story short: We very much appreciate the funding of W2W, and we are also grateful to the 3G rules in Germany, both of which made it possible that this workshop could take place in person. We truly hope that similar events can be realized more often in the near future.



Participants of the Kompaktseminar. Photo: Simon Schneider

More information is available here:

<https://www.wavestoweather.de/meetings/kompaktseminar2021>

Seminars and guest program

Find out about more the **W2W Fellows program** and about previous **guest scientists** invited by W2W 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.

Communication

Dissemination

Interview by the YESS community

The ECS in W2W have initiated a collaboration with the YESS community (<https://www.yess-community.org>). George Craig (W2W speaker), Corinna Hoose (Equal Opportunity Committee representative), Robert Redl (computing services) and Kirsten Tempest (ECS representative) have been interviewed by the YESS community about W2W. You can read the interviews here:

<https://www.wavestoweather.de/communication/dissemination-activities/publications/interview-yess>

Past issues of this newsletter

Past issues of this newsletter are available here:

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

Outreach

Interview in Mitteldeutscher Rundfunk (MDR)

Peter Knippertz was interviewed on 1st July 2021 by the Mitteldeutscher Rundfunk (MDR) on severe weather warnings. Read more here:

https://www.wavestoweather.de/communication/outreach-activities/press-releases/interview-in-mdr_01072021

Interview on floods in the Eiffel region

Volkmar Wirth was interviewed on 16 July by the “Verlagsgruppe Rhein Main” about the extreme precipitation and floods in the Eiffel region. An article was published in the „Allgemein Zeitung“ and in the “Darmstaedter Echo” on 17 July 2021. Read more here:

<https://www.wavestoweather.de/communication/outreach-activities/press-releases/article-eiffel-july2021>

TV interview in "Alle Wetter"

Volkmar Wirth gave a live interview on 4 August 2021 in the TV show “alle wetter!” on a traffic jam theory to explain the formation of weather pattern blockings. Read more and watch the video here:

https://www.wavestoweather.de/communication/outreach-activities/press-releases/alle_wetter_4aug2021

Interview in the „Berliner Zeitung“

Andreas Fink was interviewed on 28th August 2021 by the Berliner Zeitung on artificial intelligence and weather forecast. Read more here:

<https://www.wavestoweather.de/communication/outreach-activities/press-releases/interview-berliner-fink-2021>

Interview in “Focus Online”

Andreas Fink was interviewed on 3rd September 2021 by Focus Online on heatwaves and droughts. Read more here:

<https://www.wavestoweather.de/communication/outreach-activities/press-releases/interview-focus-online-sep2021/>

Collaboration with the Deutsches Museum in Munich

Corinna Hoose (KIT) will give a presentation at the Deutsches Museum in Munich on 13 October 2021 on “Clouds: water, ice, weather, climate”. This event is part of the seminar series “Wissenschaft für jedermann” addressed to the general public.

Find out more about this event here:

<https://www.wavestoweather.de/communication/outreach-activities/presentations-general-public/deutsches-museum-oct-2021>

Equal opportunity (EO) activities

Update on the “Of course!” comic book

Seven new role models (5 women, 2 men) were recently interviewed. They are from the U.S., Canada, Norway, Switzerland, and Germany and work in the fields of climate dynamics, deep ocean biology, astrophysics and, of course, meteorology. You can read the latest interviews of Petra, Volkmar and Verena here:

https://www.wavestoweather.de/equal_opportunity/activities/comic-book/



Female networking event

Tijana Janjic-Pfander was a special guest at a women networking event organised by the SFB 1294 “Data Assimilation” (<https://www.sfb1294.de>) for their Kick off Meeting on 14 September 2021 in Potsdam.

Read more: https://www.wavestoweather.de/equal_opportunity/activities



Participants of the networking event

Discussions on Diversity, Equity and Inclusion in the Cloud Physics Community (by Corinna Hoose)

Through an initiative of a group of international scientists (Karin Ardon-Dryer, Zamin A. Kanji, Luis A. Ladino, Diana L. Pereira, Ulrike Proske, and Zyanya Ramirez), the topic of diversity and gender equity was prominently discussed at the International Conference of Clouds and Precipitation (ICCP), held virtually in Pune, India, in August 2021. A survey was sent out to the community before the conference, addressing questions on gender, ethnic/cultural background, collaborations and experiences with bias and harassment. First results were presented at ICCP, along with a review of studies on the representation of minorities and women in journal article authorship in the geosciences. The survey results demonstrate clearly that a feeling of not being included within the scientific community and even harassment is an issue not for the majority, but for a substantial number of women cloud physicists and people describing themselves as belonging to a minority.

These results, and possible measures addressing them (such as structured hiring procedures) were the topic of a panel discussion, in which W2W’s scientific advisory board member Sue van den Heever and W2W PI Corinna Hoose took part.

It was also noticed that the International Committee on Clouds and Precipitation (also abbreviated as ICCP, <https://www.iamas.org/iccp/>) itself doesn’t exhibit a large diversity in the regional origin of its members. While there are 10 women out of 30 committee members and officers, representation of scientists from South America and Africa was very limited after the last election and was only raised to now 4 members after additional

nominations brought forward by ICCP president Greg McFarquhar. As a side note, 4 members are from Germany, including W2W PIs Peter Spichtinger and Corinna Hoose. In the recent committee meetings since the conference, diversity, equity and inclusion is a recurring topic and point of consideration e.g. for the organization of future workshops and meetings of ICCP.



Panel discussion at the International Conference on Clouds and Precipitation, August 2021. Picture: Youtube Screenshot.

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

Summer's highlight



When the rain is gone, southeast of Mainz, 14 March 2021. Photo Edward Groot

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