

# Waves to Weather



## Newsletter Apr/June 2019

The second Phase of Waves to Weather is funded! And with very positive reviews. This is the result of a huge amount of work from our members, but also from the funding agency and the expert panel that had to review the 400 pages and carry out the site visit. Thank you to everyone involved. The reviewers noted that a crucial strength of W2W is how well we are embedded in the national and international communities, so I would also like to thank everyone who has shown an interest in this newsletter. I look forward to continuing our contacts for the coming four years.

PS: We have just advertised a long list of exciting PhD and Postdoc positions on our website. Please spread the word to anyone who might be interested!

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 **19<sup>th</sup> Cyclone Workshop** will be co-organized by W2W and will take place in Seon (Bavaria, Germany) from September 29<sup>th</sup> – October 4<sup>th</sup> 2019. More information about the program, the venue, support to Early Career Scientists, etc. is available here:  
<http://www.wavestoweather.de/meetings/19th-cyclone-workshop>
- The **Kick-off meeting of W2W** will take place from November 4<sup>th</sup> – 6<sup>th</sup> 2019 in Eibelsstadt close to Würzburg, Germany. One highlight of this meeting will be a workshop on unconscious biases for all participants. The draft program and 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

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### Open positions

Twenty-one positions (PhD, Postdoc, scientific programmer) are 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.

### Schmidt Science Fellows

Andreas Schlüter has been selected as one of 20 members of the 2019 class of Schmidt Science Fellows on April 8<sup>th</sup> 2019 in New York City. He was one of 220 nominees from 75 leading institutions worldwide.

The Schmidt Science Fellows is an innovative post-doctoral program that aims to develop the next generation of interdisciplinary science leaders to tackle the world's most significant problems and maximize scientific opportunities for society. The new Fellows are planning to take on global challenges and scientific areas spanning health, the environment, clean energy, computer science, smart materials, and many more. The 2019 cohort of Fellows represents 15 countries of origin and joins last year's inaugural class as part of a growing Schmidt Science Fellows community.

Andreas plans on doing a Postdoc in the US as a Schmidt Science Fellow to develop an innovative crop yield model for Africa, using real-time satellite observations and weather forecasts combined with machine learning techniques. Andreas plans and on staying in contact with the W2W community.

Congratulations Andreas!



*Eric Schmidt, Andreas Schlüter and Wendy Schmidt in New York on April 8<sup>th</sup> 2019*

You can read more about this here:

<http://www.wavestoweather.de/news/schmidt-science-fellow-2019>

### 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:



**Andreas Schlüter** (project C2) defended his PhD on April 26<sup>th</sup> 2019. He will do a Postdoc in Stanford University as a Schmidt Science Fellow (see above).



**Yvonne Ruckstuhl** (project B6) defended her PhD on June 19<sup>th</sup> 2019. She will continue in W2W as a Postdoctoral fellow in the project B6.

## Research Highlights

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Here are some examples of recently published research from W2W.

### 1. From Atmospheric Dynamics to Insurance Losses – an Interdisciplinary Workshop on European Windstorms (J.G. Pinto, F. Pantillon, P. Ludwig, M. S. Déroche, G. Leoncini, C. C. Raible, L. C. Shaffrey and D. B. Stephenson)

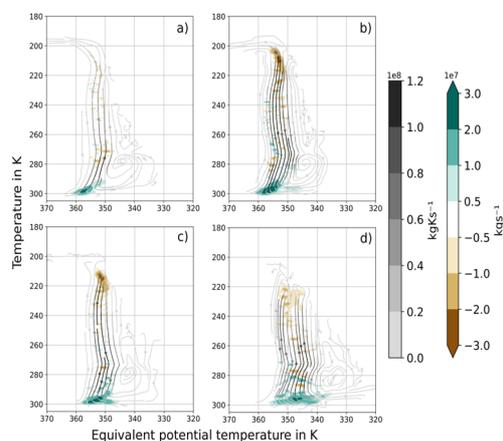


Windstorms are extreme mid-latitude cyclones and one of the major natural hazards that cause damage and losses in Europe. However, the processes involved in their intensification and generation of disastrous impacts, such as widespread wind damage and flooding, are not fully understood. The 7<sup>th</sup> European Storm Workshop took place in October 2018 at KIT in Germany. Over 60 participants from 10 countries discussed the latest results and developments in windstorm research and its industry applications.

Read the full article:

<https://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-19-0026.1>

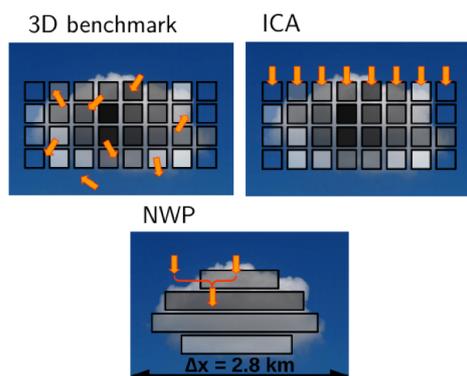
## 2. Lagrangian Description of Air Masses Associated with Latent Heat Release in Tropical Storm Karl (2016) during Extratropical Transition (C. Euler, M. Riemer, T. Kremer and E. Schömer)



The changes in the inner-core structure of tropical storm Karl during the tropical phase of its extratropical transition (ET) are investigated using a trajectory analysis on a convection-permitting scale. The trajectories are transformed from the 3-D space into a 2-D thermodynamic space to investigate the thermodynamic massflux and its divergence over a period of 12 hours for four sequential key stages during the tropical phase of ET. Investigating the origin and fate of air parcels complements the thermodynamic perspective. The inner core of the storm acts as a containment vessel for high- $\Theta_e$  air-masses that are transported into an increasingly hostile environment and the developing warm conveyor belt at the end of the tropical phase of ET comprises air masses from several source regions, and only partly from the cyclone's developing warm sector as expected for extratropical cyclones.

Read the full article: <https://doi.org/10.1175/MWR-D-18-0422.1>

## 3. Quantifying the bias of radiative heating rates in numerical weather prediction models for shallow cumulus clouds (N. Crnivec and B. Mayer)



The interaction between radiation and clouds represents a source of uncertainty in numerical weather prediction (NWP) due to both intrinsic problems of one-dimensional radiation schemes (entirely missing the effects of horizontal photon flow) and poor representation of unresolved clouds. The underlying questions addressed in this article are how large the NWP radiative bias is for shallow cumulus clouds and how it scales with various input parameters of radiation schemes, such as solar zenith angle, surface albedo, cloud cover and liquid water path.

Read the full article: <https://www.atmos-chem-phys.net/19/8083/2019/>

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

## Past activities

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### Splinter meeting at EGU

Building on last year's success, the CRC 181 "Energy transfers in Atmosphere and Ocean" organized a second splinter meeting at the European Geosciences Union (EGU) in Vienna on April 11<sup>th</sup> 2019. Scientists from the CRC 1294 "Data Assimilation", the SFB 1114 "Scaling Cascades in Complex Systems", the FOR 1898 "MS-GWaves", and W2W met and discussed about possible collaborations.



*Participants at the Splinter meeting on April 11<sup>th</sup> in Vienna (photo: Peter Knippertz)*

For more information, visit: <http://www.wavestoweather.de/outreach/egu-2019>

### Research Area C "Predictability of local weather" meeting

The 4<sup>th</sup> RA-C meeting took place on June 5<sup>th</sup> 2019 at KIT in Karlsruhe. Eighteen participants from KIT, JGU and LMU took part in the meeting. Some of them are about to leave W2W, a few will stay a bit longer, e.g., to finish their PhD, some participants recently joined W2W, and Florian Pantillon who is now working at the Laboratoire d'Aérodynamique (Toulouse, France) attended the meeting as a special guest. The format of the meeting with short presentations and extended discussions led to a lively atmosphere where fruitful comments on next research steps were made, the need for shared data sets was addressed, and a smooth transition into Phase 2 was ensured.

For more information, visit: <http://www.wavestoweather.de/meetings/rac-meeting-2019>



*Participants of the RA-C meeting on June 5<sup>th</sup> 2019 in Karlsruhe*

## Seminars and guest program

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### **Visit of Shira Raveh-Rubin**

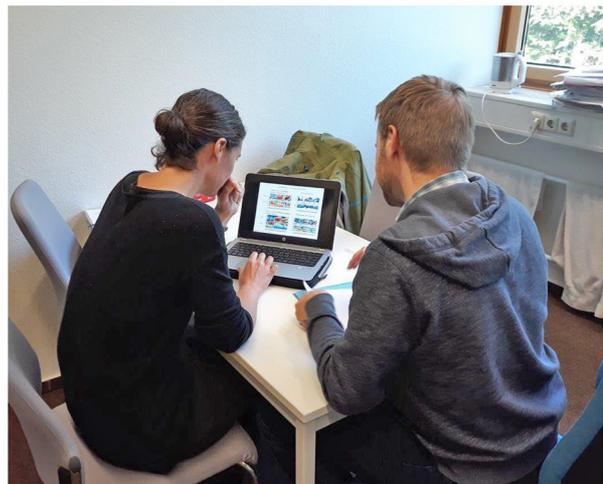
Shira Raveh-Rubin (Weizmann Institute of Science, Israel) visited the Institute for Atmospheric Physics in Mainz, the Institute for Meteorology and Climate Research at KIT and the Meteorological Institute in Munich from May 13<sup>th</sup> -17<sup>th</sup> 2019. At all locations, she presented her latest research on the role of dry air intrusions (DI) in affecting the strength of extratropical cold fronts and associated extreme weather such as wind gusts and heavy precipitation.

In Mainz, she discussed the dynamics of heat waves and the diagnostic of waviness using wave activity concepts with Volkmar Wirth, Georgios Fragkoulidis, and Paolo Ghinassi (Projects C4 and A1), PV diagnostics for non-linear Rossby wave dynamics and error growth with Franziska Teubler and Michael Riemer (Project A8), and the relation of DIs to the cyclone lifecycle, as well as their impact on aerosol/cloud distributions and properties with Annette Miltenberger (Projects B1 and B8). Potential future collaborations were discussed, in particular in the latter area.

Invited by Christian Grams to Karlsruhe, Shira gave a colloquium, which sparked a lively discussion. The ECS took the chance to directly talk to her during a post-colloquium and a joint dinner. Many informal meetings with researchers took place the next day. These meetings specifically focused on aspects of subseasonal predictability with the W2W-associated young investigator group SPREADOUT, on the dynamics of DIs with Peter Knippertz and An-

dreas Fink (Projects C2, C5 and C4), on regional climate modelling with Joaquim Pinto (Project C8), and on aerosol feedback and dust mobilization with the group of Bernhard Vogel (Project B1). Shira and the SPREADOUT group will continue to collaborate on large-scale conditions during DIs and their potential predictability on subseasonal time scales. Further exchanges between the two research groups are planned.

Shira then visited Munich where she discussed with Thomas Birner (Project C8) about DIs in the tropics and stratospheric influence of DIs, and with Federico Grazzini (Project T1) about the relation between warm conveyor belts and heavy precipitation, with a specific focus on the Mediterranean region.



*Top: Shira Raveh-Rubin and George Craig in Munich. Bottom: Shira in Karlsruhe with Dominik Büeler (left) and Christian Grams (right) (photos: Audine Laurian and Christian Grams)*

To read more about Shira Raveh-Rubin's research interests, visit:  
<http://www.wavestoweather.de/guest/shira-raveh-rubin>

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 activities

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### Girls' Day (March 28<sup>th</sup> 2019)

The country-wide event "Girls' Day" took place on March 28<sup>th</sup> 2019. Workshops have been offered to school girls by ECS in W2W and at the partner institutes.

**In Munich**, 14 participants between 13 and 17 years old visited the roof instruments, learned about teaching and research at the institute and took part in negotiations to fight climate change during a role-playing game.



*Participants in front of the meteorological institute in Munich (photo: Andrea Schäfer)*

**In Mainz**, the institute for Atmospheric Physics hosted a workshop to introduce the topic of weather and weather forecast to the participants. The participants built and tested a thermometer, a windmill and a wind vane, after attending an introductory lecture by Volkmar Wirth. The testing of the instruments took place in the wind tunnel of the institute. Two more experiments were performed in the afternoon. First, the participants created clouds using a cloud chamber and they could observe why clouds do not fall to the ground, what happens with clouds that mix with dry air, and what clouds are really made of. Second, the participants let rain drops, hailstones, snowflakes and the Death Star float in a model of a vertical wind tunnel. Finally, the participants visited the instrument platform on the roof of the institute where precipitation, radiation, wind and sunshine duration are measured. From there they could enjoy a nice view on Frankfurt.



*Participants and Christian Euler making experiments in Mainz*

For more information about this event, visit:

[http://www.wavestoweather.de/equal\\_opportunity/activities/girlsday-2019](http://www.wavestoweather.de/equal_opportunity/activities/girlsday-2019)

### **Open Day of the Faculty of Physics at LMU (May 4<sup>th</sup> 2019)**

For the very first time, the Faculty of Physics at LMU organized an „Open Day“ to present the research and teaching at the Faculty. On **May 4<sup>th</sup> 2019**, visitors of all ages and background discovered the activities at the Faculty with posters, stands and presentations, e.g., by Thomas Birner and Harald Lesch.

The W2W research questions were presented by a few W2W scientists using, e.g., a double pendulum to illustrate non-linearities and chaos, a game to present the need and purpose of ensemble predictions, an idealized simulation of atmospheric flows. At the end of the day, Thomas Birner presented the physics of weather and climate, and the research at the meteorological institute.

Thank you very much to all the participants for your time and energy!



*Top: Tobias Selz explaining ensemble forecasts (left) and at the stand in front of the double pendulum and the idealized simulation. Bottom: Thomas Birner presenting the difference between weather and climate to the general public.*

To read more about this event, click here:

[http://www.wavestoweather.de/outreach/open-day-at-lmu-04\\_05\\_2019](http://www.wavestoweather.de/outreach/open-day-at-lmu-04_05_2019)

#### **Article in the „Neue Zürcher Zeitung“**

Tobias Selz was interviewed in the "Neue Zürcher Zeitung" about the numerical challenges yet to be addressed in order to extend the range of weather predictability.

To read more about this article (in German):

<http://www.wavestoweather.de/outreach/neue-zuercher-zeitung2019>

#### **Annual Report of the Heidelberg Institute for Theoretical Studies 2018**

The C2 and C7 projects are prominently featured in the Annual Report of HITS for 2018. To read the report, click here:

[http://www.wavestoweather.de/outreach/hits\\_annual\\_report2018](http://www.wavestoweather.de/outreach/hits_annual_report2018)

#### **Interview in the „Frankfurter Allgemeine Zeitung“**

Volkmar Wirth gave an interview to the Frankfurter Allgemeine Zeitung on June 4<sup>th</sup> 2019 about the research questions of W2W during Phase 1 and 2 with a particular focus on spaghetti plots and error growth in the weather predictions.

To read the article, click here: <http://www.wavestoweather.de/news/article-in-faz>

#### **Interview on Radio Regenbogen**

Sebastian Lerch has been interviewed for the radio show "Campus Report" on the verification of probabilistic forecasts for extreme events on 21 June 2019. The interview has been

aired on Radio Regenbogen. To learn more about it, click here:

<https://www.wavestoweather.de/outreach/interview-on-radio-regenbogen>

**Interview about the heat wave hitting Europe (June 26<sup>th</sup> 2019)**

Andreas Fink, Christian Grams and Bernhard Vogel (KIT) have been interviewed about the heat wave hitting over Europe. To read more about this, click here:

[https://www.wavestoweather.de/outreach/interview-heat-wave26\\_06\\_2019](https://www.wavestoweather.de/outreach/interview-heat-wave26_06_2019)

**“Mädchen machen Technik” summer program (September 4-5<sup>th</sup> 2019)**

W2W and the meteorological institute in Munich will offer a two-day workshop for school girls between 12 and 14 years old on September 4-5<sup>th</sup> 2019.

For more information, visit:

[http://www.wavestoweather.de/equal\\_opportunity/activities/maedchenmachentechnik2019](http://www.wavestoweather.de/equal_opportunity/activities/maedchenmachentechnik2019)

**Presentation at the Deutsches Museum (October 16<sup>th</sup> 2019)**

Bernhard Vogel has been invited to give a presentation within the series “Wissenschaft für jedermann” at the Deutsches Museum in Munich on October 16<sup>th</sup> 2019. He will talk about “More than temperature and precipitation: the future of weather forecast” (preliminary title). To read more about this event, click here:

<https://www.wavestoweather.de/outreach/deutsches-museum-oct-2019>

**EO measures in W2W**

- Read about the EO committee:  
[http://www.wavestoweather.de/equal\\_opportunity/contact](http://www.wavestoweather.de/equal_opportunity/contact)
- Read about the EO measures offered in W2W:  
[http://www.wavestoweather.de/equal\\_opportunity/eo\\_measures](http://www.wavestoweather.de/equal_opportunity/eo_measures)
- Read about the EO measures and activities already implemented:  
[http://www.wavestoweather.de/equal\\_opportunity/activities](http://www.wavestoweather.de/equal_opportunity/activities)

**Past issues of this newsletter** are available here:

[http://www.wavestoweather.de/outreach/quarterly\\_newsletter](http://www.wavestoweather.de/outreach/quarterly_newsletter)

## Spring's highlight

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*Storm over Johannesburg, 30 Dec. 2017 (photo: Gerard Kilroy)*

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