

Waves to Weather



Newsletter Jan/Mar 2018

Welcome to the spring edition of the W2W Newsletter.

As you will see, we have been very busy this year organizing meetings and conferences. As usual we highlight some of our latest research results, including two papers on predictability of high impact weather, results on parameter estimation and convective statistics in convective scale ensembles, and finally my own paper on the mesoscale regime diagram.

I wish you happy reading!

George Craig

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Upcoming events

The next **Cyclone Workshop** will be organized by W2W and will take place in Seeon (Bavaria, Germany) from September 30th – October 4th 2019. Save the date!

The website of the previous Cyclone workshop is here:
<http://www.atmos.albany.edu/facstaff/rmctc/cw18/>

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

Please contact us if you have any questions.

News



Thomas Birner started as a W2 Professor at the meteorological institute in Munich on February 2018. He will be actively contributing to W2W in the near future and the consortium is looking forward to this new collaboration.

More information about his research interests can be found on his current homepage: <http://birner.atmos.colostate.edu/pubs.html>

Past activities

3rd NAWDEX Workshop

The 3rd NAWDEX Workshop (3rd cross-cutting activity “Campaign Data” workshop) took place in Munich from February 28th to March 2nd 2018. This joint workshop was co-convened by W2W and the DFG HALO-SPP (<https://www.halo.dlr.de>).

About 60 participants from 6 countries and 17 institutions took part in the workshop. The oral presentations featured updates on ongoing research and first results using the NAWDEX observations and the golden cases. The discussions focused on what has been learned since the last NAWDEX workshop, on improving the collaborations between the instruments community and the predictability community, and on plans for future research, cooperation, and publications.



Participants of the NAWDEX Workshop 2018

The program of the NAWDEX workshop is available here:

http://www.wavestoweather.de/meetings/nawdex_w2w-workshop_2018

6th International Symposium in Data Assimilation

The 6th International Symposium in Data Assimilation (ISDA2018) took place from March 5th – 9th 2018 at the LMU in Munich. About 140 participants from various research institutes, universities and weather services in Europe, North America and Asia attended the symposium. It provided a forum for oral and poster presentations in various fields of atmospheric data assimilation and ensemble prediction ranging from mathematical aspects of data assimilation to their application in operational modeling systems. Particular emphasis has been put on convective-scale data assimilation, ensemble methods and the use of remote-sensing observations related to clouds and precipitation in data assimilation.



Participants of the ISDA2018

For further details, please visit the conference website:

<http://www.wavestoweather.de/meetings/isda-2018>

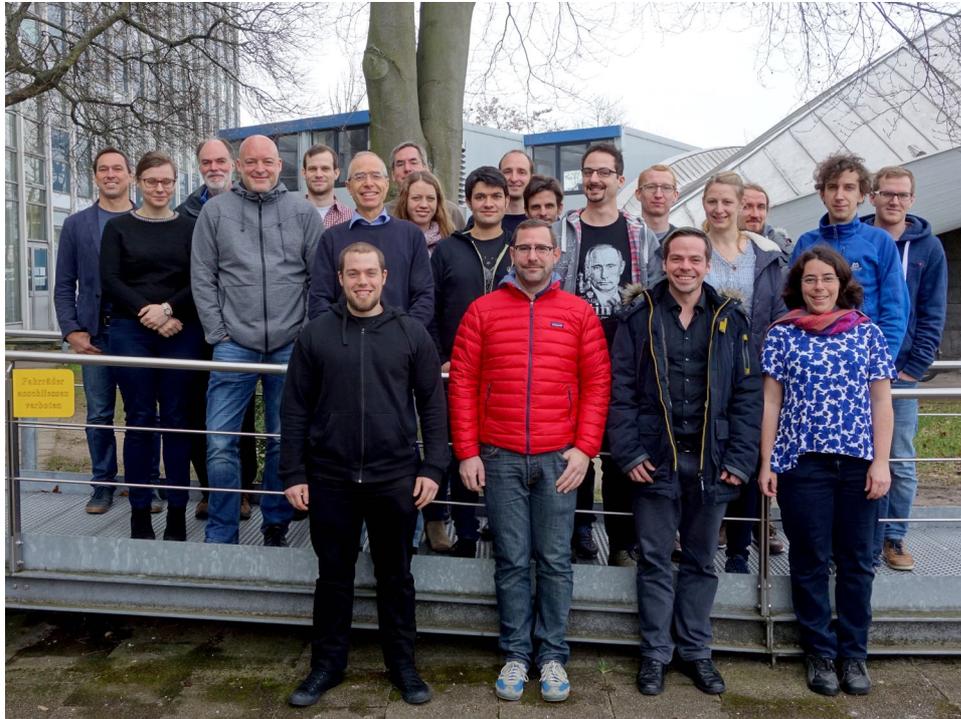
W2W meetings

- The 4th annual meeting of the W2W Early Career Scientists took place from March 12th – 14th 2018 in Heidelberg. For further details, please visit: <http://www.wavestoweather.de/meetings/ecs-workshop-mar-2018>



Participants of the ECS annual meeting

- The 3rd meeting of the Research Area A "Upscale Error Growth" took place in Mainz from March 14th – 15th 2018. For more information, please visit: <http://www.wavestoweather.de/meetings/raa-meeting-mar-2018>



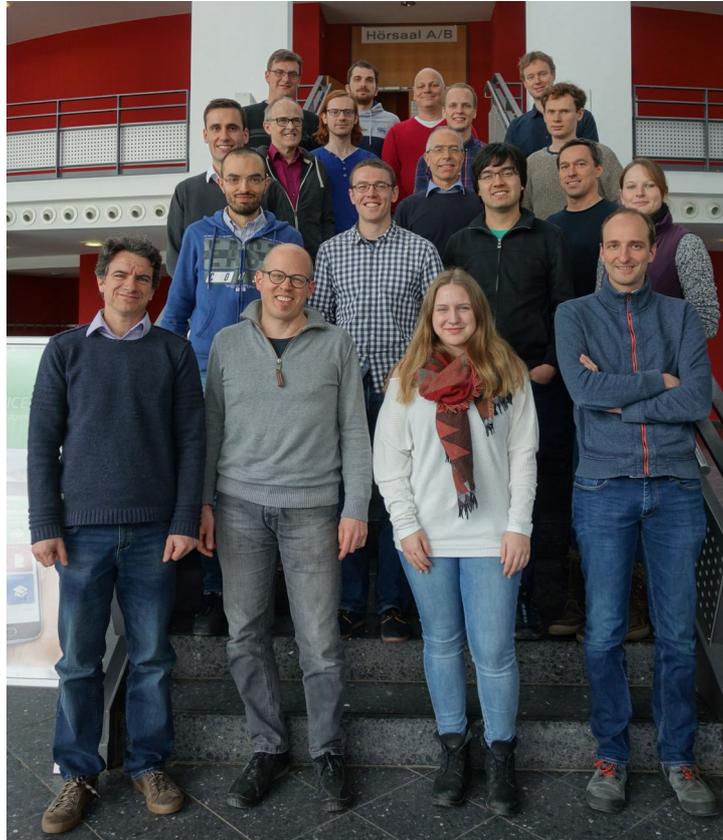
Participants of the RA-A meeting

- The 3rd meeting of the Research Area B "Cloud-scale Uncertainties" took place in Mainz on March 16th 2018. For further details, please visit: <http://www.wavestoweather.de/meetings/rab-meeting-mar2018>



Participants of the RA-B meeting

- The **3rd meeting of the Research Area C "Predictability of local Weather"** took place on March 19th 2018 in Karlsruhe. For more information, please visit: <http://www.wavestoweather.de/meetings/rac-meeting-mar-2018>

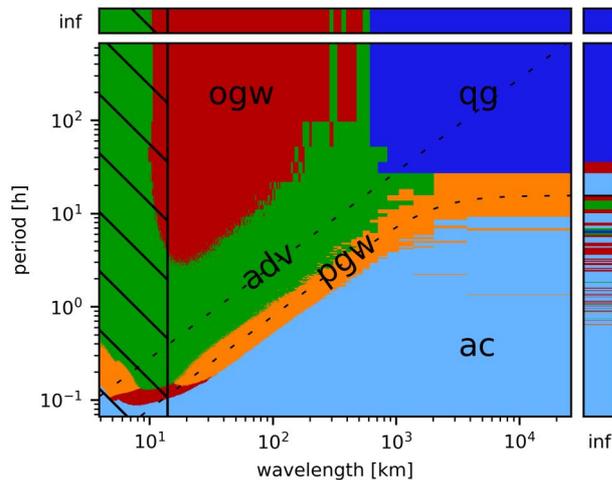


Participants of the RA-C meeting

Research Highlights

Here are some examples of recently published research from W2W.

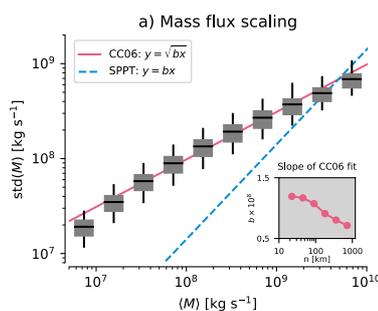
1. Mesoscale dynamical regimes in the midlatitudes (G.C. Craig and T. Selz)



The letter aims to identify dynamical regimes in the mesoscale by comparing different terms in the governing equations based on a 7-day convection-permitting simulation. These regimes are tentatively identified as: quasigeostrophic flow (qg), propagating gravity waves (pgw), stationary gravity waves related to orography (ogw), acoustic modes (ac), and a weak temperature gradient regime (adv), where vertical motions are forced by diabatic heating.

Read the full article: <http://onlinelibrary.wiley.com/doi/10.1002/2017GL076174/full>

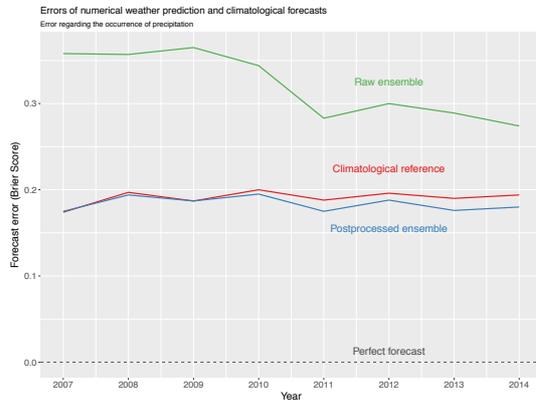
2. Variability and clustering of mid-latitude summertime convection: Testing the Craig and Cohen (2006) theory in a convection-permitting ensemble with stochastic boundary layer perturbations (S. Rasp, T. Selz, and G.C. Craig)



This study investigates the Craig and Cohen (2006) theory of convective variability originally designed for tropical equilibrium convection in the mid-latitudes. Overall, the theory still works well across a wide range of scales, which supports its application in stochastic parameterizations. There are however deviations, which are to a large part associated with cloud organization.

Read the full article: <http://dx.doi.org/10.1175/JAS-D-17-0258.1>

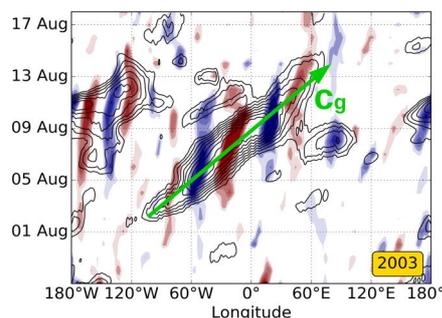
3. Skill of Global Raw and Postprocessed Ensemble Predictions of Rainfall over Northern Tropical Africa (P. Vogel, P. Knippertz, A. Fink, A. Schlueter, and T. Gneiting)



Accumulated precipitation forecasts are of high socioeconomic importance for societies. This study analyses the performance of nine operational global ensemble prediction systems within tropical northern Africa for 1-5 day accumulated precipitation forecasts. Raw ensemble forecasts show marked problems and underperform relative to a reference climatology, while postprocessed forecasts exhibit only slight skill, if at all. These results hold across different observational types, for eight monsoon seasons and for occurrence and total amount of precipitation, measured by the Brier and CRPS skill score, respectively (see figure). Overall, these results demonstrate the lack of skill of current operational ensemble precipitation forecasts and the complexity of the underlying forecast problem.

Read the full article: <http://journals.ametsoc.org/doi/abs/10.1175/WAF-D-17-0127.1?journalCode=wefo>

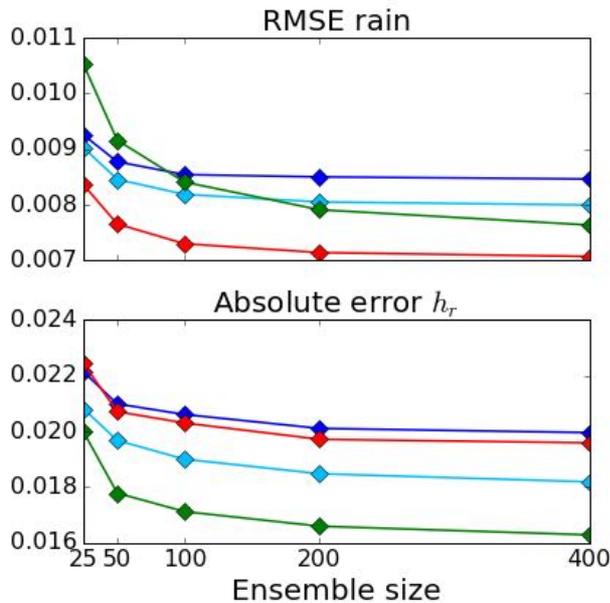
4. Linking Northern Hemisphere temperature extremes to Rossby wave packets (G. Fragkoulidis, V. Wirth, P. Bossmann, and A.H. Fink)



Upper-troposphere Rossby waves tend to organize in longitudinally confined wave packets (RWPs). It is found that in many regions of the Northern Hemisphere mid-latitudes the presence of large-amplitude RWPs is associated with an increased probability of lower-tropospheric temperature extremes. Such a link is not found for a circumglobal waviness metric derived from Fourier amplitudes. The role of RWPs on temperature extremes is also highlighted through an investigation of the 2003 and 2010 extreme heat waves in western Europe and Russia respectively.

Read the full article: <http://onlinelibrary.wiley.com/doi/10.1002/qj.3228/full>

5. Parameter and state estimation with ensemble Kalman filter based algorithms for convective scale applications (Y. Ruckstuhl and T. Janjic)



We investigate the effects of conserving physical properties and accounting for skewed distributions for the joint state and parameter estimation problem. All data assimilation algorithms can reduce the initial parameter and state error for all ensemble sizes. However, satisfying conservations laws (QPEns, red) leads to significantly smaller errors in the initial conditions than the classical Ensemble Kalman Filter (EnKF, blue) that uses Gaussian errors assumptions (top panel). Since the errors in EnKF reduce only slightly with significantly increasing ensemble size, we should therefore invest into reducing the computational costs of the QPEns to make it suitable for practical applications. Accounting for skewness (Quadratic Filter, green), on the other hand, is computationally affordable and is beneficial when the ensemble size is large enough, or when applied to parameter estimation (bottom panel). In operational prediction systems such as COSMO-KENDA for the estimation of model parameters, the Quadratic Filter could be implemented for parameter estimation only while the EnKF is used for state estimation (cyan).

Read the full article: <http://onlinelibrary.wiley.com/doi/10.1002/qj.3257/abstract>

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

Seminars and guest program

Information about 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.

Selected past and upcoming outreach activities

AMS Special Collection “W2W”

An AMS Special Collection has been created for W2W. The first W2W articles have already been flagged. They will appear on the AMS journals website soon:

<http://journals.ametsoc.org/page/collection>

Joint outreach initiatives with weather services and the media

A dissemination team consisting of W2W researchers has been created to organize joint outreach initiatives with DWD (German weather service), DMG (German Meteorological Society), ZDF (German TV channel) and other national partners. This team has regular teleconferences to discuss the steps forward.

Press release and articles

Press releases about recent W2W publications and articles about W2W research topics have been published. Read more about them here: <http://www.wavestoweather.de/outreach>

Training for school teachers

On February 27th 2018, the Faculty of Physics at the LMU and the meteorological institute in Munich (MIM) offered a 1-day training on “The physics of climate change: understanding and taking action” to more than 50 teachers in Physics, Chemistry, Biology and Geography. Bernhard Mayer made a 1-hour presentation on the physics and modeling of climate change (upper photo below). The teachers were then split in four groups and took part in different activities:

- They visited the rooftop of the institute and learned about the roof instruments
- They took part in lab experiments
- They took part in a climate workshop offered by the Didactics of Physics
- They implemented the “Forecast Factory” to better understand numerical weather forecasting and got an introduction on the topic by MIM and W2W researchers (lower photo below)



For more information about this event, visit:

http://www.wavestoweather.de/outreach/training-course-27_02_2018

Topical course for PhD students

On March 15th 2018 Peter Knippertz gave a topical course (4 x 1.5h) to PhD students in Physics at KIT on the topic: "From the farmers' almanac to exascale computing - the challenge of predicting the weather". This course was part of the KSETA-Graduate School. The 14 participants gave a very positive feedback on the course, which will most likely be offered again in the future.

For more information: <http://www.wavestoweather.de/outreach/topical-course-kitmarch2018>

Equal Opportunity (EO)

Girls' Day is a yearly countrywide event to introduce schoolgirls to disciplines and careers in which women are usually underrepresented. This year, Girls' Day will take place on Thursday, April 26th 2018. W2W will organize hands-on workshops and short presentations in Munich, Mainz, Heidelberg and Karlsruhe to introduce schoolgirls to meteorology, weather forecasting, and studying and having a career in this field. For more information, visit: http://www.wavestoweather.de/equal_opportunity/activities/girlsday-2018

About EO measures within 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

Winter's highlight



Convection over the tropical Pacific Ocean (photo: Audine Laurian)

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