WAVES TO WEATHER

3rd Annual Meeting of W2W
November 6th -8th 2017
Kempten, Germany

Program
(last update: 03.11.2017)

Monday 6th November 2017

11:00-12:00 Registration, check-in *(in Conference 4/5)* and lunch buffet *(in Conference 3)*

12:00-13:00 Introduction (Chair: A. Laurian)

12:00-12:30 Welcome and general overview (G. Craig)
12:30-12:40 Overview Cross-Cutting Activity (CCA) "Ensemble Tools" (R. Redl)
12:40-12:50 Overview CCA "Campaign Data" (A. Schäfler)
12:50-13:00 Overview CCA "Visualization" (M. Rautenhaus)

13:00-17:15 Research Area B "Cloud-scale Uncertainties" (Chair: M. Riemer)

13:00-13:30 Overview Research Area B (P. Spichtinger)
13:30-14:00 Poster presentation by the Early Career Scientists (ECS) in RA-B (2 minutes per ECS) (M. Barekzai, A. Barrett, F. Baur, N. Crnivec, A. Kumpf, N. Porz, Y. Ruckstuhl, L. Schneider, C. Wellmann)
14:00-16:00 Poster session RA-B – Coffee break *(Conference 3)*
16:00-17:00 Microphysical-dynamical feedbacks in deep convective storms (S. van den Heever, Colorado State University, USA)
17:00-19:00 Ice breaker *(Conference 3)*
19:00   Dinner at the "musics" restaurant *(in the hotel)*

Tuesday 7th November 2017

09:00-14:45 Research Area A "Upscale error growth" (Chair: A. Fink)

09:00-09:30 Overview Research Area A (M. Riemer)
09:30-10:15 Poster presentation by the ECS in RA-A (2 minutes per ECS) (J. Arnault, M. Baumgart, L. Bierdel, C. Euler, P. Ghinassi, F. Grazzini, P. Hausner, M. Hirt,

P. Jung, M. Kern, T. Kremer, S. Meggendorfer, S. Rasp, M. Rautenhaus, J. Rosemeier, A. Schäfler, M. Schindler, B. Wiebe)

10:15-12:15 Poster session RA-A – Coffee break *(Conference 3)*
12:15-13:45 Lunch buffet *(Conference 3)*
13:45-14:45 On using ensemble forecasts for atmospheric dynamics and predictability (R. Torn, University at Albany SUNY, USA)
14:45-15:00 Group picture

15:00-19:00 Research Area C "Predictability of local weather" (Chair: P. Spichtinger)

15:00-15:30 Overview Research Area C (A. Fink)
15:30-16:00 Poster presentation by the ECS in RA-C (2 minutes per ECS in RA-C) (E. Di Muzio, G. Fragkoulidis, S. Lerch, M. Maier-Gerber, F. Pantillon, A. Schlüter, P. Vogel, P. Zschenderlein)
16:00-18:00 Poster session RA-C – Coffee break *(Conference 3)*
18:00-19:00 Generating spatio-temporal precipitation forecast fields based on the output of the Global Ensemble Forecast System (GEFS) (M. Scheuerer, Univ. of Colorado and NOAA/ESRL)
19:30   Dinner at "Zum Stift" restaurant (see map page 9)

Wednesday 8th November 2017

09:00-10:00 Predictability and NWP (Daniel Rieger, DWD)
10:00-10:30 Coffee break *(Conference 3)*
10:30-12:00 Breakout group discussion (1) (see page 3)
12:00-13:30 Lunch buffet *(Conference 3)*
13:30-15:00 Breakout group discussion (2) (see page 4)
15:00-16:30 General Assembly (see separate agenda) – **all PIs and W2W members** (chair: G. Craig; minutes: A. Laurian) *(Conference 4/5)*
15:00-16:30 Early Career Scientists meeting – **all ECS** (chair: R. Redl and P. Zschenderlein) *(Conference 9, Conference 10, SkyBox)*
16:30-17:30 Report on breakout group discussions and on ECS meeting *(Conference 4/5)*
17:30-17:45 Feedback (R. McTaggart-Cowan)
17:45-18:00 Final discussion
18:00   End of the meeting

Notes:
- The plenum room for overview and keynote presentations, as well as final discussions is *Conference 4/5*.
- The coffee breaks, ice breaker and lunch breaks will take place in the *Conference 3* located one floor below the *Conference 4/5*.

Breakout group discussion (1)

Topic: Research Areas

(Wednesday 8th, 10:30-12:00)

Research Area A: Upscale Error Growth *chair: Michael Riemer*	Research Area B: Cloud-scale Uncertainties *chair: Peter Spichtinger*	Research Area C: Predictability of local Weather *chair: Andreas Fink*
Arnault Joel	Barekzai Mares	Corsmeier Ulrich (PI)
Berman Jeremy	Barrett Andrew	Di Muzio Enrico
Bierdel Lotte	Barthlott Christian (PI)	Fragkoulidis Georgios
Craig George (PI)	Baur Florian	Gneiting Tilmann (PI)
Euler Christian	Crnivec Nina	Knippertz Peter (PI)
Ghinassi Paolo	Hanke-Bourgeois Martin (PI)	Lerch Sebastian
Hausner Philip	Janjic-Pfander Tijana (PI)	Maier-Gerber Michael
Hirt Mirjam	Keil Christian (PI)	Pantillon Florian
Philipp Jung	Kumpf Alexander	Schlüter Andreas
Kern Michael	Kunz Michael (PI)	Vogel Peter
Kunstmann Harald (PI)	Mayer Bernhard (PI)	Wirth Volkmar (PI)
Kremer Tobias	Porz Nikolas	Zschenderlein Philipp
Lukacova Maria (PI)	Ruckstuhl Yvonne	
Meggendorfer Stefan	Schneider Linda	
Rasp Stephan	Vogel Bernhard (PI)	
Rautenhaus Marc	Wellmann Constanze	
Rosemeier Juliane		
Sadlo Filip (PI)		
Schäfler Andreas		
Schindler Matthias		
Schömer Elmar (PI)		
Selz Tobias		
Voigt Aiko		
Weissmann Martin (PI)		
Westermann Rüdiger (PI)		
Wiebe Bettina		
→ **Room: "Conference 4/5"**	→ **Room: "Conference 10"**	→ **Room: "Conference 9"**

Notes:
- If you are a PI involved in different research areas, please feel free to change group
- Guests are welcome to take part in these discussions

Breakout group discussion (2)

Topic: Phase 2 of W2W

(Wednesday 8th, 13:30-15:00)

Group 1 chair: George Craig	Group 2 chair: Volkmar Wirth	Group 3 chair: Peter Knippertz
Joel Arnault	Mares Barekzai	Christian Barthlott (PI)
Andrew Barrett	Florian Baur	Lotte Bierdel
Nina Crnivec	Ulrich Corsmeier (PI)	Enrico Di Muzio
Theresa Diefenbach	Philip Hausner	Georgios Fragkoulidis
Christian Euler	Tijana Janjic-Pfander (PI)	Federico Grazzini
Andreas Fink (PI)	Christian Keil (PI)	Mirjam Hirt
Paolo Ghinassi	Michael Kern	Philipp Jung
Tilmann Gneiting (PI)	Tobias Kremer	Alexander Kumpf
Martin Hanke-Bourgeois (PI)	Michael Kunz (PI)	Harald Kunstmann (PI)
Maria Lukacova (PI)	Florian Pantillon	Sebastian Lerch
Michael Maier-Gerber	Nikolas Porz	Bernhard Mayer (PI)
Stefan Meggendorfer	Stephan Rasp	Filip Sadlo (PI)
Marc Rautenhaus	Michael Riemer (PI)	Andreas Schäfler
Yvonne Ruckstuhl	Juliane Rosemeier	Andreas Schlüter
Linda Schneider	Matthias Schindler	Peter Spichtinger (PI)
Elmar Schömer (PI)	Peter Vogel	Martin Weissmann (PI)
Tobias Selz	Aiko Voigt	Constanze Wellmann
Bernhard Vogel (PI)	Rüdiger Westermann (PI)	Bettina Wiebe
Philipp Zschenderlein		
→ Room: "Conference 4/5"	**→ Room: "Conference 10"**	**→ Room: "Conference 9"**

The persons who are not on the lists above can choose the group they would like to join.

Keynote presentations

Sue van den Heever (Colorado State University, USA)   *Monday 6th, 16:15-17:15*

Title: Microphysical-dynamical feedbacks in deep convective storms

Abstract: Convective storms are found throughout the tropics and midlatitudes where they both support life on Earth through the fresh water they supply, and threaten life through the extreme weather they produce. In spite of the critical role played by convective clouds in weather and climate, accurately predicting these storm systems remains highly challenging. Cloud microphysical and dynamical processes within storms are intricately linked. Processes such as precipitation formation, latent heating, water vapor transport, cloud-radiative interactions, storm intensity and cold pool formation all depend on complex, non-linear microphysical-dynamical feedbacks. While the dynamical processes of convective storms are relatively well understood from a theoretical perspective, the strength of simulated updrafts are frequently overestimated. This has been attributed, at least in part, to the poor representation of microphysical processes in convective storm simulations. In spite of significant developments in microphysical parameterizations over the last decade, the representation of microphysical processes and the associated feedbacks is arguably the most difficult problem currently facing storm modelers. Numerous microphysical parameters need to be specified a priori when using double-moment microphysical schemes. While fewer decisions need to be made when utilizing bin microphysical schemes, in-depth microphysical process evaluations have not been performed due to a lack of observational data. During the first part of this talk, several examples of the manner in which microphysical-dynamical feedbacks can impact convective storm characteristics will be examined. The range in the response of simulated microphysical-dynamical feedbacks as a result of the a priori choices of various microphysical parameters will be presented in the second half of the talk.

Ryan Torn (University at Albany SUNY, USA)   *Tuesday 7th, 13:45-14:45*

Title: On using ensemble forecasts for atmospheric dynamics and predictability

Abstract: Over the past 20 years, there has been considerable growth in the development and use of ensemble forecasting systems, which provide multiple realizations of a same forecast, within atmospheric science community. While there has been much effort devoted to applications of the mean and standard deviation of these ensemble prediction systems, there is substantial information within the higher moment statistics of these datasets on the dynamics and predictability of dynamical systems. The purpose of this talk is to provide an introduction to ensemble-based methods of diagnosing dynamical processes and predictability of various phenomena. The first part of this talk will introduce the mathematical theory behind ensemble-based forecast sensitivity methods and how this relates to other methods of determining the sensitivity of a forecast metric to model fields at earlier lead times. In addition, subsets of ensemble members can be used to test hypotheses regarding how certain dynamical processes impact particular forecast

outcomes. The second portion of this talk will present examples of how these techniques can be used to study atmospheric predictability and dynamics. These examples include understanding how uncertainty associated with the warm conveyer belt of cyclones impacts downstream predictability and the multi-scale sensitivity of severe convection forecasts to synoptic and mesoscale features.

Michael Scheuerer (Univ. of Colorado and NOAA/ESRL)   *Tuesday 7th, 17:45-18:45*

Title: Generating spatio-temporal precipitation forecast fields based on the output of the Global Ensemble Forecast System (GEFS)

Abstract: Hydrological forecasts strongly rely on predictions of precipitation amounts and temperature as meteorological inputs to hydrological models. Ensemble weather predictions provide a number of different scenarios that reflect the uncertainty about these meteorological inputs, but are often biased and underdispersive, and therefore require statistical postprocessing. In hydrological applications it is crucial that spatial and temporal (i.e. between different forecast lead times) correlations are adequately represented by the recalibrated forecasts. We present a study with precipitation forecasts over different river basins in California that are postprocessed with the censored, shifted gamma distribution approach by Scheuerer and Hamill (2015). For modelling spatial and temporal dependence we follow Scheuerer et al. (2017) who propose a variant of the Schaake Shuffle (Clark et al., 2005) that uses spatio-temporal trajectories of observed precipitation as a dependence template, and chooses the historic dates in such a way that the divergence between the marginal distributions of these trajectories and the univariate forecast distributions is minimized. We then discuss how this approach can not just be used for modeling spatio-temporal correlations, but also permits an alternative modeling strategy where probabilistic precipitation forecasts are first generated on a coarser spatial and temporal scale, and then downscaled using the selected historic observation trajectories. A case study is presented where a combination of the two strategies is used to generate high-resolution space-time forecast fields of precipitation based on the output of the (lower resolution) Global Ensemble Forecast System (GEFS).

References:
Clark, M., Gangopadhyay, S., Hay, L., Rajagopalan, B. and Wilby, R. (2004): The Schaake shuffle: A method for reconstructing space-time variability in forecasted precipitation and temperature fields. *J. Hydrometeorol.*, **5(1)**, 243-262.
Scheuerer, M. and Hamill, T.M. (2015): Statistical post-processing of ensemble precipitation forecasts by fitting censored, shifted Gamma distributions. *Monthly Weather Review*, **143(11)**, 4578-4596.
Scheuerer, M., Hamill, T.M., Whitin, B., He, M. and Henkel A. (2017): A method for preferential selection of dates in the Schaake shuffle approach to constructing spatio-temporal forecast fields of temperature and precipitation. *Water Resources Research*, **53(4)**, 3029-3046.

Daniel Rieger (DWD)   *Wednesday 8th,09:00-10:00*

<u>Title</u>: Predictability and NWP

<u>Abstract</u>: The Deutscher Wetterdienst (DWD) operates a comprehensive numerical weather prediction (NWP) system to meet the demands of customers like emergency response agencies, military, energy sector and aviation. This talk provides an overview of the NWP system, with a focus on certain components.

An integral component is the modelling framework ICON (ICOsahedral Nonhydrostatic). ICON is used for operational global forecast with a refined grid over Europe for more than two years now. In the future, it will replace the regional modelling system COSMO for high-resolution forecasts for Germany as well. We will highlight advantages of the limited area mode of ICON (ICON-LAM), which is especially suitable for high-resolution forecasts and show results from simulations of a severe flooding event in China.

The introduction of ensemble prediction systems for COSMO and ICON (COSMO-DE-EPS and ICON-EPS) has greatly enhanced the DWD forecast skills. However, some extreme events are not covered by the spread of the ensemble systems even for short leadtimes. This was the case for the heavy precipitation event that hit Germany on 24 and 25 July 2017. A focus on the causes and predictability of such events has the potential for substantial improvements in NWP.

On a short-range perspective (leadtime 0 to 12 hours), a recently started project at DWD called SINFONY (Seamless INtegrated FOrecastiNg sYstem) aims to improve forecasts by providing a single ensemble-based framework that combines nowcasting and NWP. Improving short-range NWP forecasts of extreme events with low predictability is crucial for decision-making processes of our key customers. To achieve this goal, the quantification of uncertainty sources in the EPS is part of NWP research at DWD. We will present the current status of our research towards a stochastic representation of model error.

How to get there?

The 3ʳᵈ Annual Meeting of W2W will take place in the **bigBOX HOTEL** in Kempten (http://www.bigboxhotel.de/). The hotel is located in the Kotterner Straße 62, 1 km away from the Kempten central train station called "Kempten Allgäu Hauptbahnhof".

From the Kempten central station, you can either
- **walk**
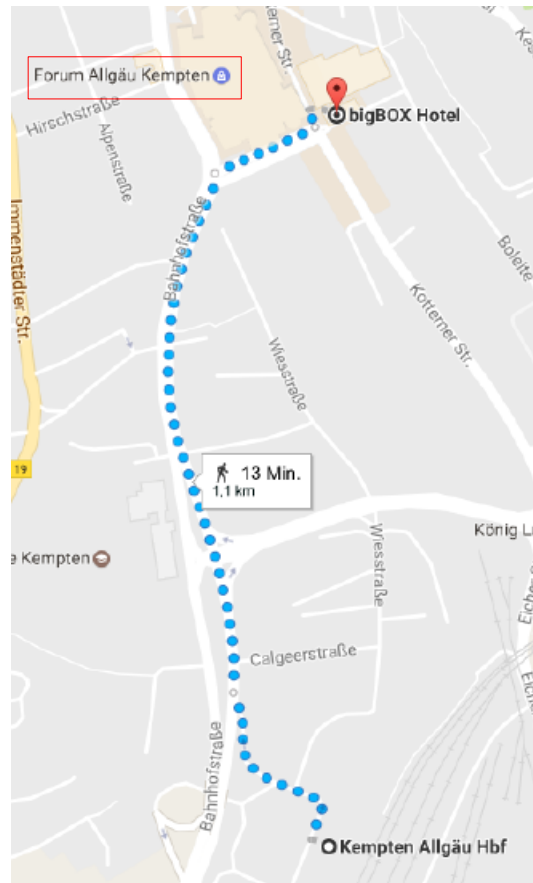
- **take the bus**, for example bus #4 (direction "Residenz"), bus #6 (direction "ZUM"), bus #8 (direction "ZUM" or "Schwalbenweg Süd"), or bus #10 (direction "Lauben") and get off at "Forum Allgäu" (in red on the map above). From there, walk to the bigBOX HOTEL.
  A map of the bus network is available here: https://www.mona-allgaeu.de/fileadmin/user_upload/MON_Buslinien-Werktags_160404.pdf

- If you come **by train**, the trip lasts about 3h30 from Karlsruhe, 4h from Mainz, 3h15 from Heidelberg, and 1h30 from Munich.
- If you come **by plane**, the trip lasts about 2h30 from Munich airport and 3h from Stuttgart airport.
- If you come **by car**, there is a customer parking lot in front of the hotel.

Dinner on Tuesday 7th Nov. 2017

The dinner will take place in the brewery restaurant **Zum Stift** located on Stiftsplatz 1.