



WAVES TO WEATHER

W2W Kick-off meeting (Phase 2)

November 4th - 6th 2019

Hotel Kapellenberg, Eibelstadt, Germany

(see map page 7)

Program

Monday 04th November 2019

- 11:30 – 12:00 *Registration, check-in and snack*
- 12:00 – 12:15 Welcome and overview of W2W (G. Craig)
- 12:15 – 15:25 Research Area A “Upscale error growth” (chair: Fink)
- 12:15 – 12:30 Overview Research Area A (M. Riemer)
- 12:30 – 12:40 A1 – Multi-scale analysis of the evolution of forecast uncertainty (G. Craig)
- 12:40 – 12:50 A2 – Impact of structured heat sources on larger scales in atmospheric dynamics (P. Spichtinger)
- 12:50 – 13:00 A3 – Model error and uncertainty at the midlatitude tropopause (M. Schindler)
- 13:00 – 13:10 A6 – Representing the evolution of forecast uncertainty (C. Keil)
- 13:10 – 13:20 A7 – Visualization of coherence and variation in meteorological dynamics (R. Westermann, K. Sdeo)
- 13:20 – 13:30 A8 – Dynamics and predictability of blocked regimes in the Atlantic-European region (S. Hauser, C. Polster and F. Teubler)
- 13:30 – 14:15 *Coffee break*
- 14:15 – 15:00 Multivariate, multiscale aspects of atmospheric predictability (Nedjeljka Zagar, Univ. Hamburg)
- 15:00 – 15:25 Discussion
- 15:25 – 18:30 Research Area B “Impact of cloud-scale uncertainties” (chair: Riemer)
- 15:25 – 15:40 Overview Research Area B (B. Mayer)
- 15:40 – 15:50 B1 – Microphysical uncertainties in hailstorms using statistical emulation and stochastic cloud physics (L. Frey)
- 15:50 – 16:00 B3 – Sources of uncertainty for convective-scale predictability (C. Keil)
- 16:00 – 16:10 B4 – Radiative interactions at the NWP scale and their impact on midlatitude cyclone predictability (B. Mayer, A. Voigt)
- 16:10 – 16:40 *Coffee break*
- 16:40 – 17:25 Global NWP: progress and prospects (Andy Brown, ECMWF)

17:25 – 17:35	B5 – Data-driven analysis and learning of the temporal evolution of ensemble forecasts (R. Westermann)
17:35 – 17:45	B6 – New data assimilation approaches to better predict tropical convection (Y. Ruckstuhl)
17:45 – 17:55	B7 – Identification of robust cloud and precipitation states via inverse methods (P. Spichtinger)
17:55 – 18:05	B8 – Role of uncertainty in ice microphysical processes in warm conveyor belts (A. Oertel, C. Grams)
17:55 – 18:05	Z2 – Computing services (A. Brinkmann)
18:05 – 18:30	Discussion
18:30 – 19:30	<i>Ice breaker in the „Weingut Leo Sauer“ (see map on page 8)</i>
19:30	<i>Dinner at the hotel</i>

Tuesday 05th November 2019

08:30 – 09:15	An asymptotic theory for hurricane development (Rupert Klein, Freie Universität Berlin)
09:15 – 12:30	<u>Research Area C “Predictability of local weather and post-processing” (chair: Mayer)</u>
09:15 – 09:30	Overview Research Area C (A. Fink)
09:30 – 09:40	C2 – Statistical-dynamical forecasts of tropical rainfall (T. Gneiting)
09:40 – 09:50	C3 – Predictability of tropical and hybrid cyclones over the North Atlantic Ocean (M. Maier-Gerber)
09:50 – 10:00	C4 – Predictability of European heat waves (A. Mayer and P. Zschenderlein)
10:00 – 10:10	C5 – Dynamical feature-based ensemble post-processing of wind gusts within European winter storms (S. Lerch)
10:10 – 10:45	<i>Coffee break</i>
10:45 – 11:30	The influence of tropical forecast errors on higher latitude predictions (Juliana Dias, ESRL, NOAA, USA)
11:30 – 11:40	C8 – Stratospheric influence on predictability of persistent weather patterns (T. Birner)
11:40 – 11:50	C9 – Visual feature analysis from individual cases to collections of ensembles (M. Rautenhaus)
11:50 – 12:00	T1 – Development of a predictability index for severe weather events over Europe (G. Craig)
12:00 – 12:30	Discussion
12:30 – 12:35	<i>Group picture</i>
12:35 – 14:00	<i>Lunch at the hotel</i>
14:00 – 16:30	<u>Central structures (chair: V. Wirth)</u>
14:00 – 14:15	Early Career Scientists (ECS) during Phase 1 (P. Zschenderlein)
14:15 – 14:45	Discussion on Z2 resources, plans on data storage (R. Redl)
14:45 – 16:00	Understanding and simulating uncertainty (M. Hanke-Bourgeois, M. Bachmayr, T. Gneiting and all participants)

- 16:00 – 16:30 Discussion on central activities: management, outreach (A. Laurian and P. Knippertz)
- 16:30 – 17:15 *Coffee break*
- 17:15 – 18:45 Breakout group discussion (*see page 4*)
- 19:00 *Dinner at the hotel*

Wednesday 06th November 2019

- 09:00 – 12:00 Workshop on unconscious biases (L. Horvath and S. Blackmore)
- 12:00 – 13:30 *Lunch buffet*
- 13:30 – 14:45 Early Career Scientists meeting – **all ECS** (*small room*)
- 13:30 – 14:45 General Assembly (see separate agenda) – **all PIs** (*main room*)
- 14:45 – 17:00 Report on breakout group discussion, ECS meeting, Scientific Advisory Board (RA coordinators, F. Baur, R. McTaggart-Cowan)
- 17:00 – 17:15 Election of the Equal Opportunity Committee and final discussion
- 17:15 End of the meeting – *Lunch bags to take away*

Breakout group discussion on Research Areas

(Tuesday 05th, 17:15 – 18:45)

Research Area A: Upscale Error Growth <i>chair: Michael Riemer</i>	Research Area B: Cloud-scale Uncertainties <i>chair: Bernhard Mayer</i>	Research Area C: Predictability of local Weather <i>chair: Andreas Fink</i>
Bachmayr Markus Craig George (PI) Groot Edward Hauser Seraphine de Heuvel Jorge Hirt Mirjam Jakub Fabian Polster Christopher Rautenhaus Marc (PI) Sadlo Filip (PI) Schindler Matthias Sdeo Kai Selz Tobias Spichtinger Peter (PI) Tempest Kirsten Teubler Franziska Tost Holger (PI) Weissmann Martin (PI) Werth Kai Wiebe Bettina Wirth Volkmar (PI)	Barthlott Christian (PI) Baumgartner Manuel Baur Florian Brinkmann Andre (PI) Frey Lena Grams Christian (PI) Hanke-Bourgeois Martin (PI) Hoose Corinna (PI) Janjic-Pfander Tijana (PI) Jung Hyunju Keil Christian (PI) Knippertz Peter (PI) Kumpf Alexander Kuntze Patrick Kunz Michael (PI) Maier Richard Manev Mihail Mayer Bernhard (PI) Miltenberger Annette (PI) Oertel Annika Porz Nikolas Redl Robert Ruckstuhl Yvonne Voigt Aiko (PI) Westermann Rüdiger (PI)	Beckert Andreas Birner Thomas (PI) Chen Xiaoyang Eisenstein Lea Garny Hella (PI) Gneiting Tilmann (PI) Grazzini Federico Hieronymus Maicon Lerch Sebastian (PI) Löffel Sheena Maier-Gerber Michael Mayer Amelie Modali Kamesh Pinto Joaquim (PI) Rautenhaus Marc (PI) Rupp Philip Schulz Benedikt Walz Eva-Maria Zschenderlein Philipp
→ Main room 1	→ Main room 2	→ Small room

If your name doesn't appear in the lists, please feel free to join the group of your choice.

Keynote presentations

Nedjeljka Zagar (Univ. Hamburg, Germany)

Monday 4th, 14:15 – 15:00

Title: Multivariate, multiscale aspects of atmospheric predictability

Abstract:

Moist processes in the tropics and at mesoscale generate a spectrum of waves that propagate both horizontally and vertically. For example, the short-term response to tropical heating anomalies projects predominantly on the gravest atmospheric gravity wave, the Kelvin wave. Its role in the initial state for numerical weather prediction (NWP) is still not clear in spite of the geostrophic balance between the zonal wind and the meridional pressure gradient.

Most of challenges in NWP in the tropics are shared by mesoscale weather prediction. In addition, for typical-size limited-area model the uncertainties propagating through the lateral boundaries reach the center of the model domain within 12-24 hours. They interact with the forecast errors cascading downscale and the errors growing in the small scales from the start of the forecasts.

Both tropics and mesoscale lack a predominant balance that could be applied in data assimilation. Using a perfect-model framework, I will show that forecast uncertainties associated with the inertia-gravity waves are less successfully reduced in data assimilation at all scales. As they are most significant at large scales in the tropics, the efficiency of the EnKF data assimilation in the tropics is sensitive to the applied radius for the covariance localization. This results in a smaller information content of observations at large scale with respect to the synoptic scales.

Simplified models can be used to explain some features of the NWP models and to investigate possible remedies. I will introduce such a model for moist processes and data assimilation and show some of its results of relevance for NWP.

Andy Brown (ECMWF, UK)

Monday 4th, 16:40 – 17:25

Title: Global NWP: progress and prospects

Abstract:

The last decades have seen remarkable progress in numerical weather prediction. Key contributors to this have included developments in data assimilation techniques and an increased focus on the development and use of ensembles. This talk will briefly review some of the advances made, and, in particular, highlight current activities that are continuing to improve the systems. Finally, the ECMWF 2016-2025 strategy sets out ambitious goals for the coming years, with plans to move towards seamless ensembles based on more complete Earth-system models and assimilation systems. Progress in this direction will be described, and some of the outstanding science challenges identified. These include the adaptation of codes and techniques to work efficiently on computer architectures of the future. This effort will require continued close collaboration and partnerships across the traditional NWP community, but also an increased linkage between physical and computational science disciplines.

Rupert Klein (Freie Universität Berlin, Germany)

Tuesday 5th, 08:30 – 09:15

Title: An asymptotic theory for hurricane development

Abstract:

Paeschke et al, JFM (2012) proposed a new theory for the evolution of tropical storms into the hurricane regime. By asymptotic analysis they constructed a three-dimensional model for the response of a strongly tilted and, at every height, nearly axisymmetric vortex to symmetric and asymmetric heating profiles. This model consists of a coupled system of evolution equations for the vortex centerline and the primary circulation.

This presentation will report on recent model extensions to include both multiscale moist physics processes and the bottom boundary layer as well as on comparisons of the reduced model with idealized three-dimensional simulations aimed at independent corroboration of the asymptotic theory.

Juliana Dias (ESRL, NOAA, USA)

Tuesday 5th, 10:45 – 11:30

Title: The influence of tropical forecast errors on higher latitude predictions

Abstract:

The atmospheric response to variations in tropical latent heating extends well beyond its source region, and therefore it is thought that a reduction of tropical forecast errors should also benefit subsequent forecasts over the extratropics. In this presentation, we first review the mechanisms underlying tropical-to-extratropical teleconnections on subseasonal timescales. Next, we discuss the use of “relaxation experiments” to quantify the remote influence of tropical forecast errors, as well as the implementation of this technique on NOAA’s FV3-GFS. This approach involves nudging forecasts towards analyses or reanalyses over a tropical region, while allowing the model to run freely elsewhere. By comparing nudged to global free running forecasts, these studies generally show that midlatitude forecasts are improved in association with reducing tropical forecast errors. For example, Week 2-4 forecast errors over the North Pacific and North America in particular are reduced by tropical nudging. This relationship is then evaluated using a conditional skill analysis applied to subseasonal reforecasts from the National Centers for Environmental Prediction Coupled Forecast System (NCEP CFSv2) and the European Centre for Medium-Range Weather Forecasts Integrated Forecast System (ECMWF IFS). We show that there is enhanced or attenuated skill in Northern Hemisphere Week 2-4 forecasts when tropical short range precipitation forecasts are “good” or “poor”, respectively. This conditional skill is modulated by both El Nino Southern Oscillation (ENSO) and the Madden and Julian Oscillation (MJO), particularly in the IFS. The results presented here indicate that midlatitude Week 2-4 predictive skill would benefit from improvements in Week 1 tropical performance, particularly for the NCEP system.

How to get there?

The Kick-off Meeting of W2W (Phase 2) will take place in the **Hotel Kapellenberg** in Eibelstadt: <https://www.hotel-kapellenberg.de/hotel-kapellenberg.html?&L=1>. The hotel is located about 10 km south-east of Würzburg central station (“Würzburg Hauptbahnhof”).

To get from Würzburg central station to the hotel **by public transport**, you can take the **bus 554** (direction “Unteres Tor, Frickenhausen a. Main”) from “Busbahnhof, Würzburg” to “Industrie-Siedlung, Eibelstadt” (11 stops, ca. 25 minutes) or the **bus 555** (direction “Bahnhof, Ochsenfurt”) from “Busbahnhof, Würzburg” to “Industrie-Siedlung, Eibelstadt” (13 stops, ca. 25 minutes), running once per hour.

The hotel is 150 m away from the bus stop “Industrie-Siedlung, Eibelstadt” (see map below).



- If you are coming **by train**, the trip to Würzburg central station lasts about 3h from Karlsruhe, 2h from Mainz, and 2h from Munich.
- If you are coming **by plane**, the trip to Würzburg central station lasts about 2h from Frankfurt airport (FRA), 3h from Munich airport (MUC), and 4h from Stuttgart airport (STR).
- If you come **by car**, there is a customer parking lot at the hotel.

Hotel rooms are reserved and paid centrally by W2W for all participants.

Ice breaker on Monday 04th Nov. 2019

The ice breaker will take place in the “**Weingut Leo Sauer**” located in the Würzburger Strasse 33 in Eibelstadt (<https://weingut-leo-sauer.jimdo.com/>), about 400 meters away from the hotel (see the map below).

