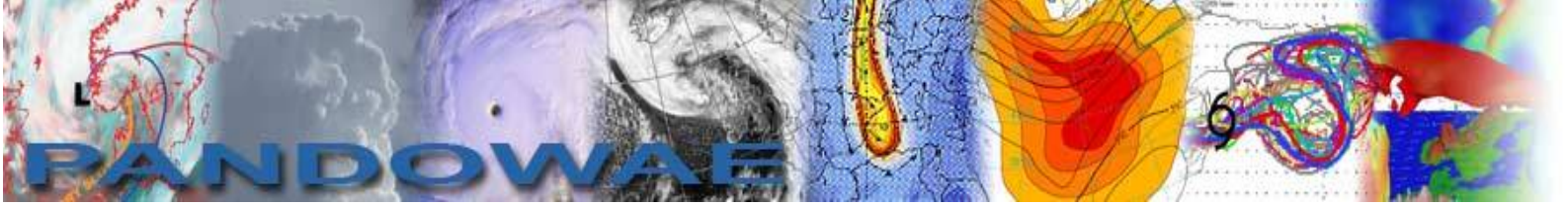


PANDOWAE Final Symposium

Progress and Future Directions of Research on Predictability and Dynamics of Midlatitude Weather Systems

May 18-21, 2015
Karlsruhe, Germany

PROGRAM

Karlsruhe Institute of Technology
Johannes Gutenberg Universität Mainz
Universität Bern
Leibniz-Institute of Atmospheric Physics IAP
ETH Zürich
DFG
Meteorologisches Institut der Universität München
Deutscher Wetterdienst
Wetter und Klima aus einer Hand
DWD
DLR

TABLE OF CONTENTS

OBJECTIVES AND THEMES

At the end of six very successful years of PANDOWAE (Predictability ANd Dynamics Of Weather Systems in the Atlantic-European Sector), this symposium presents highlights of PANDOWAE research in the context of progress of the entire international science community. To obtain a comprehensive picture, topics of the symposium are grouped around the three PANDOWAE research areas:

- *A: Upper-level Rossby wave trains: generation, propagation and wave-breaking*

- *B: Moist processes and diabatic Rossby waves*

- *C: Ensembles and adaptivity (numerical modeling & predictability)*

The symposium will also review major field campaigns *(T-PARC, HyMeX, T-NAWDEX-Falcon, ML-CIRRUS, future NAWDEX*) that provided the unique chance to gather observational data for process studies.

ORGANIZATION

The PANDOWAE Principle Investigators

Ulrich Corsmeier (KIT, Germany), George Craig (LMU München, Germany), Andreas Dörnback (DLR Oberpfaffenhofen, Germany), Sarah Jones (DWD, Germany), Olivia Martius (University of Bern, Switzerland), Dieter Peters (IAP Kühlungsborn, Germany), Michael Riemer (JGU Mainz, Germany), Heini Wernli (IAC, ETH Zurich, Switzerland), Volkmar Wirth (JGU Mainz, Germany)

Program Committee

Christian Grams (IAC, ETH Zurich, Switzerland), Julia Keller (DWD, Germany), Andreas Schäfler (DLR Oberpfaffenhofen, Germany), Richard Swinbank (MetOffice, UK)

Local Organizing Committee

Aurelia Müller, Lisa-Ann Quandt (KIT, Germany)

Our Sponsors

HOTELS AND RESTAURANTS

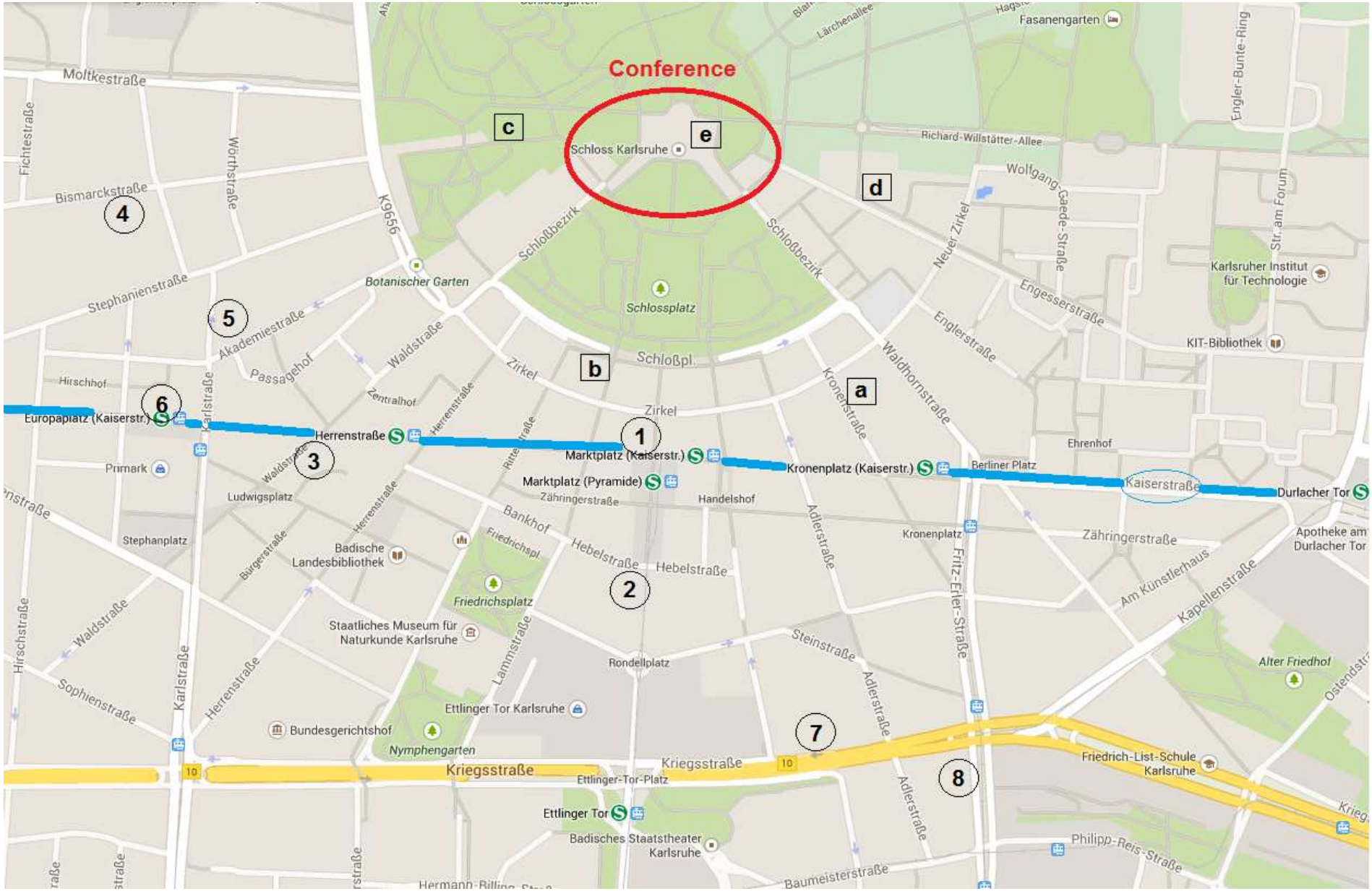
Hotels

Number	Hotel	Street	Tel.
1	Hotel am Markt	Kaiserstraße 76	0721/919980
2	Hotel Kaiserhof	Karl-Friedrich-Straße 12	0721/91700
3	Hotel Erbprinzenhof	Erbprinzenstraße 26	0721/23890
4	Hotel Kübler	Bismarckstraße 39-43	0721/1440
5	Hotel Berliner Hof	Douglasstraße 7	0721/18280
6	City Hotel Karlsruhe	Kaiserstraße 152	0721/25303
7	Hotel Blankenburg	Kriegsstraße 90	0721/932690
8	Renaissance Hotel	Mendelsohnplatz	0721/37170

Restaurants

Letter	Restaurant	Street	Tel.
a	Il Caminetto	Kronenstraße 5	0721/380682
b	Multi Kulti	Schlossplatz 19	0721/9209797
c	Badische Weinstube im Botanischen Garten	Schlossbezirk 6	0721/607879
d	Gastdozentenhaus Heinrich Hertz	Engesserstraße 3	0721/964530
e	Schlosscafé Karlsruhe	Schlossbezirk 10	0721/9664571

A lot of Fast Food Restaurants are located along the shopping street called Kaiserstraße (between Kronenplatz and Europaplatz).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Schloss Karlsruhe
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Botanischer Garten
Schloßbezirk
Schloßpl.
Zirkel
Neuer Zirkel
Moltkestraße
Bismarckstraße
Stephanienstraße
Akademiestraße
Passagehof
Waldstraße
Zentralhof
Hirschhof
Karlstraße
Herrenstraße
Europaplatz (Kaiserstr.)
Herrenstraße
Marktplatz (Kaiserstr.)
Marktplatz (Pyramide)
Kronenplatz (Kaiserstr.)
Berliner Platz
Kaiserstraße
Durlacher Tor
Ehrenhof
Kronenstraße
Waldhornstraße
Englerstraße
Engesserstraße
Wolfgang-Gaede-Straße
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Friedrich-List-Schule Karlsruhe
Philipp-Reis-Straße
Baumeisterstraße
Hermann-Billing-Straße
K9656
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PROGRAM

Monday 18 May

13:00-14:30	Introduction		(Chair: Keller, Protocol: Lentink)
13:00-13:15		Grams, Keller, Schäfler, Müller	Welcome, Organisation, Structure
13:15-13:30		Adrian, Ruti, Kottmeier	Welcome
13:30-14:00		Jones	The PANDOWAE story
14:00-14:15		Grams, Keller, Schäfler	PANDOWAE Young Scientists
14:15-14:30		Schäfler	Field Campaigns during PANDOWAE (T-PARC, TNF, HYMEX)
14:30-15:00	**Coffee break**		
15:00-16:40	**Presentations RA-A-1**		*(Chair: Selz, Protocol: Quandt)*
15:00-15:30	A-K	Chang	Keynote on RA-A: Rossby Wave Trains and Weather Forecasting
15:30-15:50	A-O	Wirth	Overview of PANDOWAE research in RA-A
15:50-16:10	A-1	Gierth	Dynamics of Rossby Wave Trains in a quantitative PV-Θ framework
16:10-16:25	A-2	Methven	Defining Rossby wave propagation and wave-mean flow interaction when meridional air parcel displacements are large
16:25-16:40	A-3	Giannakaki	Extreme precipitation events in northern Switzerland and an object-based spatial forecast verification tool of Rossby waveguides
16:40-17:15	**Coffee break**		

Monday 18 May

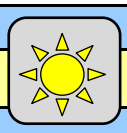
17:15-18:15		Presentations RA-A-2	*(Chair: Kober, Protocol: Maranan)*
17:15-17:30	A-4	Wolf	Dynamics of upper tropospheric Rossby wave trains and their representation in numerical weather forecast models
17:30-17:45	A-5	Quinting	The impact of extratropical transition on the dynamics of midlatitude Rossby waves
17:45-18:00	A-6	Archambault	Tropical Cyclone-Extratropical Flow Interactions over the Western North Pacific: Dynamics and Remote Impacts
18:00-18:15	A-7	Davies	Connectivity of Weather Systems and the 2013/14 Winter

18:30	Icebreaker

Tuesday 19 May

08:30-09:45		Presentations RA-A-3	*(Chair: Archambault, Protocol: Wolf)*
08:30-08:45	A-8	Schneidereit	Boreal Rossby wave breaking events: seasonal cycle and impact on weather
08:45-09:00	A-9	Reynolds	Singular Vector Analysis of the January 2009 Stratospheric Sudden Warming
09:00-09:15	A-10	Brunet	Advances in sub-seasonal forecast: predictability, dynamical and physical processes
09:15-09:30	A-11	Quandt	The representation of forecast variability associated with atmospheric blocking and extratropical transition in TIGGE
09:30-09:45			Info poster session 1

09:45-11:30	Coffee and poster session 1



11:30-12:35		Presentations RA-B-1	*(Chair: Quinting, Protocol: Binder)*
11:30-12:00	B-K	Gray	Keynote on RA-B: Diabatic processes in extratropical cyclones: a general overview and a detailed example of two heavily precipitating slow-moving summer cyclones
12:00-12:20	B-O	Wernli	Overview of PANDOWAE research in RA-B
12:20-12:35	B-1	Rivière	Dynamical and moist processes governing the motion of extratropical surface cyclones

12:35-14:00	Lunch

Tuesday 19 May

14:00-15:45		Presentations RA-B-2	*(Chair: Pantillon, Protocol: Röhner)*
14:00-14:15	B-2	Schäfler	Using airborne observations to study the role of diabatic processes for forecast errors associated with mid-latitude weather systems
14:15-14:30	B-3	Doyle	Sensitivity and Predictability of High-Impact Extratropical Cyclones
14:30-14:45	B-4	Čampa	Processes leading to heavy precipitation in the western Mediterranean region
14:45-15:00	B-5	Grams	The role of weather systems and associated diabatic processes in downstream flow sensitivity and midlatitude high impact weather
15:00-15:15	B-6	Lentink	Structural changes of Typhoon Sinlaku (2008) during its extratropical transition, using observations and modeling
15:15-15:30	B-7	Martinez-Alvarado	Rossby-wave forecast errors: the influence of diabatic processes
15:30-15:45			Info poster session 2

15:45-16:00	Group Photo

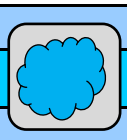
16:00-17:45	Coffee and poster session 2

19:30-21:00	Evening Discussion: Field Campaigns	*(Chair: Schäfler)*

Wednesday 20 May

08:30-09:30	**Presentations RA-B-3**		*(Chair: Čampa, Protocol: Selz)*
08:30-08:45	B-8	Boettcher	The importance of moist-diabatic PV generation for extratropical cyclones: PV towers and diabatic Rossby-waves
08:45-09:00	B-9	McTaggart-Cowan	Diagnosing Moist Isentropic Ascent with the Baroclinic Moisture Flux
09:00-09:15	B-10	Moore	Heavy Precipitation Events Associated with Recurving North Pacific Tropical Cyclones: Can We Isolate Disparate Features?
09:15-09:30			Info poster session 3

09:30-11:15 Coffee and poster session 3



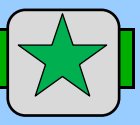
11:15-12:30	**Presentations RA-C-1**		*(Chair: Harnisch, Protocol: Gierth)*
11:15-11:45	C-K	Leutbecher	Keynote on RA-C: On research aimed at improving ensemble forecasts
11:45-12:05	C-O	Craig	Overview of PANDOWAE research in RA-C
12:05-12:20	C-5	Rodwell	Reliability in Ensemble Data Assimilation
12:20-12:35	C-2	Swinbank	Latest Developments of the Met Office Global and Regional Ensemble Prediction System

12:35-14:00 Lunch

Wednesday 20 May

14:00-15:15	Presentations RA-C-2		*(Chair: Wiegand, Protocol: Giannakaki)*
14:00-14:15	C-3	Kober	The concept of a multi-scale ensemble system
14:15-14:30	C-12	Selz	Simulation of upscale error growth from convection comparing high-resolution results and different convection schemes
14:30-14:45	C-4	Arbogast	Mid-latitude cyclone dynamics and ensemble prediction
14:45-15:00	C-6	Homar	Mediterranean high-impact weather, physical mechanisms and predictability
15:00-15:15			Info poster session 4

15:15-17:00 **Coffee & Poster Session 4**



17:00-18:30 **Breakout groups & panel discussion** *(Chair: Grams)*

Future directions in research on the understanding of physical & dynamical processes

19:00 **Symposium Dinner**

Thursday 21 May

08:30-10:00	**Presentations RA-C-3**		*(Chair: Pfahl, Protocol: Čampa)*
08:30-08:45	C-7	Weissmann	Adaptive observing strategies for airborne remote-sensing observations
08:45-09:00	C-8	Keller	Singular Vectors and the impact of observational data and perturbation methods on forecasts for tropical cyclones and their extratropical transition
09:00-09:15	C-9	Wiegand	PV Streamers – forecast quality, predictability, dynamics and HIW events
09:15-09:30	C-10	Evans	Clustering TIGGE forecasts for extratropical transition: A comparison study
09:30-09:45	C-11	Klocke	Scales of moisture variability and transport in an ensemble of ICON simulations with resolutions ranging from large-eddy resolving to global NWP-

09:45-10:15	**Coffee break**	
10:15-11:45	**Breakout groups & panel discussion** Future directions in research on numerical modelling and predictability	*(Chair: Keller)*
11:45-13:00	**Report from evening discussion**	*(Chair: Jones,*
	Conclusion, final discussion	*Protocol: Schneidereit)*

POSTER SESSIONS

Tuesday, 19 May			09:45-11:30
RA-A	P1- 1	Ruti	The World Weather Research Programme: a 10 years vision
	P1- 2	Baumgart	Finite-amplitude evolution of forecast errors: Dominance of barotropic dynamics?
	P1- 3	Chang	Applying fuzzy clustering analysis to assess uncertainty and model performance in forecasting cool season high-impact weather over the U.S. east coast
	P1- 4	Giannakaki	Forecast errors of Rosbby waveguides: An object-based spatial forecast verification tool and a short climatology of forecast errors
	P1- 5	Keller	Sensitivity of the downstream impact to the eddy kinetic energy budget of transitioning tropical cyclones
	P1- 6	Keller	The Extratropical Transition of Typhoon Choi-Wan (2009) and its role in the formation of high impact weather in North America
	P1- 7	Madonna	Rossby-wave forecast errors: the role of warm conveyor belt outflows
RA-B	P1- 8	Adler	The impact of boundary-layer processes on the pre-convective environment over the island of Corsica
	P1- 9	Martinez-Alvarado	Rossby-wave forecast errors: the influence of diabatic processes
	P1- 10	Rasp	High-resolution trajectory analysis of vertical motions in different weather situations
	P1- 11	Schäfler	The mesoscale structure of WCBs during the T-NAWDEX-Falcon campaign
	P1- 12	Steinfeld	Microphysical processes leading to PV modification in diabatic Rossby waves
RA-C	P1- 13	Berner	Increasing the skill of probabilistic forecasts: Understanding performance improvements from model-error representations
	P1- 14	Brundke	Stochastic perturbations to represent effects of subgrid-scale orography on convective initiation
	P1- 15	Harnisch	Potential of SEVIRI satellite observations for convective-scale ensemble data assimilation

Tuesday, 19 May			16:00-17:45
RA-A	P2- 1	Martius	Towards understanding the mid-latitude waveguide
	P2- 2	Pantillon	Impact of North Atlantic hurricanes on episodes of intense rainfall over the Mediterranean
	P2- 3	Quandt	Predictability of the Euro-Russian block in summer 2010 regarding Rossby wave trains and wave breaking
	P2- 4	Riboldi	A climatological perspective on the role of the “phasing” of tropical cyclones and midlatitude flow features during extratropical transition
	P2- 5	Schneidereit	High impact weather over Eurasia in summer 2010: two extreme cases
	P2- 6	Wehner	Rossby wave trains in reforecast data: climatology of object-based ensemble spread
	P2- 16	Karami	Climatological probability of stationary planetary wave propagation
RA-B	P2- 7	Crezee	Diabatic PV anomalies related to clouds and precipitation in an idealized extratropical cyclone
	P2- 8	Hardy	Early Evolution of the 23–26 September 2012 UK Floods: Tropical Storm Nadine and Diabatic Heating
	P2- 9	Joos	Microphysics and its influence on large and meso-scale flow features in an extra-tropical cyclone: Comparison of two IFS simulations
	P2- 10	Pfahl	The importance of diabatic heating for atmospheric blocking
	P2- 11	Schäfler	Impact of the inflow moisture on the evolution of a Warm Conveyor Belt
RA-C	P2- 12	Kyouda	Predictability of wintertime East-Asian weather regimes in medium-range forecasts
	P2- 13	Maranan	Object-Based Verification of Tropical Precipitation Forecasts During the YOTC-Period
	P2- 14	Saffin	The Attribution of Potential Vorticity Sources in a Numerical Weather Prediction Model
	P2- 15	Klocke	Factors controlling the predictability of Typhoon Haiyan

Wednesday, 20 May			09:30-11:15
RA-A	P3- 1	Harvey	Rossby waves on a slightly-smoothed PV front
	P3- 2	Martius	Temporal Clustering of Regional-scale Extreme Precipitation Events in Southern Switzerland
	P3- 3	Piaget	Dynamics of a local Alpine flooding event in October 2011: moisture source and large-scale circulation
	P3- 4	Spensberger	Relating objectively detected jet axes, blocking and wave-breaking events
	P3- 5	Wolf	The representation of Rossby wave trains in reanalysis data and numerical weather forecasts
	P3- 6	Wirth	Implications of the semigeostrophic nature of Rossby waves for Rossby wave packet detection
RA-B	P3- 7	Binder	The role of warm conveyor belts for cyclone intensification
	P3- 8	Boettcher	Sensitivity experiments of a diabatic Rossby-Wave with the COSMO model
	P3- 9	Čampa	PV towers and evaporative moisture sources of their diabatically produced parts
	P3- 10	Grams	Quantification of the impact of T-PARC Typhoon Jangmi (2008) on the midlatitude flow
	P3- 11	Grams	Quantifying the midlatitude impact of extratropical transition: From case studies to a composite view
	P3- 12	Lentink	A comparison of the structural developments of Typhoon Sinlaku (2008) and Typhoon Choi-Wan (2009) during their extratropical transitions: a modeling study
RA-C	P3- 13	Keller	Predicting the MJO at various resolutions with the new global model ICON
	P3- 14	Keller	Characteristics of TIGGE in representing forecast variability associated with extratropical transition
	P3- 15	Meng	Ensemble sensitivity analyses on the high-impact extreme rainfall event in Beijing on 21 July 2012

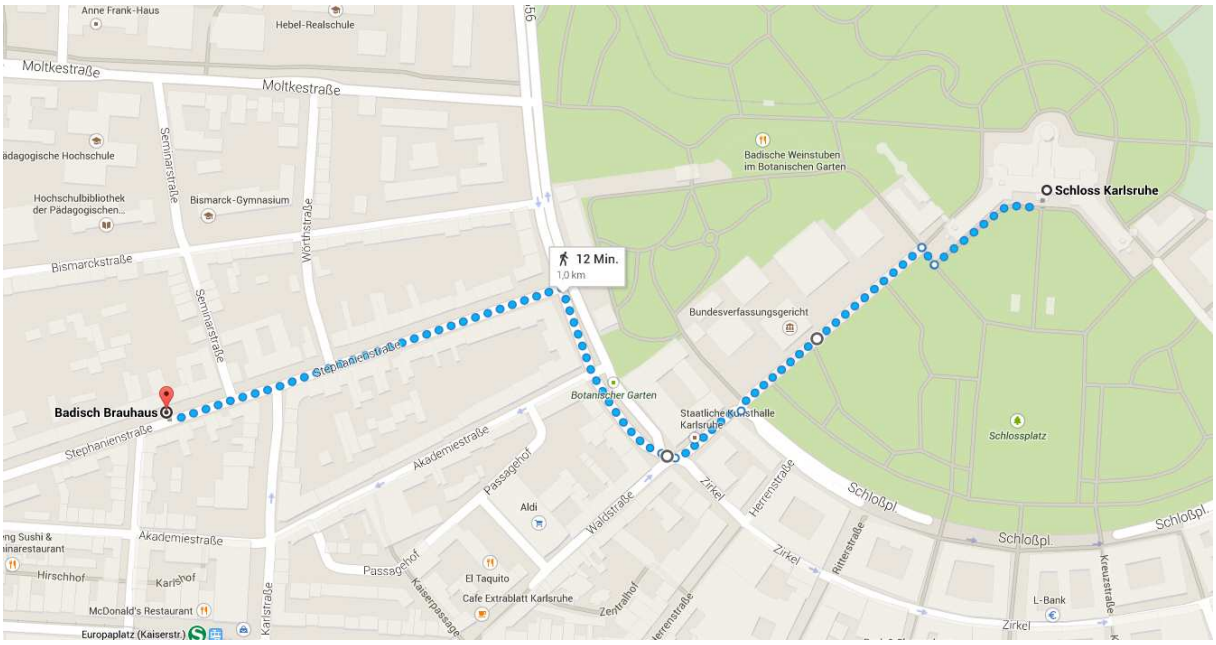
Wednesday, 20 May			15:15-17:00
RA-A	P4- 1	Quinting	A climatology of the linkage between the Madden-Julian Oscillation and midlatitude Rossby wave packets
	P4- 2	Quinting	Rossby wave amplification through tropical cyclones: a composite potential vorticity perspective
	P4- 3	Riemer	Cyclogenesis downstream of extratropical transition analyzed by Q-vector partitioning based on flow geometry
	P4- 4	Rivière	The role of synoptic Rossby wave trains coming from the North Pacific in shaping the North Atlantic Oscillation
	P4- 5	Schneidereit	Subtropical influence on sudden stratospheric warming event of January 2009
	P4- 6	van Delden	Extreme south Foehn: its relation to large-scale flow
RA-B	P4- 7	Čampa	Moisture transport between Atlantic and Mediterranean regions leading to extreme precipitation and flooding event
	P4- 8	Corsmeier	Humidity Transport Pathways and High Precipitation Events within Mediterranean Cyclones – A HyMeX case study
	P4- 9	Grams	The Central European floods in June 2013: the role of “preconditioning” and warm conveyor belts
	P4- 10	Röhner	Model study of a Mediterranean heavy precipitation event during the HyMeX campaign
	P4- 11	Weijenborg	Coherent PV anomalies associated with (extreme) deep moist convective cells
RA-C	P4- 12	Keil	Impact of different sources of uncertainty in convective-scale EPS
	P4- 13	Khodayar	HPE environment in comparison to the seasonal mean conditions in the WMED
	P4- 14	Weissmann	Ensemble-based estimates of observation impact
	P4- 15	Yamaguchi	Global distribution of the skill of tropical cyclone activity forecasts on short- to medium-range time scales

SOCIAL ACTIVITIES

Icebreaker

The Icebreaker will take place on Monday, the 18th of May at 6.30 p.m. in the Palace of Karlsruhe. It is sponsored by DWD.

Symposium Dinner



On Wednesday, the 20th of May at 7 p.m. the Symposium Dinner will take place in a brewery pub which is called Badisch Brauhaus (Stephanienstraße 38-40). It is a short walk of 1 km from the Palace to the pub.

BREAKOUT GROUPS & PANEL DISCUSSION – EVENING DISCUSSION

Breakout groups & panel discussion

To evaluate the status of research in the PANDOWAE related fields and to discuss future research directions we will host breakout groups and plenum discussions on **Future directions in research on…**

(I) …the understanding of physical & dynamical processes

(Wednesday 20 May 17:00-18:30)

(II) …numerical modelling and predictability

(Thursday 21, 10:30-12:00)

4 breakout groups are formed that will discuss for 45 minutes. Each breakout group will be moderated by two members of the panel.

(I) Group 1: Heini Wernli / Jim Doyle
Group 2: Michael Riemer / Huw Davies
Group 3: Olivia Romppainen-Martius / Mark Rodwell
Group 4: Dieter Peters / Sue Gray

(II) Group 1: Sarah Jones / Jenni Evans
Group 2: George Craig / Judith Berner
Group 3: Volkmar Wirth / Philippe Arbogast
Group 4: Andreas Dörnbrack / Richard Swinbank

The breakout group discussion is directly followed by a plenum discussion.

Breakout Groups:

	Group 1	Group 2	Group 3	Group 4
1	Wernli (I)	Riemer (I)	Martius (I)	Peters (I)
2	Doyle (I)	Davies (I)	Rodwell (I)	Gray (I)
3	Jones (II)	Craig (II)	Wirth (II)	Dörnbrack (II)
4	Evans (II)	Berner (II)	Arbogast (II)	Swinbank (II)
5	Adler	Brunet	Archambault	Chang
6	Alves	Crezee	Binder	Eichhorn
7	Barton	Giannakaki	Boettcher	Gierth
8	Baumgart	Grams	Čampa	Keil
9	Blahak	Hardy	Fink	Khodayar
10	Brundke	Joos	Harvey	Knippertz
11	Corsmeier	Karami	Keller	McTaggart-Cowan
12	Harnisch	Klocke	Lentink	Quinting
13	Homar	Kober	Maranan	Reynolds
14	Madonna	Kyouda	Meng	Rivière
15	Martinez-Alvarado	Lenggenhagen	Methven	Röhner
16	Moore	Leutbecher	Selz	Schneidereit
17	Rasp	Pantillon	Spensberger	Schwitalla
18	Ruti	Pfahl	Theis	van Delden
19	Schäfler	Quandt	Wiegand	Weijenborg
20	Steinfeld	Riboldi	Wolf	Weissmann
21	Wehner	Saffin	Yamaguchi	

Evening Discussion

As the analysis of field campaign data was an important component of PANDOWAE and as the planned NAWDEX campaign will provide a great opportunity for observations related to the research topics of this symposium in the near future, we will also have an evening session with a discussion on

(III) Field campaigns (Tuesday 19 May, 19:30-21:00)

The evening discussion will be an open discussion. Everybody is invited to contribute and we have representatives of PANDOWAE related past experiments and upcoming field campaigns e.g. NAWDEX. The following persons are asked to form the panel and moderate the discussion

John Methven (Univ. Reading representing DIAMET), Martin Weissmann (HErZ/LMU Munich, representing T-PARC), Gwendal Rivière (LMD Paris, representing French NAWDEX plans), Ron McTaggart-Cowan (Env. Canada representing Canadian NAWDEX plans), Andreas Schäfler (DLR, German NAWDEX plans)

Guiding questions for breakout group & panel discussions

(I) Future directions in research on the understanding of physical & dynamical processes

1. **Which physical and dynamical processes have been identified by research in the last decade to be highly relevant for midlatitude weather and which may have been neglected?**
2. **What are the hot topics currently discussed?**
3. **How can improved interaction between 'weather' and 'climate' researchers enhance progress in process understanding?'**
4. **How can process understanding advance operational forecasting and numerical modelling?**

(II) Future directions in research on numerical modeling & predictability

1. **Which advances have been made in numerical modeling and understanding of predictability that helped improve weather forecasts in the midlatitudes?**
2. **How are numerical models currently assessed and improved and how can we make use of knowledge on predictability in this context?**
3. **What are the future demands on weather forecasts in midlatitudes?**

(III) Field Campaigns

1. **What have we learned from previous field experiments and what have we missed?**
2. **What kind of observations would you need for your research?**
3. **What are the requirements and aims for future field experiments (NAWDEX and beyond)?**

LIST OF PARTICIPANTS

- Bianca Adler, Karlsruhe Institute of Technology, Germany
- Gerhard Adrian, Deutscher Wetterdienst (DWD)
- Oscar Alves, Australian Buerau of Meteorology , Melbourne, Australia
- Philippe Arbogast, MeteoFrance
- Heather Archambault, NOAA, SilverSprings
- Christian Barthlott, Karlsruhe Institute of Technology, Germany
- Yannick Barton, University of Bern
- Marlene Baumgart, Johannes Gutenberg-Universität Mainz, Germany
- Judith Berner, NCAR, USA
- Hanin Binder, IAC, ETH Zurich, Switzerland
- Ulrich Blahak, Deutscher Wetterdienst (DWD)
- Pila Bossmann, Karlsruhe Institute of Technology, Germany
- Maxi Boettcher, IAC, ETH Zurich, Switzerland
- Fabian Brundke, Ludwig-Maximilians-Universität München, Germany
- Gilbert Brunet, Env.Canada
- Jana Čampa, Karlsruhe Institute of Technology, Germany
- Edmund Chang, Stony Brook, USA
- Ulrich Corsmeier, Karlsruhe Institute of Technology, Germany
- George Craig, Ludwig-Maximilians-Universität München, Germany
- Bas Crezee, IAC, ETH Zurich, Switzerland
- Huw Davies, IAC, ETH Zurich, Switzerland
- Andreas Dörnbrack, DLR Oberpfaffenhofen, Germany
- Jim Doyle, NRL, Monterey, USA
- Joachim Eichhorn, Johannes Gutenberg-Universität Mainz, Germany

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