



# ITN WinterSchool & Joint TiPES/CriticalEarth Conference on Critical Transitions

Monday, 13 February 2023 - Friday, 24 February 2023

**Location: Institute for Advanced Study (IAS): Lichtenbergstraße 2 a,  
Garching. Munich , DE**

## Agenda

(version2)

Zoom link for online participation:

<https://tum-conf.zoom.us/j/9186534390?pwd=VDBHwGNuUWZUNEg0N3JyTkW4Rys5UT09>

Meeting-ID: 918 653 4390

Kenncode: 425813

### **Organisation/contacts:**

**WinterSchool:** Christian Kuehn ([ckuehn@ma.tum.de](mailto:ckuehn@ma.tum.de)) and Niklas Boers ([n.boers@tum.de](mailto:n.boers@tum.de))

**Joint TiPES/CE Conference:** Niklas Boers ([n.boers@tum.de](mailto:n.boers@tum.de))

**Local organizational support /invoicing, reimbursements:** Mariola Nicpon-Stasch ( [Sekretariat-M8@ma.tum.de](mailto:Sekretariat-M8@ma.tum.de)); Karin Haußmann ([karin.haussmann@tum.de](mailto:karin.haussmann@tum.de) )

**CriticalEarth/TiPES support:** Eliza Cook ([elizacook@nbi.ku.dk](mailto:elizacook@nbi.ku.dk)), Helle A. Kjær ([hellek@nbi.ku.dk](mailto:hellek@nbi.ku.dk))

## Monday, 13 February 2023 (CE WinterSchool)

### ESR workshop 2 (EW2): Methods of Stochastic Multiscale Dynamics Organiser: Prof Christian Kuehn (TUM)

- (12:30 - 14:00) Lunch break
- (14:00 - 15:30) EW2 Lecture 1: Prof. Christian Kuehn (TUM, Germany)
- (15:30 - 16:00) Coffee break
- (16:00 - 17:30) EW2 Lecture 2: Prof. Nils Berglund (Université d'Orléans, France)
- (17:30 - 19:00) Dinner/Socialising - Self Organised

## Tuesday, 14 February (CE WinterSchool)

### ESR workshop 2 (EW2): Methods of Stochastic Multiscale Dynamics Organiser: Prof Christian Kuehn (TUM)

- (09:00 - 10:30) EW2 Lecture 3: Prof. Christian Kuehn (TUM, Germany)
- (10:30 - 11:00) Coffee break
- (11:00 - 12:30) EW2 Lecture 4: Prof. Nils Berglund (Université d'Orléans, France)
- (12:30 - 14:00) Lunch
- (14:00 - 15:45) Project Work: Session 1
- (15:45 - 16:15) Coffee break
- (16:15 - 18:00) Project Work: Session 2
- (18:00 - 19:00) Dinner/Socialising - Self Organised

## Wednesday, 15 February (CE WinterSchool)

### ESR workshop 2 (EW2) Methods of Stochastic Multiscale Dynamics Organiser: Prof Christian Kuehn (TUM)

- (09:00 - 10:30) EW2 Lecture 5: Prof. Christian Kuehn (TUM, Germany)
- (10:30 - 11:00) Coffee break
- (11:00 - 12:30) EW2 Lecture 6: Prof Nils Berglund (Université d'Orléans, France)
- (12:30- 14:00) Lunch
- (14:00 - 15:45) Project Work: Session 3
- (15:45 - 16:15) Coffee break
- (16:15 - 18:00) Project Work: Presentations
- (18:00 - 19:00) Dinner/Socialising - Self Organised

## Thursday, 16 February (CE WinterSchool)

### Workshop 2 (W2): Critical transitions in complex climate models

Organiser: Prof Christian Kuehn (TUM)

- (10:00 - 11:00) **KEYNOTE 1: Dr Anna von der Heydt** (Utrecht University, Netherlands)
- (11:00 - 11:30) **Coffee**
- (11:30 - 12:30) **KEYNOTE 2: Dr Andrew Keane** (University College Cork, Ireland)
- (12:30 - 14:00) **Lunch**
- (14:00 - 15:00) **KEYNOTE 3: Prof. Georg Gottwald** (University of Sydney, Australia)
- (15:00 - 15:30) **Coffee Break**
- (15:30 - 18:00) **Free time for Science** (e.g. Group discussions around themes, or Walk-and-talk with groups)
- (18:00 - 19:00) **Dinner/Socialising - Self Organised**

## Friday, 17 February (CE WinterSchool)

### Workshop 2 (W2): Critical transitions in complex climate models

Organiser: Prof Christian Kuehn (TUM)

- (10:00 - 11:00) **KEYNOTE 4: Prof. Dan Crisan** (Imperial College London, UK)
- (11:00 - 11:30) **Coffee break**
- (11:30 - 12:30) **KEYNOTE 5: Dr Johannes Lohmann** (University of Copenhagen, DK)
- (12:30 - 14:00) **Lunch**
- (14:00 - 15:00) **KEYNOTE 6: Prof. Ulrike Feudel** (University of Oldenburg, Germany)
- (15:00 - 15:30) **Coffee Break**
- (15:30 - 18:00) **Free time for Science** (Group discussions around themes, or Walk-and-talk with groups)
- (18:00 - 19:00) **Dinner/Socialising - Self organised**

## Saturday, 18 February (CE WinterSchool)

Excursion to the Alps for WinterSchool Participants (09:00 - 19:00)

Details TBC during the conference (Organisers: Christian Kuehn/Niklas Boers)

## Sunday, 19 February (CE WinterSchool)

Free time for Science: Collaborations (09:00 - 18:00)

Self organized

## Monday, 20 February (CE WinterSchool)

### ESR Workshop 3 (EW3): Modelling and Machine Learning of Dynamical Systems: Organiser: Prof Niklas Boers (TUM)

- (09:00 - 10:45) Lecture 1 - Dr. Maximillian Gelbrecht (PIK, Germany)
- (10:45 - 11:15) Coffee break
- (11:15 - 13:00) Lecture 2: Dr. Maximillian Gelbrecht (PIK, Germany)
- (13:00 - 14:00) Lunch
- (14:00 - 15:45) EW3 Project Work: Session 1
- (15:45 - 16:15) Coffee break
- (16:15 - 18:00) EW3 Project Work: Session 2
- (18:00 - 19:00) Dinner/Socialising - self organised

## Tuesday, 21 February (CE WinterSchool)

### ESR Workshop 3 (EW3): Modelling and Machine Learning of Dynamical Systems: Organiser: Prof Niklas Boers (TUM)

- (09:00 - 10:45) Lecture 3 - Dr. Maximillian Gelbrecht and Alistair White (PIK, Germany)
- (10:45 - 11:15) Coffee break
- (11:15 - 13:00) Lecture 4 - Dr. Maximillian Gelbrecht and Alistair White (PIK, Germany)
- (13:00 - 14:00) Lunch
- (14:00 - 15:45) Project Work: Session 3
- (15:45 - 16:15) Coffee break
- (16:15 - 18:00) Project Presentations

# Wednesday, 22 February (Joint TiPES/CE Conference)

## Joint TiPES/Critical Earth Conference on Critical Transitions

Organiser: Prof. Niklas Boers

**(09:00 - 10:00) TiPES Work Package Updates (Niklas Boers, TUM, DE)**

**(10:00 - 11:00) Invited Talks (25mins + 5mins questions)**

**1. Jonathan Donges (PIK, DE):** *Tipping elements and Earth system resilience in the Anthropocene*

**2. Paul Ritchie (Uni. Exeter, UK):** *Probabilistic safe overshoots*

**(11:00 - 11:20) Coffee**

**(11:20 - 13:00) PICO Session 1: Past abrupt climate change in observations and models**

**(Format: Speakers present slides for 5 mins + 3 min for questions)**

**Takahito Mitsui:** Early warning signals prior to Dansgaard-Oeschger cooling events

**Keno Riechers:** Greenland Interstadials modeled as noise induced excursions of an excitable climate system

**Guido Vettoretti:** Ice Age Climate Rhythms and Randomness: Modelling Abrupt Climate Events

**Helle Kjær:** New Ice core data

**Irene Malmierca Vallet:** Dansgaard-Oeschger events in climate models: Review and baseline MIS3 protocol

**John Slattery:** Improved Characterization of Dansgaard - Oeschger Events in Climate Models

**Ignacio del Amo:** Diffusion driven by  $\alpha$ -stable noise in a double well potential

**Jade Ajagun-Brauns:** A fast slow model for glacial-interglacial cycles since the Mid-Pleistocene Transition

**Kolja Kypke:** TBD

**(13:00 - 14:00) Lunch**

**(14:00 - 15:30) Free time for Science & Collaboration**

**(15:30 - 16:00) Coffee break**

**(16:00 - 17:00) Keynote: James Yorke (University of Maryland, USA) 45mins + 15 mins questions**

Title: *Exploring Numerical Phenomena in Weather Models via Tiny Models*

In this talk, we will delve into the numerical phenomena that are seen in weather models and are present in our small-scale models - created in collaboration with Yoshi Saiki and Hiroki Takahashi. We will showcase how our new 'mosquito disease transmission model' emulates Lorenz's explosive 'butterfly effect', despite having only negative Lyapunov exponents. Join us as we explore the exciting world of numerical weather modeling and its impact on our understanding of the atmosphere.

**(17:00 - 18:00) Reception**

# Thursday, 23 February (Joint TiPES/CE Conference)

## Joint TiPES/CriticalEarth Conference on Critical Transitions

Organiser: Prof. Niklas Boers

(09:00 - 10:00) **CriticalEarth Work Package updates: Peter Ditlevsen** (Uni. Copenhagen, DK)

(10:00 - 11:00) **Invited Talks**

**3. Freddy Bouchet (ENS de Lyon, France):** *Using rare event algorithms to study tipping events*

**4. Guido Vettoretti (Uni. Copenhagen, DK):** *Modelling the impacts of volcanic eruptions on the DO cycles*

(11:00 - 11:20) **Coffee break**

(11:20 - 13:00) **PICO Session 2: Future tipping in models and data as well as climate sensitivity / climate response in the presence of tipping points**

**(Format: Speakers present slides for 5 mins + 3 min for questions)**

**Sebastian Bathiany (TUM):** Indicators of vegetation resilience in dynamic vegetation mode

**Victor Couplet (UCLouvain):** Tipping cascades in SURFER

**Swinda Falkena (Utrecht):** The effect of collapse of the AMOC on ENSO: Is it tipping?

**Maya Ben Yami (TUM):** Robust impacts of an AMOC collapse on tropical monsoon systems: a multi-model comparison

**Lana Blaschke (PIK):** Spatial correlation as indicator of resilience in vegetation systems

**Nils Bochow (UiT):** Overshooting the critical threshold for the Greenland ice sheet

**Freddy Bouchet (CNRS, ENS):** Tipping to a superrotating atmosphere

**Matteo Cini (CNR-ISAC):** Stability of noise induced AMOC collapse with a Rare Event Algorithm

**Oliver Mehling (Politecnico di Torino):** Unforced centennial-scale variability and abrupt changes of the AMOC in CMIP6 models

**Sjoerd Terpstra (Utrecht):** Catalogue of abrupt changes in CMIP6

(13:00 - 14:00) **Lunch**

(14:00 - 15:30) **Free time for Science & Collaboration**

(15:30 - 16:00) **Coffee break**

(16:00 - 17:00) **Keynote: Raymond Pierrehumbert (University of Oxford, UK)** 45mins + 15min questions

Title: *Bifurcations large and small*

One of the challenges regarding possible bifurcations in the Earth's climate system is that even if one can detect when a bifurcation is near to occurrence, local information about the climate system doesn't generally provide information on where the climate lands on the other side of the bifurcation. It may be a "large" bifurcation, such as Snowball Earth or runaway greenhouse, or a comparatively small bifurcation such as loss of summer Arctic sea ice. I will make some general remarks on this problem, including the possibility of systems with "little bifurcations everywhere," but concentrate on the biggest bifurcation of all - the transition to runaway greenhouse states and the ultimate post-runaway state on the other side of that bifurcation.

(17:00 onwards) **Conference Dinner: Garching Augustiner:**

Address: Freisinger Landstraße 4, 85748 Garching.

# Friday, 24 February

## Joint TiPES/Criticlearth Conference on Critical Transitions

Organiser: Prof. Niklas Boers

**(09:00 – 09:30) Invited Talk 5: Max Rietkerk (Utrecht University) (25mins + 5mins questions)**

*Title: Pathways of resilience in complex systems.*

**(09:30 – 10:00) Invited Talk 6: Takahito Mitsui (TUM) (25mins + 5mins questions)**

*Synchronization theory for Quaternary glacial-interglacial cycles*

**(10:00 - 10:20) Coffee break**

**(10:20 - 12:00) PICO Session 3: Mathematical / theoretical approaches to understanding tipping / critical behavior**

**(Format: Speakers present slides for 5 mins + 3 min for questions)**

**Ruth Chapman (Uni. Exeter):** Stochastic data adapted AMOC box models

**Reyk Börner (Uni. Reading):** Transition paths in multiscale AMOC box models

**Jan Swierczek-Jereczek (Uni. Madrid):** Transition Indicators a high-end software to accelerate research and computation of transition indicators

**Joe Clarke (Uni. Exeter):** Early Warning Signals in Time and Space

**Frank Kwasniok (Uni. Exeter):** Data-driven anticipation and prediction of critical transitions using non-autonomous dynamical modelling

**Alessandro Lovo (ENS Lyon):** Rare Event Algorithm for the tipping of the AMOC

**Oisin Hamilton (RMIB):** Multistability in a Coupled Ocean-Atmosphere Low Order Model: Non-linear Temperature Equations

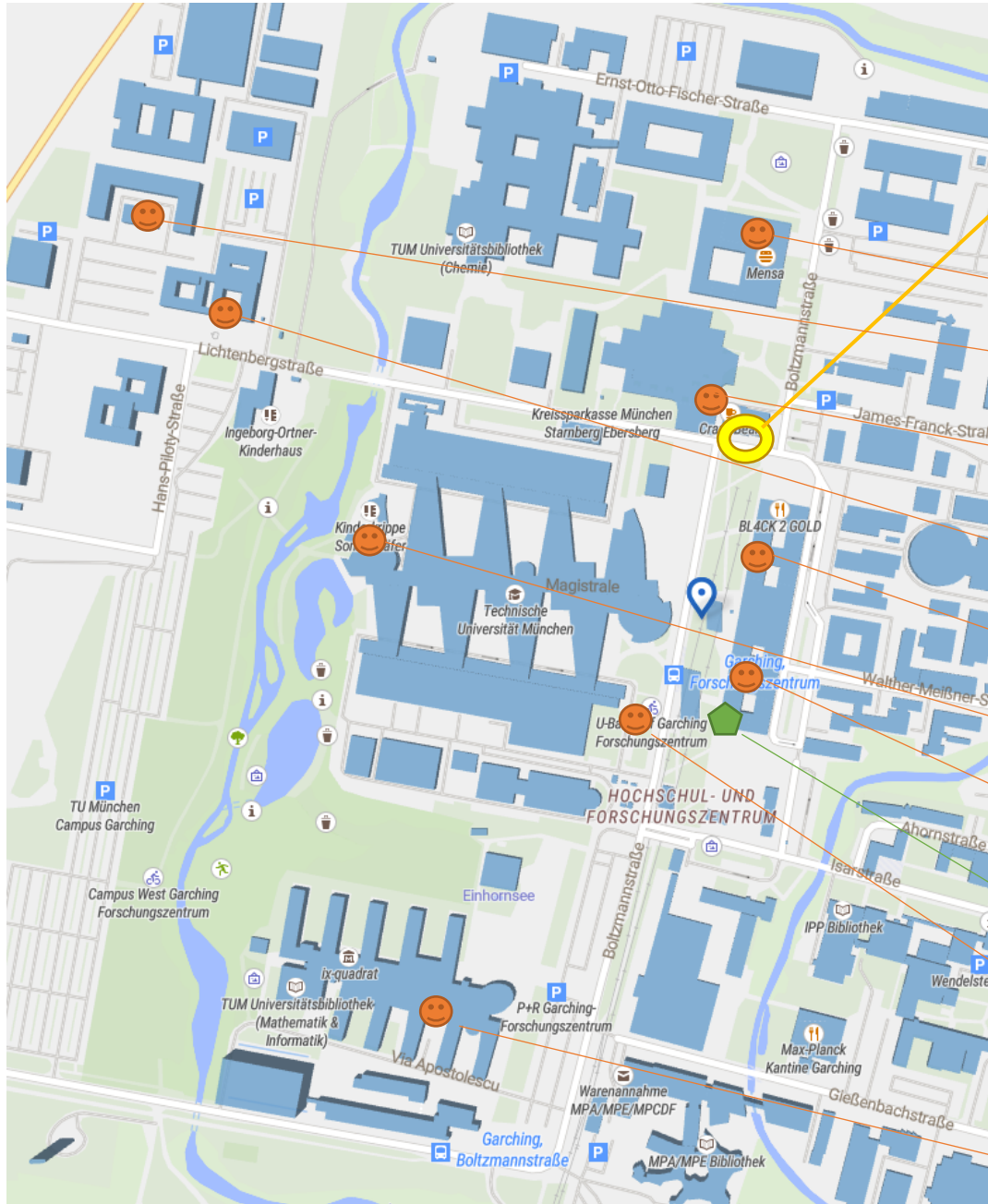
**Andrea Di Benedetto (Utrecht):** Workable climate policies in a democracy with a climate-denying party

**(12:00 - 13:00) Conference Wrap-up and general discussion**

**(13:00 - 14:00) Lunch**


**(14:00 - 16:00) TiPES Management Meeting**

**End of meeting**



- [Institute for Advanced Study \(IAS\)](#)  
Lichtenbergstraße 2 a, 85748 Garching bei München


- [Mensa Garching](#)  
Boltzmannstraße 19, 85748 Garching bei München
- [Gate Kitchen](#)  
Lichtenbergstraße 8, 85748 Garching bei München
- Crazy Bean  
Lichtenbergstraße 2, 85748 Garching bei München
- [Herr Lichtenberg](#)  
Lichtenbergstraße 6, 85748 Garching bei München
- [Goldbraun](#)  
Walther-von-Dyck Str., 85748 Garching bei München
- [StuCafé](#)  
Lichtenbergstraße 4, 85748 Garching bei München
- [The Faculty Restaurant & Bar](#)  
Walther-von-Dyck Str. 12, 85748 Garching bei München
- [Stellaris](#)  
Walther-von-Dyck-Straße 16, 85748 Garching bei München
- [Bäckerei Riedmair](#) - [Asia Imbiss](#) – Gourmet Imbiss  
Boltzmannstraße 11, 85748 Garching bei München
- [Wilhelm](#)  
Boltzmannstraße 3, 85748 Garching bei München

 Winterschool/ Conference     
  Food / Restaurant     
  Hotel/ Apartment     
 - U6 Garching Forschungszentrum



## Conference Dinner



### [Garching Augustiner](#)

Gesindehaus GmbH  
Freisinger Landstraße 4  
85748 Garching b. München

## Hotel/ Accomodation



### [Hoyacker Hof](#)

Freisinger Landstraße 9A  
85748 Garching bei München



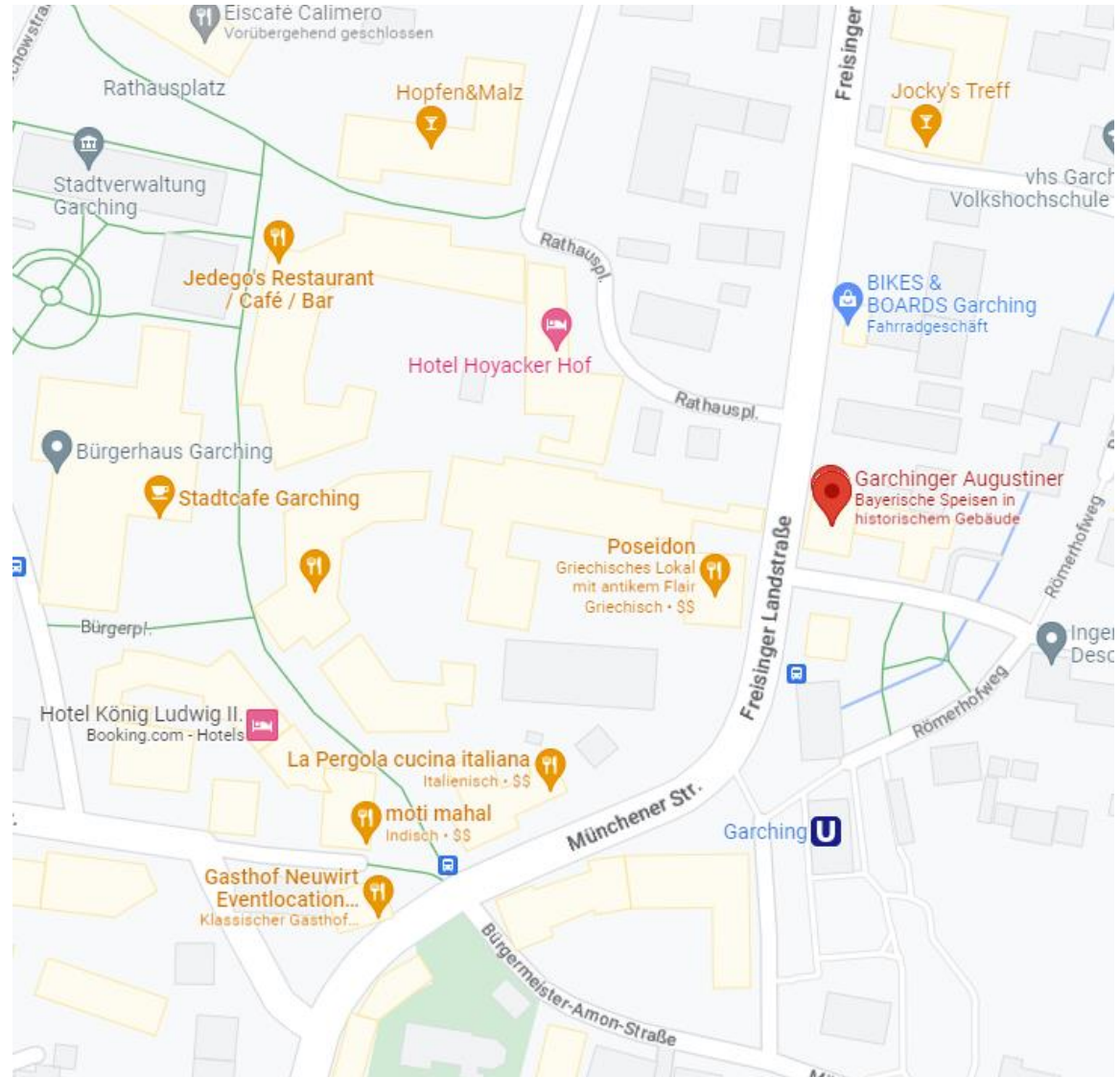
### [Hotel König Ludwig II](#)

Bürgerplatz 3  
85748 Garching bei München



### [Stellaris](#)

Walther-von-Dyck Str. 16  
85748 Garching bei München



## Public Transport / TAXI

[MVG](#)

Taxi - ALPEN Taxi GmbH die Taxizentrale in Garching – 0049 89 12024943