Dartington Workshop on Tipping Points in the Earth System

Report of Contributions

Contribution ID: **2** Type: **not specified**

Talk by Ayako Abe-Ouchi (remote)

Tuesday, 13 September 2022 09:30 (30 minutes)

Session Classification: Talks 1-convener Denis-Didier Rousseau

Contribution ID: **3**   Type: **not specified**

Talk by Witold Bagnievski

Tuesday, 13 September 2022 09:00 (15 minutes)

Part 1 recent progress on a self-consistent framework of abrupt climate changes in proxy reconstructions of past climates

Session Classification: Talks 1-convener Denis-Didier Rousseau

Contribution ID: **5**   Type: **not specified**

Talk by Johannes Lohmann

Tuesday, 13 September 2022 14:00 (15 minutes)

Multistability and tipping points of the ocean circulation

Session Classification: Talks 2-Convener Javier Blasco Navarro

Contribution ID: **6**   Type: **not specified**

Talk by Virna Meccia

Tuesday, 13 September 2022 13:45 (15 minutes)

Internal multi-centennial variability of the Atlantic Meridional Overturning Circulation simulated by EC-Earth3

Session Classification: Talks 2-Convener Javier Blasco Navarro

Contribution ID: **17**   Type: **not specified**

Louise Sime - Introduction to Objective 1, and our progress

Tuesday, 13 September 2022 10:30 (20 minutes)

Session Classification: Discussion on Objective 1

Contribution ID: **20**   Type: **not specified**

Eirik Myrvoll Nilsen

Tuesday, 13 September 2022 10:50 (15 minutes)

Part 3 recent progress on a self-consistent framework of abrupt climate changes in proxy reconstructions of past climates

Session Classification: Discussion on Objective 1

Contribution ID: **21**

Type: **not specified**

Irene Malmierca

Tuesday, 13 September 2022 11:05 (15 minutes)

Recent progress on identifying D-O tipping elements (TEs) and their interactions in models and data, and the identification of critical forcing levels

Session Classification: Discussion on Objective 1

Contribution ID: **22**   Type: **not specified**

Rachel Diamond

Tuesday, 13 September 2022 11:20 (15 minutes)

Recent progress on Arctic sea ice as a potential (TEs) and its interactions within CMIP5 and CMIP6 models - with a focus on warm climates

Session Classification: Discussion on Objective 1

Contribution ID: **23** Type: **not specified**

Richard Wood

Tuesday, 13 September 2022 11:35 (10 minutes)

Recent progress on simulating abrupt climate changes from a (self-consistent) hierarchy of models

Session Classification: Discussion on Objective 1

Contribution ID: **24** Type: **not specified**

Louise Sime

Tuesday, 13 September 2022 11:45 (30 minutes)

Summary and discussion of remaining Objective 1 questions

Session Classification: Discussion on Objective 1

Contribution ID: **25** Type: **not specified**

Talk by Florian Rabe

Wednesday, 14 September 2022 09:00 (30 minutes)

Representing Mathematical Models of Physical Systems

Session Classification: Talks 3-Convener Alison McLaren

Contribution ID: **26**   Type: **not specified**

Talk by Peter Ditlevsen

Wednesday, 14 September 2022 09:30 (15 minutes)

Confident prediction of forthcoming tipping point

Session Classification: Talks 3-Convener Alison McLaren

Contribution ID: **27**   Type: **not specified**

Talk by Victor Couplet

Wednesday, 14 September 2022 09:45 (15 minutes)

B-tipping, R-tipping, and overshooting phenomena in a toy model of the AMOC

Session Classification: Talks 3-Convener Alison McLaren

Contribution ID: **28**   Type: **not specified**

Talk by Keno Riechers

Tuesday, 13 September 2022 09:15 (15 minutes)

Part 2 recent progress on a self-consistent framework of abrupt climate changes in proxy reconstructions of past climates

Session Classification: Talks 1-convener Denis-Didier Rousseau

Contribution ID: **29**   Type: **not specified**

Talk by Denis Höning

Tuesday, 13 September 2022 14:15 (15 minutes)

Stability of the Greenland Ice Sheet and Connections to Anthropogenic Carbon Emissions

Session Classification: Talks 2-Convener Javier Blasco Navarro

Contribution ID: **30**   Type: **not specified**

Talk by Ulrike Feudel- Rate-induced tipping in predator-prey systems

Thursday, 15 September 2022 09:00 (30 minutes)

Nowadays, populations are faced with unprecedented rates of global climate change, habitat fragmentation and destruction causing an accelerating conversion of their living conditions. Critical transitions in ecosystems often called regime shifts lead to sudden shifts in the dominance of species or even to species'extinction and decline of biodiversity. Many regime shifts are explained as transitions between alternative stable states caused (i) by certain
bifurcations when certain parameters or external forcing cross critical thresholds, (ii) by fluctuations or (iii) by extreme events. We address a fourth mechanism which does not require alternative states but instead, the system performs a large excursion away from its usual behaviour when external conditions change too fast. During this excursion, it can embrace dangerously, unexpected states. We demonstrate that predator-prey systems can either exhibit a population collapse or an unexpected large peak in population density if the rate of environmental change crosses a certain critical rate. In reference to this critical rate of change which has to be surpassed, this transition is called rate-induced tipping (R-tipping). Whether a system will track its usual state or will tip with the consequence of either a possible extinction of a species or a large population peak like, e.g., an algal bloom depends crucially on the time scale relations between the ecological timescale and the time scale of environmental change. However, populations have the ability to respond to environmental change due to rapid evolution. We show how such kind of adaptation can prevent rate induced tipping in predator-prey systems. This mechanism, called evolutionary rescue, introduces a third timescale which needs to be taken into account. Only a large genetic variation within a population would be able to successfully counteract an overcritically fast environmental change.
[Anna Vanselow1, Lukas Halekotte1, Sebastian Wieczorek2 & Ulrike Feudel1, 1) ICBM, University of Oldenburg, Oldenburg, Lower Saxony, Germany 2) Department of Applied Mathematics, University College Cork, Cork, Ireland]

Session Classification: Talks 4-Convener Victor Couplet

Contribution ID: **31**   Type: **not specified**

Talk by Julian Newman

Thursday, 15 September 2022 09:30 (15 minutes)

Finite-time stabilisation by slowly varying forcing

Session Classification: Talks 4-Convener Victor Couplet

Contribution ID: **32** Type: **not specified**

Talk by Xu Zhang

Thursday, 15 September 2022 09:45 (15 minutes)

Climate background-dependent bifurcation of Atlantic Meridional Overturning Circulation

Session Classification: Talks 4-Convener Victor Couplet

Contribution ID: **33**   Type: **not specified**

Talk by Mary Silber

Thursday, 15 September 2022 13:30 (30 minutes)

A framework to investigate how changing rainfall patterns may impact vegetation band patterns in drylands

Session Classification: Talks 5-Convener Lana Blaschke

Contribution ID: **34**   Type: **not specified**

Talk by Robbin Bastiaansen

Thursday, 15 September 2022 14:00 (15 minutes)

Linear and nonlinear climate response

Session Classification: Talks 5-Convener Lana Blaschke

Contribution ID: **36**   Type: **not specified**

Talk by Tim Lenton

Friday, 16 September 2022 09:00 (45 minutes)

Session Classification: Talks 6

Contribution ID: **37**   Type: **not specified**

Bus to Kent's Cavern

Wednesday, 14 September 2022 13:30 (4 hours)

We have arranged for a bus to visit Kent's Cavern with evidence of past abrupt climate changes, bringing us back to Dartington Hall for about 18:00.

Session Classification: Excursion

Contribution ID: **38**   Type: **not specified**

Talk by Kerstin Lux

Tuesday, 13 September 2022 13:30 (15 minutes)

Memory Effects on Early Warning Signs

Session Classification: Talks 2-Convener Javier Blasco Navarro

Contribution ID: **39**   Type: **not specified**

Discussion led by Michel Crucifix

Wednesday, 14 September 2022 10:30 (2 hours)

  -Sum up our results and progress (20min)
-Brainstorming about efficient communication with policymakers or policyadvisers (30 min)
-Nicola Botta (online) about the difference between acting and planning (20 min)
-WP 7 (20 min)

Session Classification: Discussion on Objective 5 (O5). Bridge the gap between climate science and policy advice

Contribution ID: 40   Type: **not specified**

Discussion led by Marisa Montoya

Thursday, 15 September 2022 10:30 (10 minutes)

Session Classification: Discussion on Objective 4 (O4). Define and identify safe operating spaces

Contribution ID: 42　　　　　　　　　　　　　　　　　　Type: **not specified**

Valerio Lucarini - introductory talk

Thursday, 15 September 2022 14:30 (30 minutes)

Session Classification: Discussion on Objective 3 (O3). Characterise climate response in the presence of Tipping Points

Contribution ID: 44   Type: **not specified**

Talk by Matteo Cini

Thursday, 15 September 2022 14:15 (15 minutes)

Simulating AMOC collapse with a Large Deviation Algorithm

Session Classification: Talks 5-Convener Lana Blaschke

Contribution ID: 45 Type: **not specified**

Update from mangement

Friday, 16 September 2022 09:45 (15 minutes)

Session Classification: Talks 6

Contribution ID: 47   Type: **not specified**

Niklas Boers

Tuesday, 13 September 2022 14:30 (5 minutes)

Intro and overview

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: 49 Type: **not specified**

Andreas Morr

Tuesday, 13 September 2022 14:35 (20 minutes)

Assessing EWS in the presence of continuous-time correlated noise

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: **50** Type: **not specified**

Chris Boulton

Tuesday, 13 September 2022 14:55 (13 minutes)

Amazon Resilience

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: 51 Type: **not specified**

Lana Blaschke

Tuesday, 13 September 2022 15:08 (13 minutes)

Amazon spatial correlations

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: **52** Type: **not specified**

Maya Ben-Yami (remote)

Tuesday, 13 September 2022 15:21 (13 minutes)

AMOC EWS in CMIP6 models

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: **53**   Type: **not specified**

Andreas Morr

Tuesday, 13 September 2022 15:47 (13 minutes)

Green Sahara Collapse

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: **54**   Type: **not specified**

Nils Bochow (remote)

Tuesday, 13 September 2022 15:34 (13 minutes)

EWS in the South American monsoon

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: **55**   Type: **not specified**

Discussion

Tuesday, 13 September 2022 16:20 (40 minutes)

Session Classification: Discussion on Objective 2 (O2). Provide approaches for the identification and validation of Early Warning Signals (EWSs)

Contribution ID: **56** Type: **not specified**

Marisa Montoya

Thursday, 15 September 2022 10:40 (20 minutes)

Identifying safe operating spaces through analysis and modelling of tipping elements in future climates

Session Classification: Discussion on Objective 4 (O4). Define and identify safe operating spaces

Contribution ID: **57**   Type: **not specified**

Pete Ashwin

Thursday, 15 September 2022 11:00 (20 minutes)

Safe operating spaces, multistability and impending tipping points

Session Classification: Discussion on Objective 4 (O4). Define and identify safe operating spaces

Contribution ID: **58** Type: **not specified**

Victor Couplet

Thursday, 15 September 2022 11:20 (20 minutes)

A route to O4 using commitment ideas

Session Classification: Discussion on Objective 4 (O4). Define and identify safe operating spaces

Contribution ID: **59**   Type: **not specified**

Discussion

Thursday, 15 September 2022 12:00 (30 minutes)

Session Classification: Discussion on Objective 4 (O4). Define and identify safe operating spaces

Contribution ID: **60**   Type: **not specified**

Discussion led by Anna von der Heydt

Thursday, 15 September 2022 15:00 (1 hour)

Session Classification: Discussion on Objective 3 (O3). Characterise climate response in the presence of Tipping Points

Contribution ID: **62** Type: **not specified**

Anna von der Heydt

Thursday, 15 September 2022 11:40 (20 minutes)

How does climate sensitivity help to constrain safe operating spaces?

Session Classification: Discussion on Objective 4 (O4). Define and identify safe operating spaces

Contribution ID: **63**

Type: **not specified**

Welcome by Peter Ditlevsen

Tuesday, 13 September 2022 08:50 (10 minutes)

Session Classification: Talks 1-convener Denis-Didier Rousseau

Contribution ID: **66**   Type: **not specified**

Early Career -Open questions and snacks

Thursday, 15 September 2022 17:00 (1h 30m)

Session Classification: General assembly for PI's and WP leaders. For ECR discussions and snacks

Contribution ID: **67**   Type: **not specified**

General Assembly (GA)-for PIs and WP leaders

Thursday, 15 September 2022 17:00 (1h 30m)

The GA is the ultimate decision-making body of TiPES, responsible for overall decisions concerning the project as a whole such as addressing major strategic issues as/if they arise. The GA will be held annually and has responsibility for steering the overall direction of the project.

Each beneficiary have one vote.

The GA is chaired by the Coordinator. Specifically the GA will:

• Oversee the whole project, approval of priority setting and of variations in project science, partners or management structure

• Consider and approve changes to any technical specifications for annex 1 of the Grant Agreement and changes in work between beneficiaries if the effect extends beyond individual work packages

• Discuss any issues raised by partners and other project stakeholders

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Items for discussion are so far

-Update on progress by management
-Update on the current amendment
-Discussion of 36 months report
-Input from Astrid Hasselbalch (by Helle Kjær)

-please suggest further items you would like to discuss or debate

Session Classification: General assembly for PI's and WP leaders. For ECR discussions and snacks

Contribution ID: **68** Type: **not specified**

Sacha Sinet

Tuesday, 13 September 2022 17:25 (5 minutes)

Predicting Cascading
Phenomena via asymptotics

Session Classification: PICO presentations

Contribution ID: **69** Type: **not specified**

Laura Jackson

Tuesday, 13 September 2022 17:05 (5 minutes)

AMOC thresholds in CMIP6 models: North Atlantic Hosing MIP

Session Classification: PICO presentations

Contribution ID: **70**   Type: **not specified**

Rene van Westen

Tuesday, 13 September 2022 17:10 (5 minutes)

Wind-driven Ocean Circulation –Model Order Reduction

Session Classification: PICO presentations

Contribution ID: **71** Type: **not specified**

Valérian Jacques-Dumas

Tuesday, 13 September 2022 17:15 (5 minutes)

Machine Learning Estimate
of the committor function

Session Classification: PICO presentations

Contribution ID: **72** Type: **not specified**

Paul ritchie

Tuesday, 13 September 2022 17:20 (5 minutes)

Evidence of local Amazon dieback in CMIP6 models

Session Classification: PICO presentations

Contribution ID: **73**   Type: **not specified**

Alison McLaren and Merve Gorguner

Tuesday, 13 September 2022 17:00 (5 minutes)

Adding Water Tracers and Isotopes to the
UK Earth System Model (UKESM2)

Session Classification: PICO presentations

Contribution ID: **74** Type: **not specified**

Bert Wuyts

Tuesday, 13 September 2022 17:35 (5 minutes)

Tropical forest: Data and model

Session Classification: PICO presentations

Contribution ID: **75** Type: **not specified**

Ignacio del Amo

Tuesday, 13 September 2022 17:30 (5 minutes)

Double well experiment: noise tipping with α-stable noise.

Session Classification: PICO presentations

Contribution ID: **76**   Type: **not specified**

Takahito Mitsui

Tuesday, 13 September 2022 17:40 (5 minutes)

Synchronization and vibrational resonance in glacial interglacial cycles

Session Classification: PICO presentations

Contribution ID: **77**   Type: **not specified**

Da Nian

Tuesday, 13 September 2022 17:45 (5 minutes)

The combined impact of global warming and AMOC collapse on the Amazon Rainforest

Session Classification: PICO presentations

Contribution ID: **78** Type: **not specified**

Jessica Steer

Tuesday, 13 September 2022 17:50 (5 minutes)

Spontaneous Dansgaard-Oeschger type oscillations in climate models: Tipping Points in the climate system

Session Classification: PICO presentations

Contribution ID: **79** Type: **not specified**

Ruth Chapman

Tuesday, 13 September 2022 17:55 (5 minutes)

Stochastic data adapted AMOC box models

Session Classification: PICO presentations

Contribution ID: **80** Type: **not specified**

George Datseris

Tuesday, 13 September 2022 18:00 (5 minutes)

Basin fraction continuation algorithms

Session Classification: PICO presentations