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Stockholm Resilience Centre  
Sustainability Science for Biosphere Stewardship



UNIVERSITY OF  
Southampton

## LOOPS-3 2017

Transformative change and social-ecological resilience in the World-Earth system: modelling, concepts and data

### General information

#### Workshop dates

January 25 – 26, 2017  
(back to back with the Earth League  
Symposium on “Transformation now!”,  
January 23 – 24, 2017)

#### Location

Trefoil building, Albert-Einstein-Campus,  
Potsdam, Germany

#### Organizers

Jonathan Donges (PIK, SRC)  
Jobst Heitzig (PIK)  
Wolfgang Lucht (PIK)  
James Dyke (UoS)  
Sarah Cornell (SRC)



PIK Trefoil, Credit: Jokeair

#### Topics

1. Where are human agency, social networks and complex co-evolutionary interactions in our models of the Anthropocene?
2. What concepts, data and modelling approaches can inform the operational development of World-Earth models?
3. How can these concepts and models (1. + 2.) be applied to the study of transformation focusing on the decarbonization transformation as an example?

# Programme

## Days 1/2, Mon./Tue. January 23+24, 2017

### Earth League Symposium: Transformation now!

(A56 PIK Trefoil Conference Hall)

See separate programme of Earth League Symposium ([www.pik-potsdam.de/earthleague2017](http://www.pik-potsdam.de/earthleague2017))

## Day 3, Wednesday, January 25, 2017

### LOOPS-3 Workshop 2017 Transformative change and social-ecological resilience in the World-Earth system: modelling, concepts and data

(A56 PIK Trefoil Conference Hall)

09:00 *Morning coffee and snacks* (A56 PIK Trefoil Conference Hall Foyer)

09:30 Welcoming words, presentation of workshop aims and structure (Wolfgang Lucht)

#### 10:00 **Participants' presentations and discussion**

*The aim of this session is to set out a smorgasbord of ideas, modelling approaches and data sources. The short talks should be structured around the three guiding questions (see Topics above). Speakers have max 5 minutes to present their ideas. Speakers marked \* have been allocated max. 10 minutes to give broader context and point to key challenges. Keeping to time keeps ideas flowing and allows time for discussion.*

Lessons for modelling from the Earth League Symposium "Transformation Now" (Carlos Nobre \*)

Assessing the co-evolution of agricultural intensification and environmental degradation: a data-driven approach (David Armstrong McKay)

How ecology shapes exploitation & social strategies of natural resource users: Linking simple mathematical models to empirical systems (Pawel Romanczuk)

Complexity approaches to incorporate adaptation/mitigation in the spatial distribution of urban population & land-use (Roger Cremades)

Experience from modelling the Roman empire and plans for the energy nexus (Brian Dermody \*)

How to include human behaviour and decision making into Earth system models? Insights from a review of potential modelling techniques and approaches (Finn Müller-Hansen)

Clear, simple, and wrong? Concepts and models of emerging social complexity (Maurits Ertzen \*)

Modelling social collapse within the World-Earth Model: concepts, data and empirical evidences (Avit Bhowmik)

10:55 Questions and Discussion

11:10 How to trigger off cascades of environmentally friendly behaviour? (Michael Mäs \*)

Representing human behaviour in social-ecological system models with generally applicable behavioural algorithms (Wolfram Barfuss)

Bursting the carbon bubble. Divestment dynamics in a fossil fuel stock market (Birte Ewers)

Ambitious long term goals versus weak short term commitments – modelling the challenges of the Paris accord (Klaus Hasselmann \*)

Social tipping as opinion dynamics of bounded rational agents. Approaches to modeling divestment (Jakob Kolb)

Employing final cause to inform the operational development of World-Earth models (Katherine Farrell)

Problems of a tacitly undifferentiated global human in conceptualisations and representations of the Anthropocene & issues of Anthropocene data (Sarah Cornell \*)

Adaptive network models for transformation (Steven Lade)

Measuring the influence of feedback loops in socio-ecological systems (Joseph Abram)

12:10 Questions and Discussion

12:30 *Lunch* (A56 PIK Trefoil Conference Hall Foyer)

14:00 Presentation of PIK's World-Earth modelling platform CORE (Jonathan Donges & Jobst Heitzig)

14:30 Discussion (in plenum and breakout groups):

- What are the central components and dynamics to be represented in World-Earth models?
- What would participants like to contribute to such a platform?
- In what other topics are participants interested in this context?

15:30 *Coffee break* (A56 PIK Trefoil Conference Hall Foyer)

16:00 Discussion (first group work block)

17:00 Discussion (second group work block)

18:00 Wrap-up and transfer to dinner

19:00 *LOOPS-3 Workshop dinner in Potsdam's historic centre (Holländer Viertel), Restaurant Fliegender Holländer*

## **Day 4, Thursday, January 26, 2017**

### **LOOPS-3 Workshop 2017 Transformative change and social-ecological resilience in the World-Earth system: modelling, concepts and data (continued)** (A56 PIK Trefoil Conference Hall)

09:00 *Morning coffee and snacks* (A56 PIK Trefoil Conference Hall Foyer)

09:30 Summary of yesterday's discussions and reports from break-out groups

10:30 Discussion on future LOOPS collaborations, publications, and proposals  
(in plenum and breakout groups)

12:30 Wrap-up and farewell (The Organizers)

13:00 *Lunch* (Canteen or Café Freundlich on Telegrafenberg Campus, **on participants' expense**)

14:00 Guided tour of historic Telegrafenberg campus (for all interested participants)

## Description

### Background

The LOOPS workshops bring together global change researchers from diverse perspectives to explore novel approaches for analysis and modelling of the human world and biophysical Earth as a coevolutionary system. Participants share the view that understanding and addressing the global challenges of the Anthropocene demands a new kind of dynamic social-ecological model – a World–Earth model – that complements today’s Earth system models and integrated assessment models with insights about complexity and resilience.

Previous LOOPS workshops have identified priority areas for the development of World-Earth models, a structurally new approach for dealing with planetary social-ecological dynamics: human agency, societal dynamics beyond economics, global networks, and complex social-ecological coevolution. These workshops are co-convened by researchers at the Potsdam Institute for Climate Impact Research (PIK), Stockholm Resilience Centre (SRC), and the University of Southampton (UoS). They are collaborative activities of PB.net, IRI THESys at Humboldt University Berlin, and the Earth League:

- LOOPS-1 2014 (Kloster Chorin, Germany): Closing the loop – Towards co-evolutionary modelling of global society-environment interactions
- LOOPS-2 2015 (Southampton, UK): From Limits to Growth to Planetary Boundaries: Defining the safe and just space for humanity

LOOPS-3 will follow directly after the international [Earth League Symposium on “Transformation now!”](http://www.pik-potsdam.de/earthleague2017) ([www.pik-potsdam.de/earthleague2017](http://www.pik-potsdam.de/earthleague2017)), where its high-level science-policy context will be discussed. The focal task of LOOPS-3 will be to scope a co-evolutionary analysis of global decarbonization dynamics within an environmentally safe and socially just operating space. Discussions will address both the methodologies for safe operating space analysis, and the next steps for technical and operational implementation.

### Work mode

- Brief technical talks for rapid information exchange and discussion of emergent connecting themes.
- Ample time for work in break-out groups and reporting back to plenum, aiming for synthesis papers, research proposals and new modelling and analysis efforts.
- Challenges in the implementation of a World-Earth model will be discussed. One example is the developing COPAN:CORE model design which emerged from previous LOOPS workshops; participants with other modelling approaches are warmly invited to add them into the discussion.
- Collaborative planning for publications, collaborations and funding proposals. Experience from the previous LOOPS workshops indicates that plans for joint working will be produced during the workshop.

## Contact

### LOOPS-3 Workshop

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**Phone (Brigitta Krukenberg):** +49 331 288 2620

# Locations

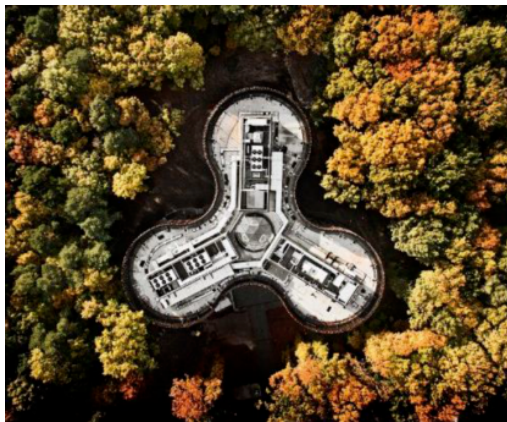
## Albert Einstein Science Park Potsdam

**Address:** Telegrafenberg, 14473 Potsdam, Germany

**Phone:** +49 331 2880



### A56 PIK Trefoil



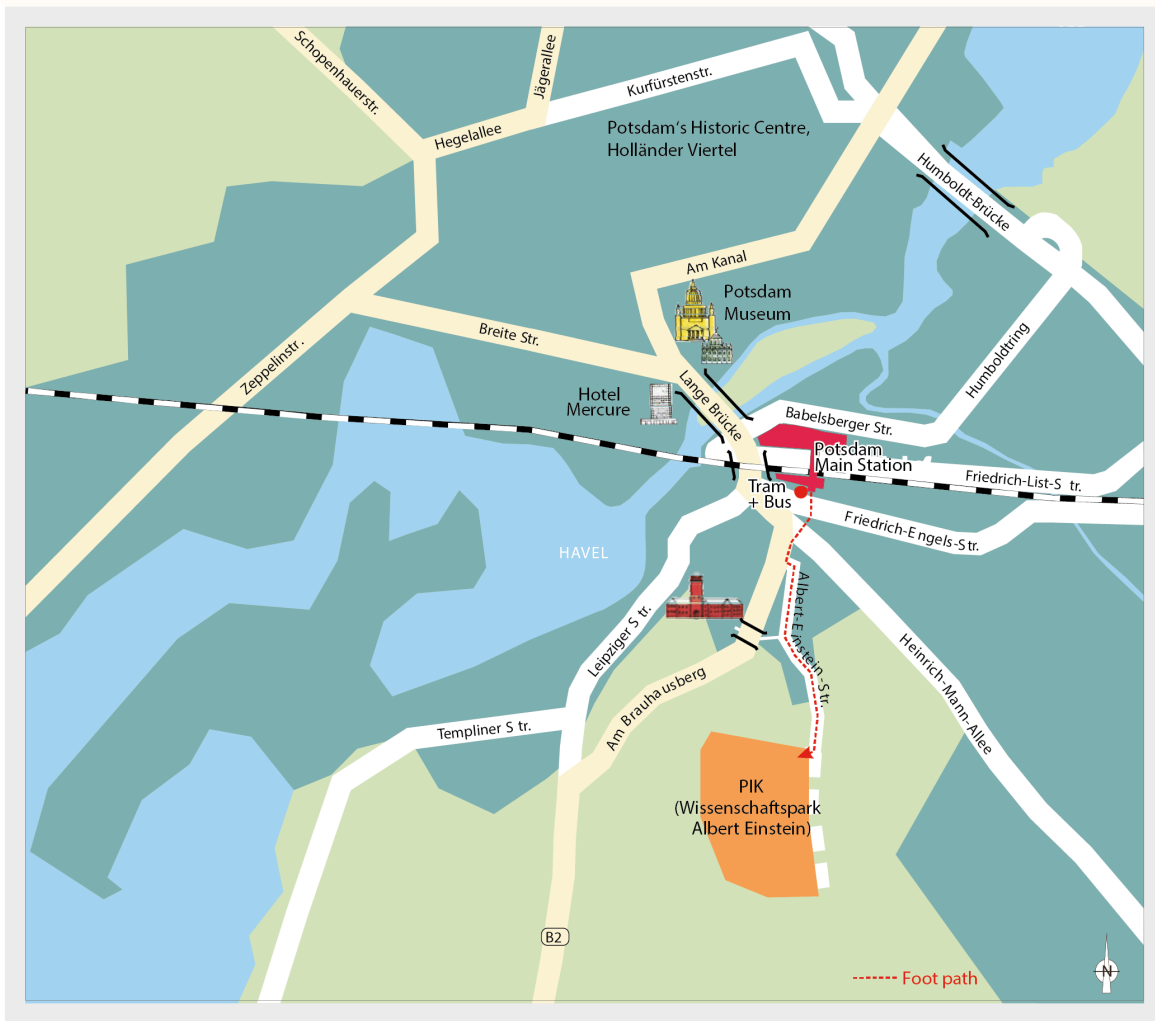
**Address:** Telegrafenberg A56, 14473 Potsdam, Germany

**Phone (conference hall):** +49 331 288 20845

**Phone (Foyer conference hall):** +49 331 288 20844

**Events:** Earth League Symposium, LOOPS-3 Workshop





## Restaurant Fliegender Holländer



**Address:** Benkertstraße 5, 14467 Potsdam, Germany  
**Phone:** +49 331 275030

**Event:** LOOPS-3 Workshop Dinner