Seventh Framework Programme

Theme 6

Environment

Project: 603864 – HELIX

Full project title:

High-**E**nd c**L**imate **I**mpacts and e**X**tremes

Deliverable: 1.3

Project Fact Sheet

Version 1.0

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Actual date of submission: 31/10/17

D1.3: Project Fact Sheet

October

2017

Introductory note

The first fact sheet in this document describes the aims, methods, and partners of the project. Although it is being delivered in month 48, the fact sheet was produced at the start on the project. In addition a number of other fact sheets were also produced early on in the project and were used at COP meetings (2014 and 2015) and other dissemination events. Two examples form part of this delivery.

Climate Change

HELIX

At a glance

Title: High-End cLimate Impacts and eXtremes

Instrument: Collaborative project

Total cost: 11 794 205€

EC contribution: 8 999 998€

Duration: 48 months

Start date: 01/11/2013

Consortium: 16 partners from 12 countries

Coordinating organisation: The University of Exeter (UK)

Project coordinator: Richard Betts

Project website: www.helixclimate.eu

Key Words: Climate Change, Climate Science, Climate Policy, Emissions, High-end scenarios, Integrated Assessment, Climate Modelling, Impacts, Adaptation, Vulnerability, 2°C, 4°C, 6°C, Decision-makers, Stakeholders.

The challenge

Although the United Nations aims to limit global warming to 2ºC above pre-industrial levels of CO_2 in the atmosphere, the ongoing rise in emissions of greenhouse gases suggests that this target is becoming increasingly difficult to achieve. Policymakers, businesses and other decision-makers are therefore considering the need to adapt to changes in climate under higher levels of global warming. This requires coherent information on future climate conditions, and the consequences of different actions to adapt to a changed climate. International negotiations on limiting global warming also require clear information on the consequences of different levels of climate change. While a vast array of projections, scenarios and estimates of future climate change and its impacts already exists, much is conflicting, unclear, of unknown levels of certainty and difficult to use to inform decisions. High-end cLimate Impacts and eXtremes (HELIX) is a new area of scientific study to help inform policy.

Project Objectives

The HELIX project brings together European and international expertise, with the latest models and techniques to address these questions:

(1) What could 4°C and 6°C worlds look like, and how may this differ to a 2°C world?

(2) What does high-end climate mean to a variety of stakeholders?

(3) What are the consequences of different adaptation choices to high-end climate impacts?

Methodology

HELIX is a 2-stage process to make best use of existing information while also developing new tools, techniques and understanding to provide improved information to stakeholders.

Stage 1 is a preliminary assessment of impacts using existing climate change projections and socioeconomic scenarios from the 5th Coupled Model Intercomparison Project (CMIP5), Representative Concentration Pathways (RCPs), Shared Socioeconomic Pathways (SSPs), Coordinated Regional Downscaling Experiment (CORDEX) and Inter-Sectoral Impacts Model Intercomparison Project (ISI-MIP).

These will be used to assess a range of potential pathways to reaching Specific Warming Levels (SWLs) of 2ºC, 4ºC and 6ºC global warming, including different time horizons, greenhouse gas mixes, climate responses, energy systems and economic states.

The biophysical and socioeconomic impacts of climate change at these SWLs under different pathways is being assessed using existing models complemented by non-modelling approaches, with a particular focus on land systems, food, water and energy security. Results from Stage 1 will be discussed in detail with stakeholders to obtain feedback on their utility.

A major focus of HELIX is global-scale impacts, with additional impacts and adaptation at regional scales in Europe, northern sub-Saharan Africa and South Asia. Engagement with in-country stakeholders is central to these regional activities.

In parallel with Stage 1, new models and scenarios are being developed ready for use for generating new advice in Stage 2. This includes new, high-resolution General Circulation Models (GCMs) of the global atmosphere, to improve the representation of weather extremes, and new impacts models.

A key innovation in both biophysical and economic modelling is the development of more integrated approaches, to improve the internal consistency of assessments and hence increase the realism of scenarios and resulting advice. Non-linearities and tipping elements in natural and human systems, and their combined system, are investigated. Systematic approaches to quantifying uncertainty are being developed and applied where appropriate, complemented by non-quantitative assessments to aid conceptual understanding and communication.

Informed by stakeholder feedback following Stage 1, this new knowledge is being used to provide new, internally-consistent assessments and provide a firmer basis for decision-making.

Expected Results

In close collaboration with stakeholders, HELIX is providing for the first time:

1) A set of coherent global scenarios of the natural and human world at 2ºC, 4ºC and 6ºC global warming reached at different rates and with different pathways of adaptation by society.
2) Detailed information in three focus regions: Europe, northern sub-Saharan Africa, and South Asia.
3) A detailed analysis of confidence and uncertainty.

HELIX's innovative approaches to integrated research across disciplines and pro-active engagements with policymakers, business, non-governmental organisations and the international scientific community is ensuring that our research has global impact.

Project Partners	
The University of Exeter (UK)	Met Office (UK)
University of East Anglia (UK)	Stichting VU-VUmc (NL)
Joint Research Centre of the EU Commission	World Food Programme (UN)
University of Liege (BE)	Centre National de la Recherche Scientifique (FR)
Swedish Meteorological & Hydrological Institute (SE)	Potsdam Institute for Climate Impact Research (DE)
University College London (UK)	Technical University of Crete (GR)
IGAD Climate Prediction and Application Centre (KE)	Bangladesh University of Engineering and Technology (BUET)
Foundation for Innovation and Technology Transfer - India Institute of Technology Delhi (IN)	Agence Nationale de la Meteorologie du Senegal (SN)

High-End cLimate Impacts and eXtremes

Collaborative partners:

University of Exeter, UK
Met Office, UK
Tyndall Centre for Climate Change Research, UK
VU University Amsterdam, NE
Joint Research Centre, EU
World Food Programme, UN
University de Liege, BE
Centre National De La Recherche Scientifique, FR
Sveriges Meteorologiska Och Hydrologiska Institut, SE
Potsdam Institute Fuer Klimafolgenforschung, DE
University College London, UK
Technical University of Crete, GR
IGAD Centre for Climate Prediction and Application, KE
Bangladesh University of Engineering and Technology, BD
Foundation for Innovation and Technology Transfer, IN
Agence Nationale de la Meteorologie du Senegal (SN)

Linked research funded by the same EU FP7 theme:

IMPRESSIONS: Led by Dr Paula Harrison, University of Oxford
www.eci.ox.ac.uk/research/biodiversity/impressions

RISES-AM: Led by Prof Agustin Sanchez-Arcilla, University of Catalonia

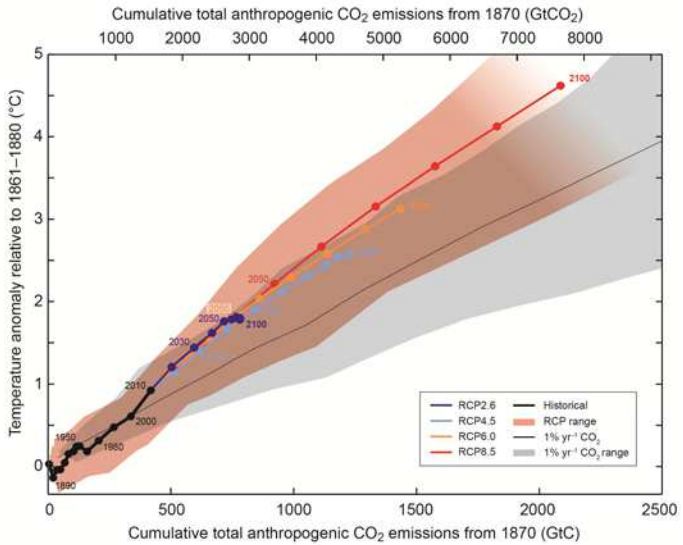
Funded by EU FP7 Cooperation ENV.2013.6.1-3: Impacts of higher end scenarios (global average warming >2^{0}C with respect to pre-industrial level)

Twitter: @helixclimate

High-End cLimate Impacts and eXtremes

Impacts and adaptation 4^{0}C, 6^{0}C, 2^{0}C

At HELIXclimate we are assisting decision-makers in making climate adaptation more manageable by providing a set of credible, coherent, global and regional views of different worlds at 4^{0}C, 6^{0}c and 2^{0}C. We are sixteen organisations funded by the EU to work together to explore consequences and responses to two degrees and beyond.



The global carbon budget – the amount of CO_2 in the atmosphere that can be emitted without exceeding the two degrees warming - could be used up entirely by 2040. Figure is SPM.10 from IPCC WG1 AR5 SPM-20.

Contact the co-ordinator:
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Head of Climate Impacts at the Met Office Hadley Centre
email: helixclimate@exeter.ac.uk

High-End cLimate Impacts and eXtremes

What do 4^0C and 6^0C climate worlds look like in comparison to a 2^0C world and what are the consequences and choices for adapting to future climates? Our research focus at HELIXclimate is land and coastal impacts and their consequences for food, water and energy security; flooding, infrastructure, ecosystems, health, migration, and risk of conflict.

Our work is:

- Developing global scenarios of the combined natural and human world at 4^0C warming, with and without society pro-actively undertaking adaptation
- Developing and analysing further global scenarios of the world at 2^0C and 6^0C by 2100
- Devising detailed case studies for Europe, northern hemisphere sub-Saharan Africa and South Asia
- Describing reliable assessments of confidence in the scenarios
- Ensuring our research addresses the needs of decision-makers

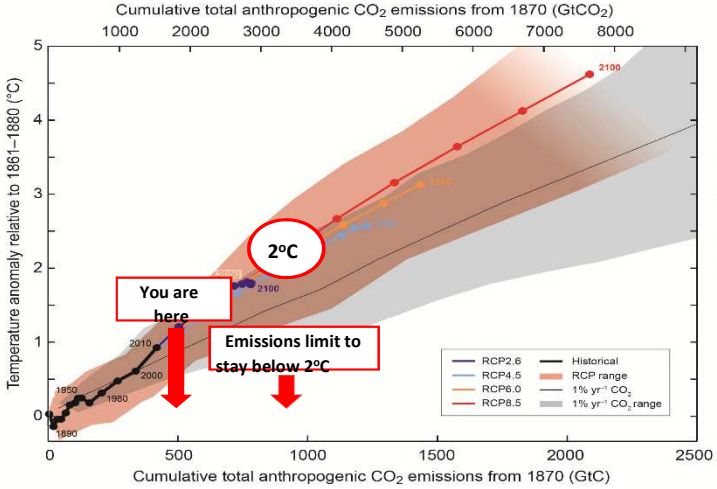
High-End cLimate Impacts and eXtremes

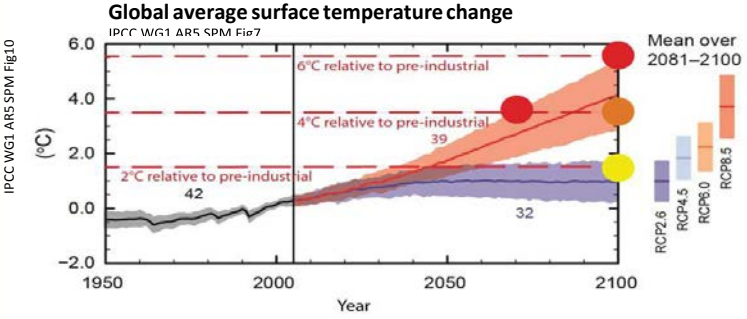
HELIXclimate's overarching focus is to achieve impact through excellent research and stakeholder engagement. We are developing a set of eight coherent global scenarios of the natural and human world at 2^0C, 4^0C, 6^0C warming achieved at different rates and different pathways of adaptation by society. We work globally and also focus on three regions in more detail: Europe, northern hemisphere sub-Saharan Africa and South Asia. All are supported with a comprehensive analysis of confidence and uncertainty.

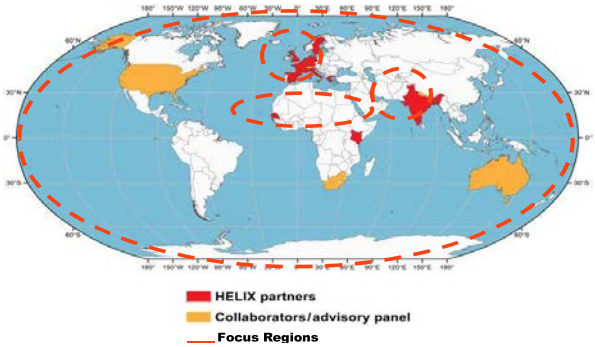
Our work is:

1. Stakeholder engagement and public outreach, led by UEA (UK)
2. Pathways to Specific Warming Levels, led by Met Office (UK)
3. Timeslices and regional downscaling, led by SMHI (Sweden)
4. Global biophysical Impacts, led by PIK (Germany)
5. Global socio-economic impacts, led by Joint Research Centre (EU)
6. Regional focus; Europe, led by Joint Research Centre (EU)
7. Regional focus: Africa, led by World Food Programme (UN)
8. Regional Focus, South Asia, led by IIT Delhi (India)
9. Risk Management of Tipping Points, led by University of Exeter (UK)

Impacts and High-End cLimate Impacts and eXtremes Adaptation 2, 4, 6°C







Our total carbon emissions are more than half-way to 2°C of global warming

We are assisting decision-makers in making climate adaptation more manageable by providing a set of credible, coherent, global and regional views of different worlds at 2°C, 4°C, 6°C

We are researching climate change impacts including on land and coast and their consequences for food, water security, flooding, energy security, infrastructure, ecosystems, health, migration, and risk of conflict

We have three focus regions: Europe, Sub-Saharan Africa in the Northern Hemisphere, and the north-East Indian sub-continent

Our results are supported with a comprehensive assessment of confidence level and uncertainty

HELIX is a 4 year project of €12 million across 16 partners worldwide

We are assessing three levels of global warming, 2, 4, 6°C

We are comparing different impact and adaptations with each other

We are analysing how impact and adaptation at specific warming levels are influenced by the timing of mitigation actions and adaptation actions

We are 16 research organisations working globally and in 3 focus regions specialising in:

Engagement and communication

Pathways to Specific Warming Levels

High Resolution Time-Slices and Regional Downscaling

Global Biophysical Impacts

Global Assessment of Socio-Economic Impacts

Regional Focus : Europe, Sub-Saharan Africa in the Northern Hemisphere, and North-East Indian sub-continent

Risk Management of Tipping Points

HELIX is led by Professor Richard Betts at the University of Exeter and the UK Met Office.

www.helixclimate.eu helixclimate@exeter.ac.uk