CLIMATE CHANGE PROGRAMME

Scenarios and related data for MACSUR2

Timothy Carter
Finnish Environment Institute (SYKE)

MACSUR Conference 2015
Integrated Climate Risk Assessment in Agriculture & Food
8-9 April 2015, University of Reading, UK

SYKE

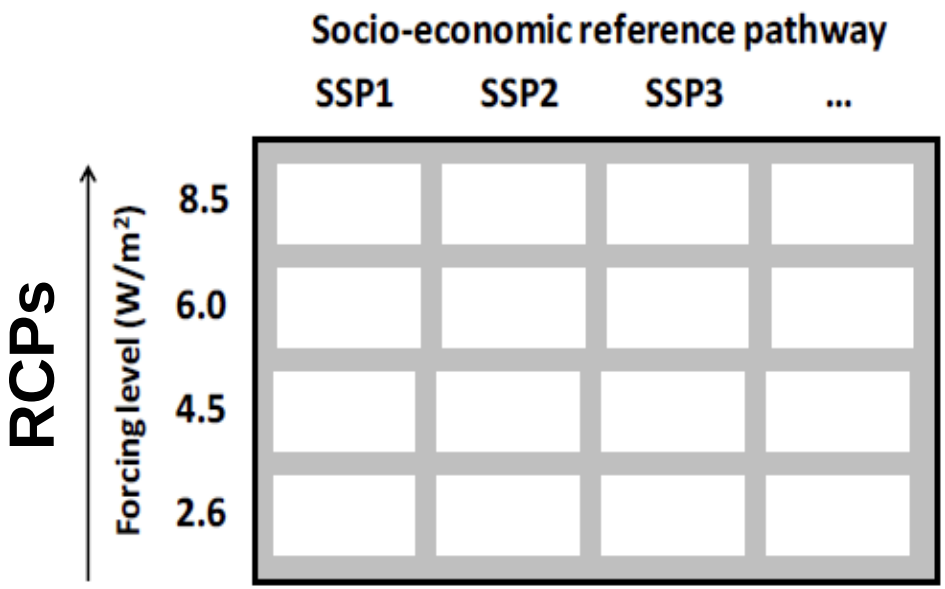
CLIMATE CHANGE PROGRAMME

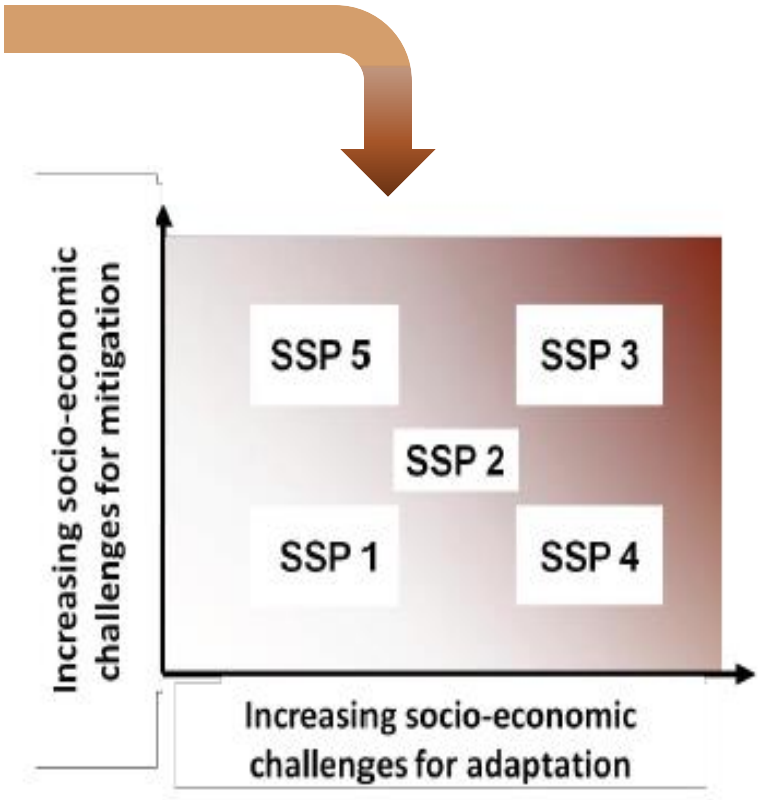
Scenario selection for MACSUR2

- **Framing scenario selection (RCP/SSP)**
- **Ongoing scenario development in FP7 IMPRESSIONS**
- **Some examples of sources of data and scenarios**

SYKE

RCPs, SSPs and RAPs





Representative Ag Pathways

- economic & social development narratives
- agricultural technology trends
- prices and costs of production
- ag, mitigation & other policy

AgMIP The Agricultural Model Intercomparison and Improvement Project

Antle & Nelson, pers. comm., 2012

CLIMATE CHANGE PROGRAMME

Scenario selection for IMPRESS

	SSP1	SSP3	SSP4	SSP5
RCP8.5	o	XX	o	
RCP4.5	XX	XX	XX	o

SYKE

Scenario selection for IMPRESSIONS

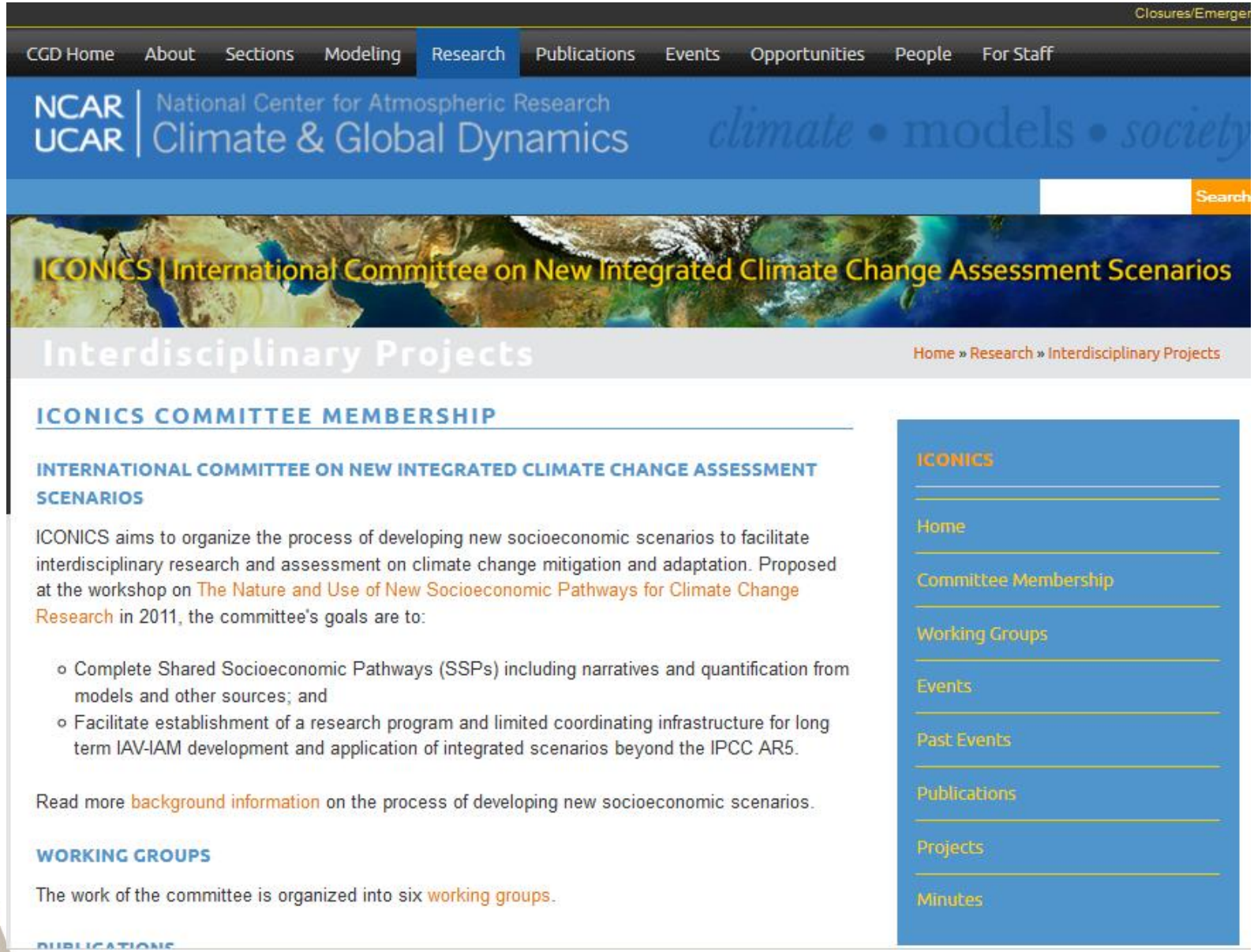
	SSP1	SSP3	SSP4	SSP5
RCP8.5	o	XX	o	
RCP4.5	XX	XX	XX	o

- **Uses the RCP/SSP global scenario framework**
- **Pairs high-end climate (RCP8.5) with compatible socio-economic worlds (SSP5 and SSP3)**
- **Pairs low-end climate (RCP4.5) with compatible socio-economic worlds (SSP1, SSP3, SSP4) for which mitigation policy might also be required (SPAs)**
- **Facilitates comparison across SSPs for the same forcing (SSP4 vs SSP5 and SSP1 vs. SSP3 vs. SSP4)**
- **Facilitates comparison across forcings for the same SSP – SSP3 (RCP8.5 vs RCP4.5)**

CLIMATE CHANGE PROGRAMME

ICONICS

https://www2.cgd.ucar.edu/research/iconics



SYKE

CLIMATE CHANGE PROGRAMME

ICONICS

https://www2.cgd.ucar.edu/research/iconics

ICONICS

Home » Research » Interdisciplinary Projects » ICONICS

ICONICS WORKING GROUPS

WORKING GROUPS

ICONICS work is initially focused on several high priority tasks. Informal working groups are coordinating inputs from interested individuals and developing drafts for circulation and comment. The list of working groups below includes links to individual working group pages for additional information. If you are interested in working on one of these topics, please contact the working group chair listed.

- Narratives for SSPs
  Co-chairs: Brian O'Neill, Elmar Kriegler
- IAV-IAM handshake document and research community interactions
  Chair: Jae Edmonds
- IAM quantitative drivers and IAM scenarios for SSPs
  Co-chairs: Detlef van Vuuren, Keywan Riahi
- IAV quantitative elements and evaluation metrics
  Co-chairs: Marc Levy, Bas van Ruijven
- Nested scenarios across geographies and time
  Co-chairs: Kasper Kok, Ben Preston
- Roadmap for future IAV-IAM collaboration on scenarios
  Chair: Stephane Hallegatte

ICONICS

Home

Committee Membership

Working Groups
- Narratives for SSPs
- IAV-IAM handshake document...
- IAM quantitative drivers...
- IAV quantitative elements...
- Nested scenarios across...
- Roadmap for future IAV-IAM...

Events

Publications

Projects

Outreach

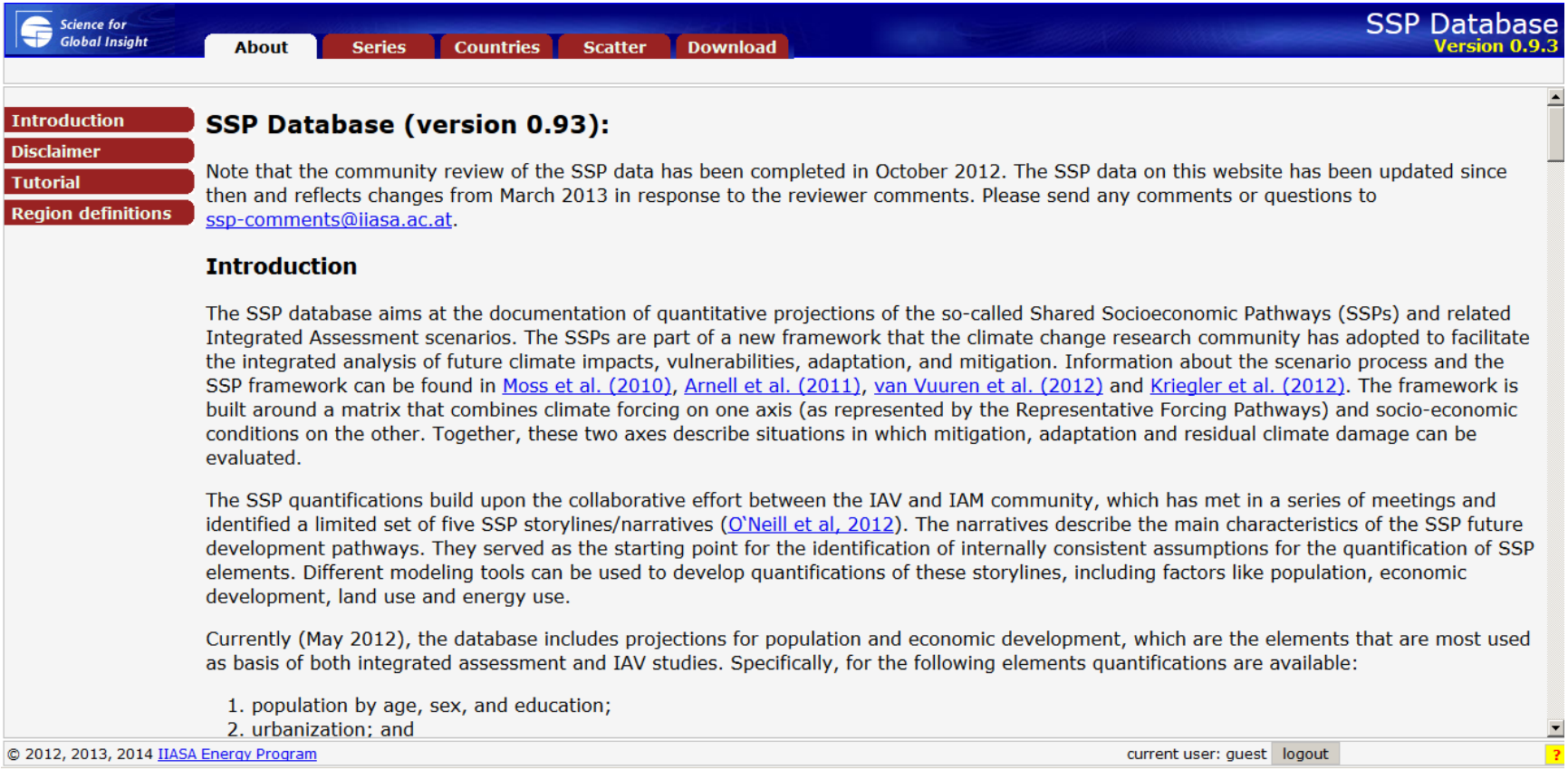
ICONICS MAILING LIST

SYKE

CLIMATE CHANGE PROGRAMME

SSP Database at IIASA

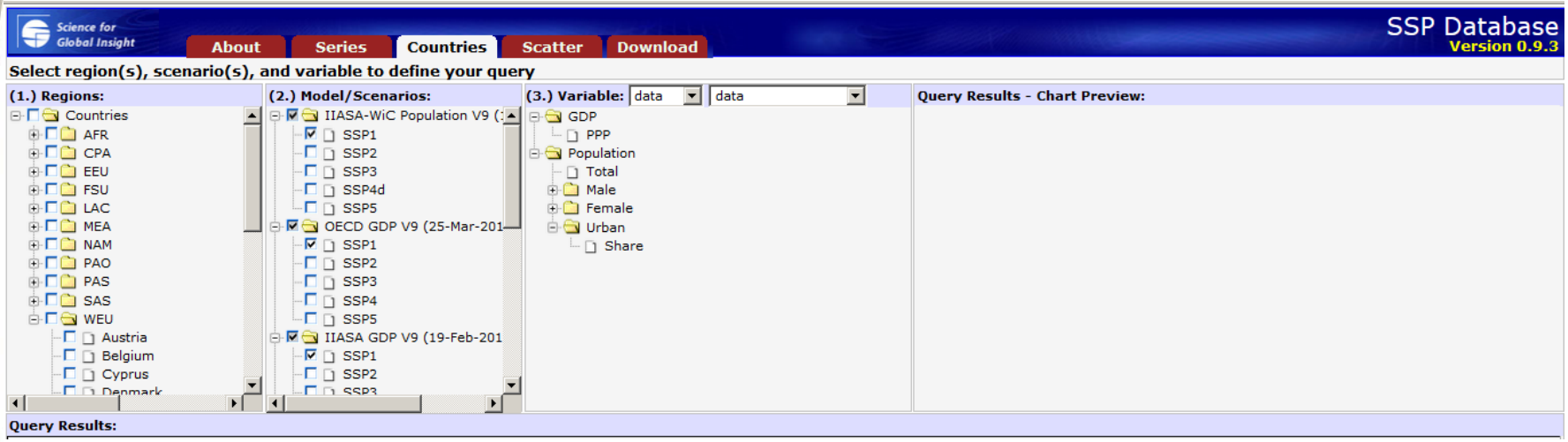
https://secure.iiasa.ac.at/web-apps/ene/SspDb/dsd?Action=htmlpage&page=welcome



SYKE

SSP Database at IIASA

https://secure.iiasa.ac.at/web-apps/ene/SspDb/dsd?Action=htmlpage&page=welcome



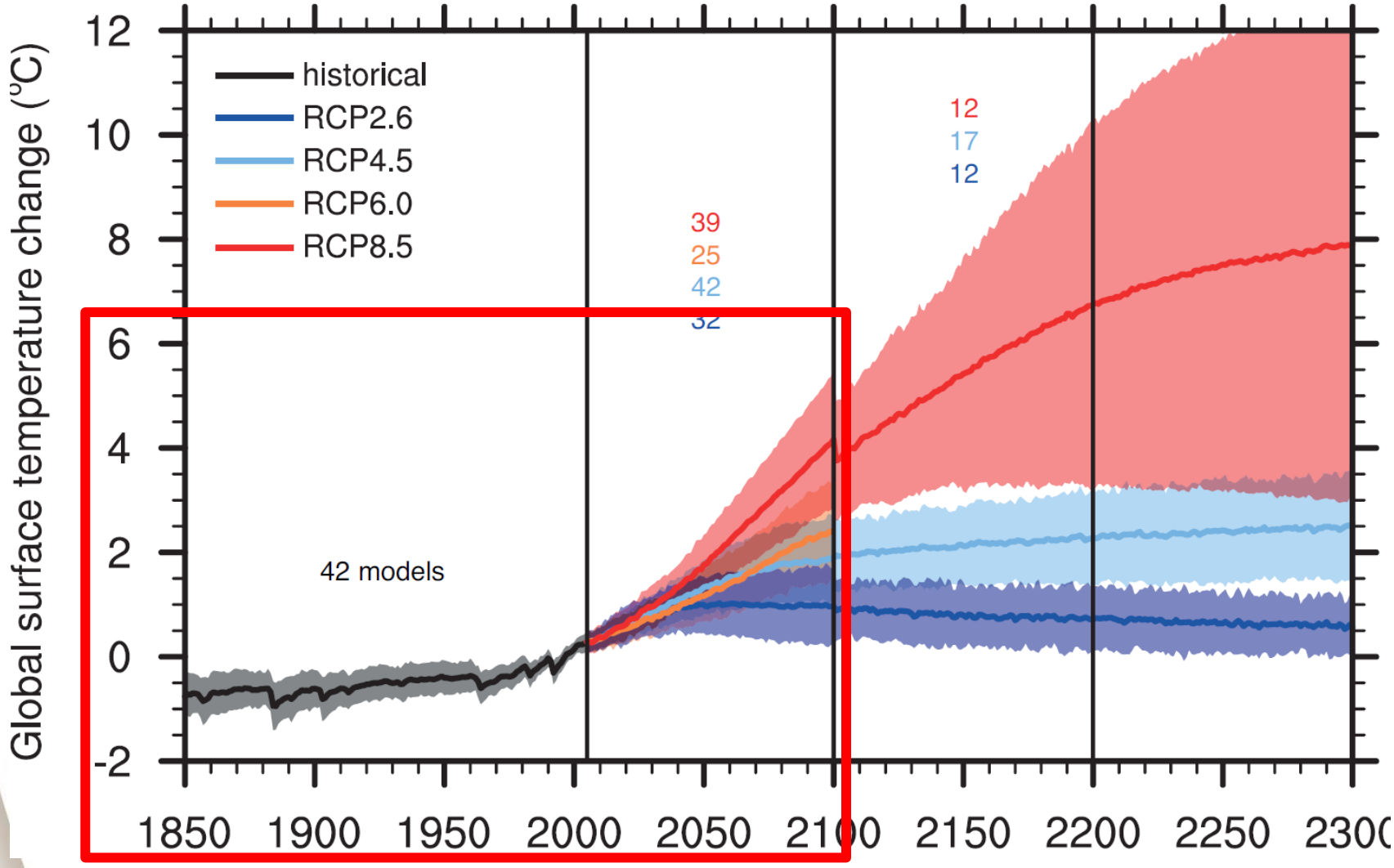
Climate scenario selection for IMPRESSIONS

- **Core** set and **Extended** set

- **Climate system forcing**: RCP8.5 and RCP4.5 (radiative forcing by 2100 of 8.5 Wm^{-2} and 4.5 Wm^{-2} relative to pre-industrial

CLIMATE CHANGE PROGRAMME

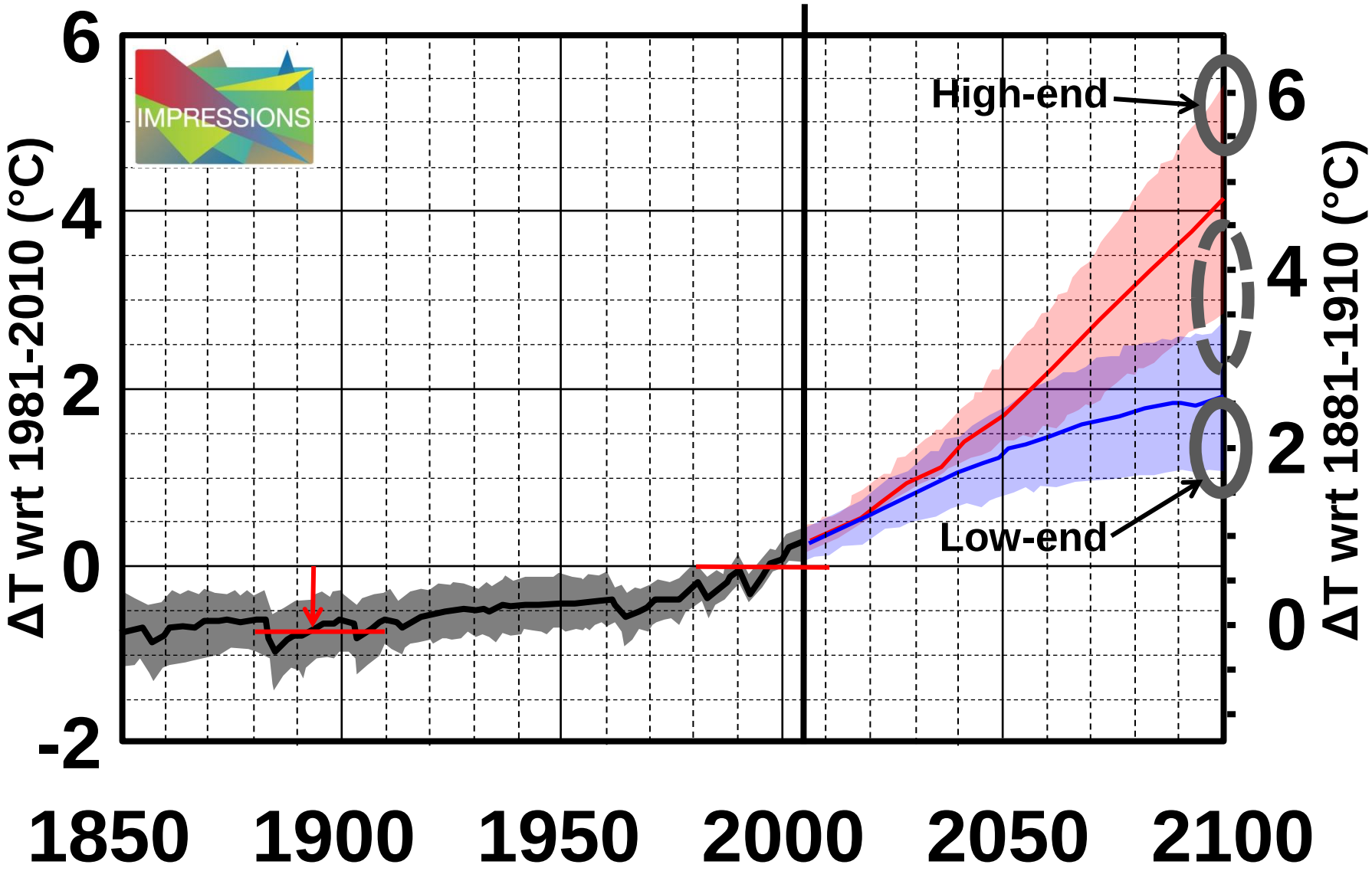
Global annual mean surface air temperature anomalies (wrt 1986–2005) from CMIP5 concentration-driven experiments. Projections are shown for each RCP for the multi-model mean (solid lines) and the 5 to 95% range (±1.64 standard deviation) across the distribution of individual models (shading)



Source: Collins et al. (2015)

SYKE

CMIP5 ensemble global mean temperature change for RCP8.5 and RCP4.5 relative to recent (1981-2010) and pre-industrial (1881-1910)



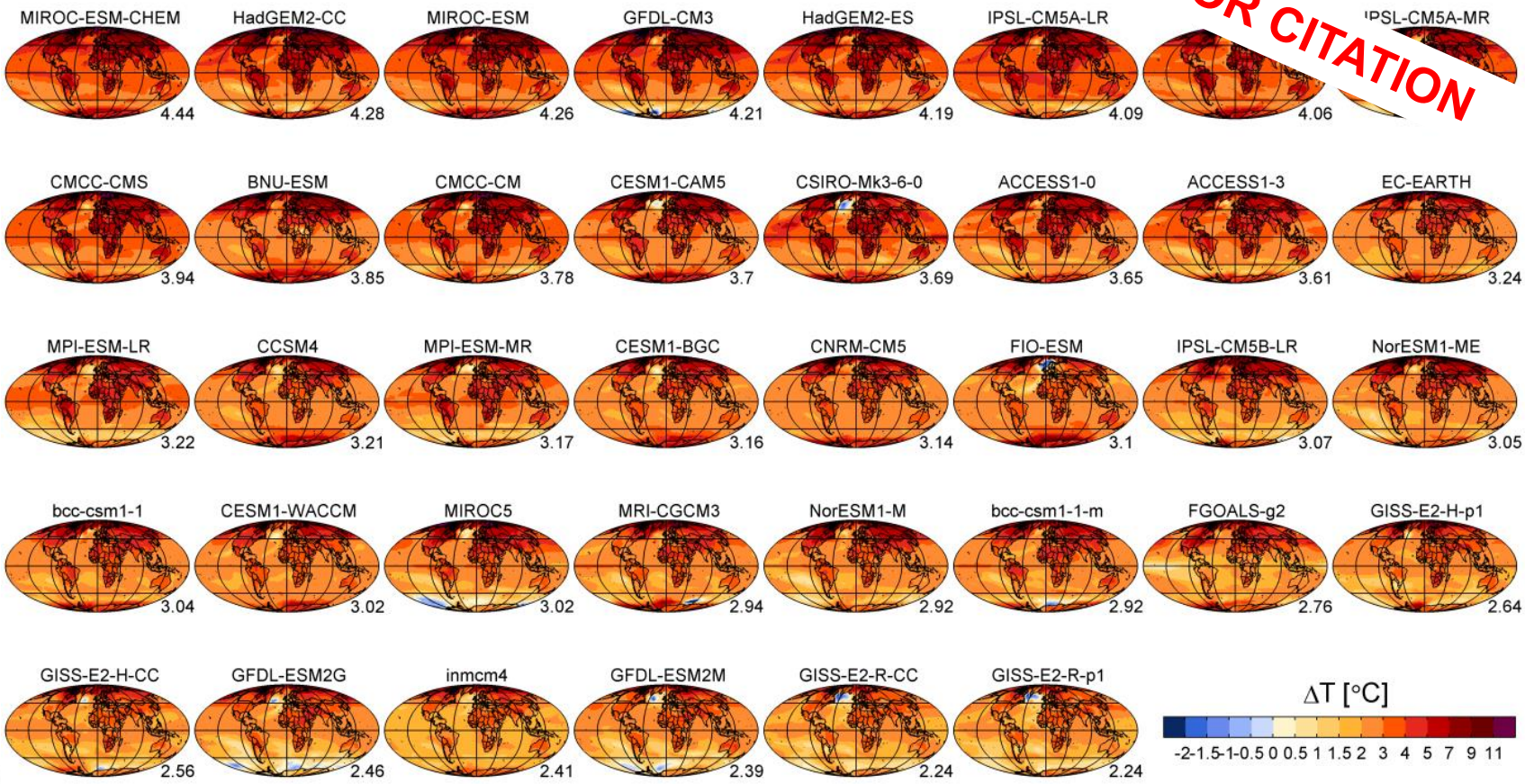
Climate scenario selection for IMPRESSIONS

- **Core** set and **Extended** set

- **Climate system forcing**: RCP8.5 and RCP4.5 (radiative forcing by 2100 of 8.5 Wm^{-2} and 4.5 Wm^{-2} relative to pre-industrial
- **CMIP5 global models**: simulations to 2100 assuming a given forcing conducted for the CMIP5 exercise using different Earth system model (ESM) simulations
- **Probabilistic climate**: regional projections of temperature and precipitation change (joint distributions) under a given forcing (two methods based on CMIP5)
- **Dynamically downscaled**: based on dynamical downscaling of CMIP5 global model outputs over Europe in the Co-Ordinated Regional Downscaling EXperiment (CORDEX) using fine resolution regional climate models
- **Climate sensitivity**: select GCMs with a high or low climate sensitivity
- **Regional patterns**: Spatial and seasonal patterns of changes in precipitation (primary criterion) and temperature over Europe, used to guide the selection of a manageable number of projections showing a representative range of patterns.

CLIMATE CHANGE PROGRAMME

CMIP5 annual mean temperature changes (2071-2100 vs. 1981-2010) for CMs under RCP8.5 (ranked by global mean temperature change)



SYKE

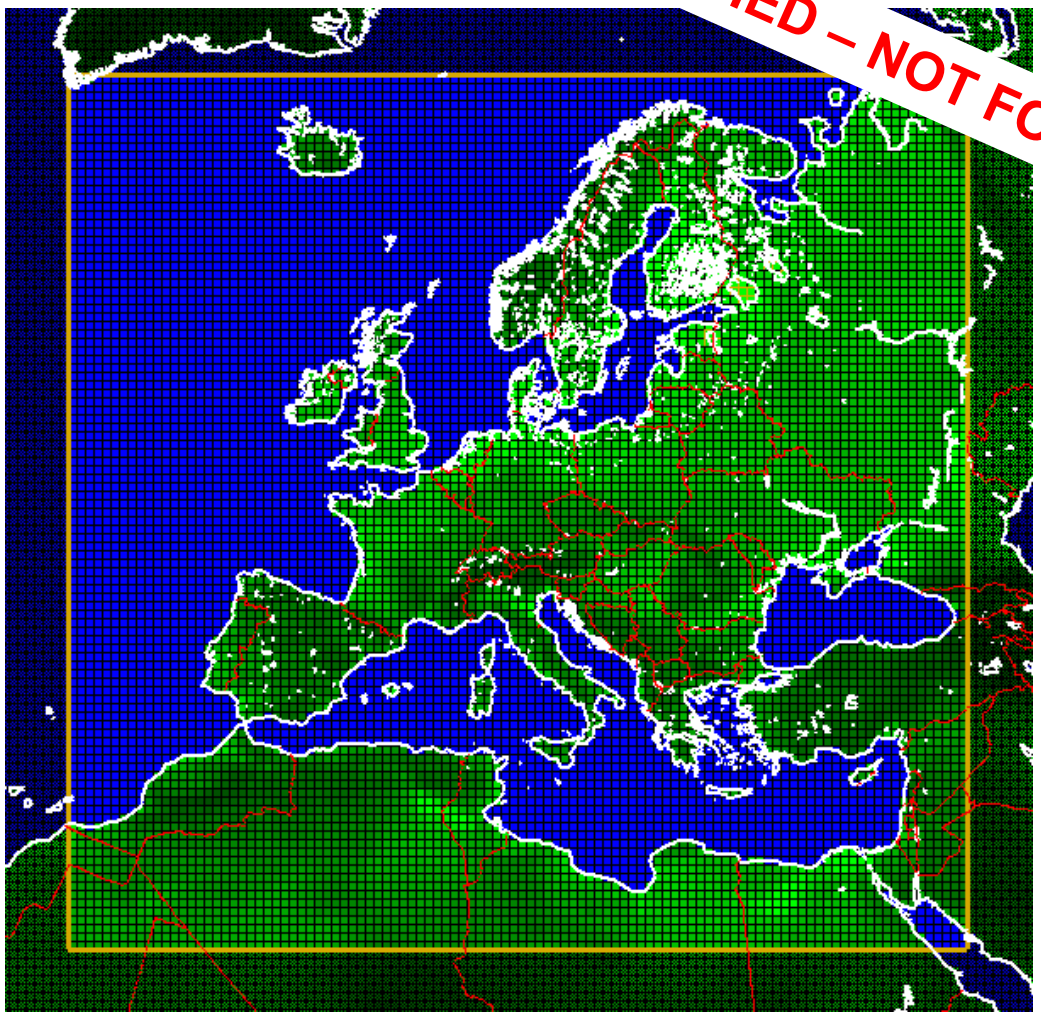
IMPRESSIONS

Source: Danish Meteorological Institute, unpublished

EURO-C[illegible]DEX domain

[http://wcrp-cordex.ipsl.jussieu.fr/ind[illegible]mmunity/domain-euro-cordex]

UNPUBLISHED – NOT FOR CITATION



Source: Danish Meteorological Institute, unpublished

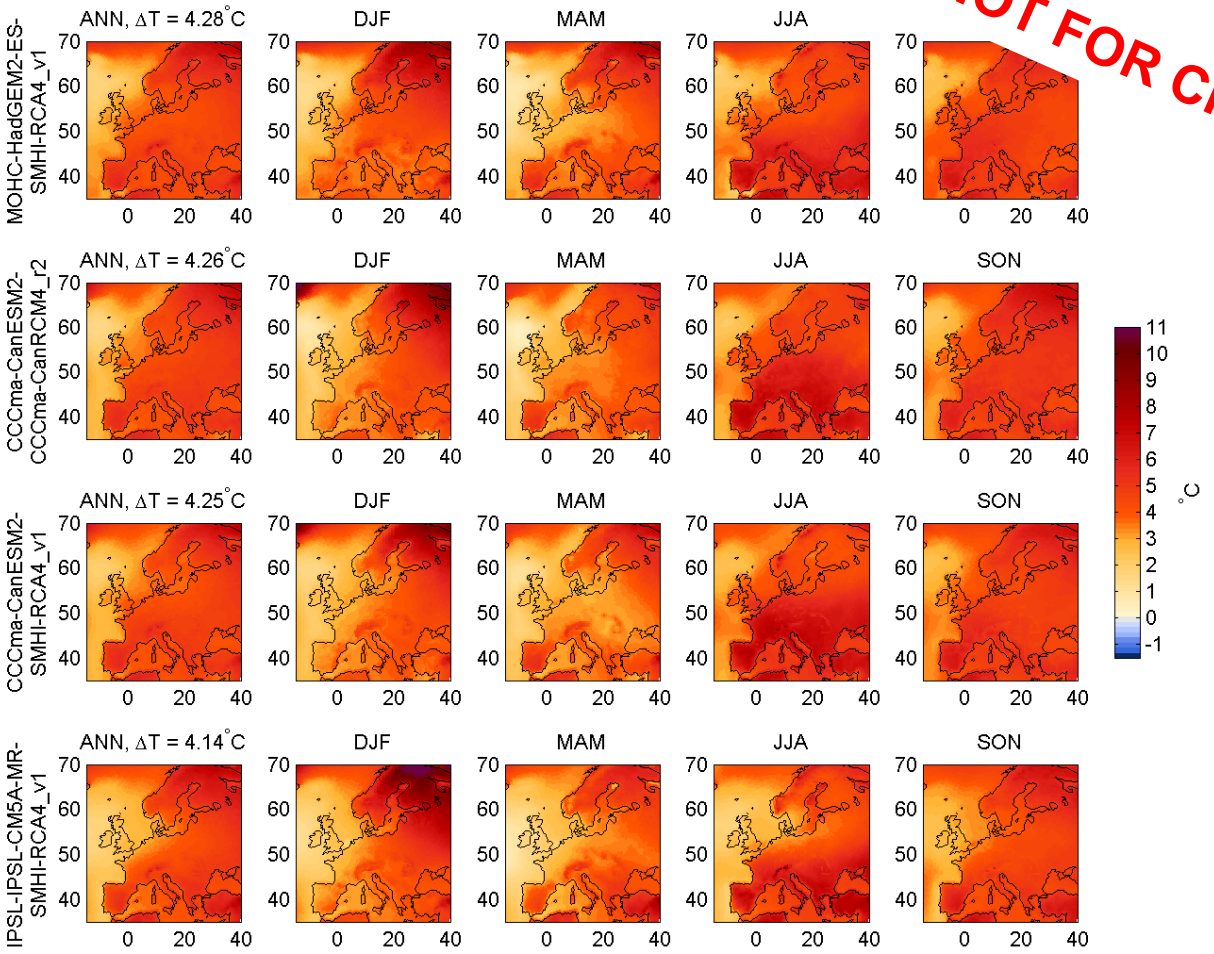
CLIMATE CHANGE PROGRAMME

SYKE

IMPRESSIONS

CORDEX RCM annual a[illegible]easonal mean temperature changes (2071-2100 vs. [illegible]2010) for RCP8.5 over Europe (four examples ran[illegible]temperature)

UNPUBLISHED – NOT FOR CITATION



Source: Danish Meteorological Institute, unpublished

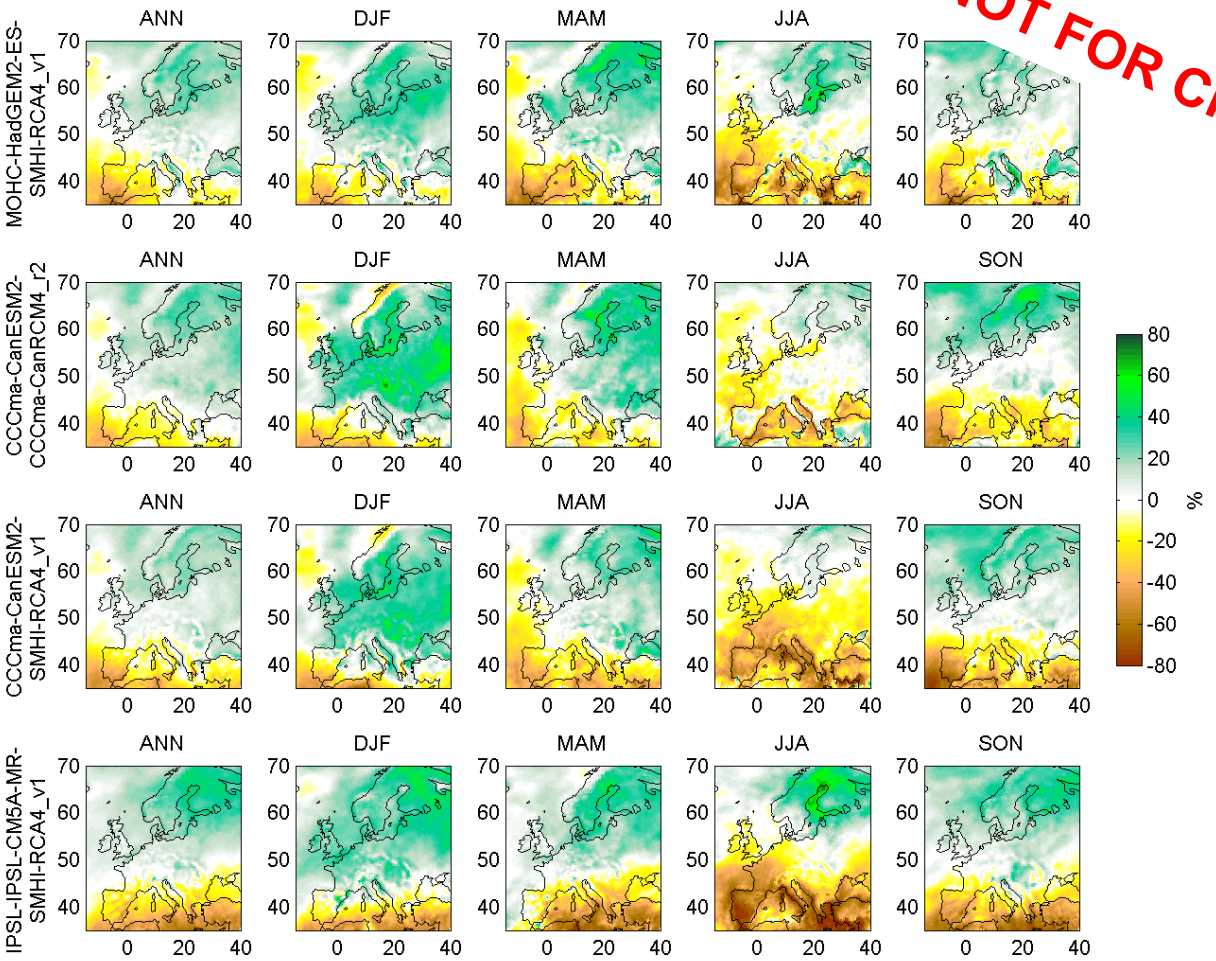
CLIMATE CHANGE PROGRAMME

SYKE

IMPRESSIONS

CLIMATE CHANGE PROGRAMME

CORDEX RCM annual a[illegible]easonal mean precipitation changes (2071-2100 vs. [illegible]010) for RCP8.5 over Europe (four examples ran[illegible]temperature)



IMPRESSIONS

SYKE

Source: Danish Meteorological Institute, unpublished

CLIMATE CHANGE PROGRAMME

SYKE

CLIMATE CHANGE PROGRAMME

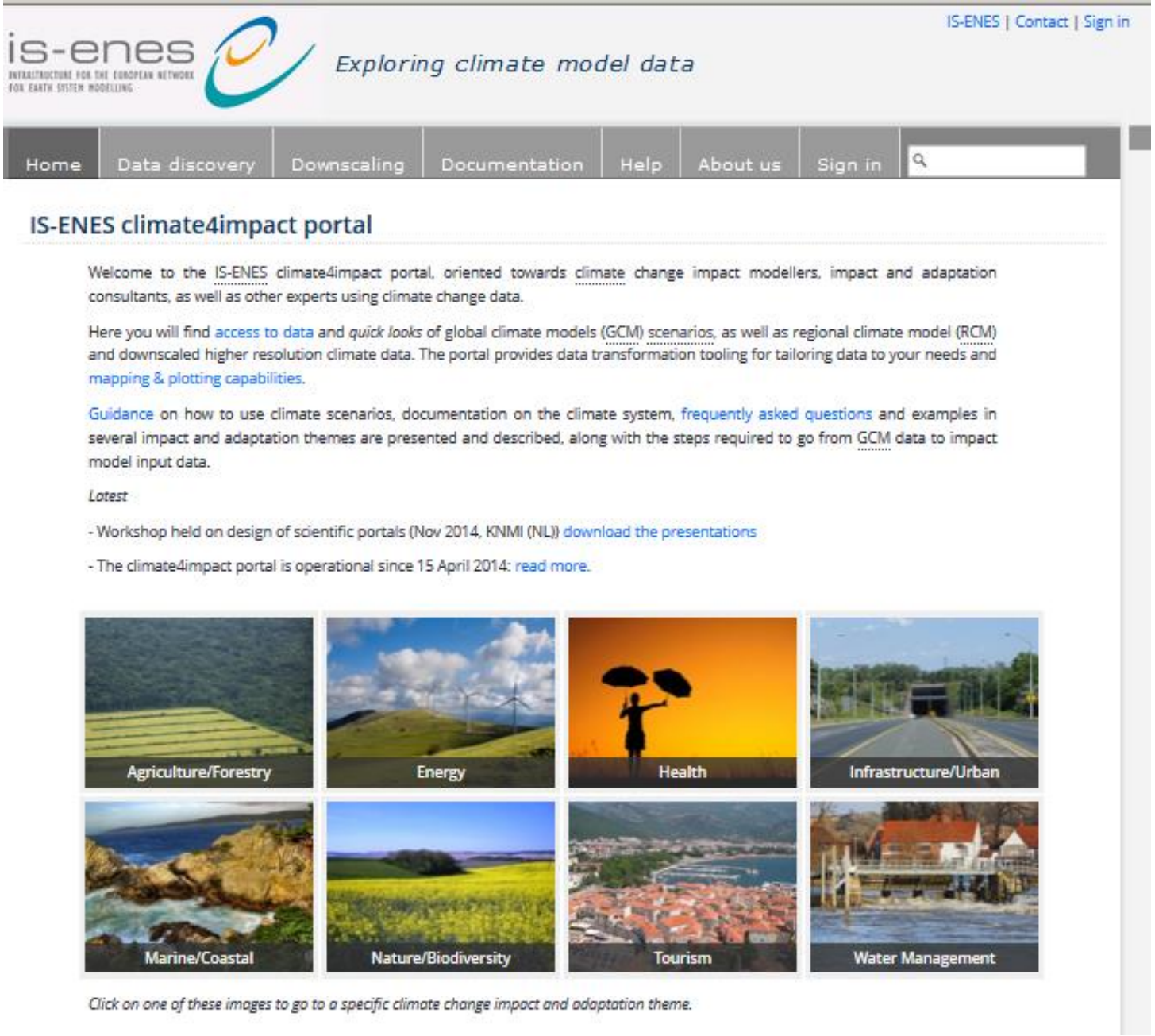
IPCC Data Distribution Centre

http://www.ipcc-data.org/

SYKE

CLIMATE CHANGE PROGRAMME

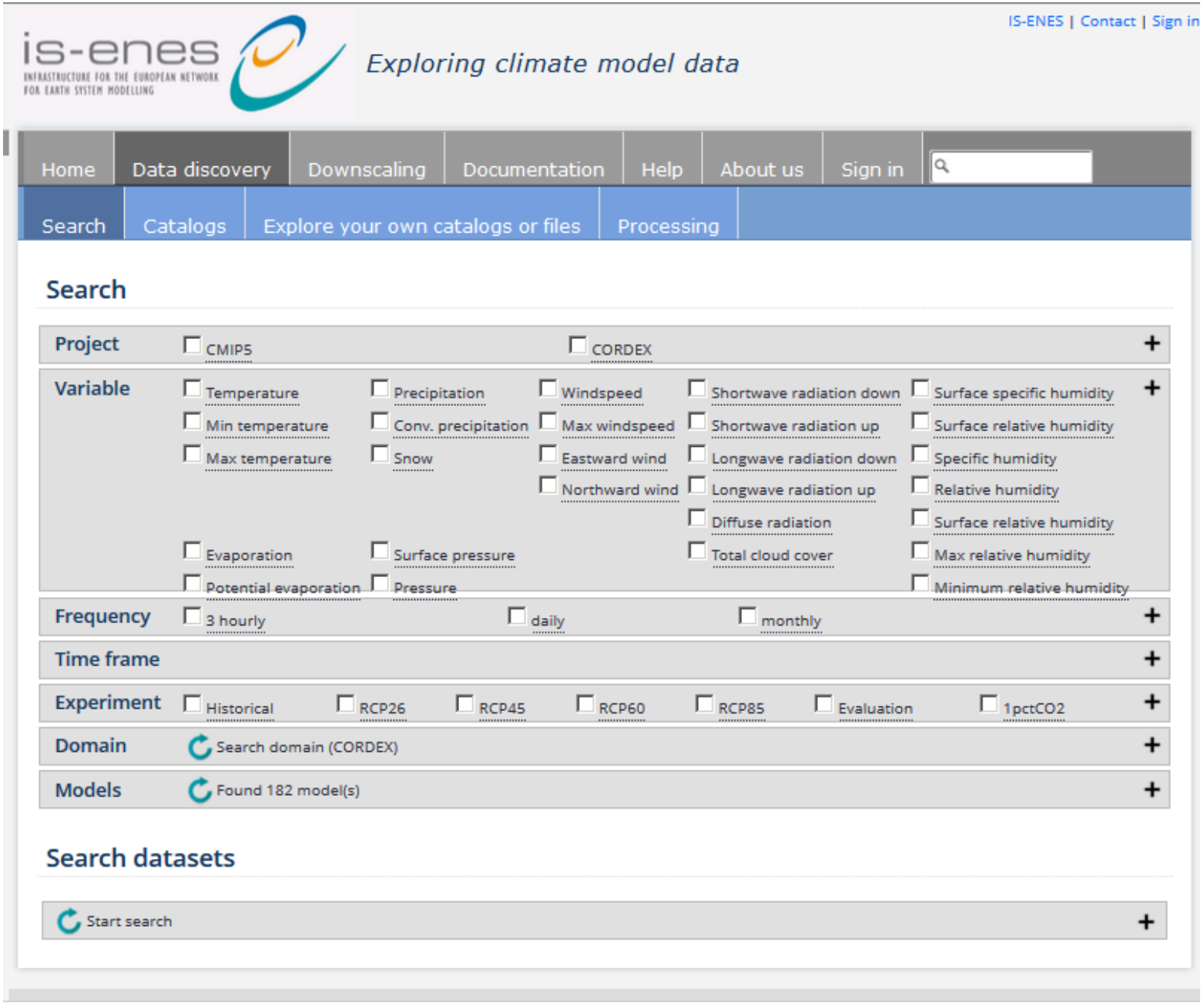
http://climate4impact.eu/impactportal/general/index.jsp



SYKE

CLIMATE CHANGE PROGRAMME

http://climate4impact.eu/impactportal/general/index.jsp



SYKE

Some other issues:

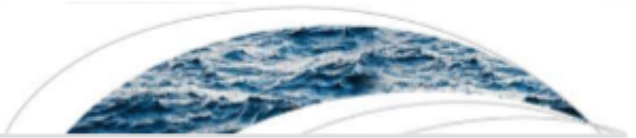
- **Bias correction of downscaled climate data, and/or**
- **Change factor ("delta change") method**
- **Observed datasets, e.g.:**
  - **Site data (availability?)**
  - **CRU E-OBS gridded data (daily: TG TN TX RR PP; 0.25º lat/lon)**
  - **Agri4Cast Data (daily: 25 km)**
  - **WATCH ERA-Interim data (3-hourly: T, Wind at 10m, PP, LWdown, SWdown, RR, Snowfall rate; 0.5º lat/lon resolution)**

CLIMATE CHANGE PROGRAMME

WATCH meteorological forcing data set

AGU PUBLICATIONS

Water Resources Research



DATA AND ANALYSIS NOTE

10.1002/2014WR015638

The WFDEI meteorological forcing data set: WATCH Forcing Data methodology applied to ERA-Interim reanalysis data

Graham P. Weedon[1], Gianpaolo Balsamo[2], Nicolas Bellouin[3], Sandra Gomes[4], Martin J. Best[5], and Pedro Viterbo[4]

[1]Met Office, Joint Centre for Hydrometeorological Research, Wallingford, UK, [2]European Centre for Medium-Range Weather Forecasts, Reading, UK, [3]Department of Meteorology, University of Reading, Reading, UK, [4]Instituto Dom Luiz, University of Lisbon, Lisbon, Portugal, [5]Met Office, Exeter, UK

Key Points:

- Global three hourly meteorological forcing data at half-degree spatial resolution
- Covers 1979–2012
- Improvements compared to the WATCH forcing data

Correspondence to:
G. P. Weedon
graham.weedon@metoffice.gov.uk

Citation:
Weedon, G. P., G. Balsamo, N. Bellouin, S. Gomes, M. J. Best, and P. Viterbo (2014), The WFDEI meteorological forcing data set: WATCH Forcing Data methodology applied to ERA-Interim reanalysis data, *Water Resour. Res.*, *50*, 7505–7514, doi:10.1002/2014WR015638

Abstract The WFDEI meteorological forcing data set has been generated using the same methodology as the widely used WATCH Forcing Data (WFD) by making use of the ERA-Interim reanalysis data. We discuss the specifics of how changes in the reanalysis and processing have led to improvement over the WFD. We attribute improvements in precipitation and wind speed to the latest reanalysis basis data and improved downward shortwave fluxes to the changes in the aerosol corrections. Covering 1979–2012, the WFDEI will allow more thorough comparisons of hydrological and Earth System model outputs with hydrologically and phenologically relevant satellite products than using the WFD.

1. Introduction

SYKE

Joint Programming Initiatives in Europe

?

SYKE

Implementing JPI Climate

First Implementation Plan
Approved December 2013

- **Joint strategies**
- **Joint research funding**
- **Alignment of national research**
- **Collaboration with other research initiatives**

MACSUR2 input?

Fast Track Activities
Preparing joint calls, elaborating strategies

2013 Joint calls (10M€)
- Russian Arctic and Boreal systems
- Societal transformations to face CC

2015 joint call (15M€)
- Climate predictability and inter-regional linkages
- Open to international with Belmont Forum (incl. India, China, Brazil…)

***Planned* 2016 joint call (75M€)**
- Research for Climate Services
- ERA-NET Co-funded by MS & EC

Source: P. Monfray (JPI-Climate Co-Chair)