OS NOVOS CENÁRIOS SÓCIO-ECONÓMICOS E CLIMÁTICOS DO IPCC

FILIPE DUARTE SANTOS

SIM – Laboratório de Sistemas, Instrumentação e Modelação em Ciências e Tecnologias do Ambiente e do Espaço
FCUL – Faculdade de Ciências da Universidade de Lisboa
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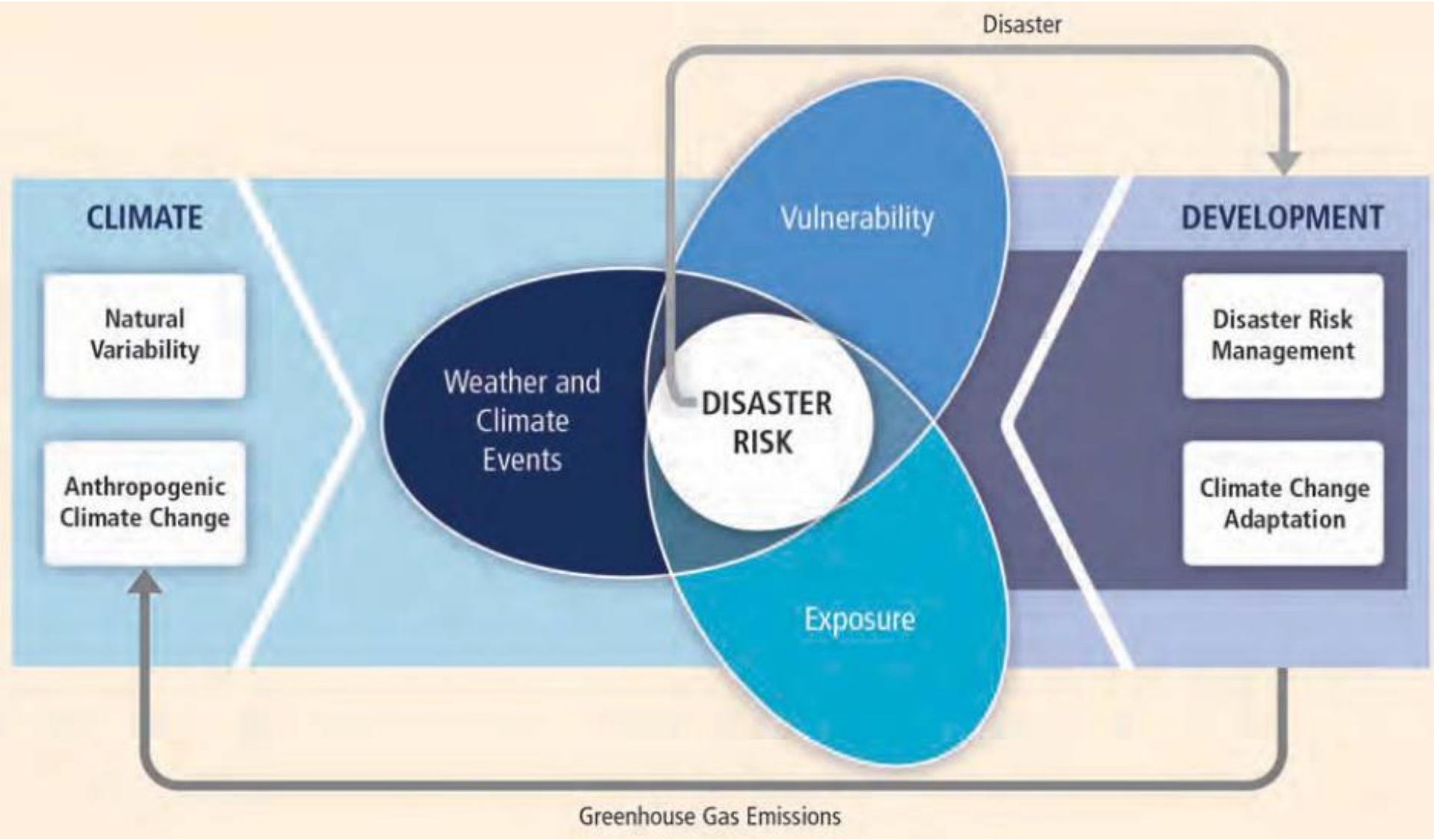
Impactos das Alterações Climáticas nos Recursos Hídricos

IV Jornadas dos Recursos Hídricos, APRH

Beja, 26 Novembro 2013

IPCC FRAMEWORK



IPCC AR5 WGI, 2013

The following terms indicate the assessed likelihood:

Term*	Likelihood of the Outcome
Virtually certain	99–100% probability
Very likely	90–100% probability
Likely	66–100% probability
About as likely as not	33–66% probability
Unlikely	0–33% probability
Very unlikely	0–10% probability
Exceptionally unlikely	0–1% probability

* Additional terms that were used in limited circumstances in the Fourth Assessment Report (*extremely likely:* 95–100% probability, *more likely than not:* >50–100% probability, and *extremely unlikely:* 0–5% probability) may also be used when appropriate.

IPCC AR5, 2013

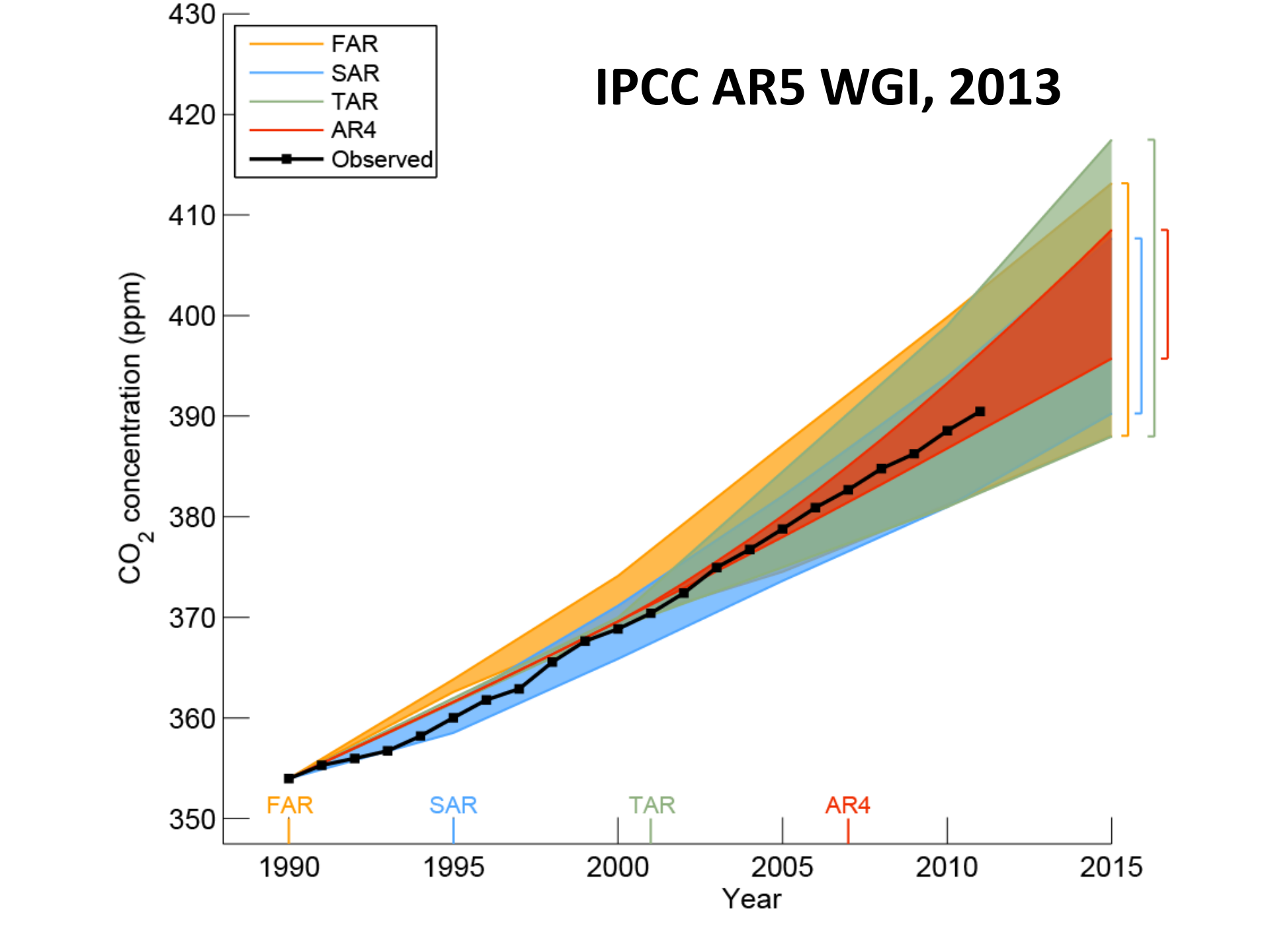

IPCC AR5 WGI, 2013
FAR
SAR
TAR
AR4
Observed
CO_2 concentration (ppm)
430
420
410
400
390
380
370
360
350
FAR
SAR
TAR
AR4
1990
1995
2000
2005
2010
2015
Year

Figure 1.6: Observed globally and annually averaged carbon dioxide concentrations in parts per million (ppm) since 1990 compared with projections from the previous IPCC assessments. Observed global annual CO2 concentrations are shown in black (based on NOAA Earth System Research Laboratory measurements, http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html). The uncertainty of the observed values is 0.1 ppm. The shading shows the largest model projected range of global annual CO2 concentrations from 1990 to 2015 from FAR (Scenario D and business-as-usual), SAR (IS92c and IS92e), TAR (B2 and A1p), and AR4 (B2 and A1B). Moreover, the publication years of the assessment reports are shown.

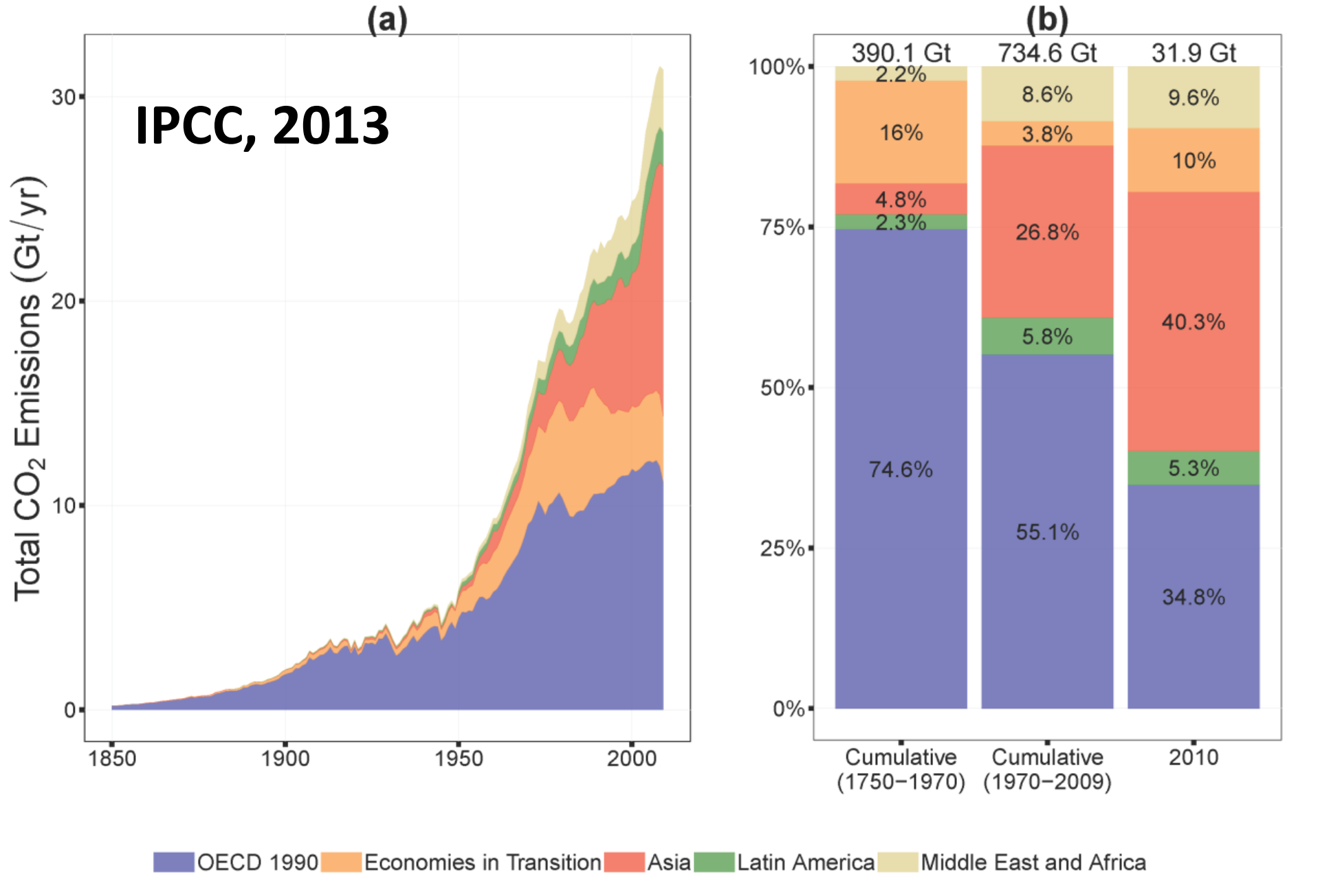
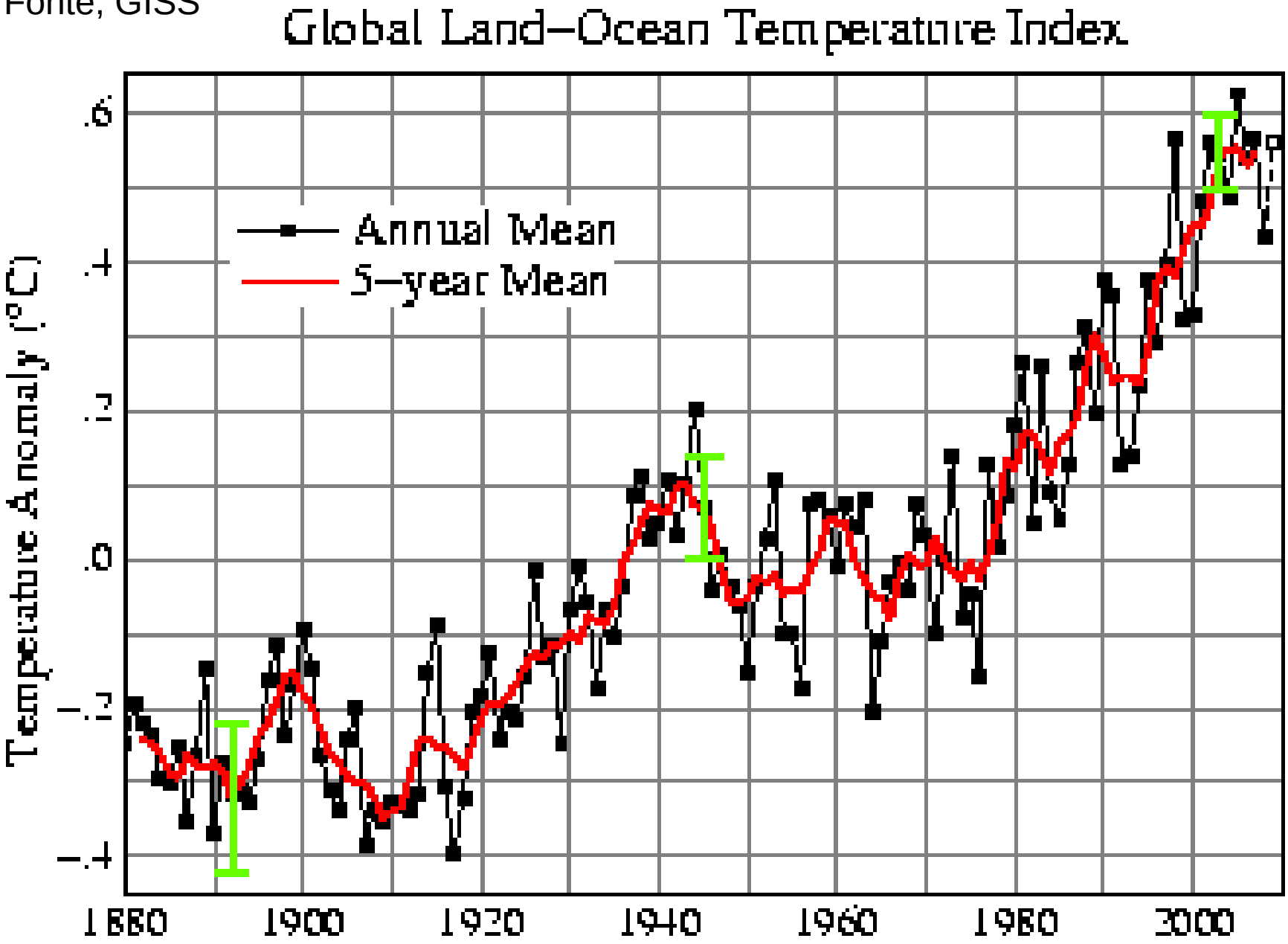
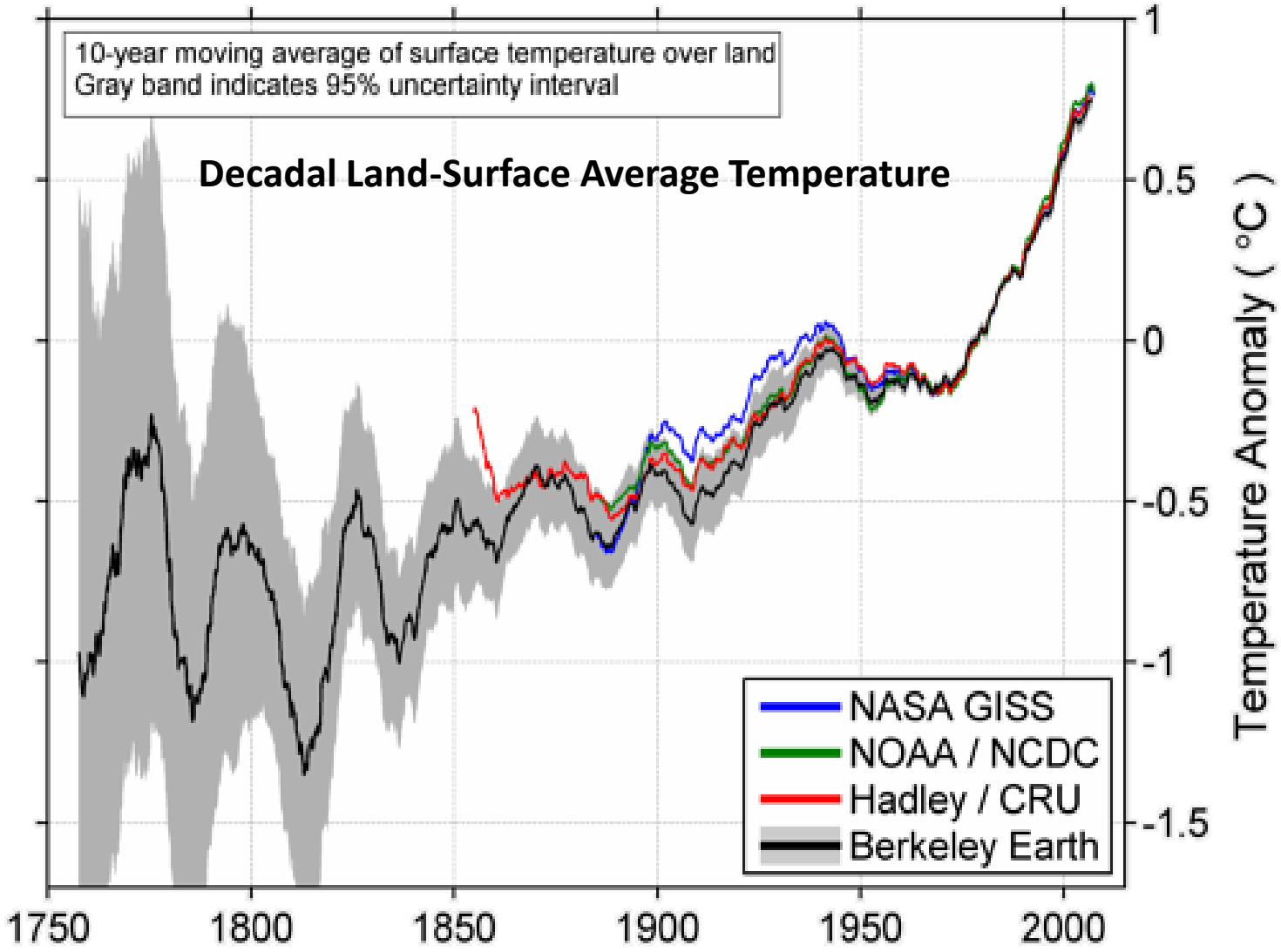

(a)
IPCC, 2013
Total CO_2 Emissions (Gt/yr)
30
20
10
0
1850
1900
1950
2000
(b)
390.1 Gt
734.6 Gt
31.9 Gt
100%
75%
50%
25%
0%
2.2%
16%
4.8%
2.3%
74.6%
8.6%
3.8%
26.8%
5.8%
55.1%
9.6%
10%
40.3%
5.3%
34.8%
Cumulative (1750–1970)
Cumulative (1970–2009)
2010
OECD 1990
Economies in Transition
Asia
Latin America
Middle East and Africa

Figure SPM.3. Current and historical anthropogenic CO2 emissions from fossil fuel combustion in five major world regions. Panel (a) shows the annual emissions between 1850 and 2010 in gigatonnes of CO2 per year. Panel (b) shows the regional contributions to cumulative global CO2 emissions between 1850 and 1970, cumulative global CO2 emissions between 1970 and 2009 and global CO2 emissions in 2010. The five regions covered are OECD countries (blue), economies in transition (orange), Asia (red), Latin America (green) and Middle East and Africa (ocher). For country mappings please see Report Annex II. [Figure 5.2.2]

Fonte, GISS


Global Land–Ocean Temperature Index
Annual Mean
5–year Mean
Temperature Anomaly (°C)
.6
.4
.2
.0
-.2
-.4
1880
1900
1920
1940
1960
1980
2000

New Analysis of Land Surface Temperatures (BEST): A skeptics‘ confirmation of global warming



Berkeley Earth, http://www.berkeleyearth.org

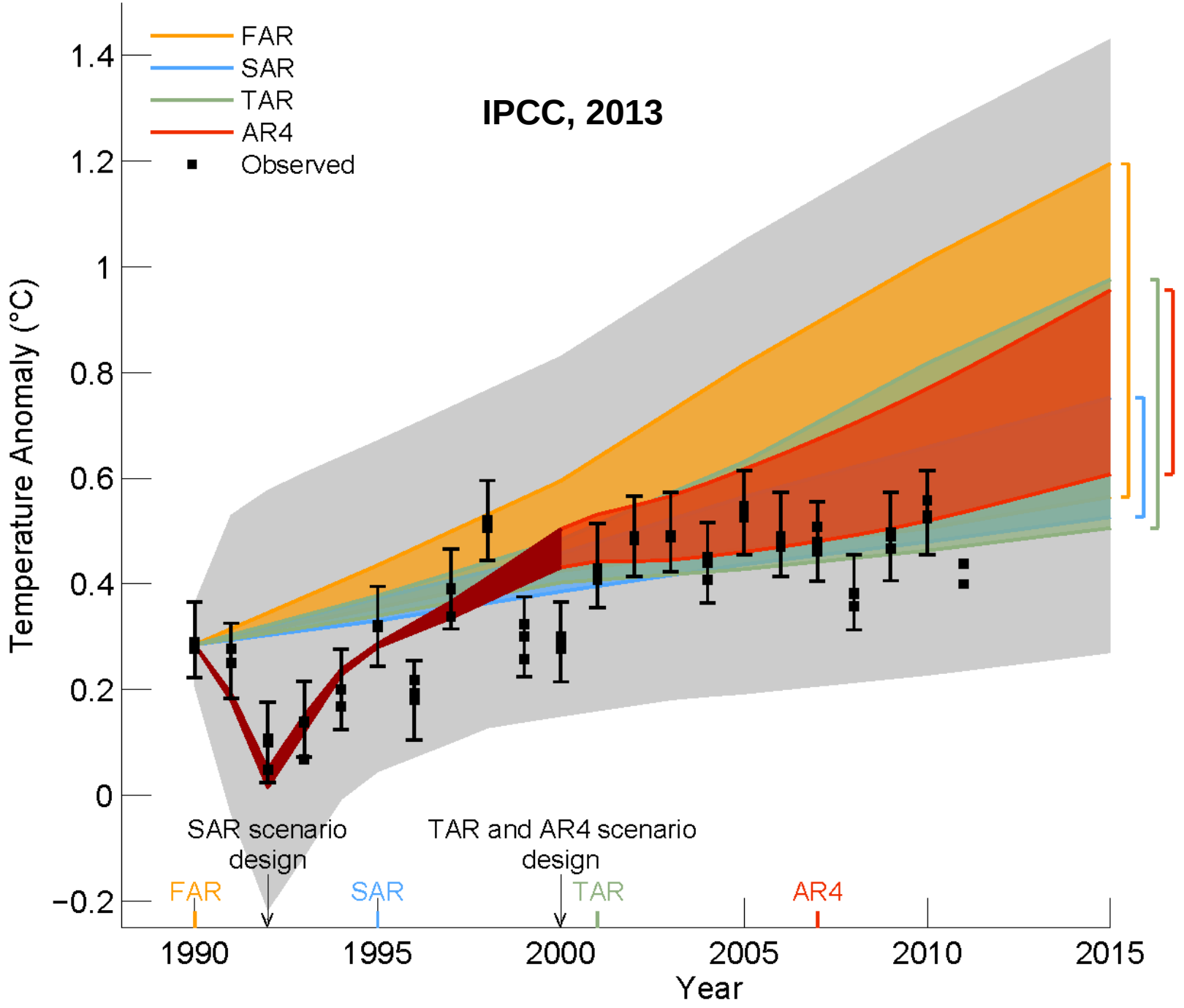
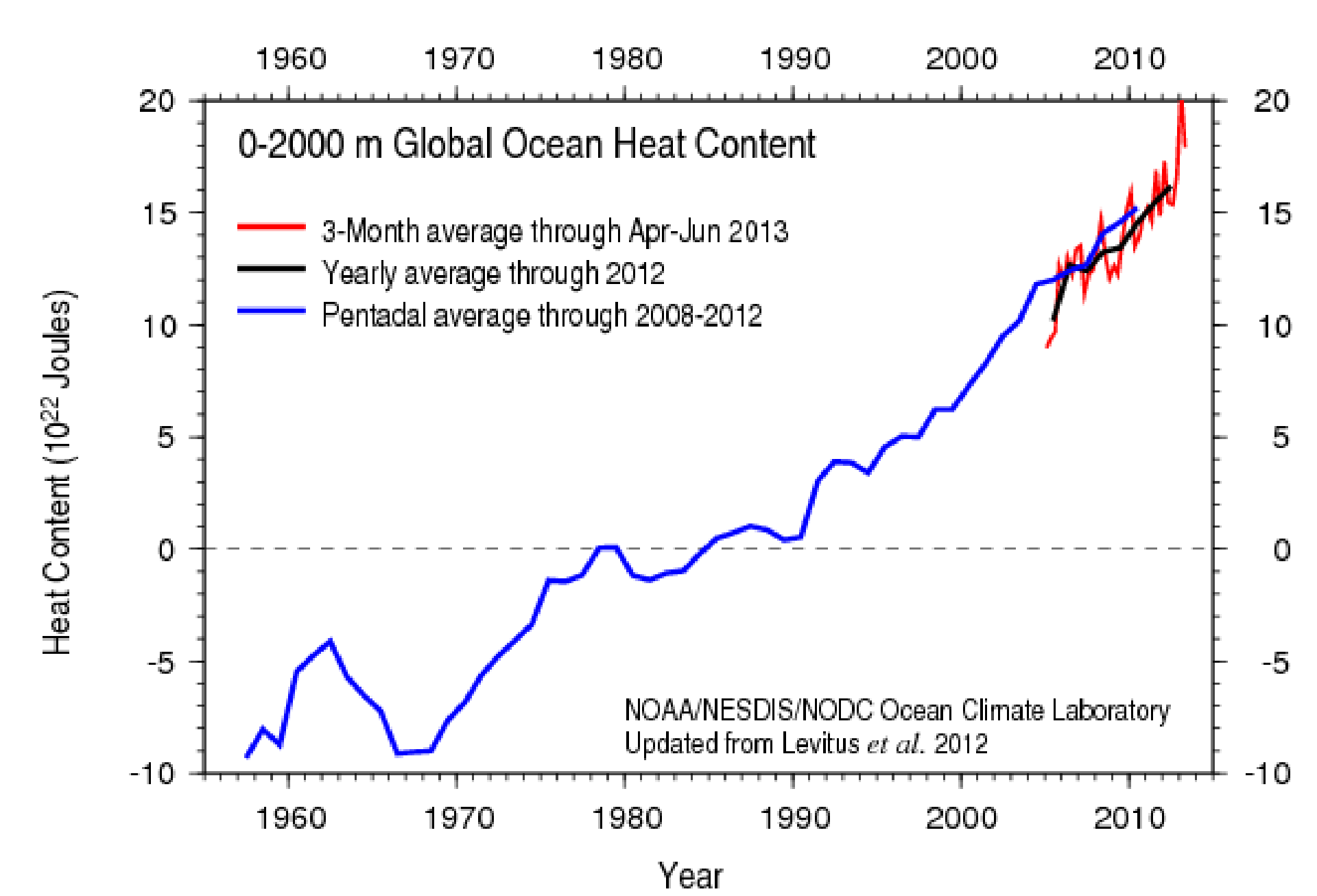

IPCC, 2013
FAR
SAR
TAR
AR4
Observed
Temperature Anomaly (°C)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
−0.2
SAR scenario design
TAR and AR4 scenario design
FAR
SAR
TAR
AR4
1990
1995
2000
2005
2010
2015
Year

Figure 1.4: Estimated changes in the observed globally and annually averaged surface temperature (in ºC) since 1990 compared with the range of projections from the previous IPCC assessments. Values are aligned to match the average observed value at 1990. Observed global annual temperature change, relative to 1961–1990, is shown as black squares (NASA (updated from Hansen et al., 2010; data available at http://data.giss.nasa.gov/gistemp/); NOAA (updated from Smith et al., 2008; data available at http://www.ncdc.noaa.gov/cmb-faq/anomalies.html#grid); and the UK Hadley Centre (Morice et al., 2012; data available at http://www.metoffice.gov.uk/hadobs/hadcrut4/) reanalyses). Whiskers indicate the 90% uncertainty range of the Morice et al. (2012) dataset from measurement and sampling, bias and coverage (see Appendix for methods). The coloured shading shows the projected range of global annual mean near surface temperature change from 1990 to 2015 for models used in FAR (Scenario D and business-as-usual), SAR (IS92c/1.5 and IS92e/4.5), TAR (full range of TAR Figure 9.13(b) based on the GFDL_R15_a and DOE PCM parameter settings), and AR4 (A1B and A1T). The 90% uncertainty estimate due to observational uncertainty and internal variability based on the HadCRUT4 temperature data for 1951-1980 is depicted by the grey shading. Moreover, the publication years of the assessment reports and the scenario design are shown.



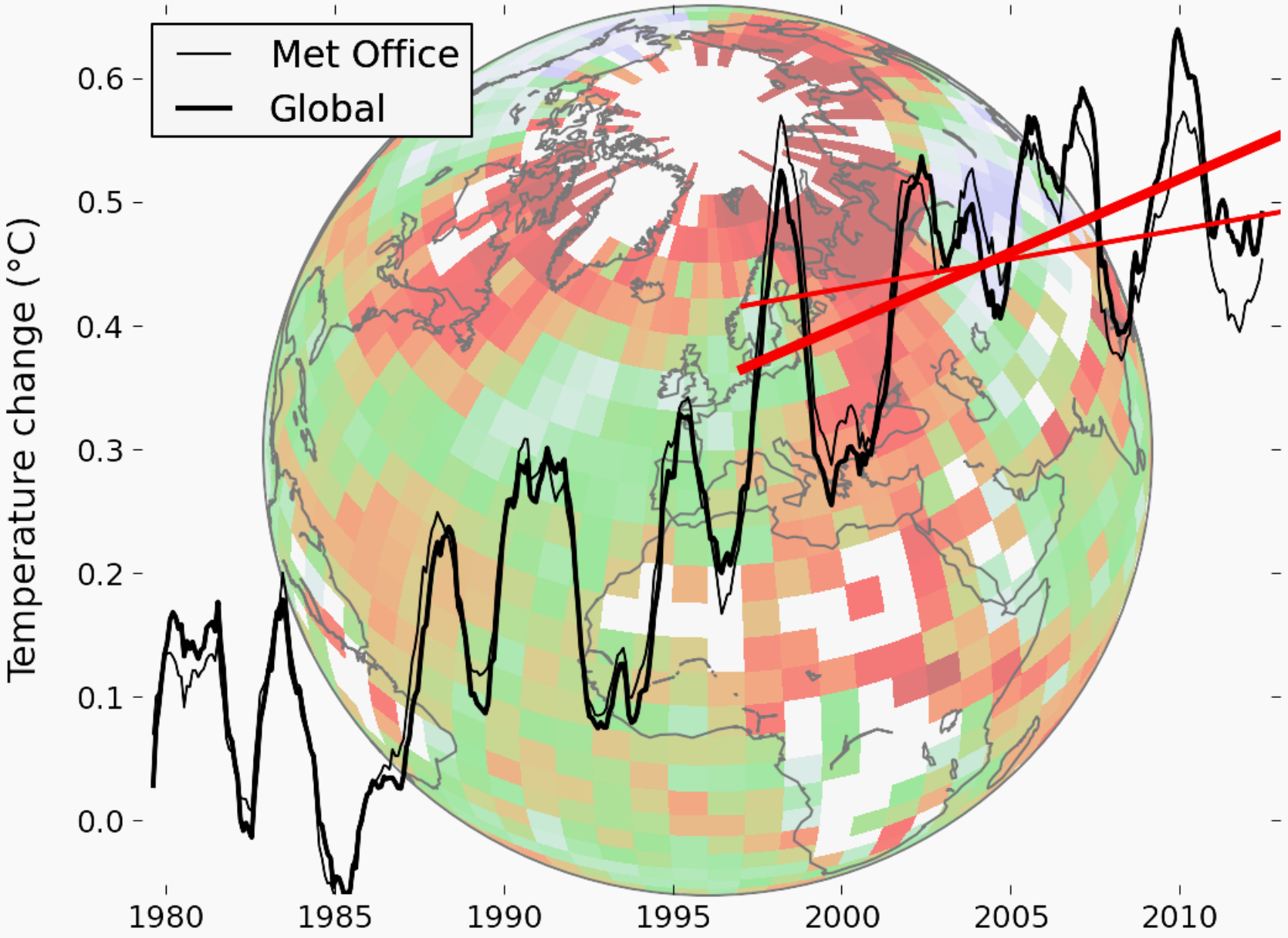
Levitus, 2012

A new study by British and Canadian researchers shows that the global temperature rise of the past 15 years has been greatly underestimated. The reason is the data gaps in the weather station network, especially in the Arctic. If you fill these data gaps using satellite measurements, the warming trend is more than doubled in the widely used HadCRUT4 data, and the much-discussed "warming pause" has virtually disappeared.

Coverage bias in the HadCRUT4 temperature series and its impact on recent temperature trends

Kevin Cowtan[1,*],
Robert G. Way[2]

DOI: 10.1002/qj.2297
Quarterly Journal of the Royal Meteorological Society


Cowtan, 2013
Met Office
Global
Temperature change (°C)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
1980
1985
1990
1995
2000
2005
2010

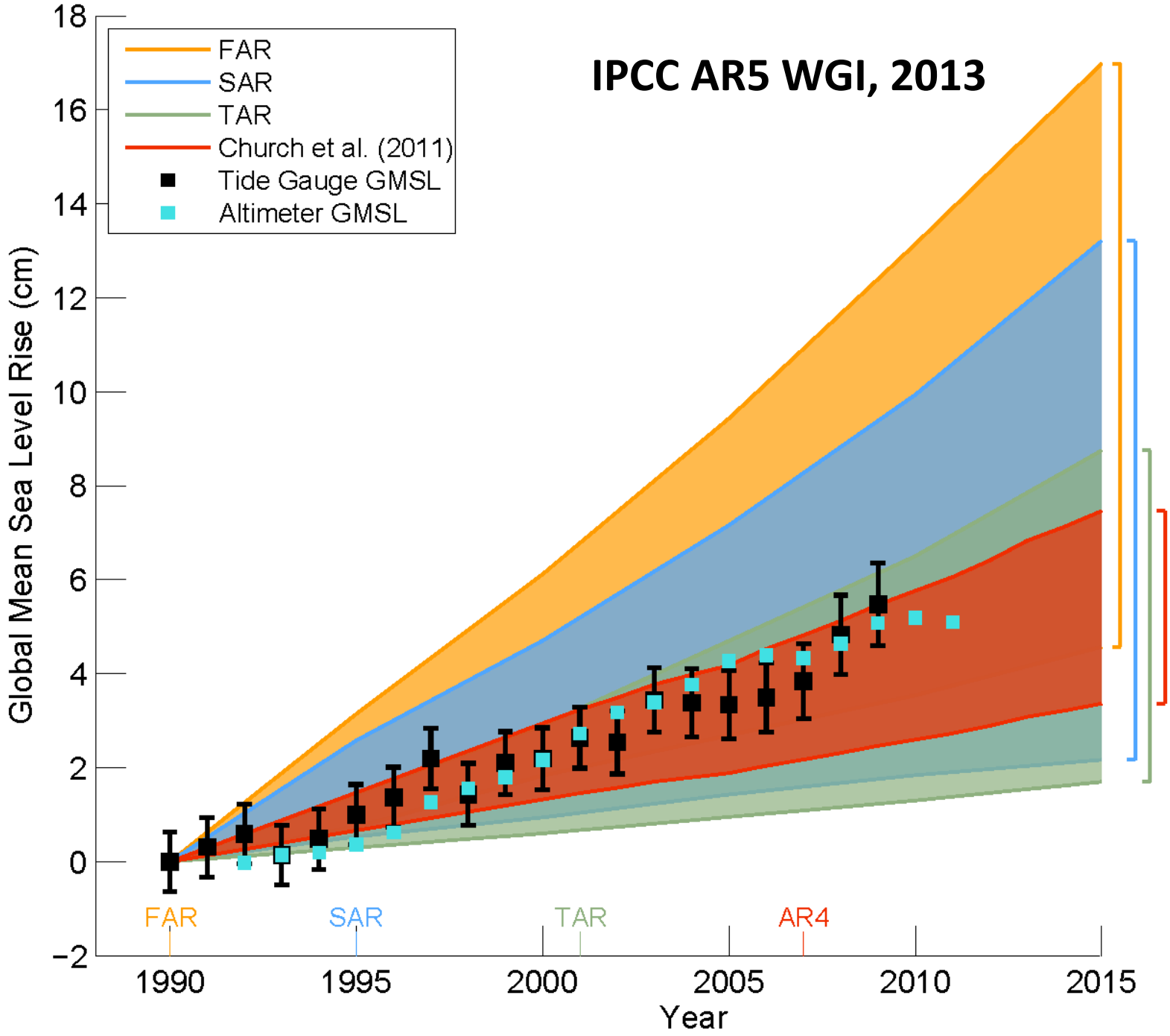
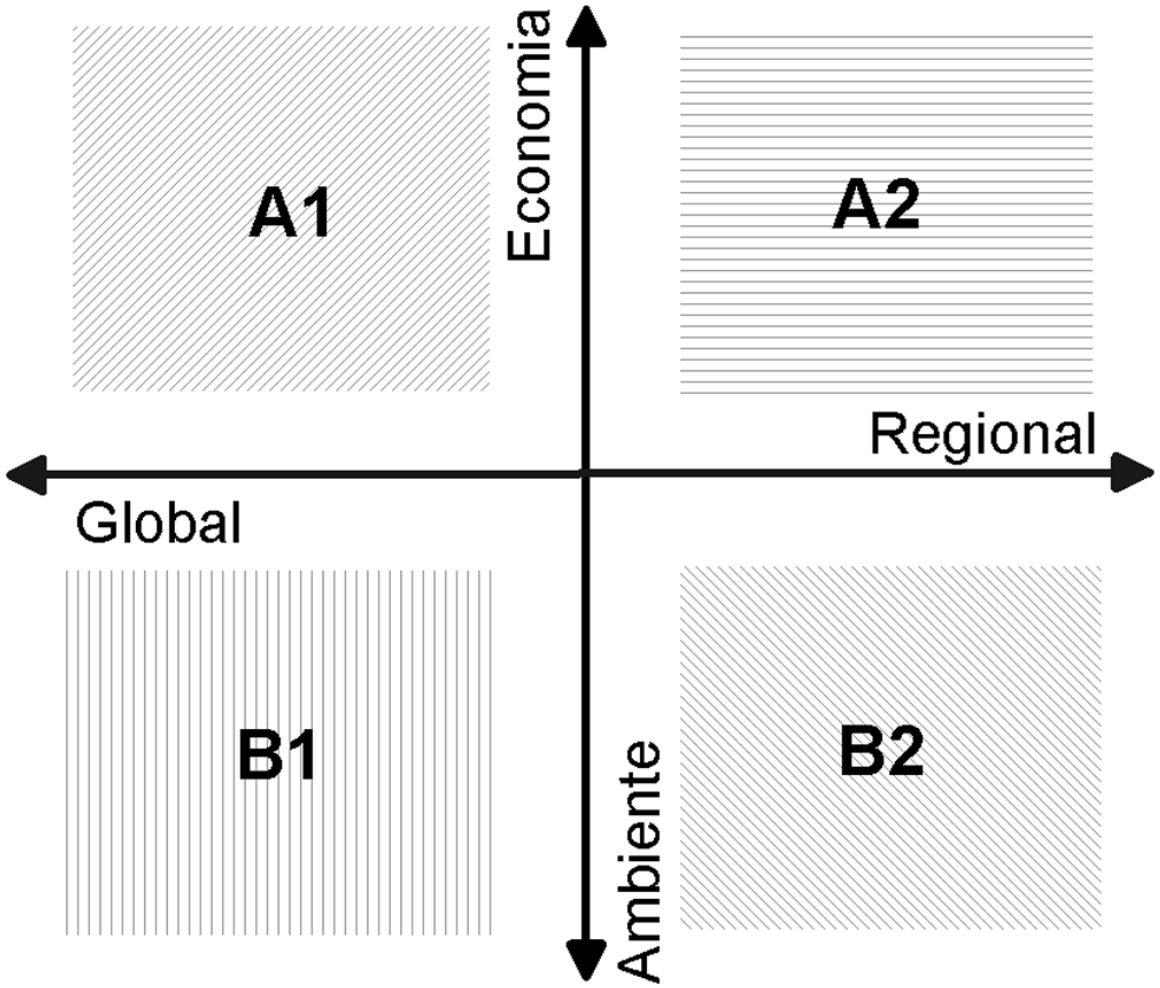

IPCC AR5 WGI, 2013
FAR
SAR
TAR
Church et al. (2011)
Tide Gauge GMSL
Altimeter GMSL
Global Mean Sea Level Rise (cm)
18
16
14
12
10
8
6
4
2
0
−2
1990
1995
2000
2005
2010
2015
Year
FAR
SAR
TAR
AR4

Figure 1.11: Estimated changes in the observed global annual sea level since 1990. Estimated changes in global annual sea level anomalies from tide gauge data (Church and White, 2011; available at http://www.cmar.csiro.au/sealevel/sl_data_cmar.html) (black error bars showing 1σ uncertainty) and based on annual averages from TOPEX and Jason satellites (Nerem et al., 2010; available at http://sealevel.colorado.edu/results.php) (blue dots) starting in 1992 (the values have been aligned to fit the 1993 value of the tide gauge data). The shading shows the largest model projected range of global annual sea level rise from 1990 to 2015 for FAR (Scenario D and business-as-usual), SAR (IS92c and IS92e), TAR (A2 and A1FI) and for Church et al. (2011) based on the CMIP3 model results available at the time of AR4 using the SRES A1B scenario.

Cenarização *IPCC*
Special Report on Emission Scenarios



Fonte, SIAM

IPCC AR5 WGI, 2013

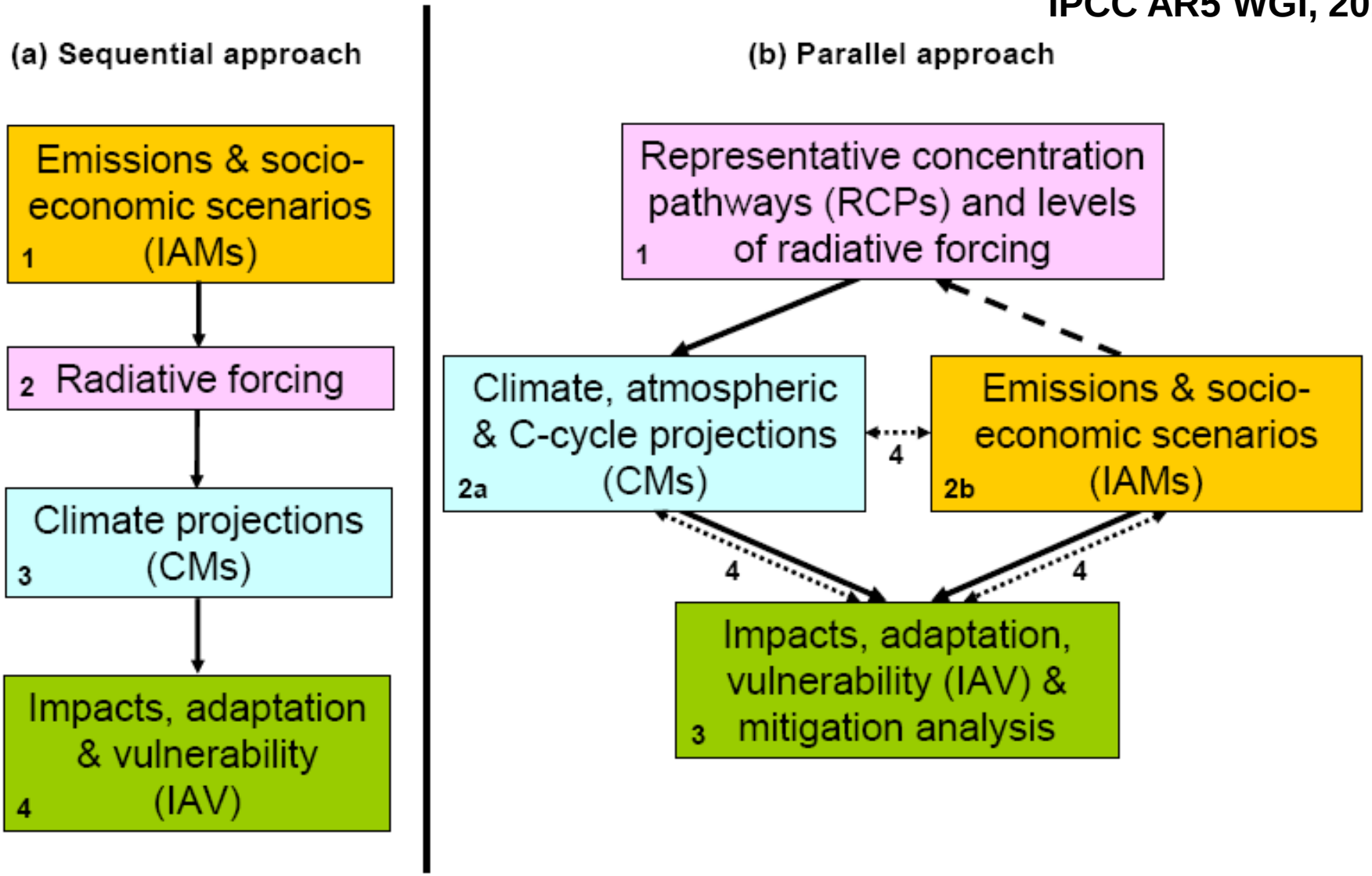
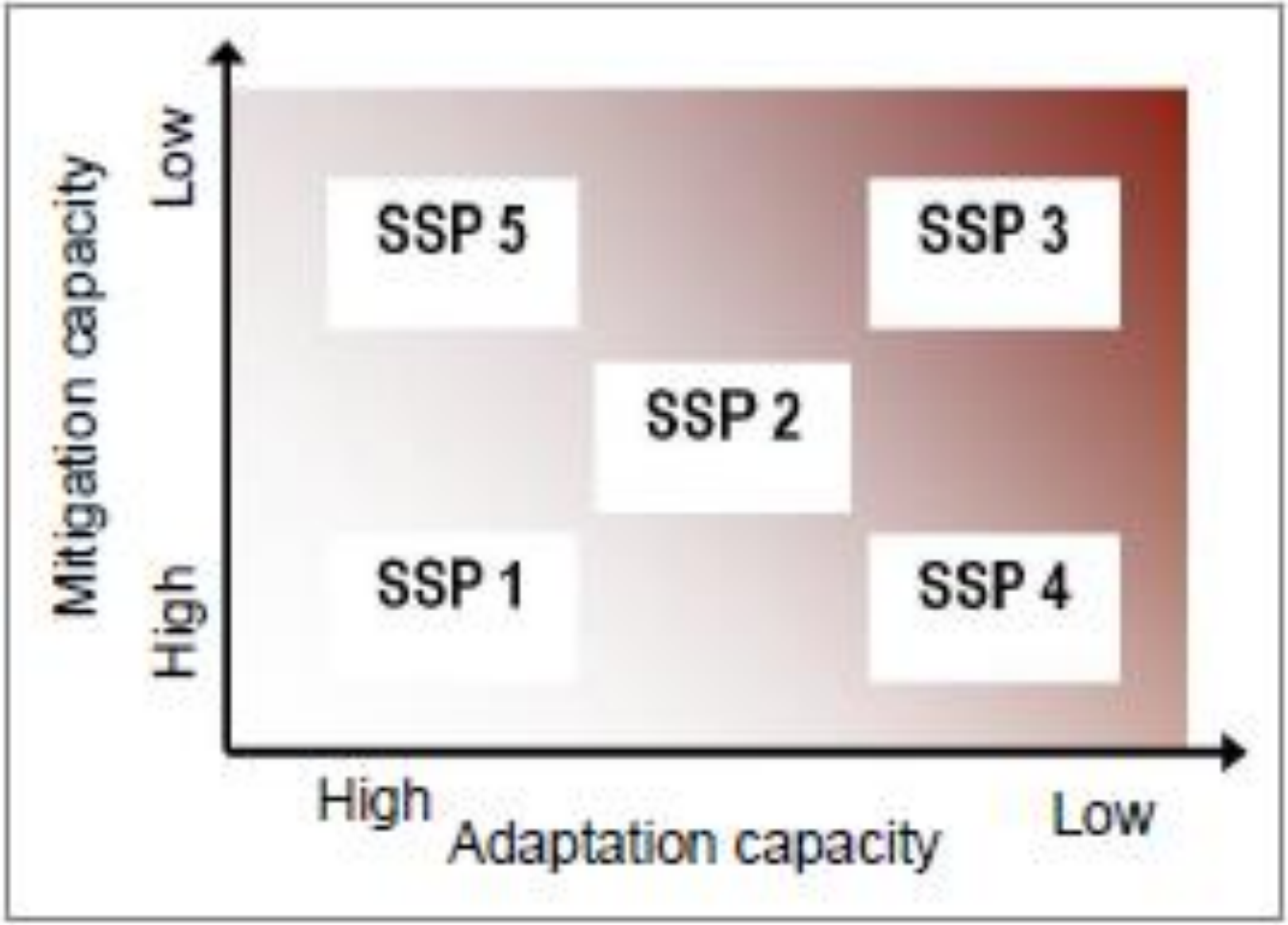
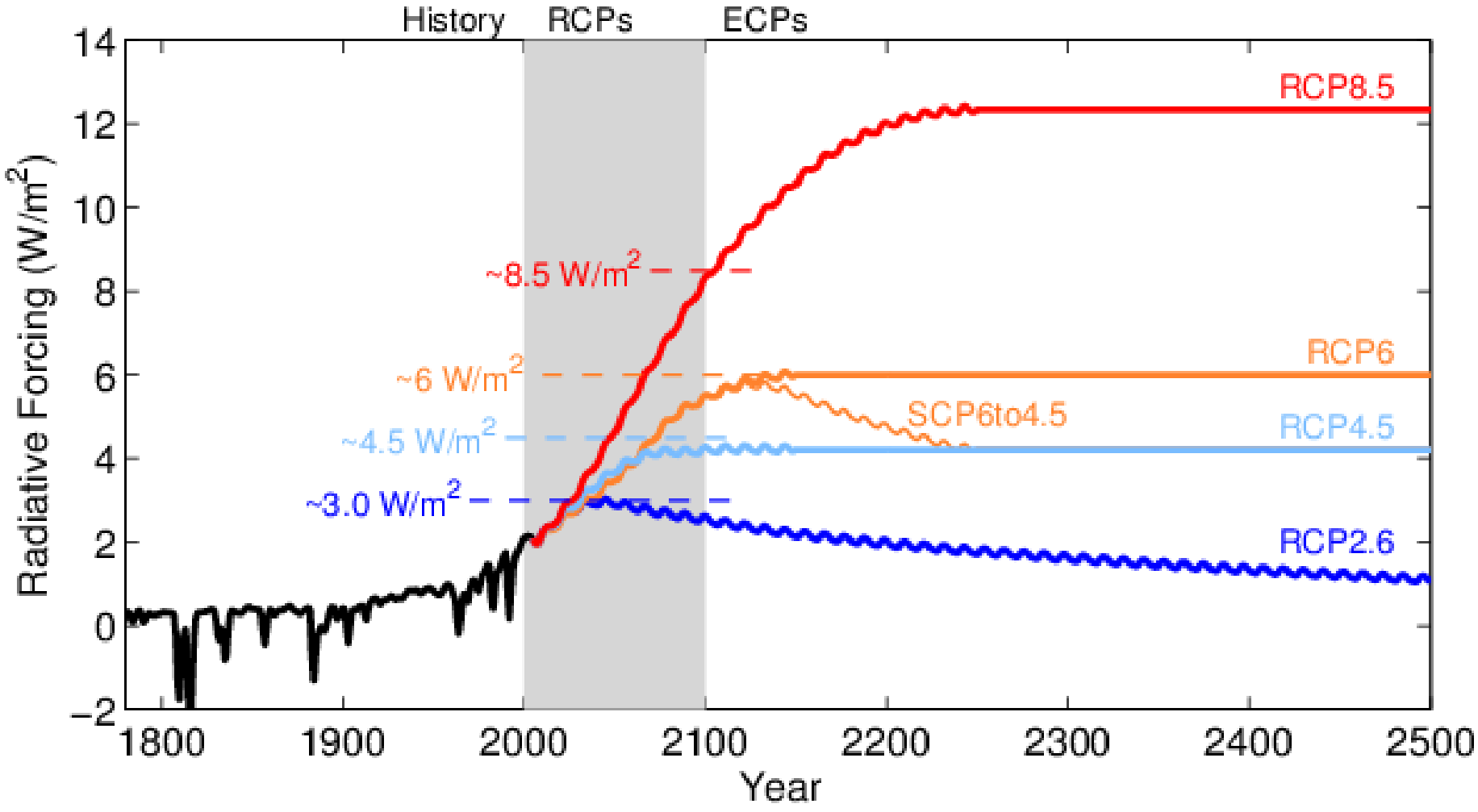


Figure 1. Approaches to the development of global scenarios: (a) previous *sequential* approach; (b) proposed *parallel* approach. Numbers indicate analytical steps (2a and 2b proceed concurrently). Arrows indicate transfers of information (solid), selection of RCPs (dashed), and integration of information and feedbacks (dotted).



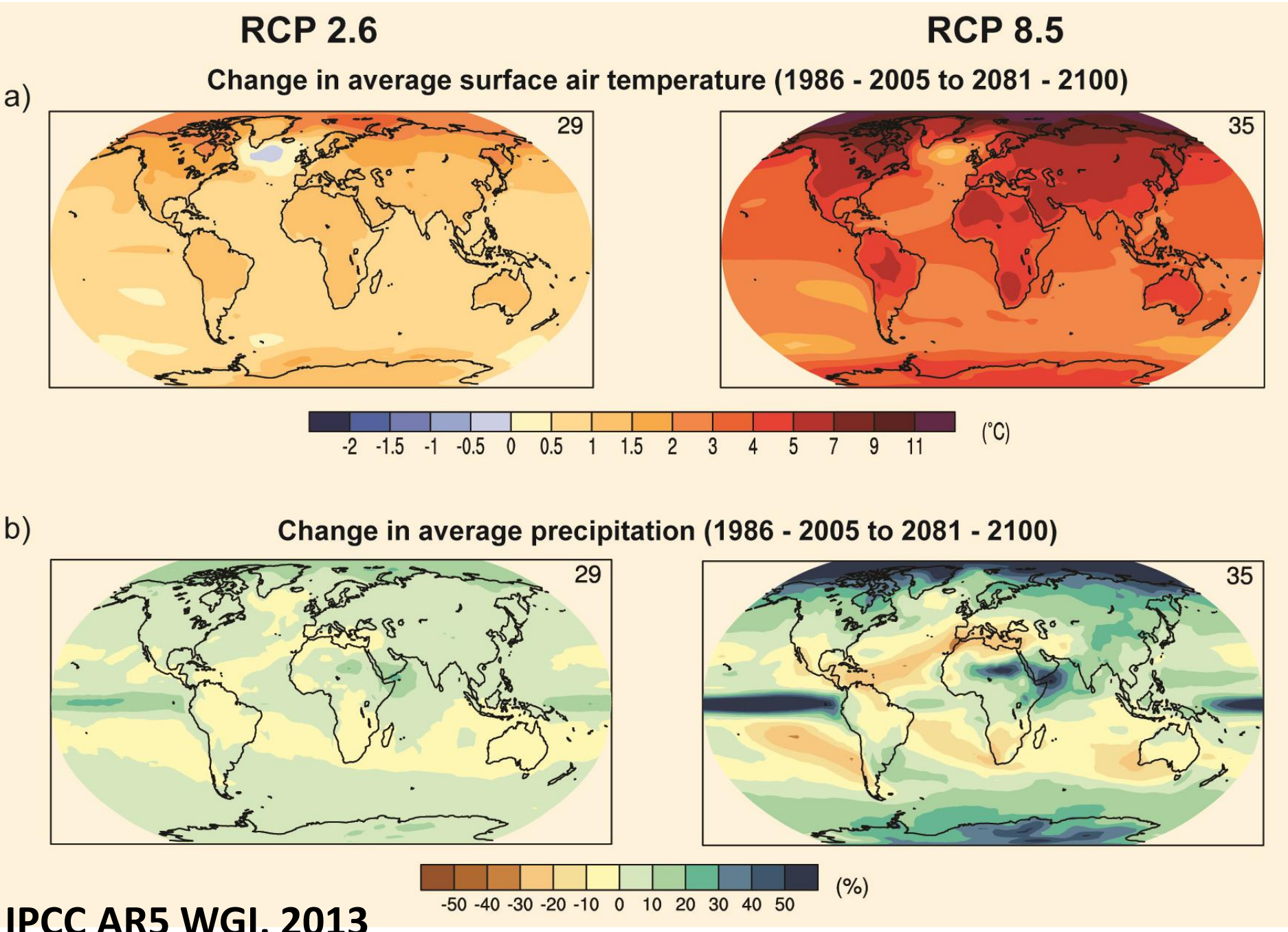
***5 Shared Socioeconomic Pathways*.**

IPCC AR5 WGI, 2013

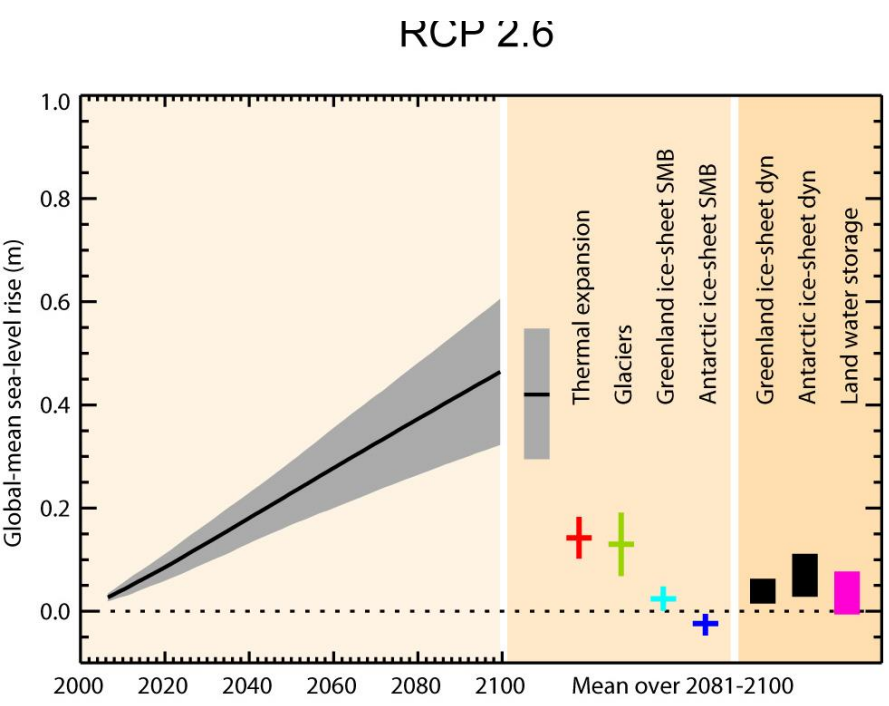


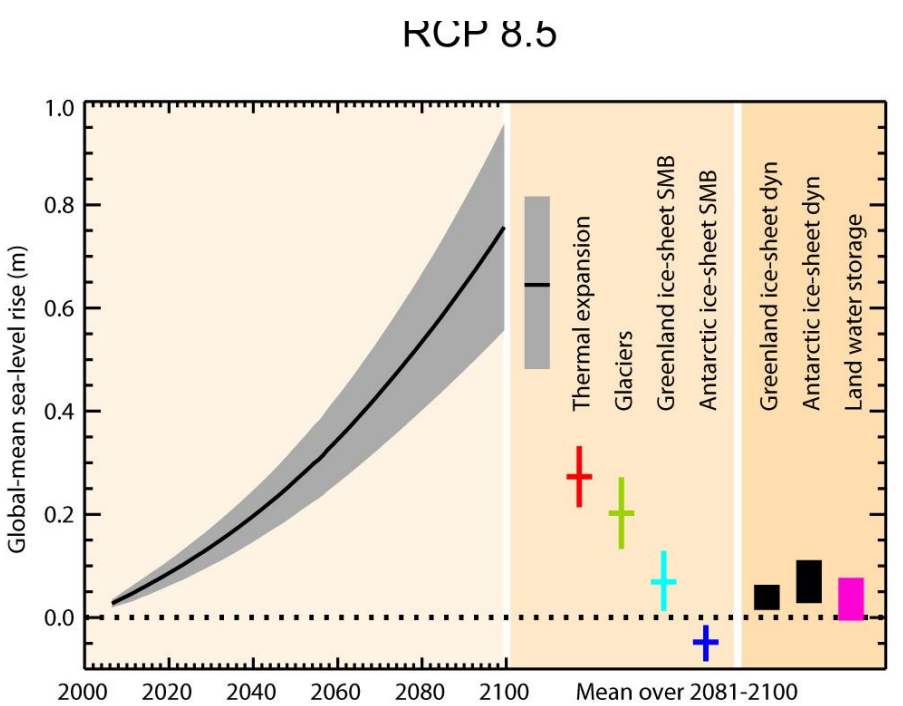
4 Representative Concentration Pathways

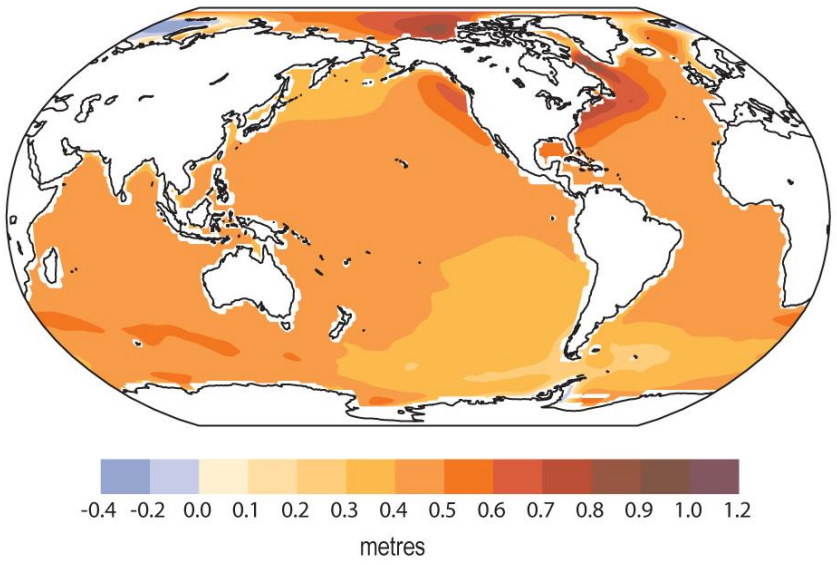
IPCC AR5 WGI, 2013

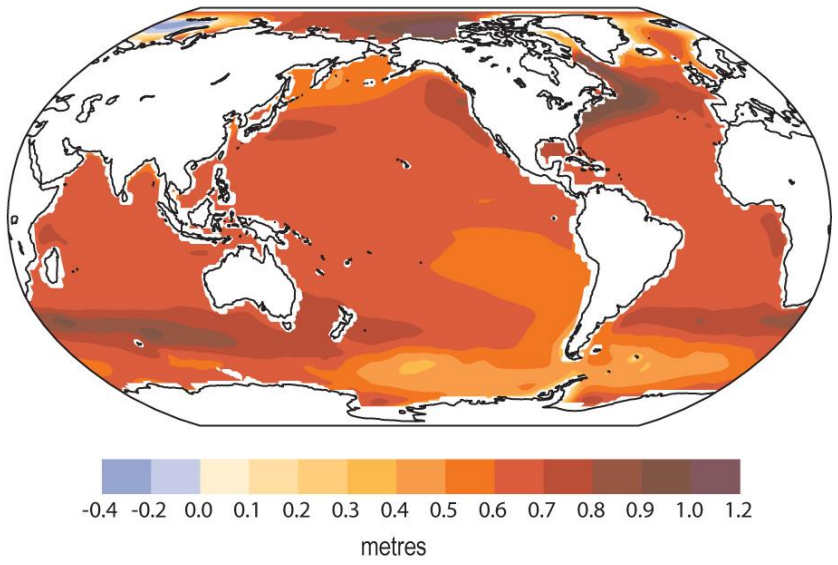


IPCC AR5 WGI, 2013

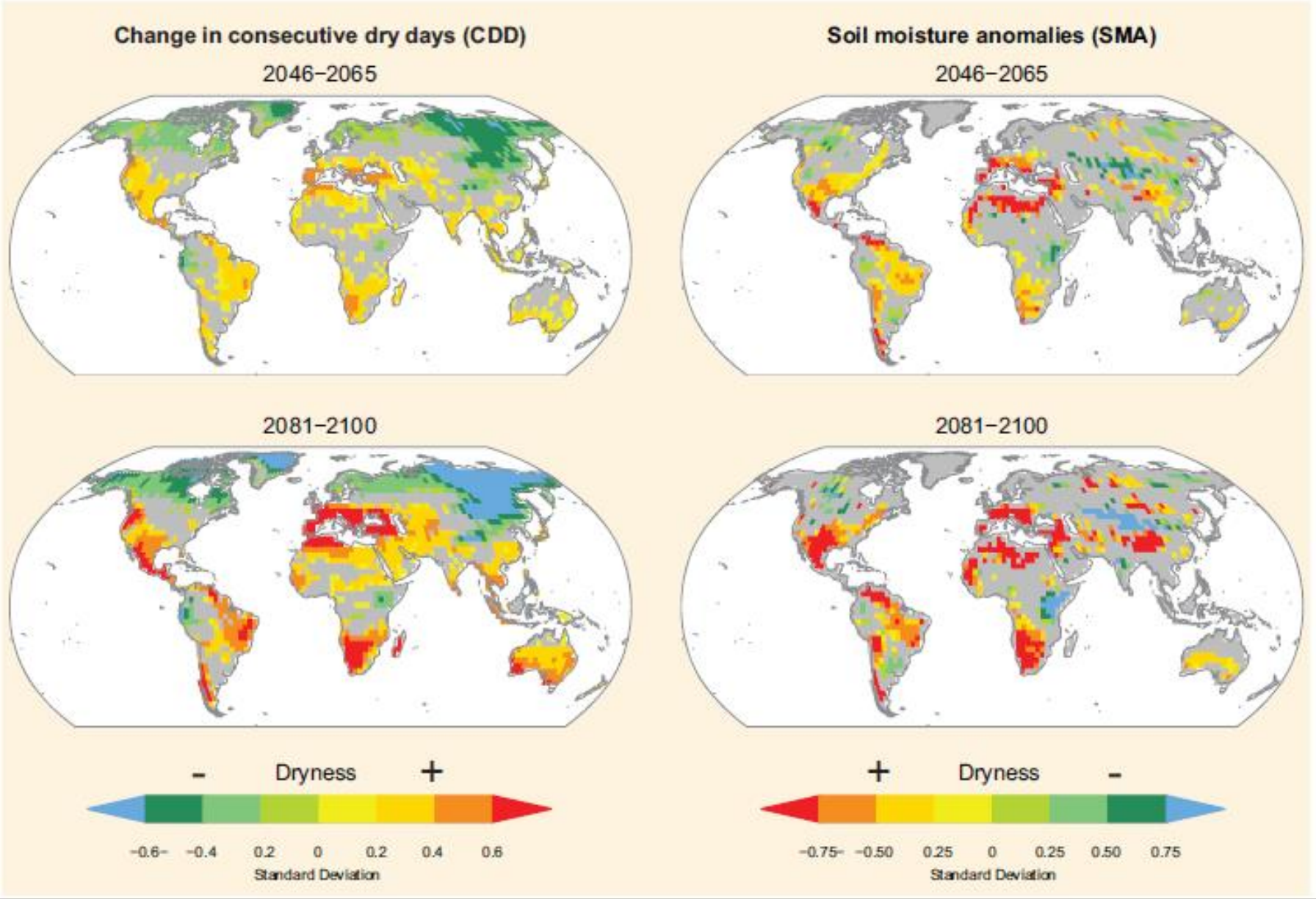




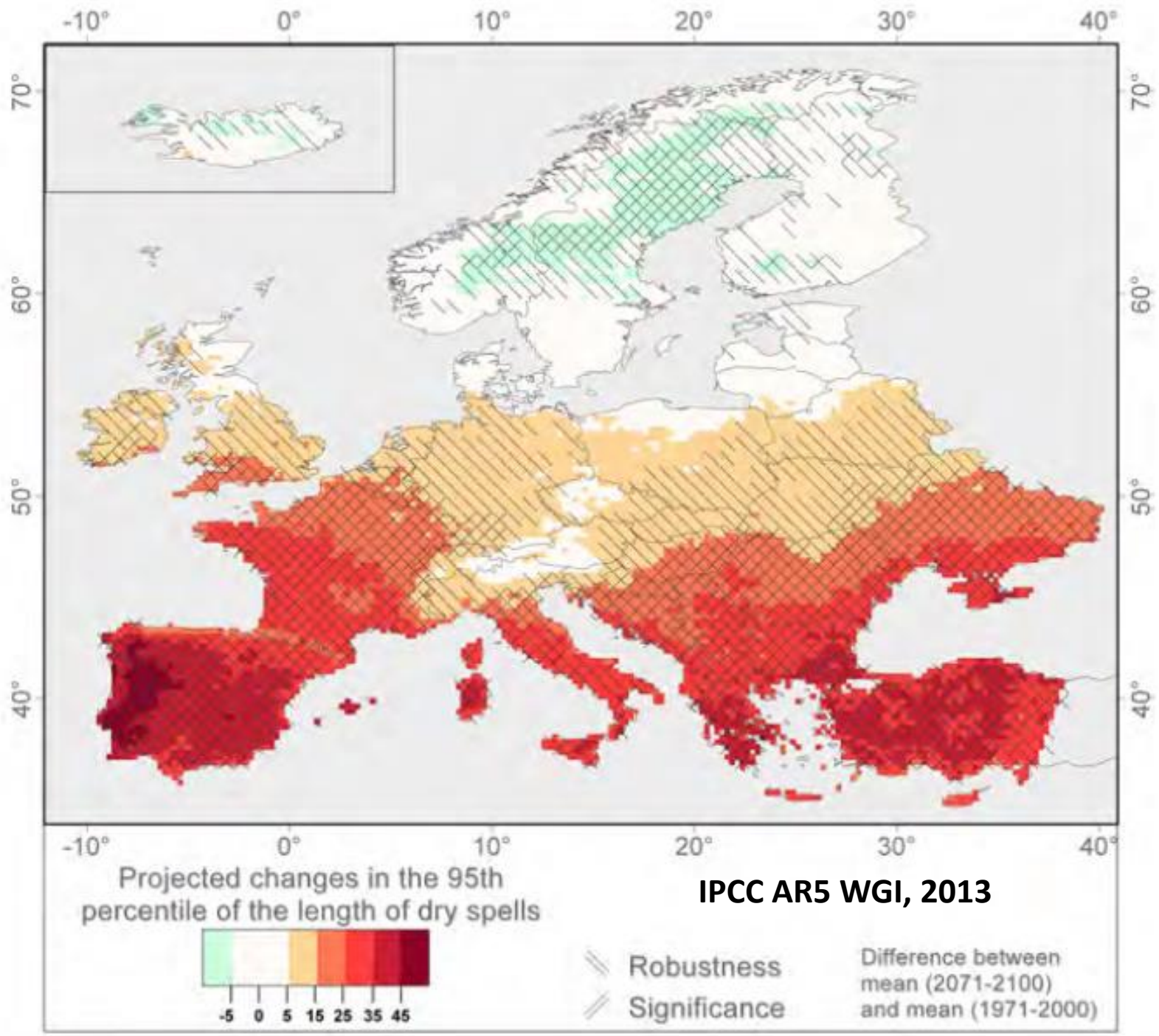




IPCC AR5 WGI, 2013



IPCC AR5 WGI, 2013

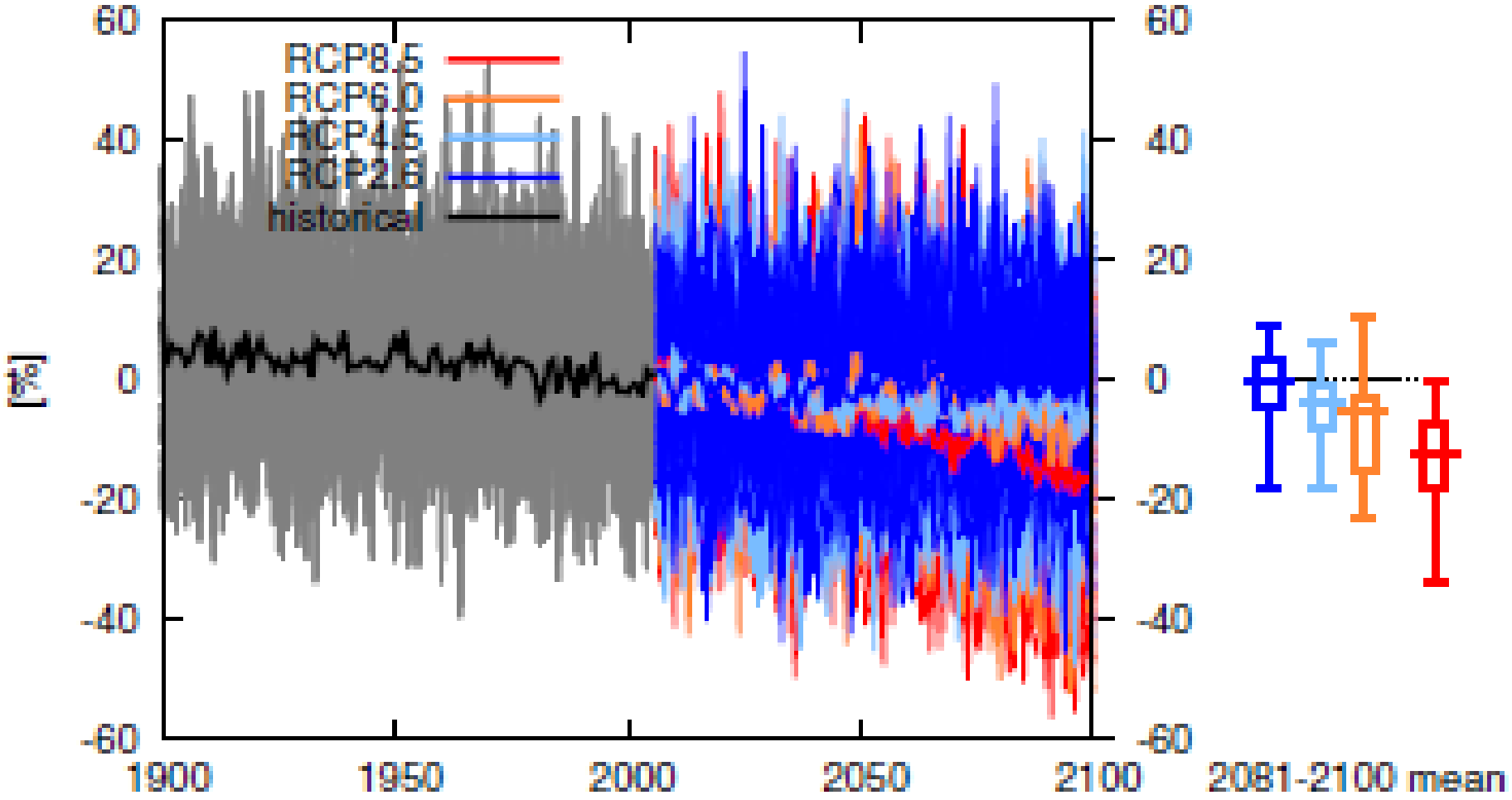


IPCC AR5 WGI, 2013

Figure 23-4: Projected changes in the 95th percentile of the length of dry spells for the period 2071-2100 compared to 1971-2000 (in days). Dry spells are defined as periods of at least 5 consecutive days with daily precipitation below 1mm. Changes represent average over 20 regional model simulations taken from EU-ENSEMBLES project. Hatched areas indicate regions with robust (at least 66% of models agree in the sign of change) and/or statistical significant change (significant on a 95% confidence level using Mann-Whitney-U test). For the eastern part of Turkey, unfortunately no regional climate model projections are available. Based on CMIP3 data, will be substituted by CMIP5 CORDEX data.

IPCC AR5 – WGII, 2013

Precipitation in Southern Europe/ Mediterranean Region,
IPCC AR5 WGI, 2013



Climate scenarios based on
Representative Concentration Pathways (RCP)

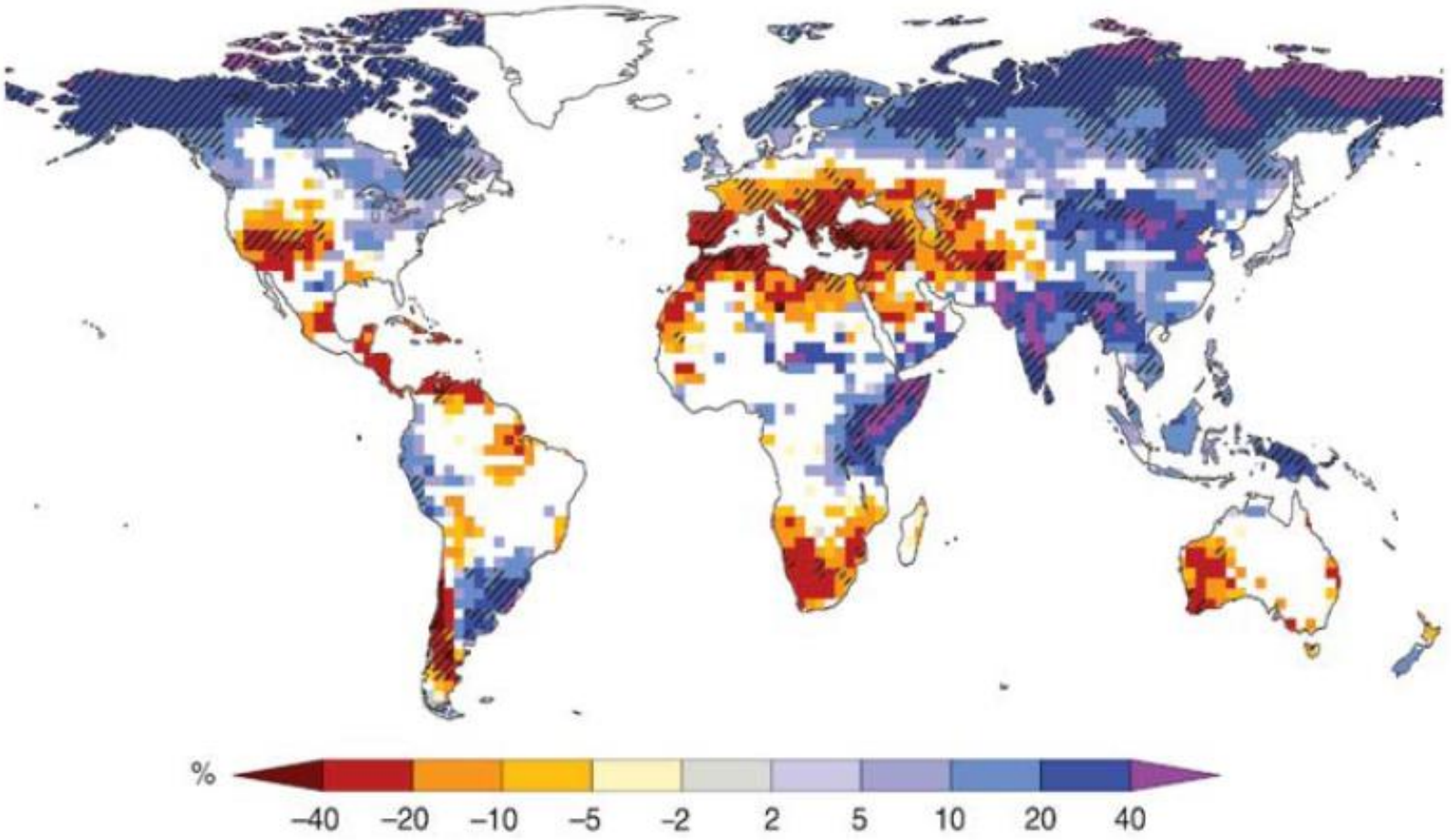


***Figure 2.10**: Large-scale relative changes in annual runoff for the period 2090–2099, relative to 1980–1999. White areas are where less than 66% of the ensemble of 12 models agree on the sign of change, and hatched areas are where more than 90% of models agree on the sign of change (Milly et al., 2005). [Based on SYR Figure 3.5 and WGII Figure 3.4]*

IPCC AR4 WGII, 2007

Adaptação

Ajuste nos sistemas naturais ou humanos, em resposta a estímulos climáticos observados ou projectados, que permita moderar efeitos negativos ou explorar oportunidades benéficas (IPCC WGII, 2007)

FP7 EU PROJECT at CCIAM - SIM

BASE - Bottom-up Climate Adaptation Strategies towards a Sustainable Europe

Start date: 2012 | End Date: 2015

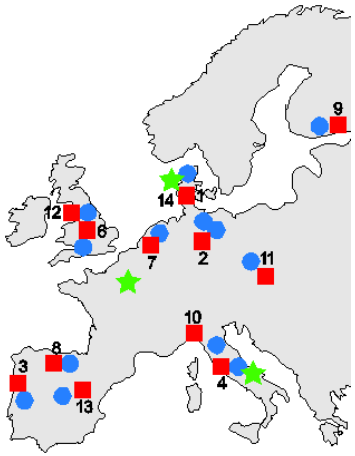
FP7 Env.2012.6.1-3 Total grant: 5.900.000 €

The Bottom-up Climate Adaptation Strategies towards a Sustainable Europe (BASE) project will address the need for research on sustainable climate adaptation strategies, which promote interactions between bottom-up and top-down assessments. The intention is to evaluate the environmental, social and economic impacts, the costs and benefits, policy coherence and stakeholder perceptions of different climate adaptation pathways from an interdisciplinary perspective. The findings from BASE will feed into the European Clearing House Mechanism (CHM) portal and adaptation support tools for policy development.

From the CCIAM Research Group

BASE

- Project period: Oct' 12 to Sep' 16
- Total budget: Approx. 7.55 M Euros
- 14 partners across the EU:



- Working closely with the EEA Topic Centre on Climate Change Adaptation

The research leading to these results has received funding from the European Community's Seventh Framework Programme under Grant Agreement No.308337 (Project BASE)

BASE aims:

- **Compilar e analizar dados e informação sobre medidas de adaptação;**
- **Melhorar e desenvolver metodologias e ferramentas que identificam conflitos e sinergias;**
- **Integrar conhecimento *bottom-up* com processos *top-down*;**
- **Preencher lacunas do conhecimento e criar pontes entre sectores e escalas;**
- **Aumentar a integração do conhecimento local nas estratégias de adaptação;**
- **Disseminar o conhecimento, experiência e resultados entre stakeholders e introdução dos dados e informação em ferramentas da UE** (Climate-ADAPT).

The research leading to these results has received funding from the European Community's Seventh Framework Programme under Grant Agreement No.308337 (Project BASE)

Alentejo, próximos passos …

- **Estado da Arte Académico Participativo**
- **Identificação de boas práticas de Adaptação**
- **Debate e contribuição para o desenho de uma estratégia integrada, envolvendo vários "stakeholders"**

Estamos à disposição para promover, trazer conhecimento e sintetizar informação relativa ao desenvolvimento de estratégias e implementação de ações.

The research leading to these results has received funding from the European Community's Seventh Framework Programme under Grant Agreement No.308337 (Project BASE)

BASE BOTTOM-UP CLIMATE ADAPTATION STRATEGIES TOWARDS A SUSTAINABLE EUROPE

SEVENTH FRAMEWORK PROGRAMME

Workshop Estado da Arte Participativo
Adaptação às Alterações Climáticas no Alentejo

Dia 20 de Novembro 9h-18h, Beja

Instituto Politécnico de Beja - Escola Superior Agrária

Este evento, suportado pelo projecto BASE – "Bottom-up climate Adaptation strategies towards a Sustainable Europe" vai juntar especialistas de diferentes disciplinas relacionadas com o Alentejo e Alterações Climáticas. Será o primeiro de vários e tem como objectivo realizar um estado da arte participativo sobre o conhecimento relevante, como na agricultura, gestão dos recursos hídricos e populações rurais, e a investigação existente em adaptação às alterações climáticas no Alentejo. Desta forma, consideramos essencial a sua participação, como especialista, neste evento que decorrerá com formatos de apresentações curtas e trabalhos/dinâmicas em grupo.

Objectivos específicos:

-Mapear as instituições, investigadores e projectos relacionados com este tema em Portugal e promoção de colaborações e sinergias;

-Partilha do conhecimento local, regional e nacional relacionado com as alterações climáticas nas áreas da agricultura, gestão dos recursos hídricos, engenharia ecológica, socio-economia rural, políticas e comunicação;

-Identificar estratégias/políticas e ações locais, regionais ou nacionais que possam promover uma boa adaptação às alterações climáticas;

-Desenhar visões & possibilidade assim como "caminhos" de adaptação;

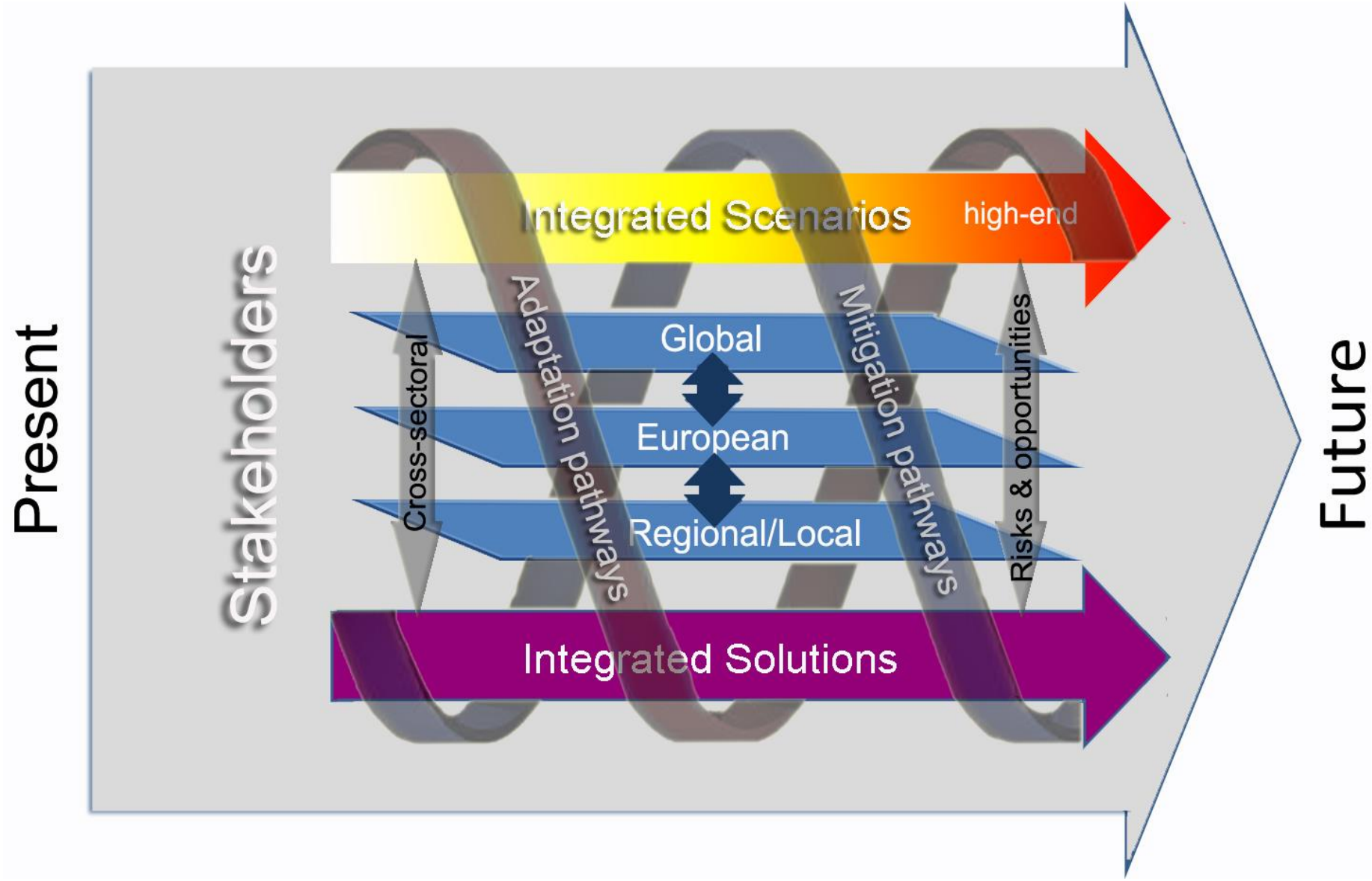
FP7-EU PROJECT IMPRESSIONS

ENV.2013.6.1-3 Impacts of high-end scenarios (global average warming >2°C with respect to pre-industrial level

IMPRESSIONS - Impacts and **R**isks from High-**E**nd **S**cenarios: **S**trategies for **I**nnovative Soluti**ons**

Starting: November 2013
Duration: 54 months
Partners: 27 institutions in 18 countries (EU, USA, Japan)
CCIAM-SIMs role: WP leaders (WP1), Case-study leaders
Budget: 8 M euros

Conceptual figure for the IMPRESSIONS project



OBRIGADO PELA VOSSA ATENÇÂO