MedECC

Mediterranean Experts on Climate and environmental Change

Environmental Change in the Mediterranean Basin

–

Towards a First Assessment Report

Wolfgang Cramer (CNRS) + MedECC members

http://www.medecc.org/

With financial support from the government of

Plan Bleu

MÉTROPOLE AIX-MARSEILLE PROVENCE

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Gouvernement Princier PRINCIPAUTÉ DE MONACO

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ADEME

Aix*Marseille université

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Union for the Mediterranean
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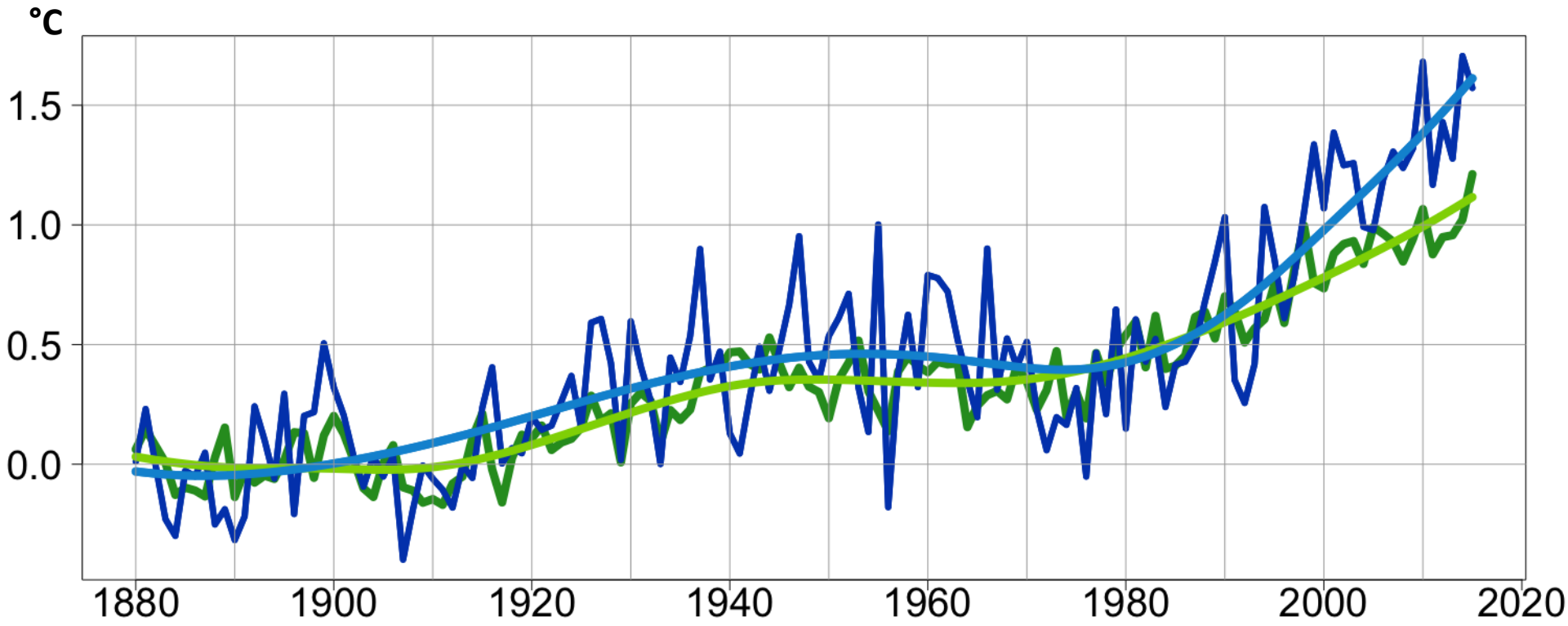
الإتحاد من أجل المتوسط

Mediterranean annual warming trend (MedECC)

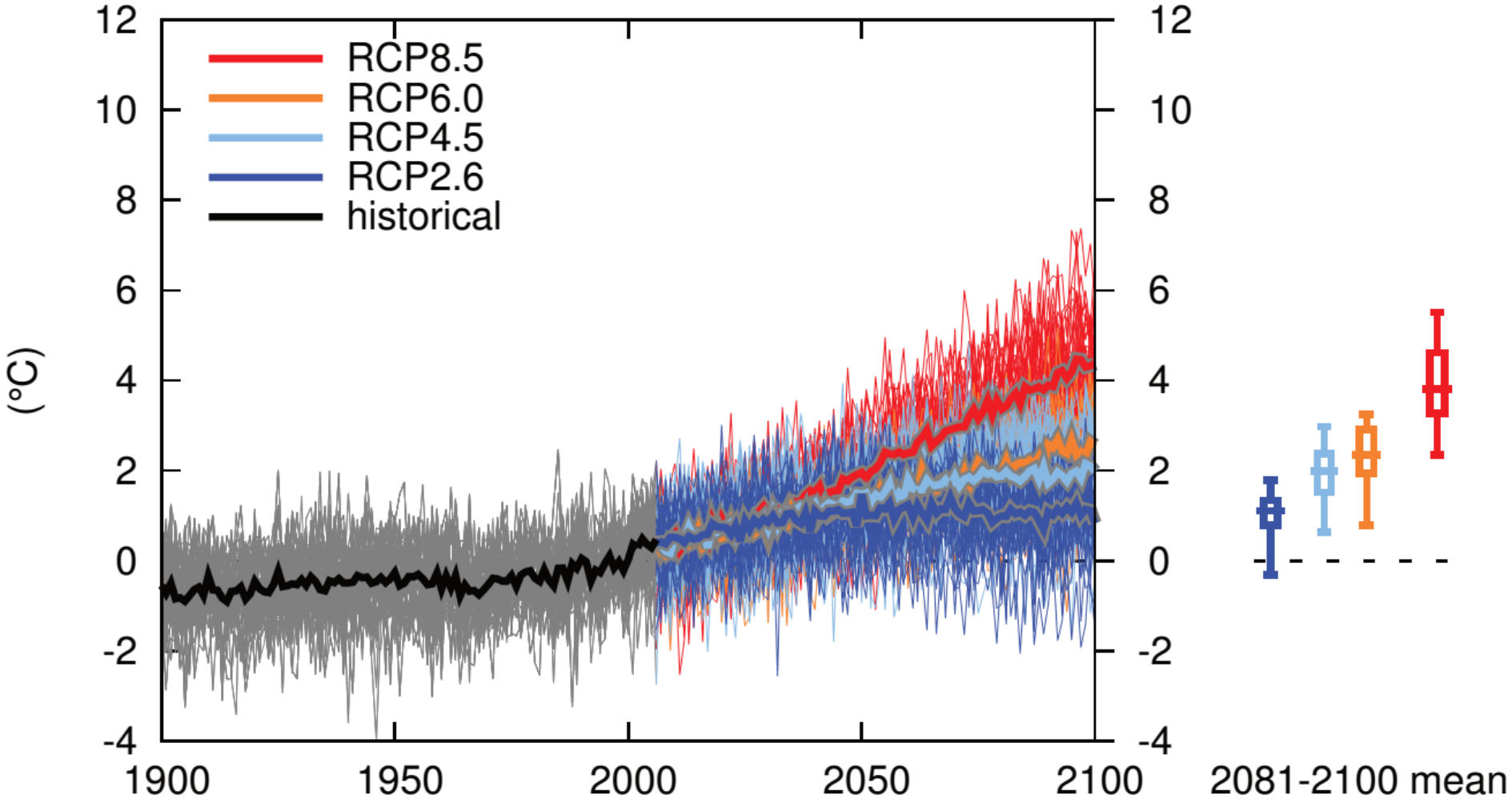


global mean temperature

regional mean temperature (Mediterranean)

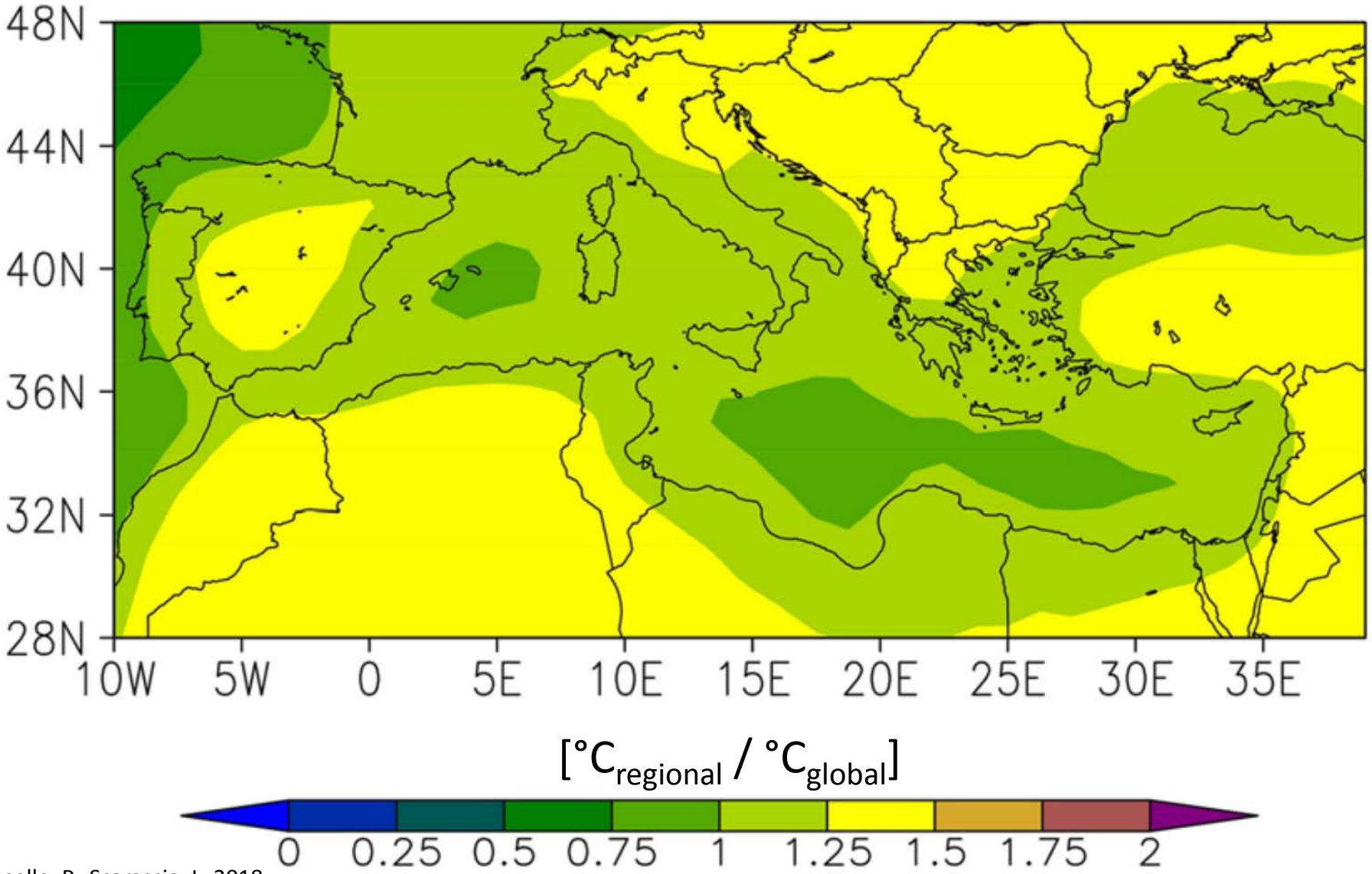
Cramer et al., in revision (data analysis: A. Toreti, JRC)

Mediterranean warming Dec-Feb for different scenarios (IPCC AR5)



IPCC, 2013: Annex I: Atlas of Global and Regional Climate Projections [van Oldenborgh, G.J., M. Collins, J. Arblaster, J.H. Christensen, J. Marotzke, S.B. Power, M. Rummukainen and T. Zhou (eds.)].

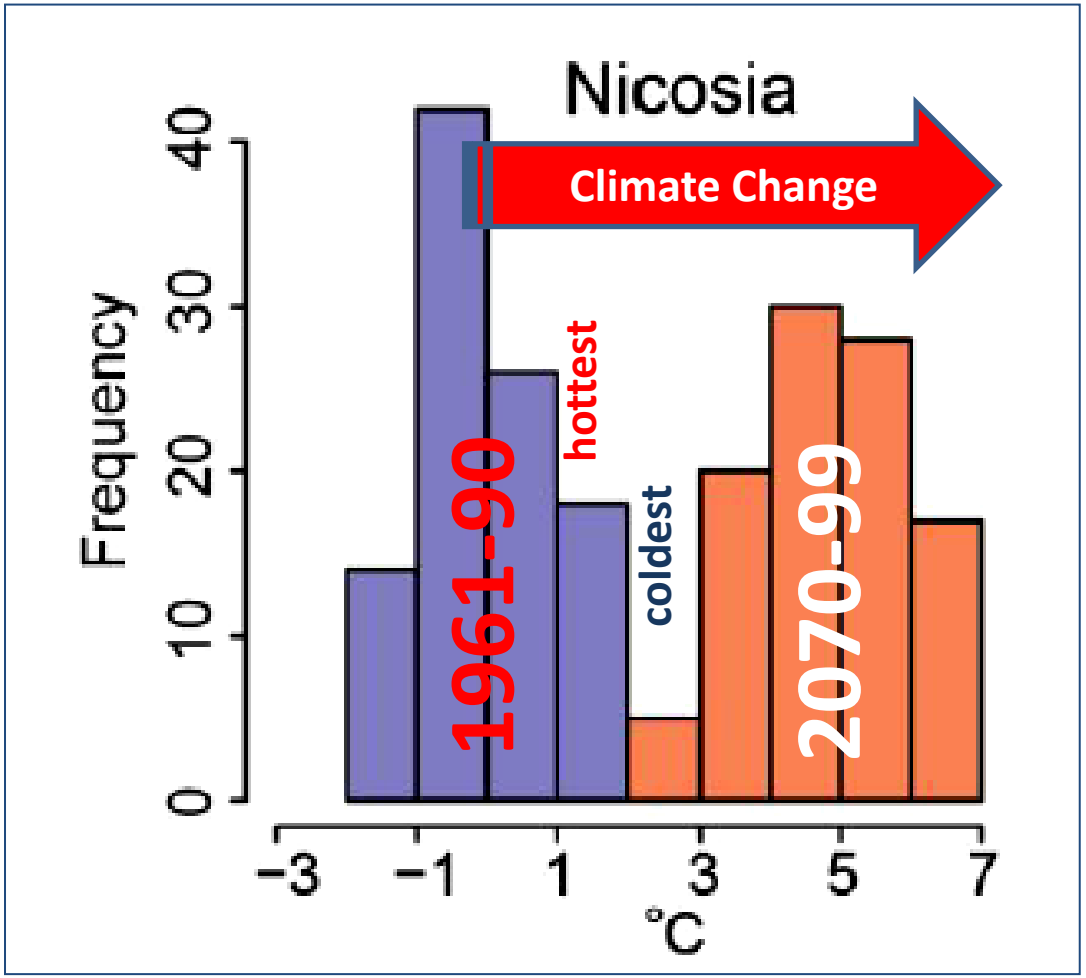
Mediterranean annual warming trend, relative to global (MedECC)



Lionello, P., Scarascia, L. 2018,
Regional Environmental Change

Urban warming in the Eastern Mediterranean

Climate models project particularly severe warming in large cities in the Eastern Mediterranean

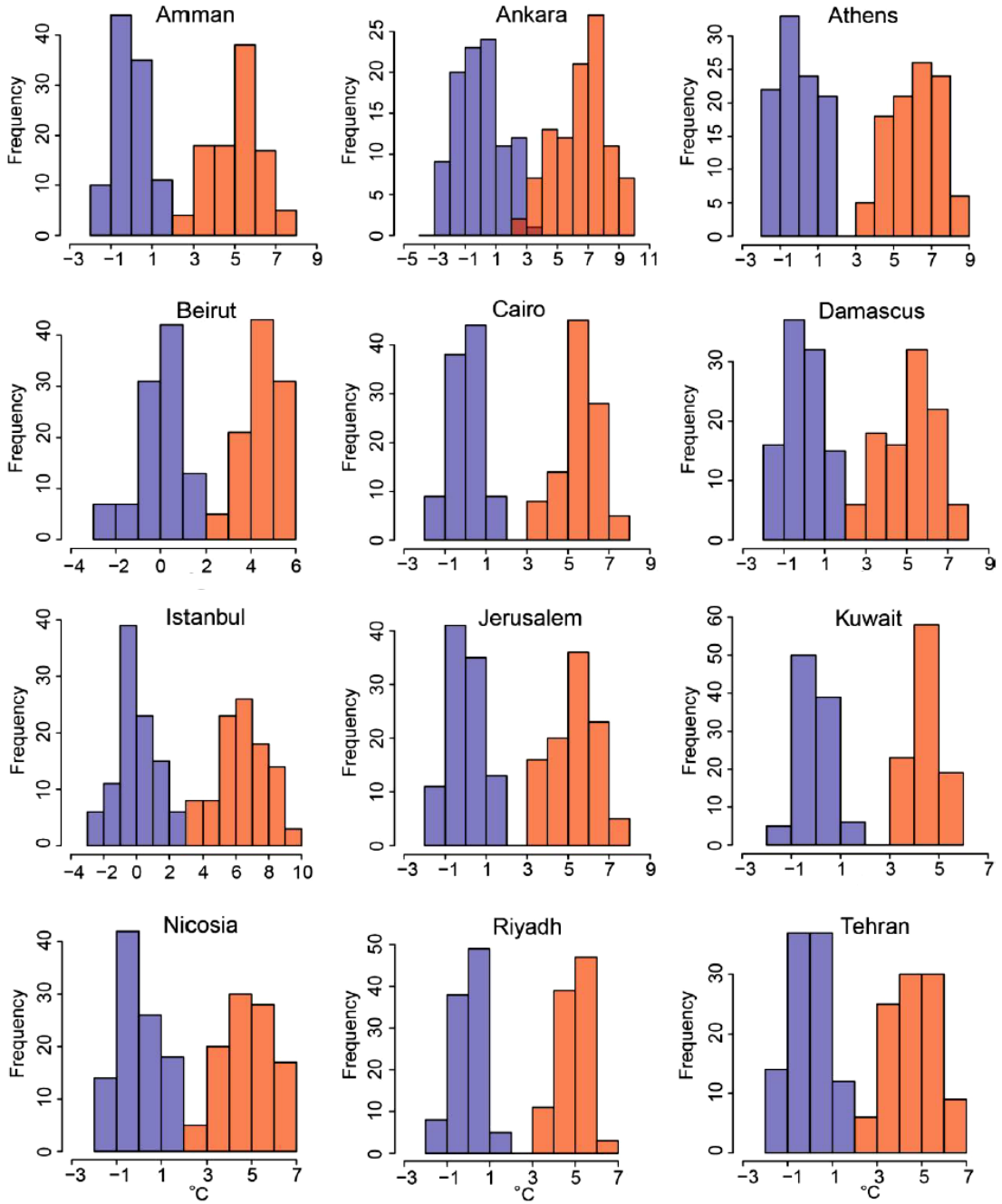


Recent and end-of-century temperature anomalies. Model calculated frequency histograms (%) of **summer (JJA) daytime maximum temperature** (TX) anomalies relative to the period 1961-1990, based on the A1B scenario. Blue is for the period 1961-1990 (hence cantered around 0°C) and red for the period 2070-2099

Lelieveld et al. 2014, Regional Environmental Change

Urban warming in the Eastern Mediterranean

For most of the large cities in the MENA Region ⇨ coldest summer month in the future will be warmer than today's hottest month



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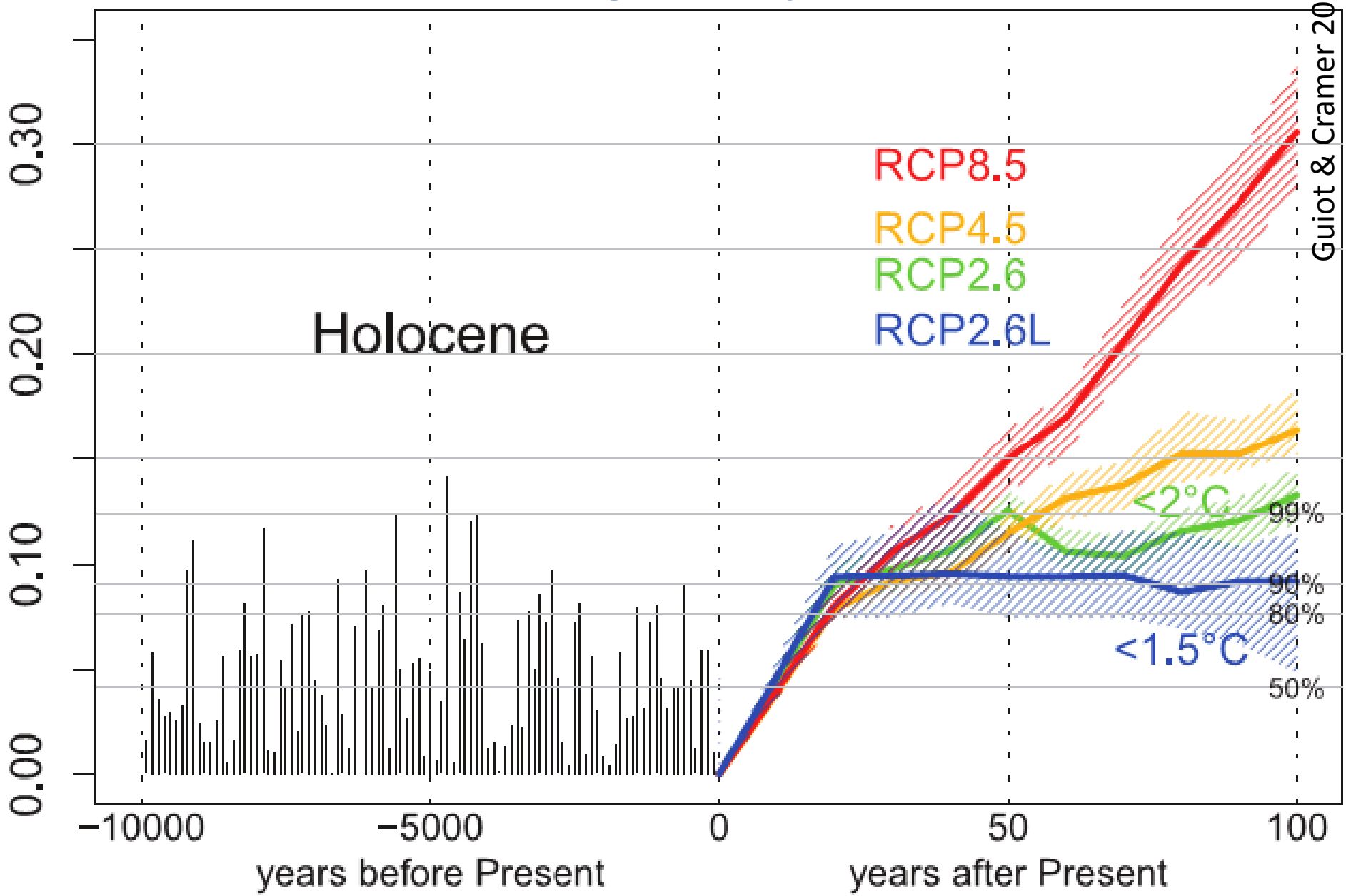
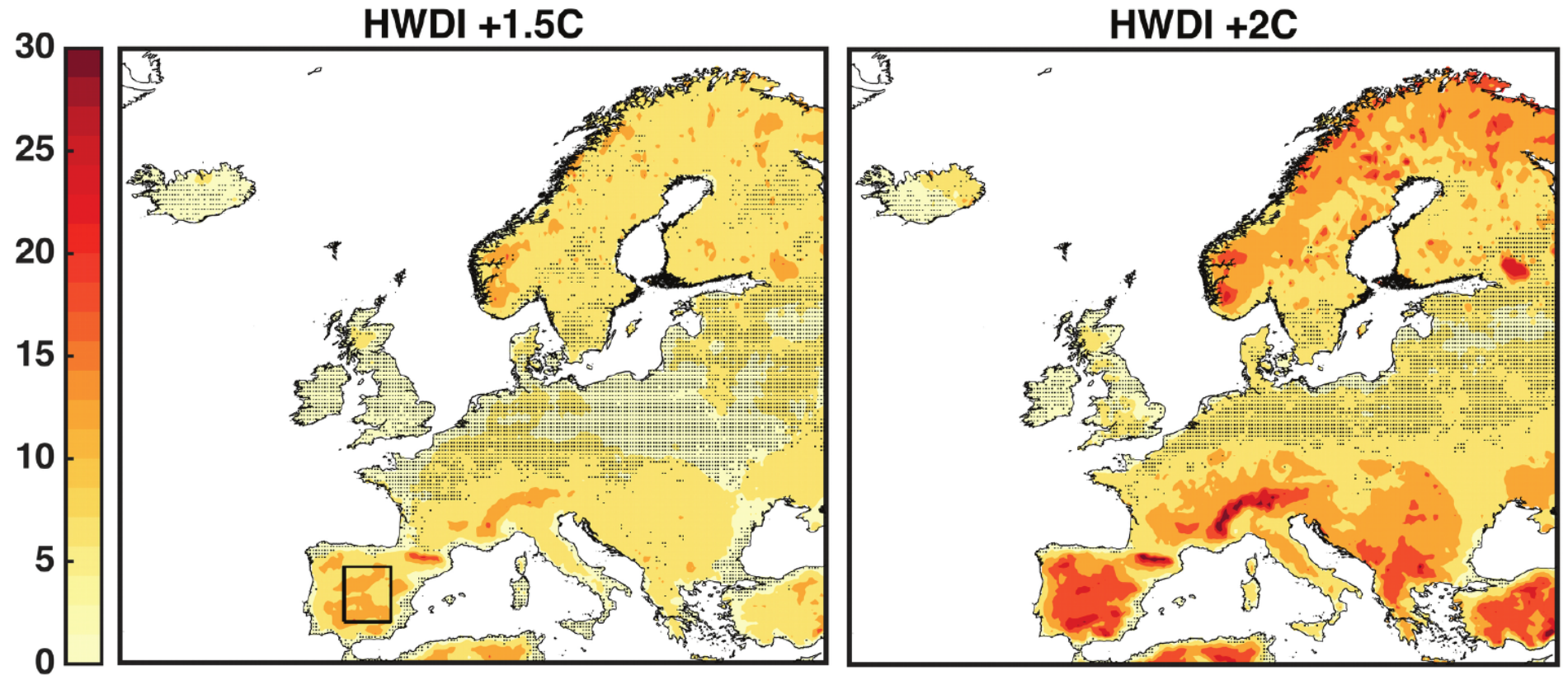
Lelieveld et al. 2014, Regional Environmental Change

Mediterranean vegetation, past and future

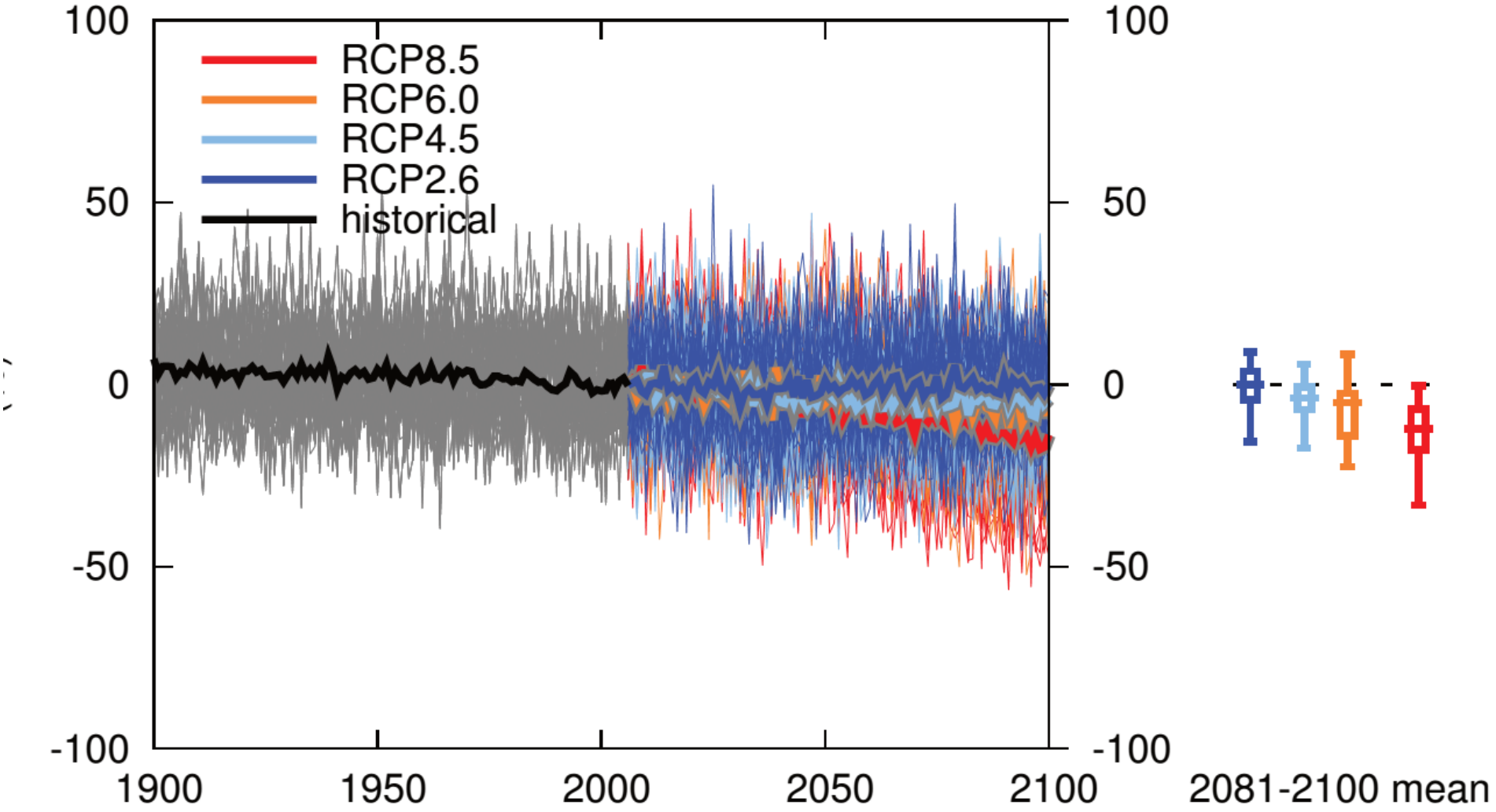


Heat Wave Duration Index (HWDI) and the Paris Agreement target



Jacob et al. 2018. Climate impacts in Europe under + 1.5°C global warming. Earth's Future

Mediterranean rainfall Oct-Mar for different scenarios (IPCC AR5)



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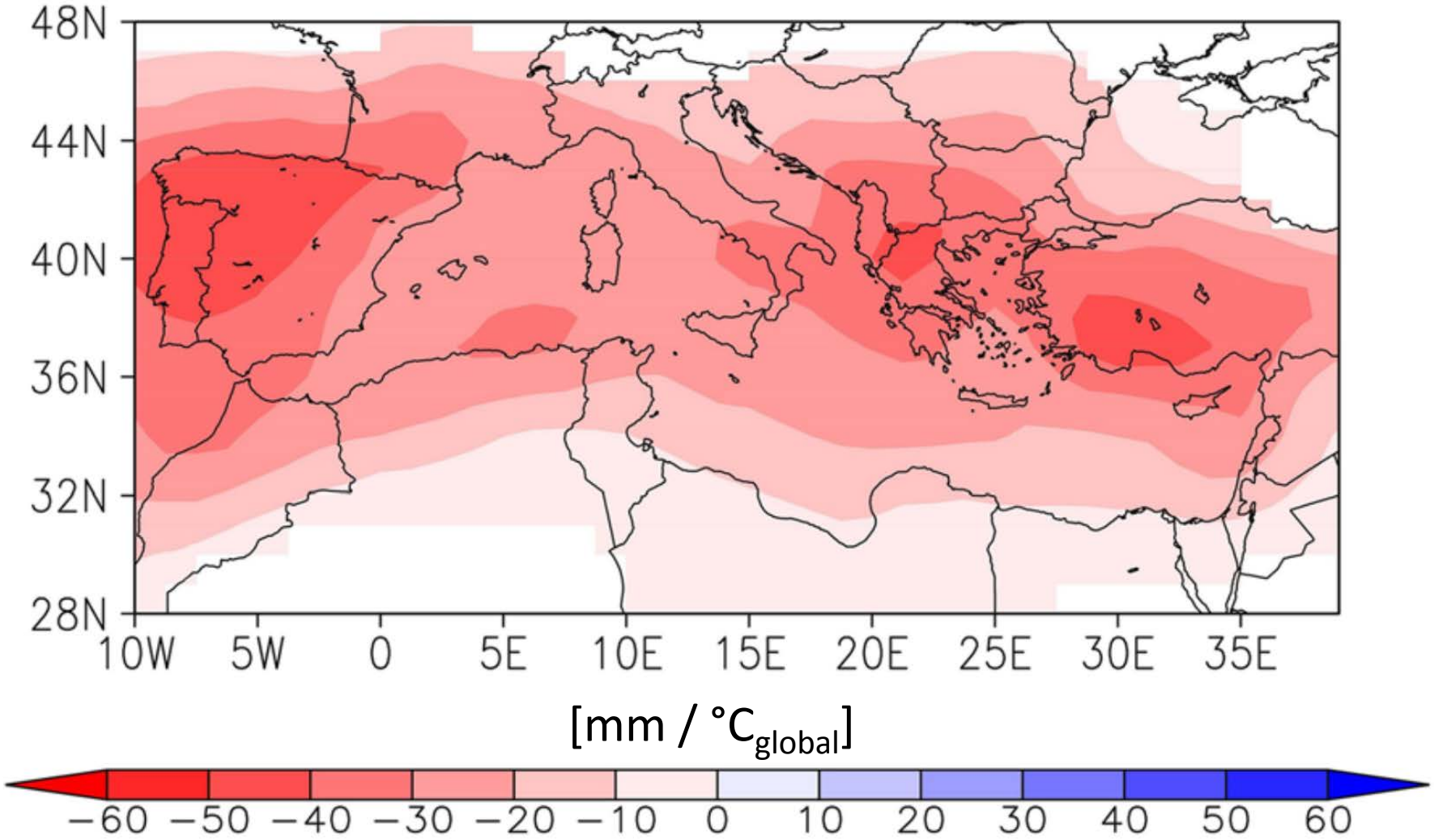
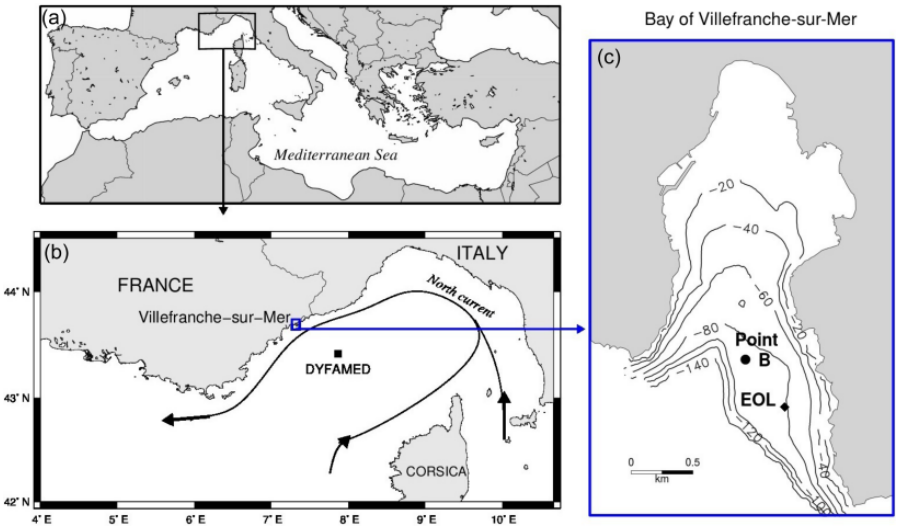
Mediterranean annual rainfall trend, relative to global temperatures (MedECC)



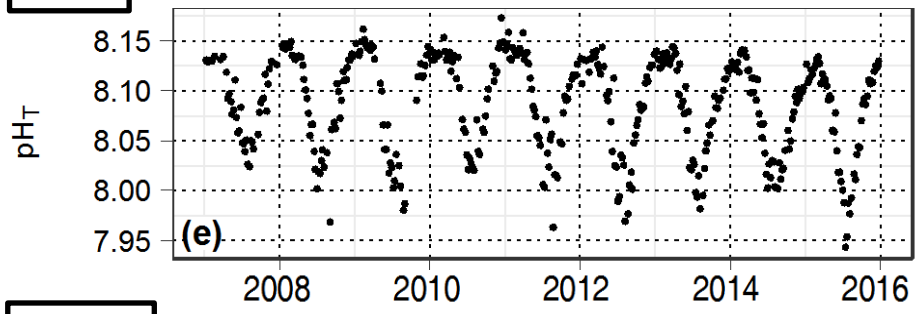
Lionello, P., Scarascia, L. 2018,
Regional Environmental Change

Mediterranean acidification

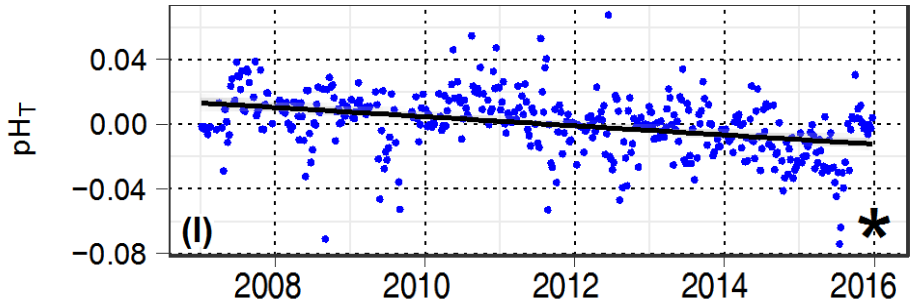
Ocean acidification is already measurable in the Mediterranean Sea



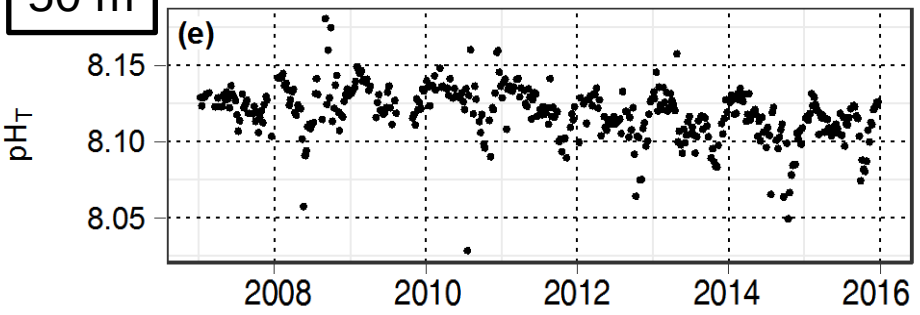
1 m



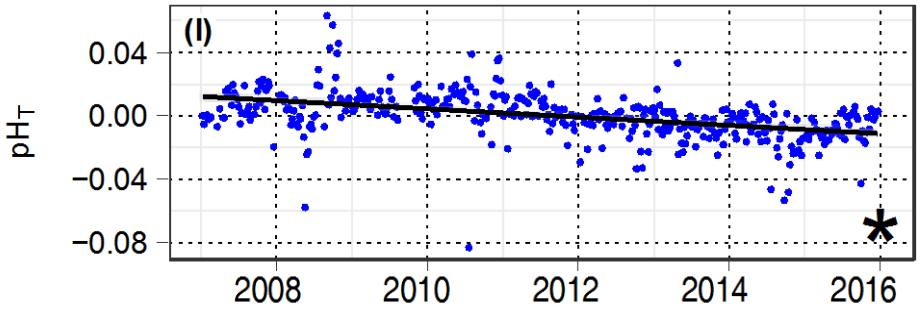
-0.0028 units y^{-1}



50 m



-0.0026 units y^{-1}



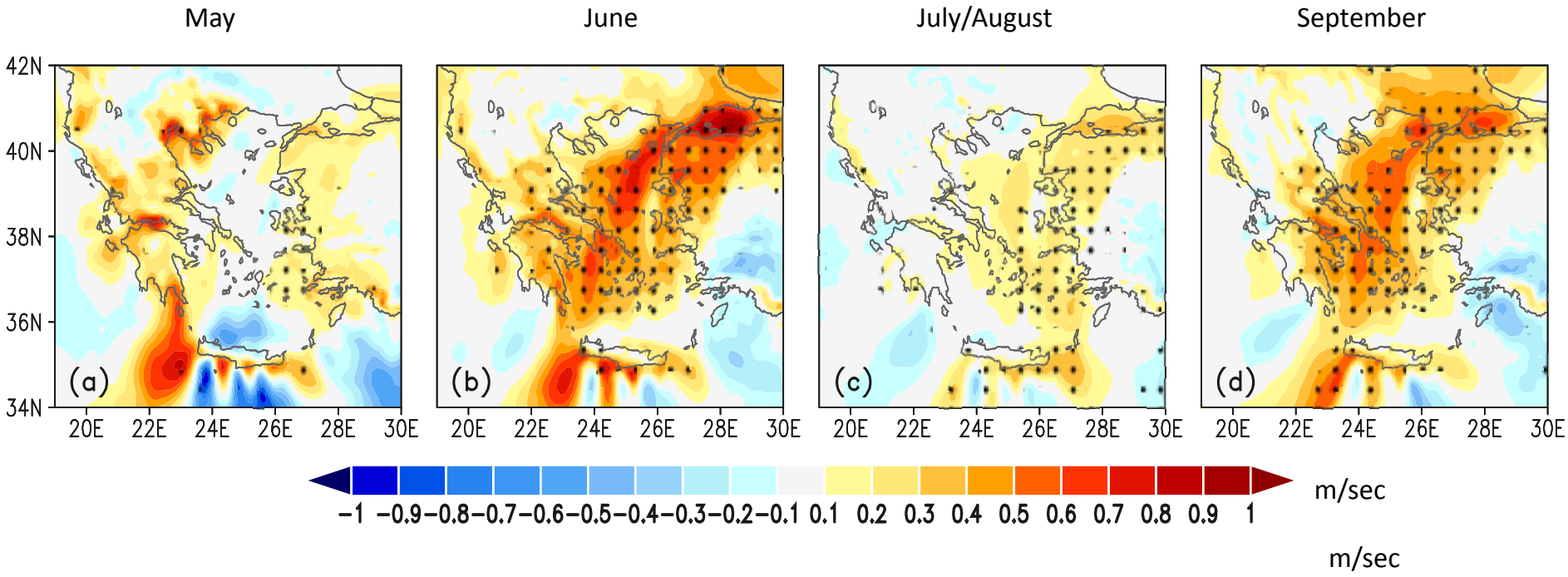
Mediterranean coral bleaching

Necrosis in Cladocora caespitosa in the Columbretes Islands Marine Reserve

Photos: D. Kersting

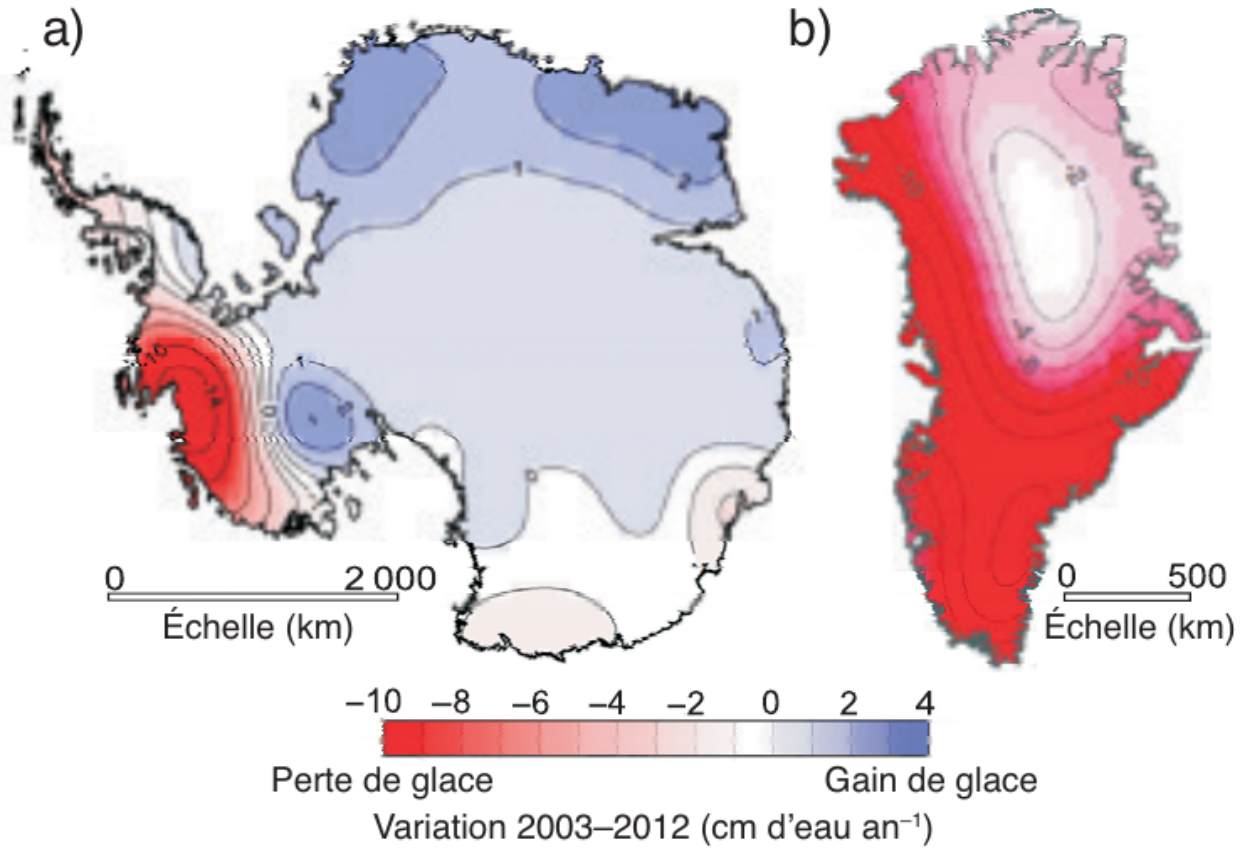
Impacts of Mediterranean acidification

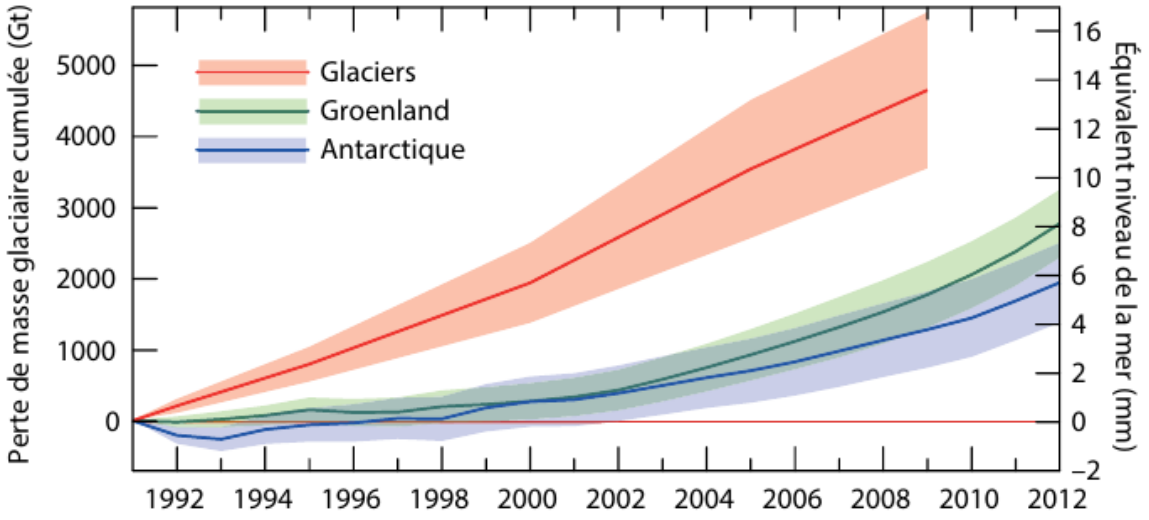
Late century Etesian winds under RCP8.5 (MedECC)



Mean model ensemble Etesian wind speed (m/sec) changes for the late century (2071-2100) with respect to the period 1971–2000 under RCP8.5. July and August are considered together as the peak period for Etesian winds. Stippling indicates robust and significant changes at the 90% significance level.

Dafka et al. subm.

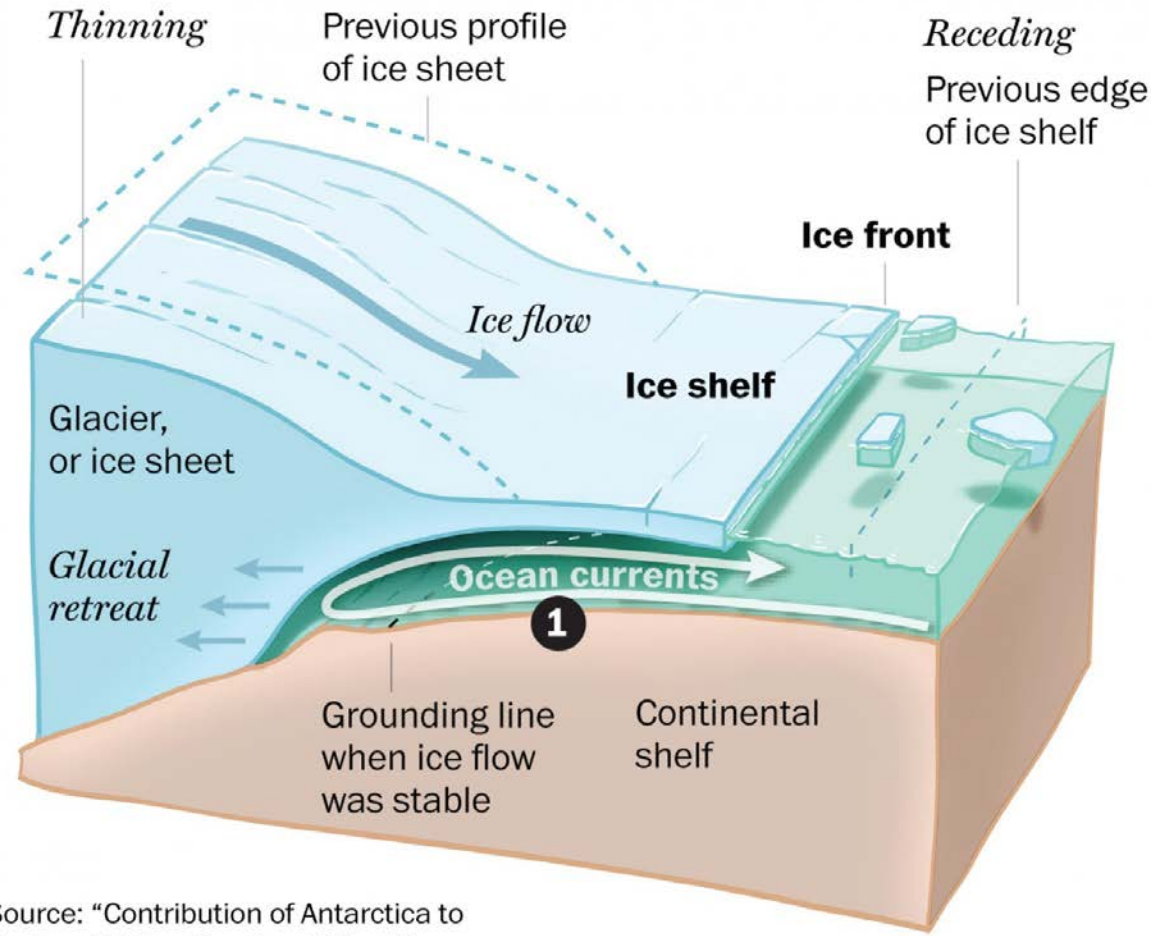

a)
b)
0
2 000
Échelle (km)
0
500
Échelle (km)
−10 −8 −6 −4 −2 0 2 4
Perte de glace
Gain de glace
Variation 2003–2012 (cm d'eau an⁻¹)


Perte de masse glaciaire cumulée (Gt)
Équivalent niveau de la mer (mm)
Glaciers
Groenland
Antarctique
5000
4000
3000
2000
1000
0
16
14
12
10
8
6
4
2
0
−2
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012

Melting from below

Scientists have long known that glaciers resting under sea level can be unstable if they rest on a downward sloping sea bed.

1. Warmer ocean currents erode the glacier's base from below. The grounding line retreats downhill, and as it does, even more of the glacier is exposed to warm water. It melts more, and flows faster.



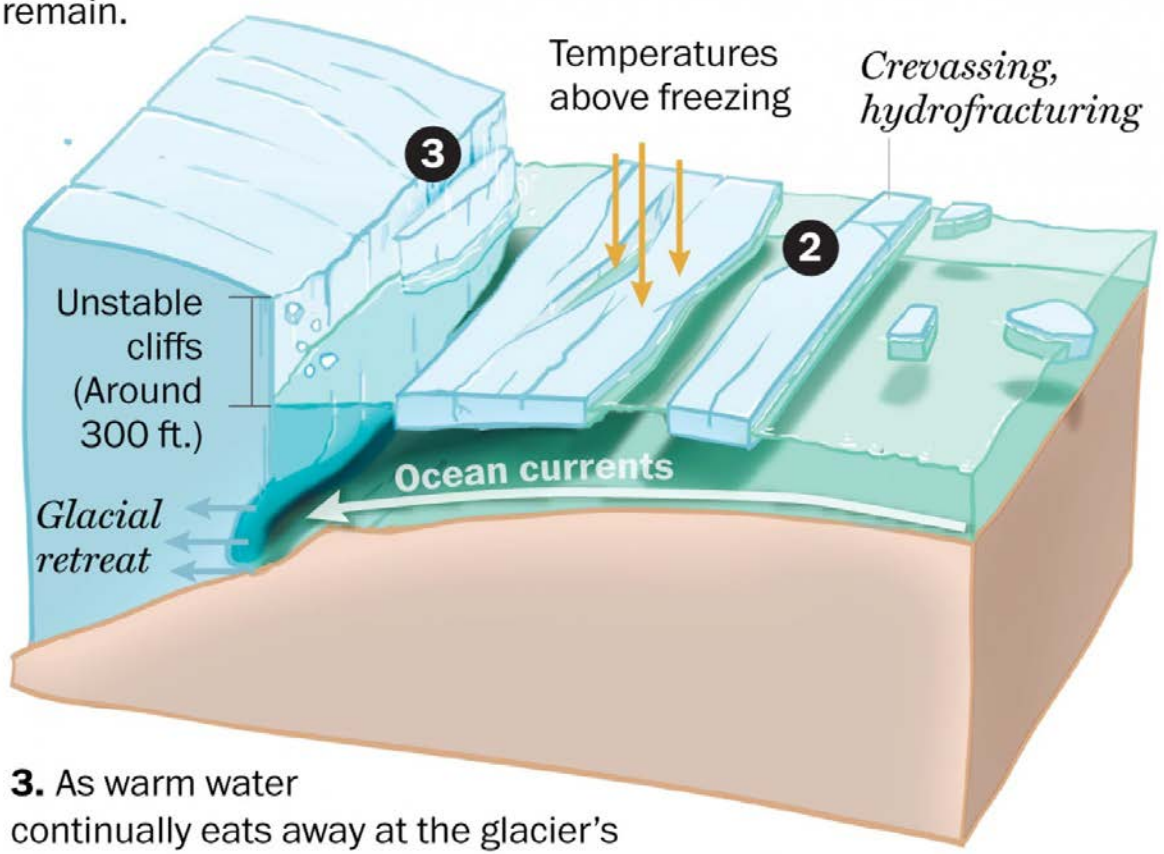
Source: "Contribution of Antarctica to Past and Future Sea-Level Rise," by Robert M. DeConto and David Pollard, in Nature

CHIQUI ESTEBAN, BONNIE BERKOWITZ, PATTERSON CLARK / THE WASHINGTON POST

Shearing from cliffs

Now, researchers have identified two new processes that can make this still worse.

2. Warm air, rain and meltwater cause fissures in the shelf, which breaks away from the glacier in large swaths. Eventually, only vertical ice cliffs remain.

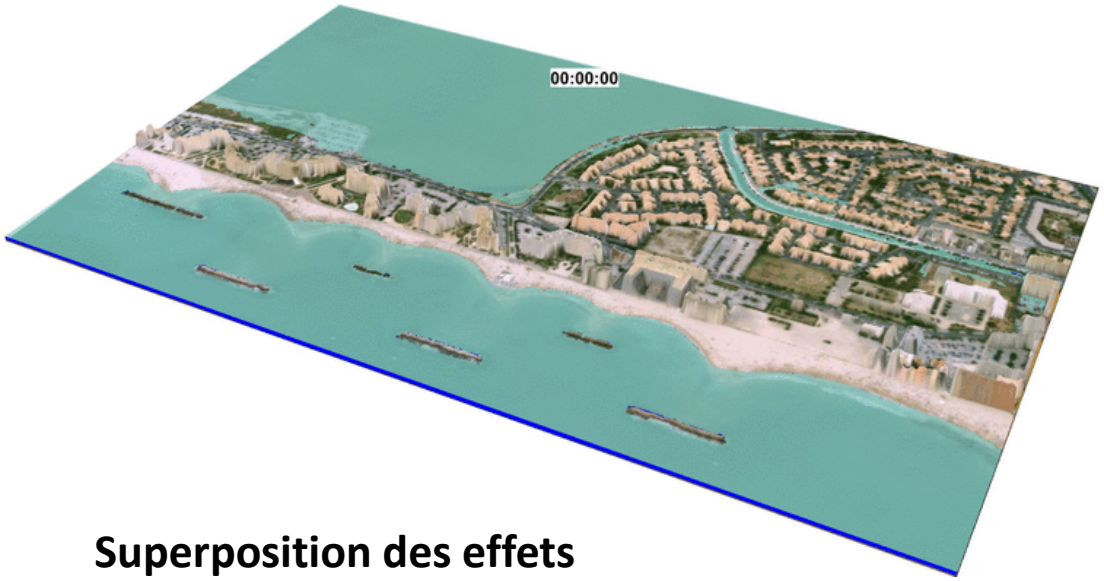


3. As warm water continually eats away at the glacier's base, the unstable cliff faces above the water line shear off under their own massive weight.

Source: "Contribution of Antarctica to Past and Future Sea-Level Rise," by Robert M. DeConto and David Pollard, in Nature

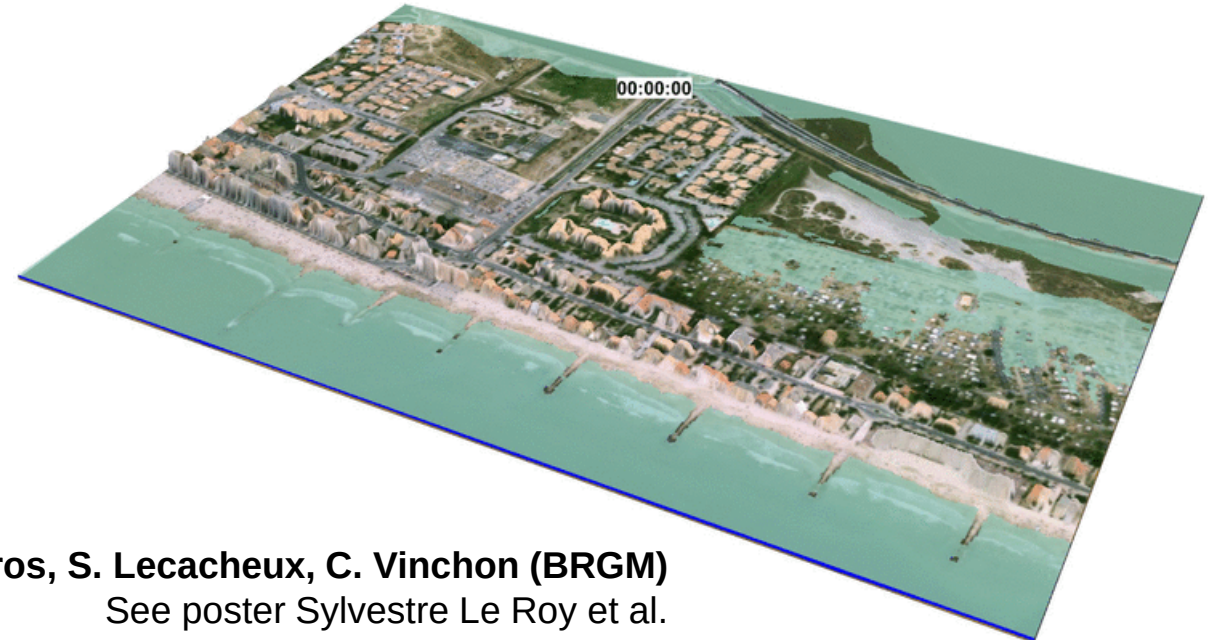
CHIQUI ESTEBAN, BONNIE BERKOWITZ, PATTERSON CLARK / THE WASHINGTON POST

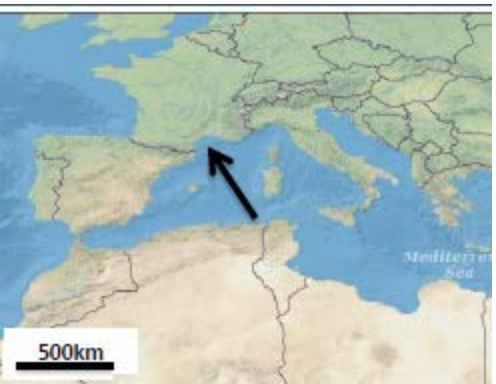
Modélisation vagues à vagues lors d'une tempête



- Suite de modèles depuis la méditerranée occidentale jusqu'à la côte
- Modélisation vagues à vagues
- Validation sur des tempêtes historiques (vagues, niveaux d'eau)
- Erreurs: moins de 20cm

Superposition des effets de la tempête de novembre 1982 et d'une élévation du niveau marin de +35cm

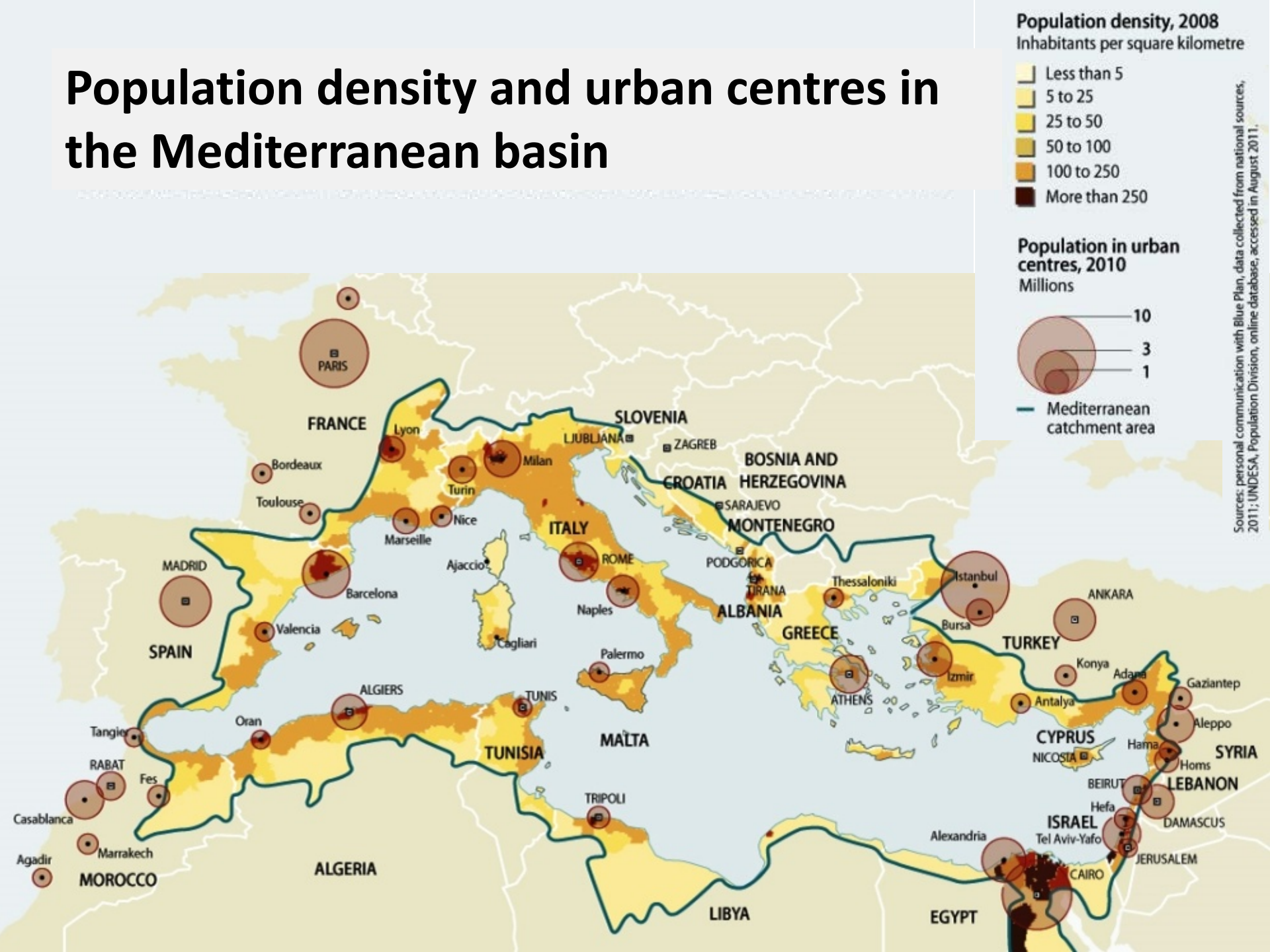




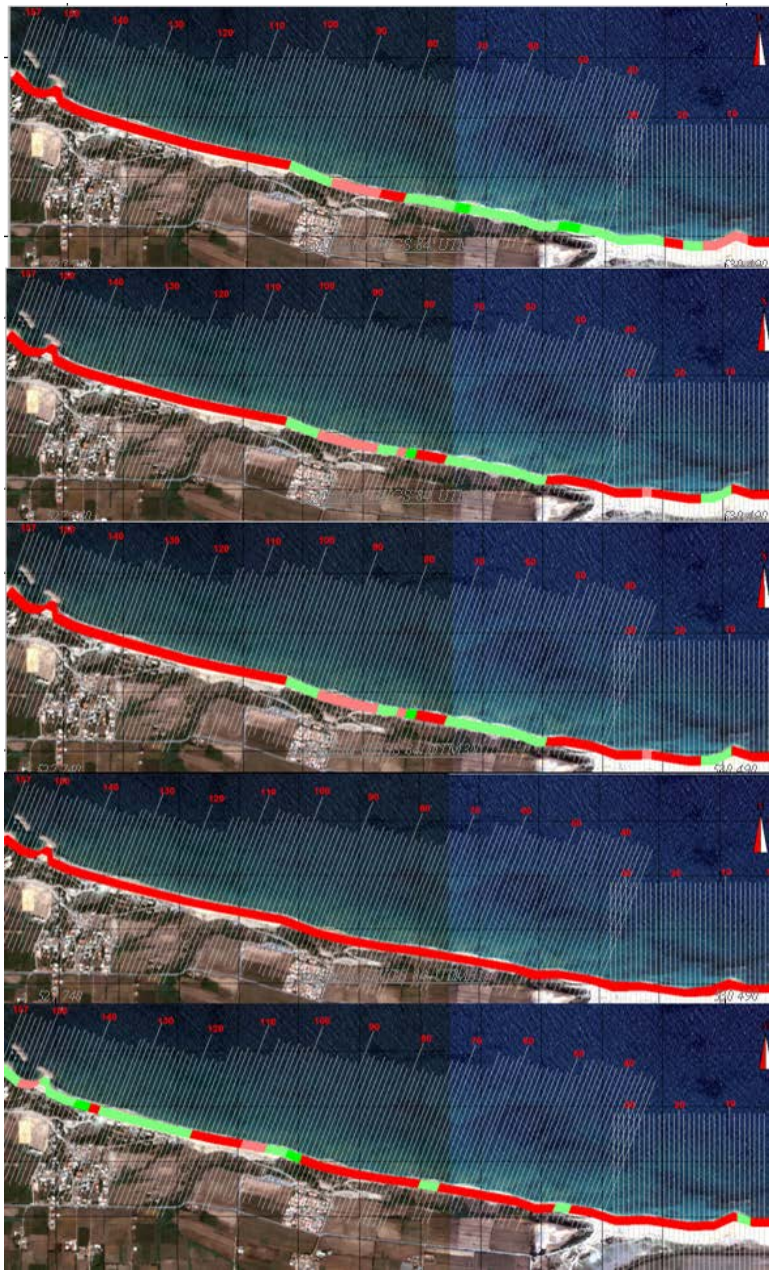
R. Pedreros, S. Lecacheux, C. Vinchon (BRGM)

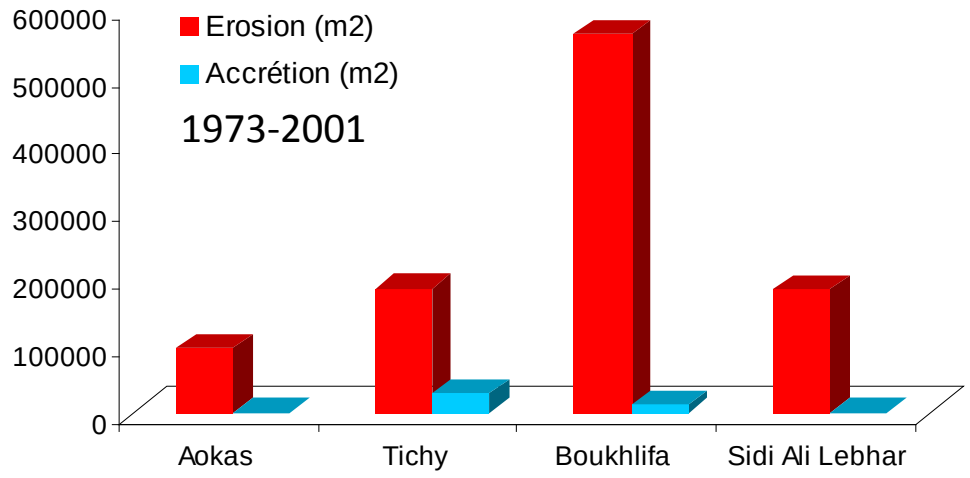
See poster Sylvestre Le Roy et al.

Population density and urban centres in the Mediterranean basin



Climate change and coastal erosion in Algeria





Cannes La Bocca, 3 Oct 2015, Photo: Philippe Farjon/VISUAL

Clearly, current policies do not address these challenges

Could it be that the science base is insufficiently known?

Developing a scientific assessment for decision makers

The MedECC ambition is to develop

- a scientifically robust assessment and synthesis of environmental change and its impacts in the Mediterranean Basin, based on published research
- a regional science-policy interface on climate and environmental change in the Mediterranean, approved by policy makers
- 390 scientists from 30 countries in MedECC have so far committed their contributions, on the condition that good interaction with policymakers can be ensured

Developing a scientific assessment for decision makers – main activities so far

- Overall scope (Aix-en-Provence, October 2016)
- WG1 (Rabat, May 2017): Water resources, energy, food security
- WG3 (Palermo, June 2017): Development, health, human security
- WG2 (Marseille, July 2017): Marine and terrestrial ecosystems and their services
- Drivers (Aix-en-Provence, March 2018)
- Report outlines from all WGs have been harmonized and will be discussed with policy makers for review

Developing a scientific assessment for decision makers – status today

- Thanks to support by UfM, a secretariat has been established at PlanBleu, Marseille
- Open call for contributions is launched now
- Update will be presented at UNFCCC-COP24, Katowice, Dec 2018

The MedECC First Assessment Report – outline

Summary for Policymakers — *stakeholder dialogue*

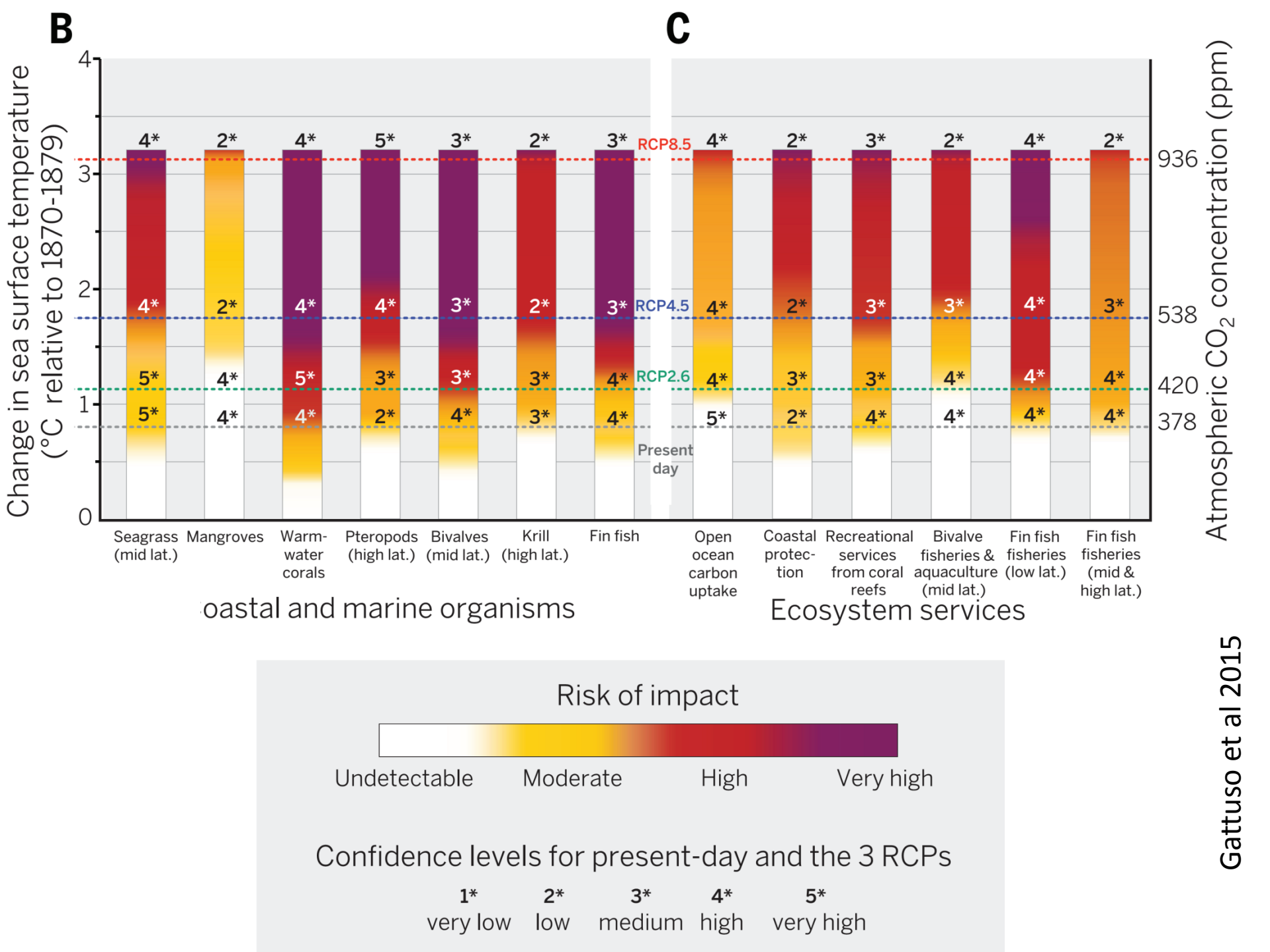
1. Introduction
2. Drivers of the environmental impacts (physical and human drivers)
   a. Climate
   b. Pollution
   c. Land/sea use and management
   d. Invasive species
3. Challenges
   a. Water, food, energy (WG1)
   b. Ecosystems and ecosystem services (WG2)
   c. Development, health and human security (WG3)

current main focus

4. Managing future risks and building resilience
   a. Best practices and policies for adaptation, mitigation and sustainable devel.
   b. Knowledge gaps and needs for research and observations
   c. Mediterranean cooperation and networking for building resilience
   d. Training and capacity building

second phase

Summary for policymakers to be submitted for approval by decision makers



Gattuso et al 2015


MedEC
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- Contributions are always welcome!
- Sign up at **medecc.org**