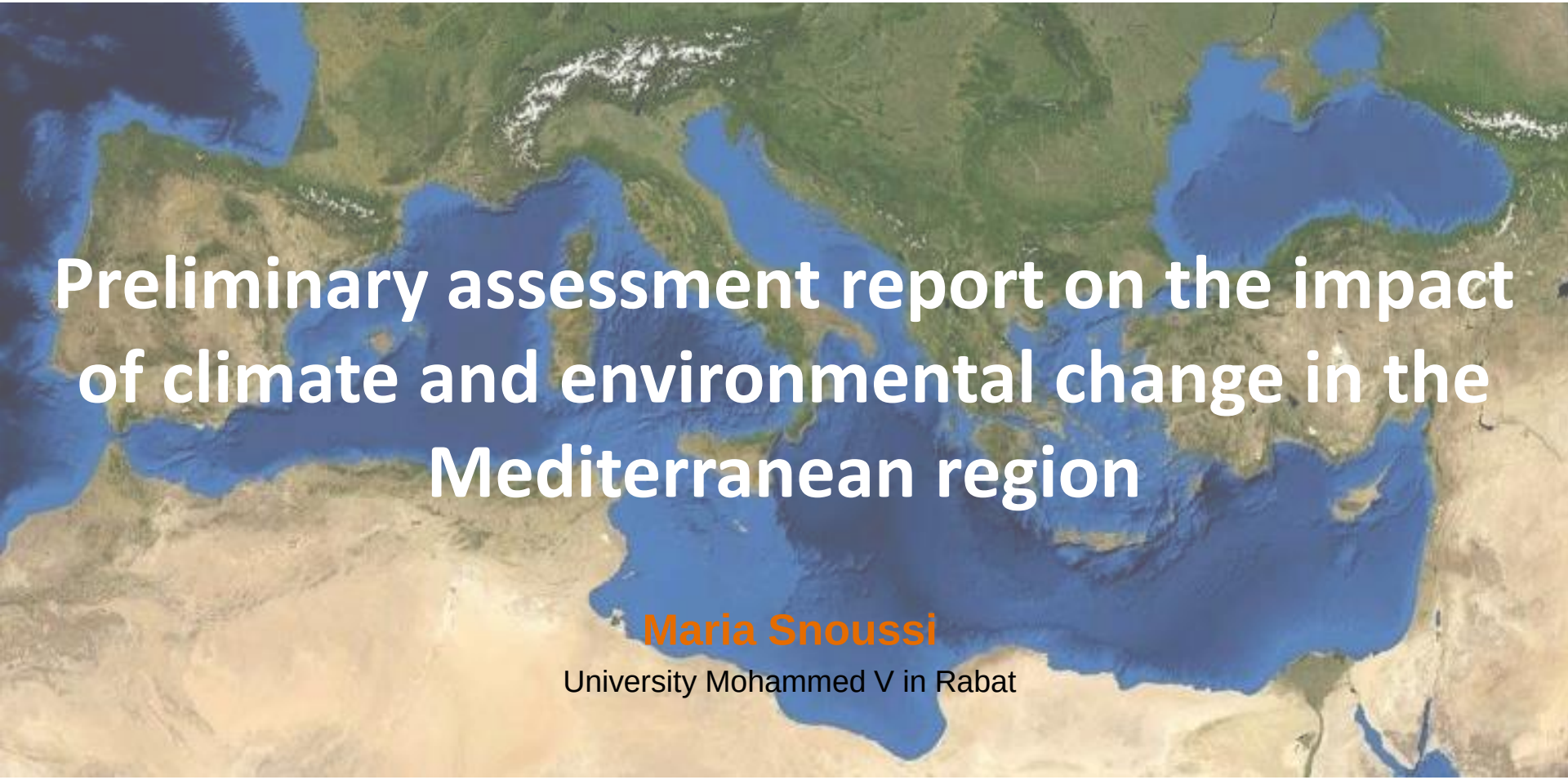


Preliminary assessment report on the impact of climate and environmental change in the Mediterranean region

Maria Snoussi
University Mohammed V in Rabat

On behalf of

MedECC
Mediterranean Experts on Climate and environmental Change

Brief history of MedECC

MedEC
Mediterranean Experts on Climate and environmental Change

- ✓ MedECC network launched in July 2015 by independent scientists, now approx. 700 members
- ✓ Initiates scientific assessment of environmental risks in the Mediterranean Basin
- ✓ Secretariat of the Union for the Mediterranean, in cooperation with Plan Bleu (UNEP/MAP Regional Activity Center) supports MedECC
- ✓ Contributes to the implementation of the Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025
- ✓ 2016-2017 Scoping for First Assessment Report (MAR1)
- ✓ 2018-2020 Report preparation (85 Lead Authors from 19 countries)
- ✓ Current status: Second Order Draft completed, external expert review completed, Lead Author Meeting Dec 11-13

Union for the Mediterranean
Union pour la Méditerranée
الإتحاد من أجل المتوسط

UN environment
United Nations Environment Programme

MAP
Mediterranean Action Plan
Barcelona Convention

Plan Bleu

Preliminary work

REVIEW ARTICLE
https://doi.org/10.1038/s41558-018-0299-2
2018
nature climate change

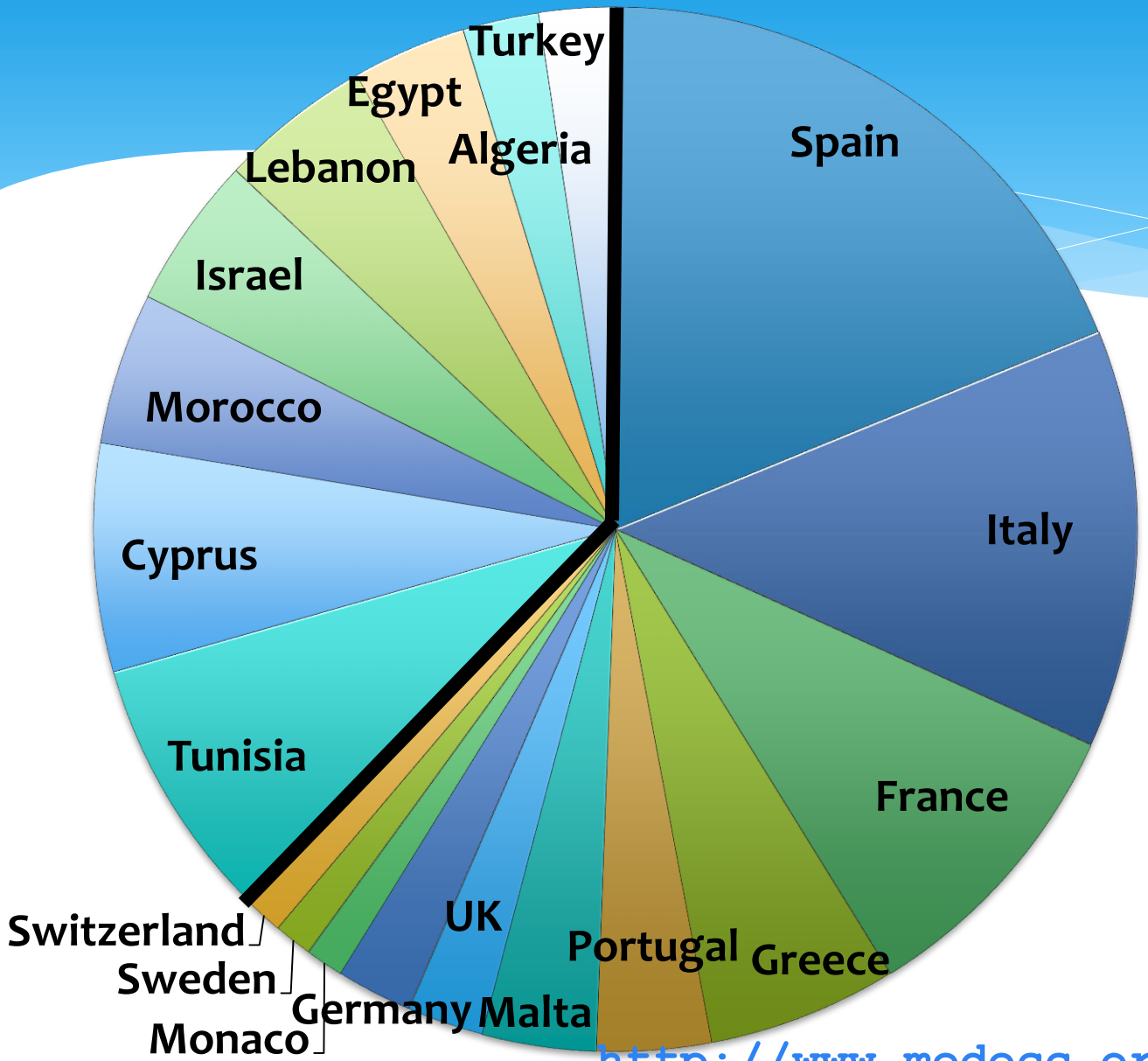
Climate change and interconnected risks to sustainable development in the Mediterranean

Wolfgang Cramer[1*], Joël Guiot[2], Marianela Fader[3], Joaquim Garrabou[4,5], Jean-Pierre Gattuso[6,7], Ana Iglesias[8], Manfred A. Lange[9], Piero Lionello[10,11], Maria Carmen Llasat[12], Shlomit Paz[13], Josep Peñuelas[14,15], Maria Snoussi[16], Andrea Toreti[17], Michael N. Tsimplis[18] and Elena Xoplaki[19]

Recent accelerated climate change has exacerbated existing environmental problems in the Mediterranean Basin that are caused by the combination of changes in land use, increasing pollution and declining biodiversity. For five broad and interconnected impact domains (water, ecosystems, food, health and security), current change and future scenarios consistently point to significant and increasing risks during the coming decades. Policies for the sustainable development of Mediterranean countries need to mitigate these risks and consider adaptation options, but currently lack adequate information — particularly for the most vulnerable southern Mediterranean societies, where fewer systematic observations schemes and impact models are based. A dedicated effort to synthesize existing scientific knowledge across disciplines is underway and aims to provide a better understanding of the combined risks posed.

http://www.medecc.org/ @Med_ECC

MedECC Report authors



85 scientists from 19 countries

32 authors from southern / eastern Med (38%)

30 female authors (35%), among 16 coordinators (CLAs), 7 females (44%)

MedECC
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MedECC First Assessment Report Outline

Summary for Policymakers

1. Introduction

2. Drivers of change (climate, land use, pollution, invasive alien species)

3. Challenges

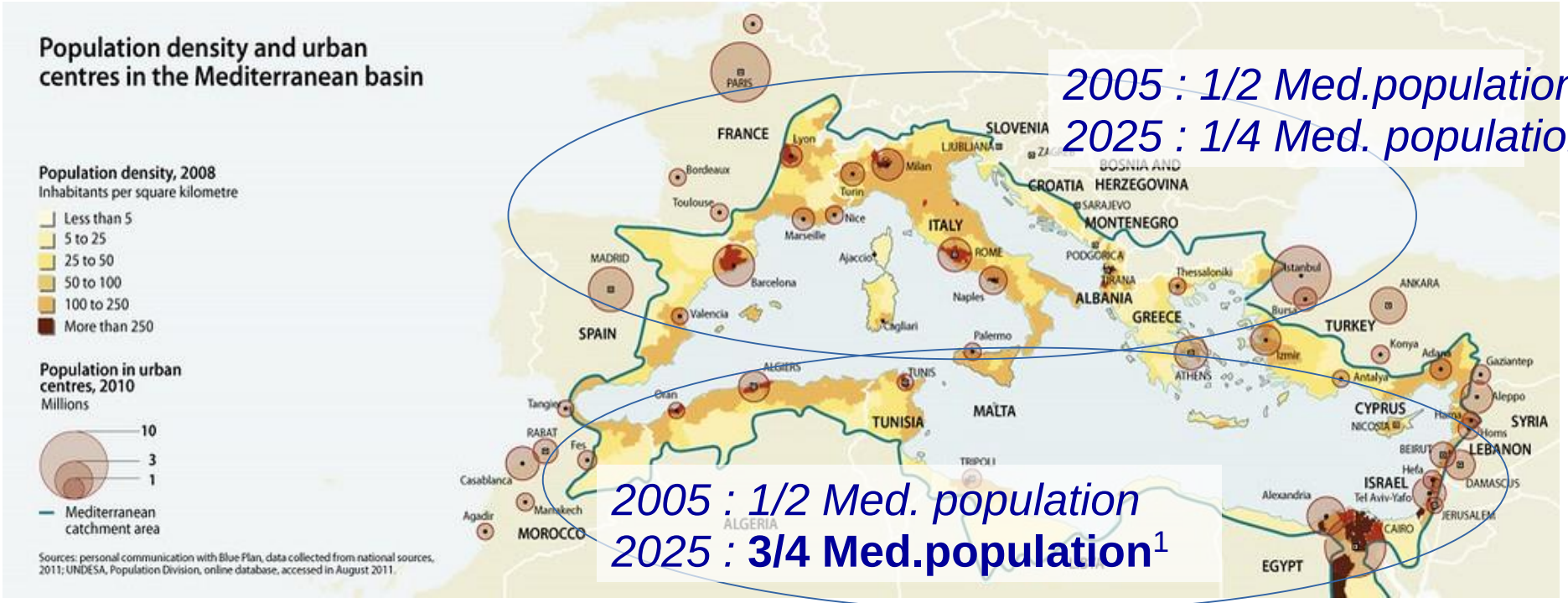
   3.1. Resources (water, food, energy)

   3.2. Ecosystems and ecosystem services

   3.3. Society (development, health and human security)

4. Managing future risks and building resilience

Mediterranean Population



Mediterranean Population Growth:

1/3 live on coastal areas

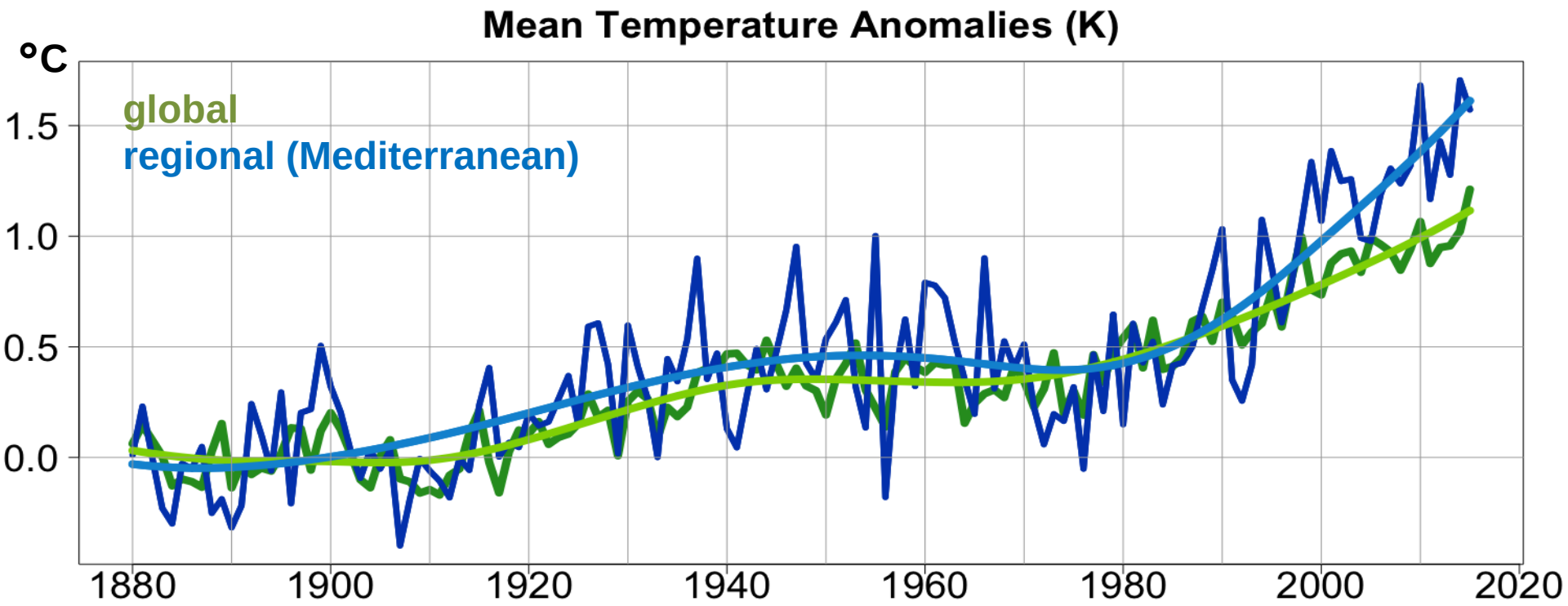
=

174 millions in 2025[3]

276 millions (1970),
517 millions (2019),
expected 529 millions (2025)[2]

[1]UNEP/MAP/MED POL 2005.[2]UNDSA 2011
[3]UN/MAP/BP/RAC 2005

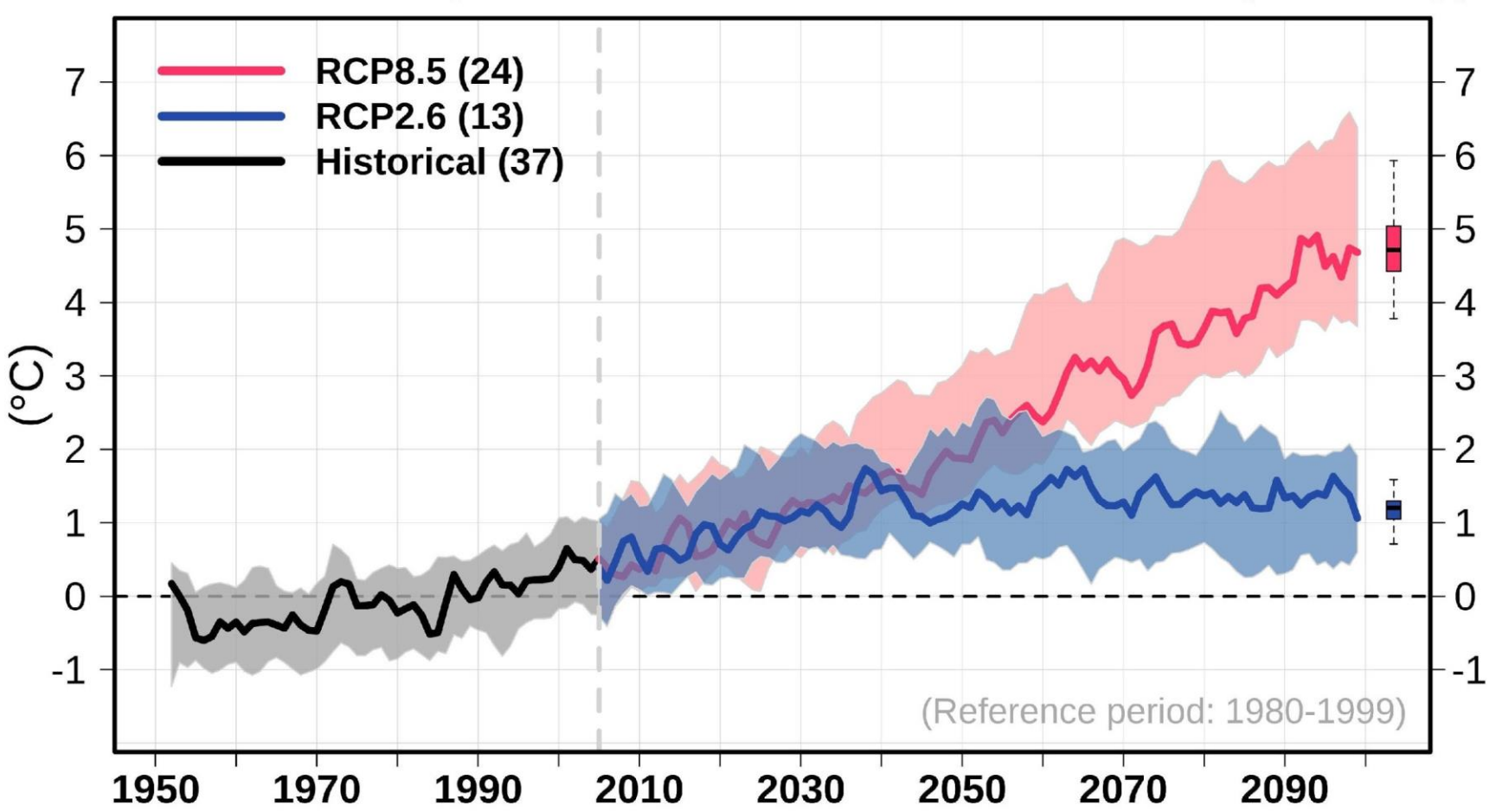
Mediterranean observed warming



- Mediterranean region currently warms 20% faster than the globe
- Annual mean temperature now 1.4°C above pre-industrial times
- Mean sea level has risen by 6 cm
- Ocean water acidity increases

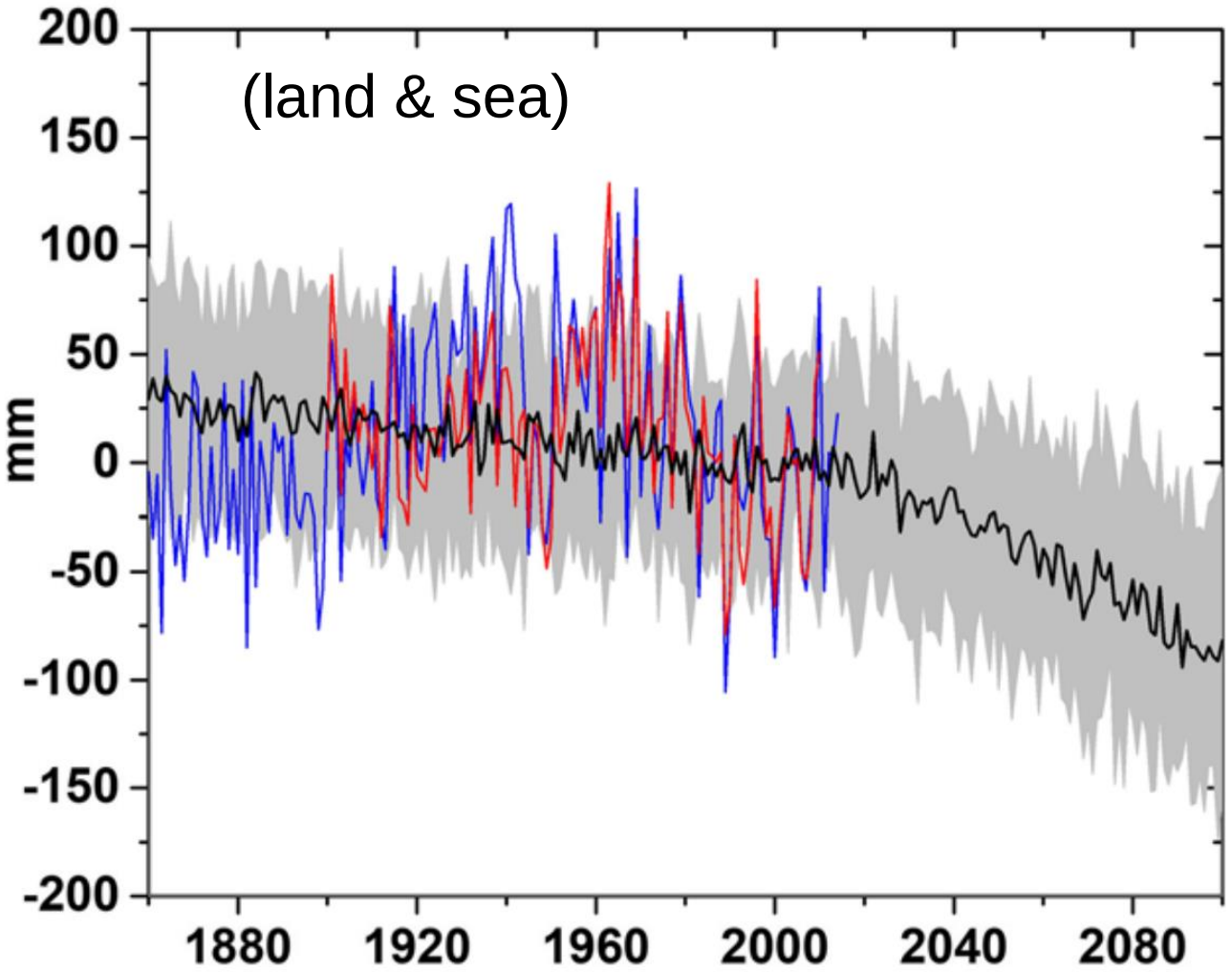
Cramer et al., 2018 (data analysis: A. Toreti, JRC)

Mediterranean expected warming



- Regional warming will continue to exceed global rates
- Heatwaves will intensify in duration and peak temperatures
- Summer rainfall will likely be reduced by 10 to 30% in some regions
- Sea level will rise faster than before (with regional differences), by 43-84 cm (global IPCC estimate) until 2100, but possibly more than one meter

Mediterranean annual rainfall trend (MedECC)



Rainfall in the Mediterranean is expected to drop, especially in summer, by as much as 30–40% by the end of the century if no mitigation efforts are made

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

Mediterranean fisheries

1950-2011

Loosing 41 % top marine predators

Loosing 34 % fish species

CAUSES

Warming

Overfishing

Pollution

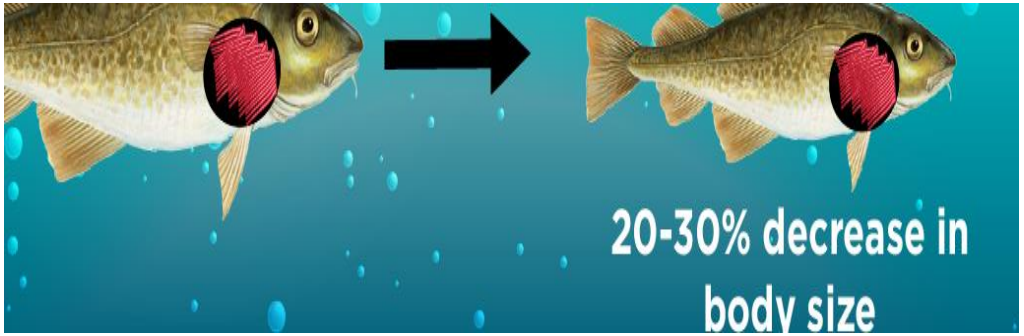
Invasive species

1°C warming throughout the upper ocean will result in the increase of hypoxic areas (low in oxygen) by 10

(Deutsch et al.,2011)

For every 1 °C increase in water temperature

(Pauly and Cheung, 2018)



Mediterranean agriculture

Mediterranean region 60% of the world's growing area for durum wheat. Through bread, pasta or couscous, this is the base of the food pyramid and are daily included as part of the main meals in Mediterranean diet.

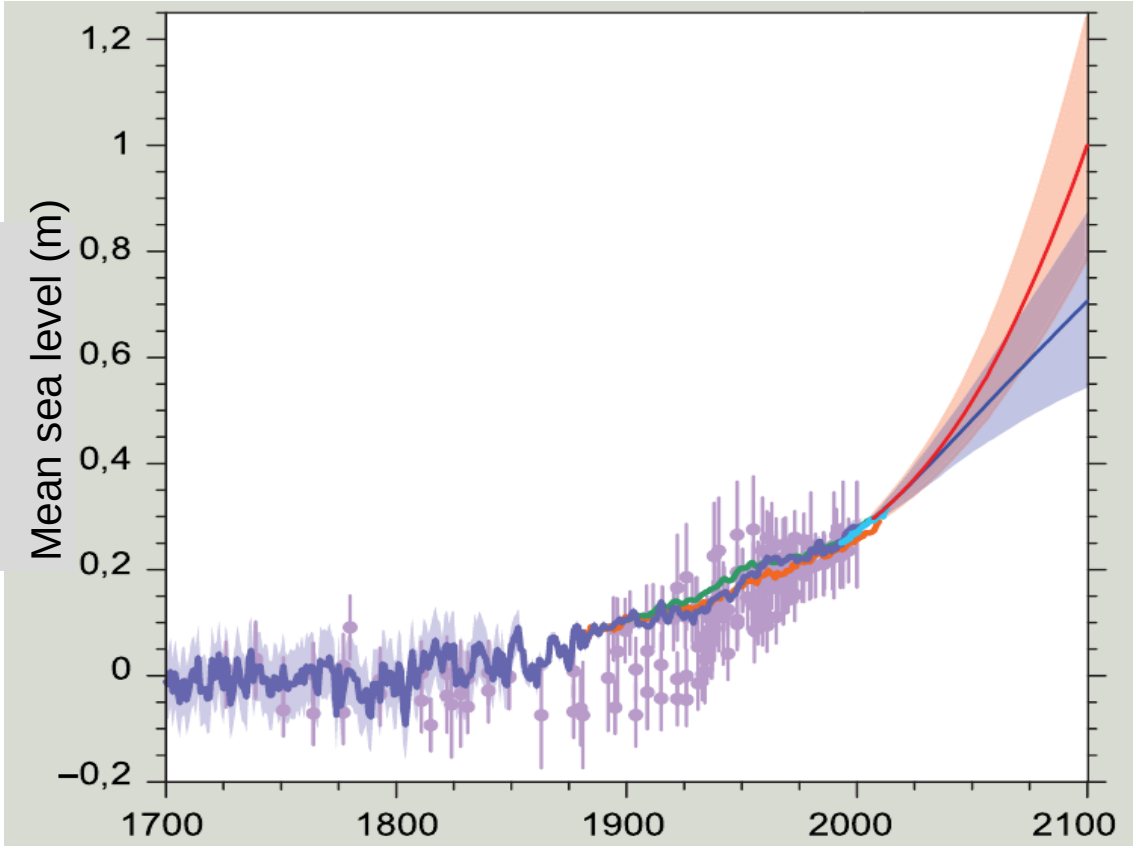
Photo: Manfred Richter

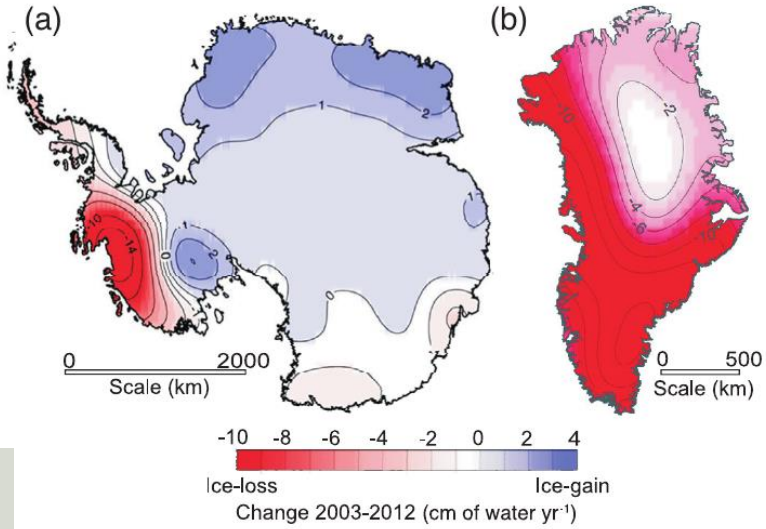
Wheat yield reduction of 7.5 % for each 1°C of warming
At 5°C rise (high GHG scenario in 2090): 37.5 % yield reduction (without considering other parameters like reduced rainfall or direct CO_2 effects

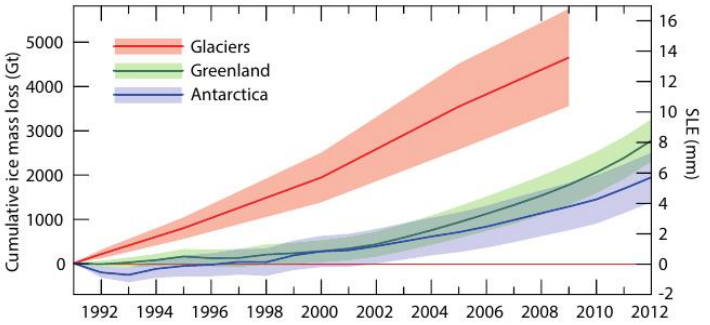
Agroecological techniques may provide enhanced resilience and also carbon storage for climate protection.

Global mean sea level rise

- 40-80 cm by 2100 considered “likely”
- growing risk of Antarctic destabilization
- 1-2 m cannot be ruled out



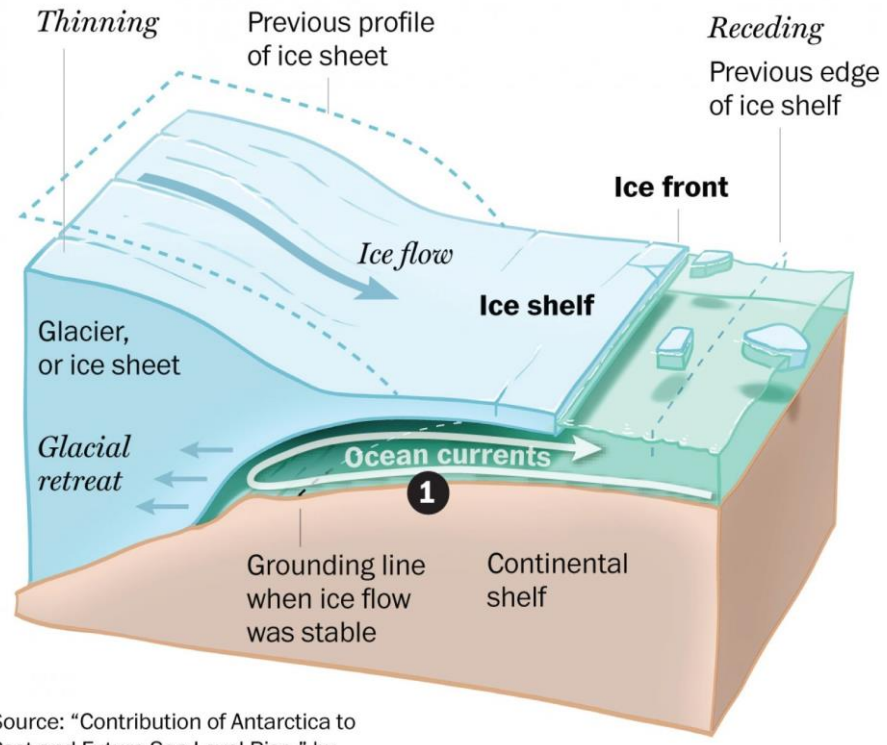




Melting from below

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.



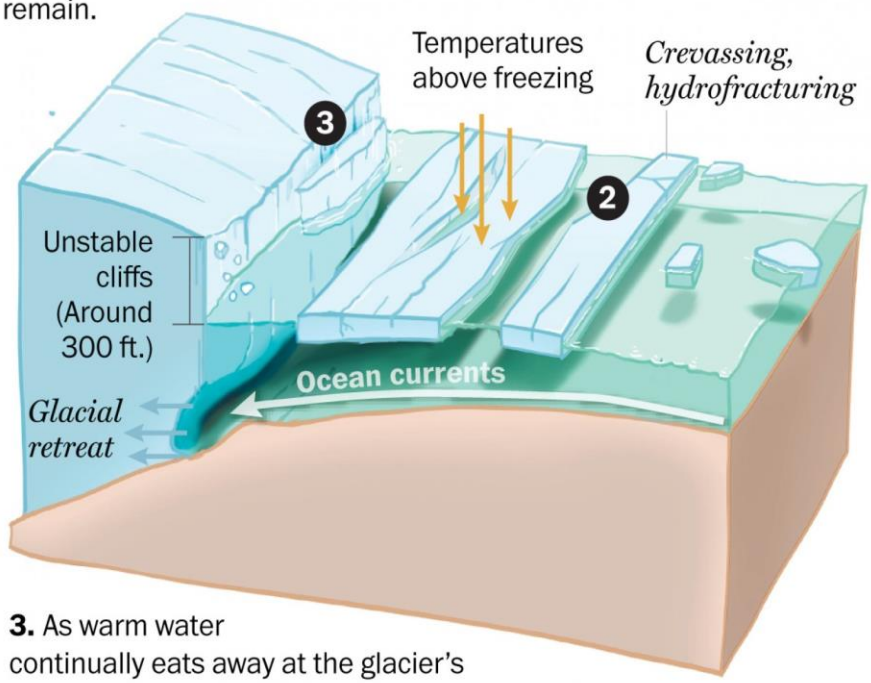
Source: "Contribution of Antarctica to Past and Future Sea-Level Rise," by Robert M. DeConto and David Pollard, in Nature

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.

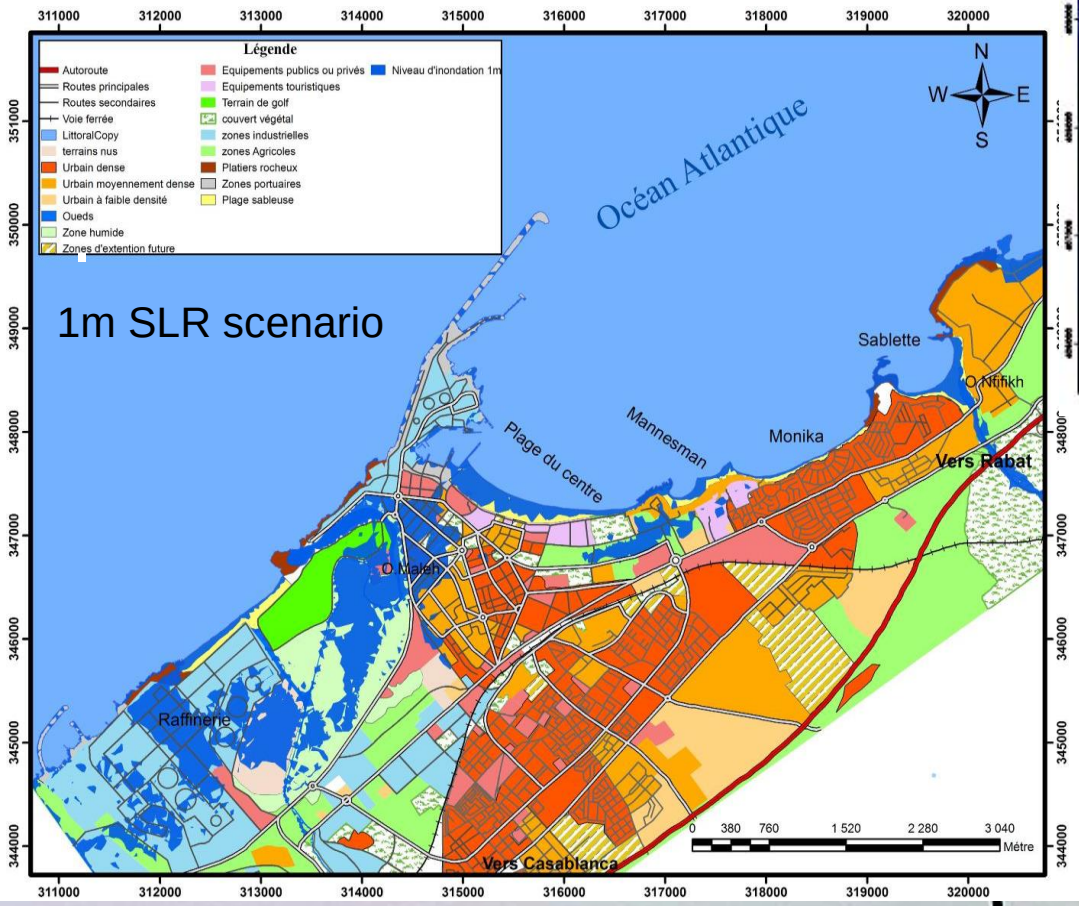


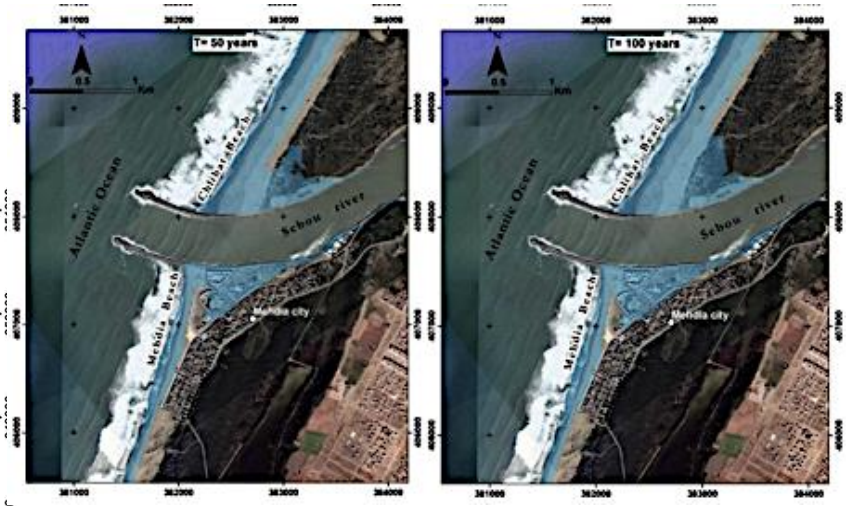
3. As warm water continually eats away at the glacier's base, the unstable cliff faces above the water line shear off under their own massive weight.

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

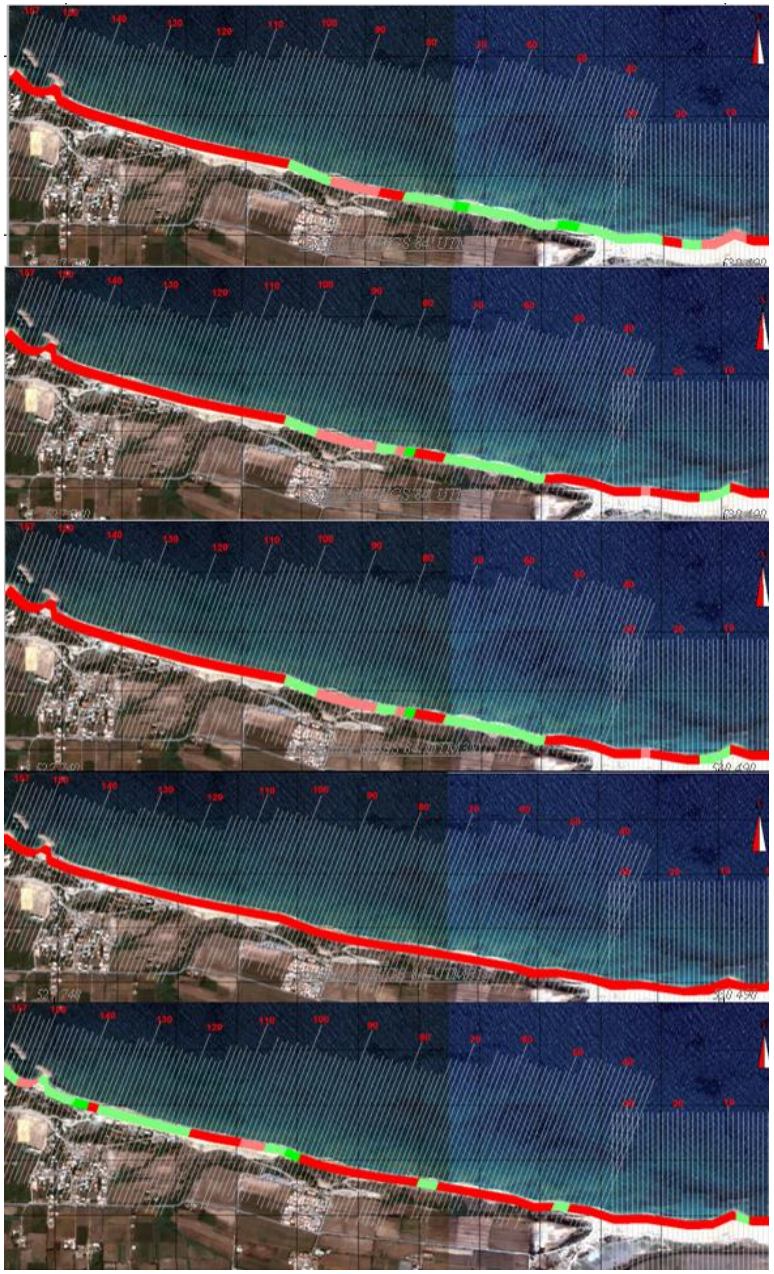
CHIQUI ESTEBAN, BONNIE BERKOWITZ, PATTERSON CLARK / THE WASHINGTON POST

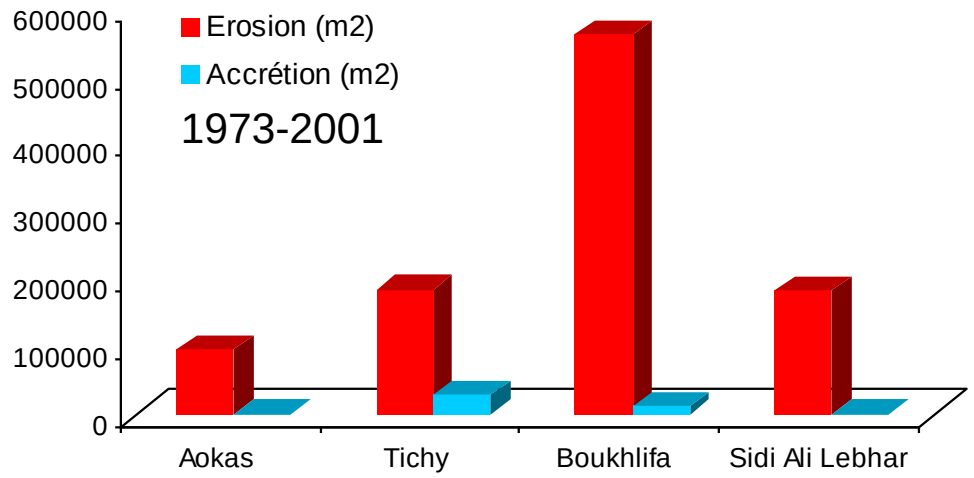
Coastal risks





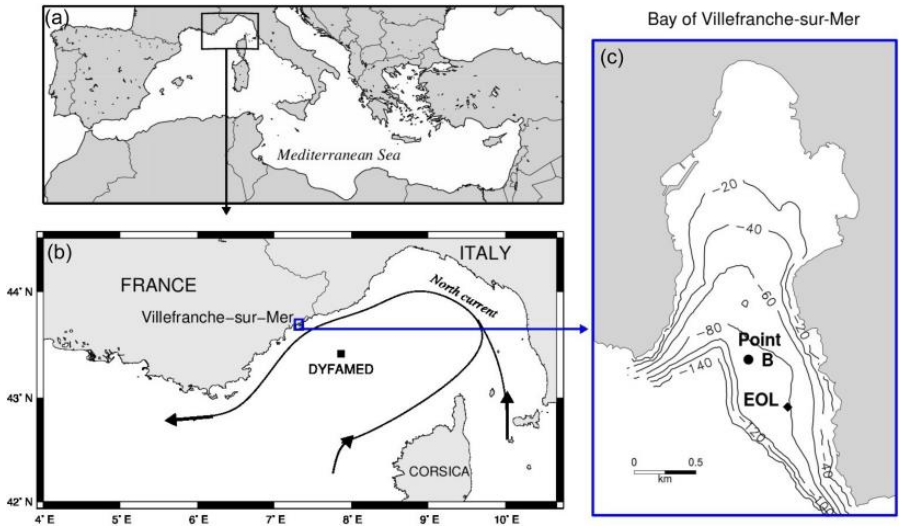
Coastal erosion in Algeria



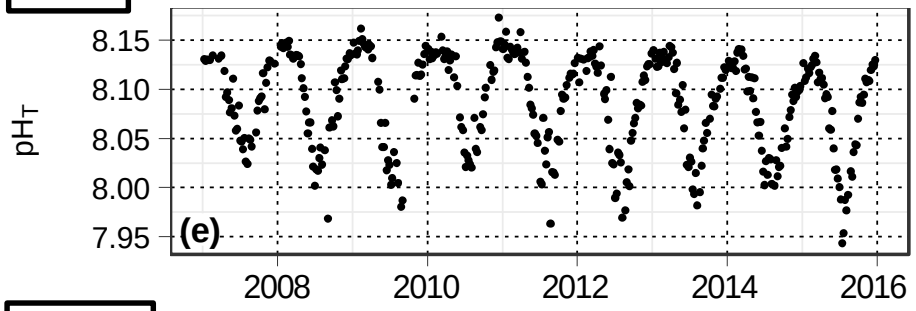


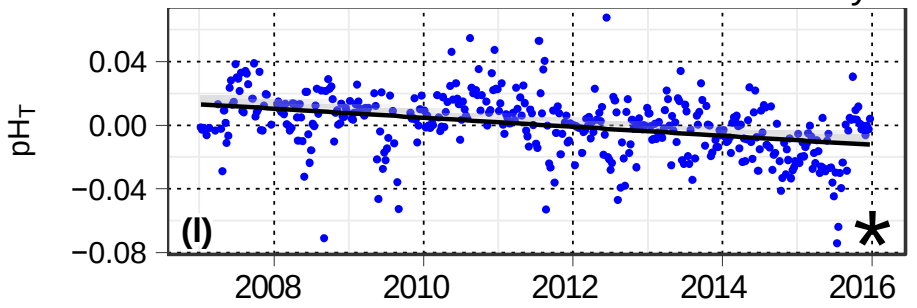
Mediterranean acidification

Ocean acidification is already measurable in the Mediterranean Sea

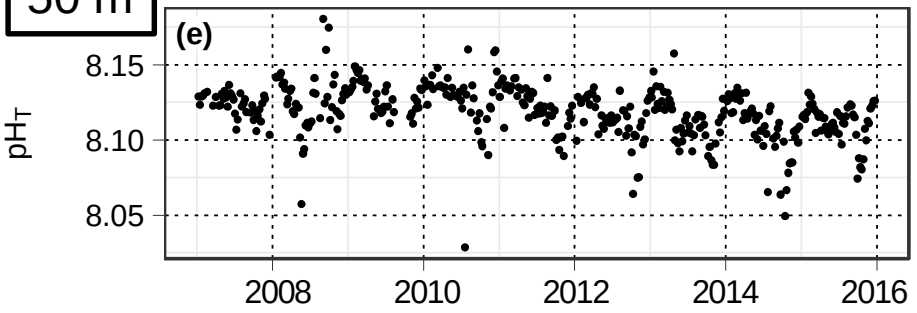


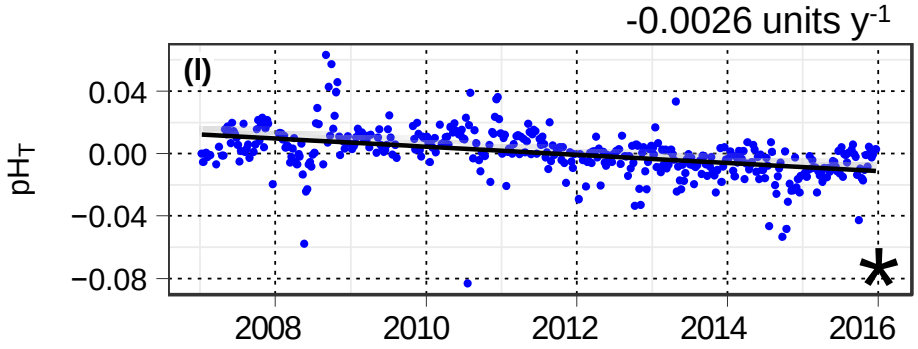
1 m





50 m



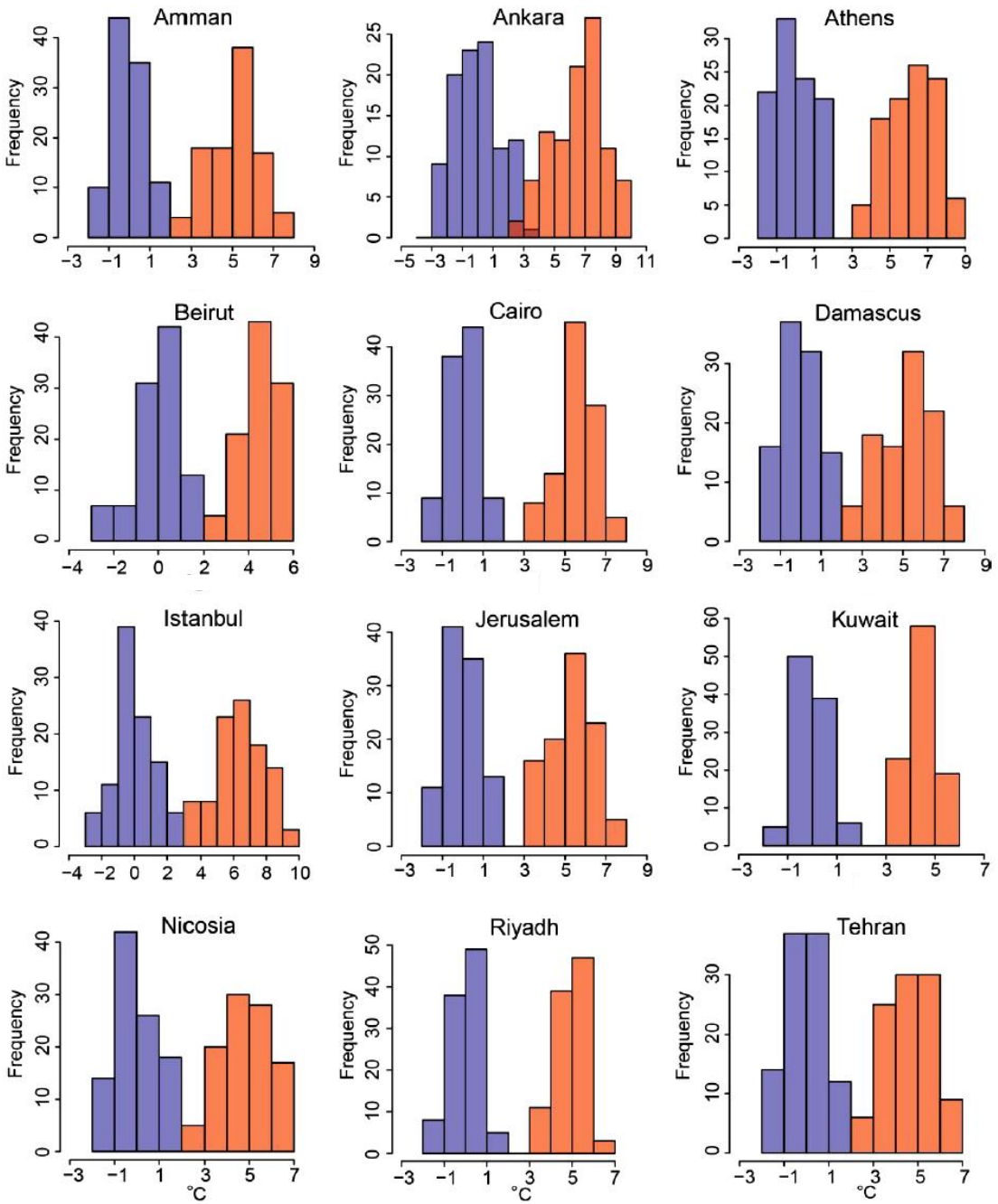


Impacts of Mediterranean acidification

In the coming decades, synergies between warming and acidification are likely to affect large numbers of marine species including commercial species such as mussels

Urban warming in MENA cities

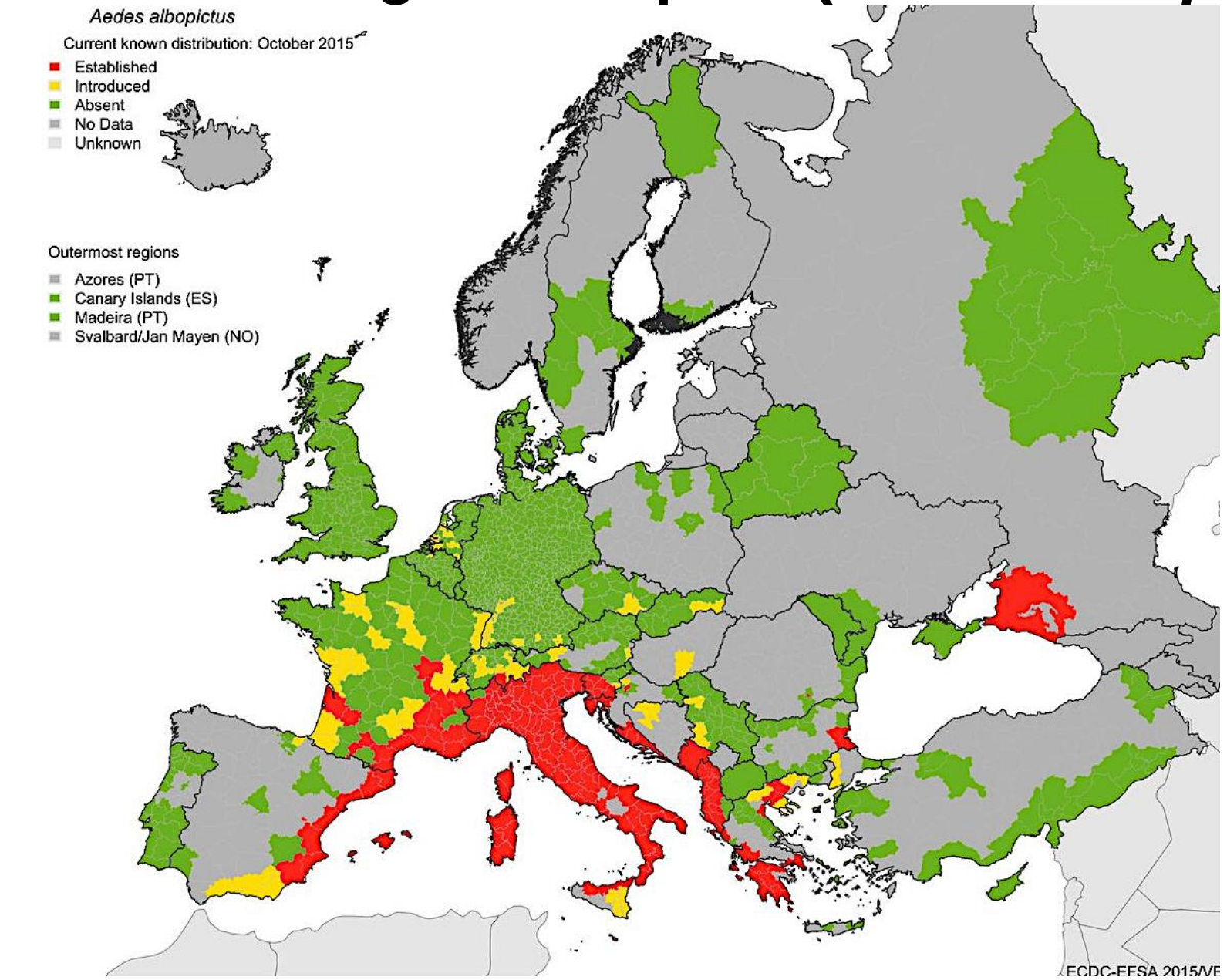
For most of the large cities in the MENA Region ⇨ coldest summer month in the future will be warmer than today's hottest month



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

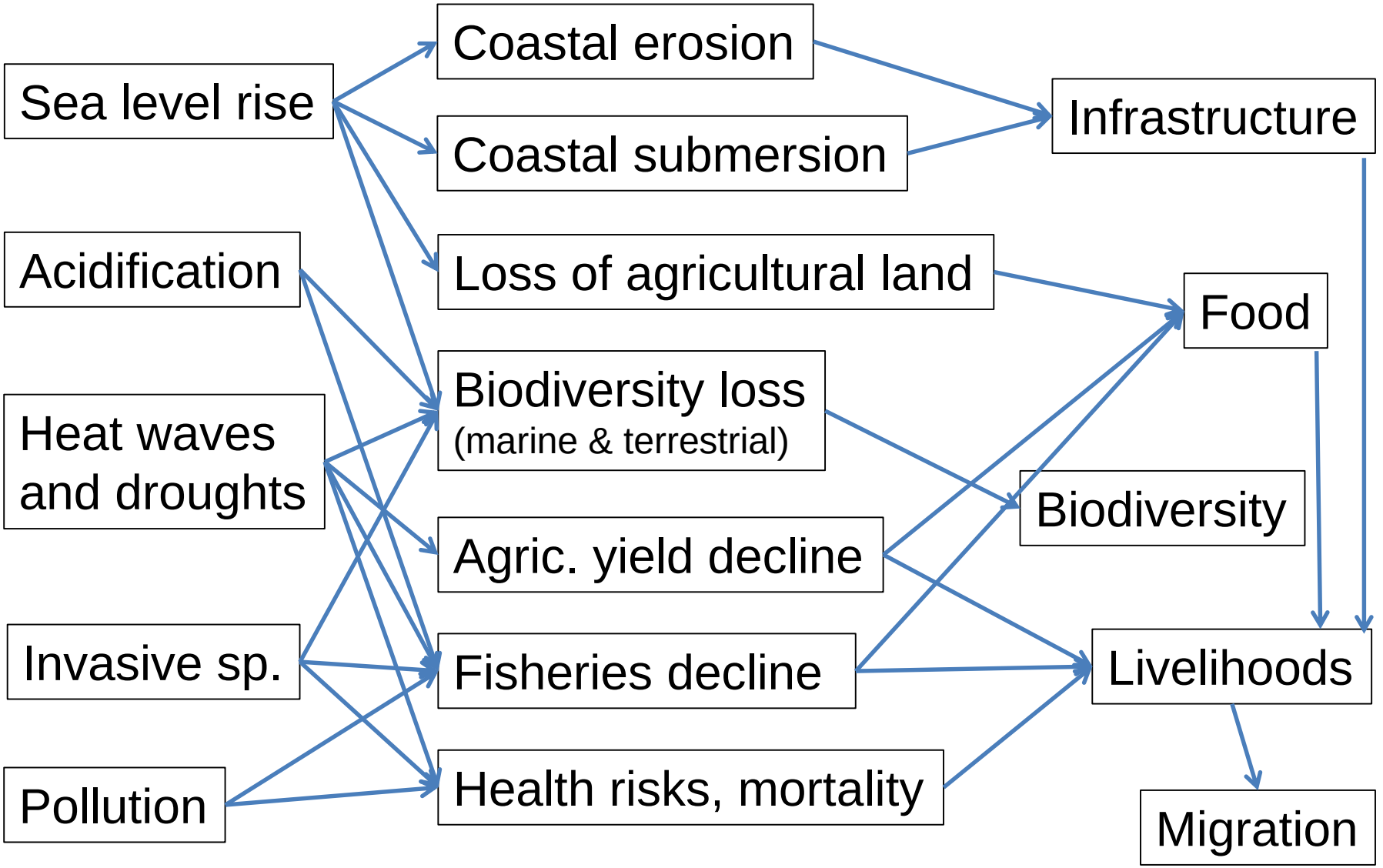
Lelieveld et al. 2014, Regional Environmental Change

Invasion of tiger mosquito (*Aedes albopictus*)



[ECDC (European Center for disease prevention and control]

Key risks in the Mediterranean Basin




Thank you very much for your attention!

Supporting institutions for MedECC

Union for the Mediterranean
Union pour la Méditerranée
الإتحاد من أجل المتوسط

Sweden
Sverige

UN environment
United Nations Environment Programme

MAP
Mediterranean Action Plan
Barcelona Convention

Plan Bleu

Support for MedECC events

ADEME
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OSMED LABEX

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Initiative d'excellence

Gouvernement Princier
PRINCIPAUTÉ DE MONACO

air

Generalitat de Catalunya
Consell Assessor per al Desenvolupament Sostenible

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FRANCE
French National Research Institute for Sustainable Development

Région Provence Alpes Côte d'Azur