

29 MAGGIO 2017

## Festival dello Sviluppo Sostenibile

Politecnico di Milano | Piazza Leonardo da Vinci, 32 | Edificio 3 | Aula De Donato

### Convegno

# «Il clima del futuro, i ghiacci del pianeta e noi»

## Introduzione

*Stefano Caserini*

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PARTNER



MAIN MEDIA PARTNER



MEDIA PARTNER



CON LA COLLABORAZIONE DI



CON IL CONTRIBUTO DEL



MINISTERO DELL'AMBIENTE  
E DELLA TUTELA DEL TERRITORIO E DEL MARE

# Obiettivo n. 13: agire per il clima



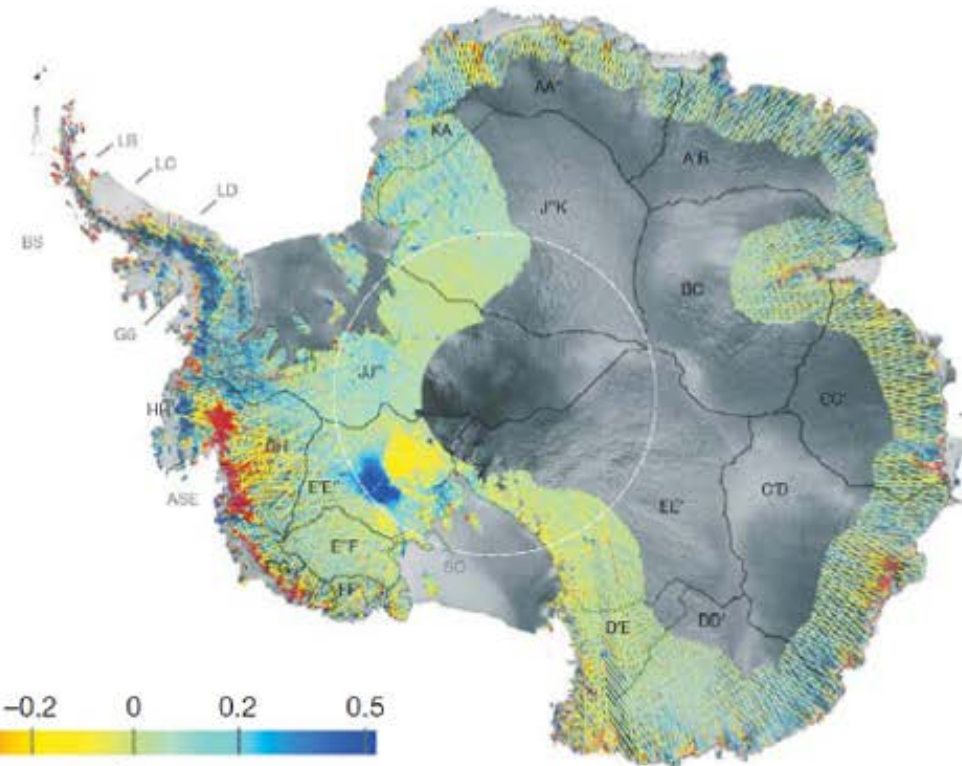
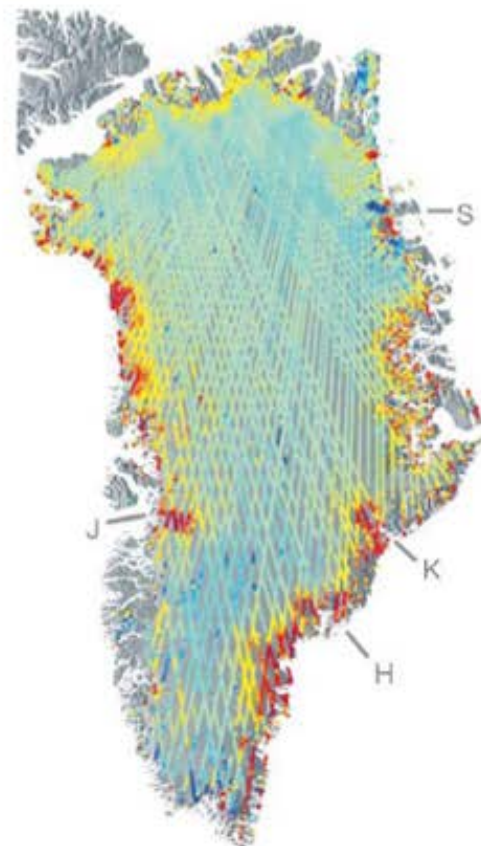
## SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD



# **I ghiacci del pianeta: una grande rimozione nel dibattito sul cambiamento climatico?**

# I ghiacci del pianeta: una grande rimozione nel dibattito sul cambiamento climatico?



(Pritchard et al. 2009)

# I ghiacci del pianeta: una grande rimozione nel dibattito sul cambiamento climatico?

*Nature Vol. 271 26 January 1978*

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## West Antarctic ice sheet and CO<sub>2</sub> greenhouse effect: a threat of disaster

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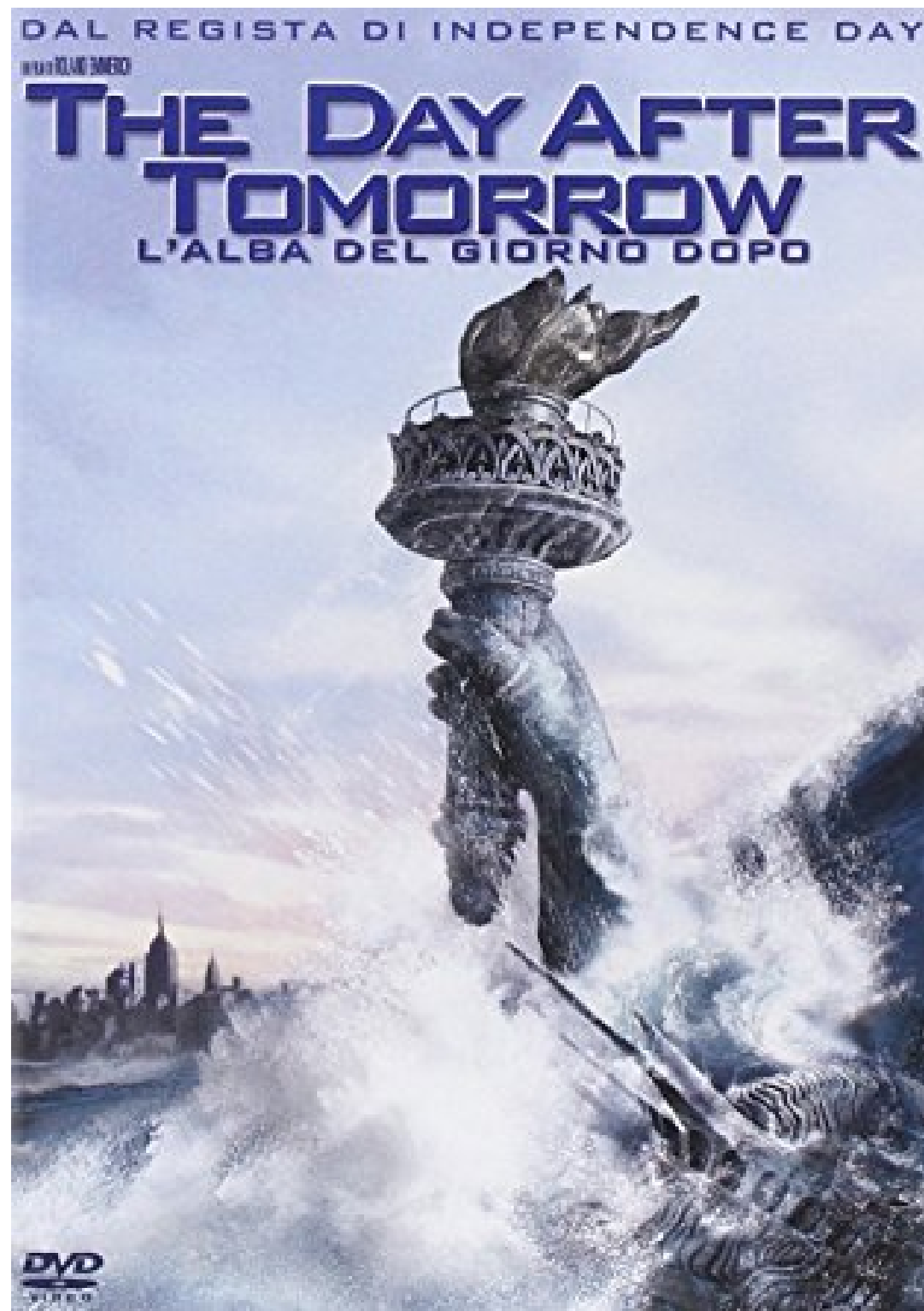
*If the global consumption of fossil fuels continues to grow at its present rate, atmospheric CO<sub>2</sub> content will double in about 50 years. Climatic models suggest that the resultant greenhouse-warming effect will be greatly magnified in high latitudes. The computed temperature rise at lat 80° S could start rapid deglaciation of West Antarctica, leading to a 5 m rise in sea level.*

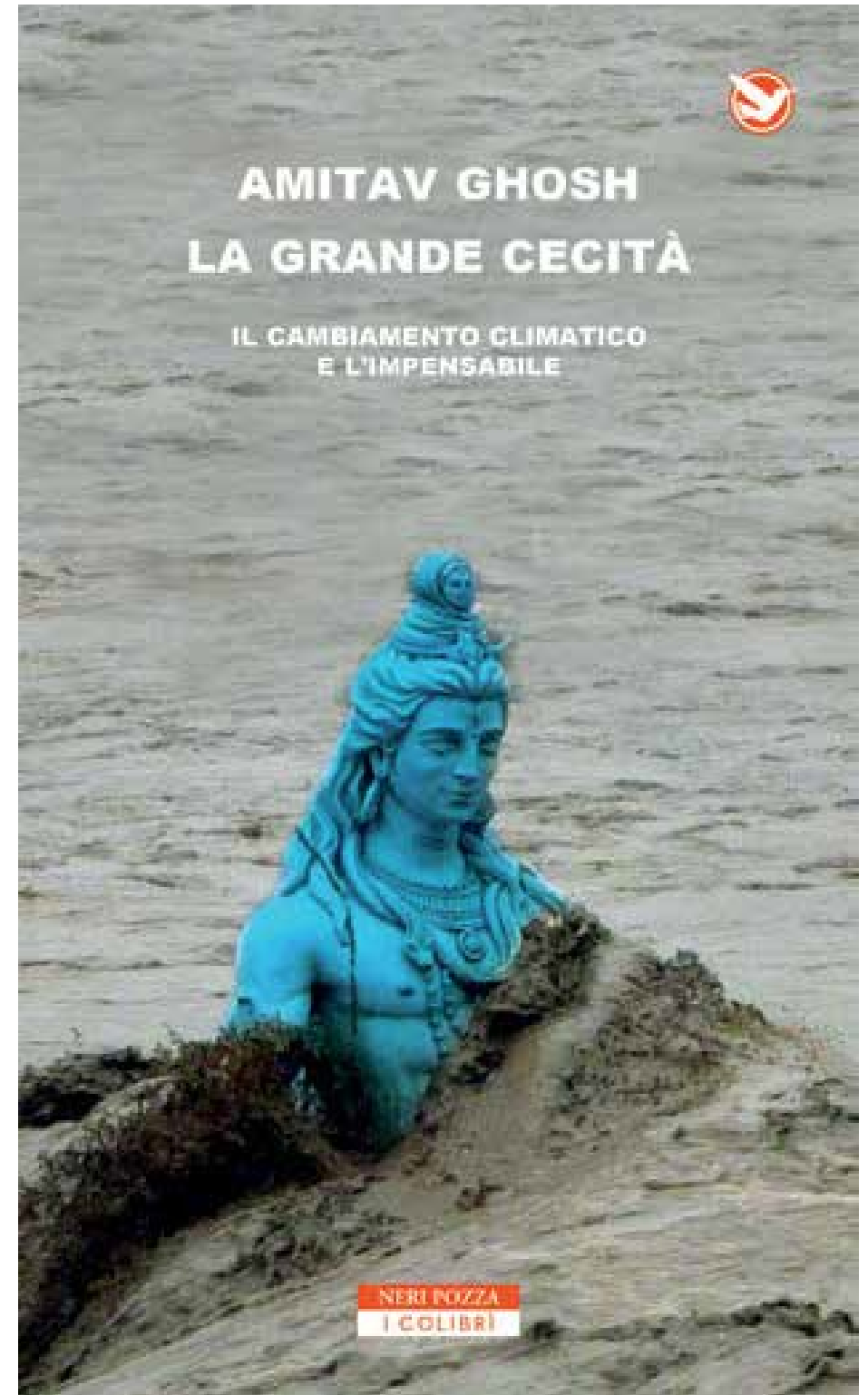
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ATMOSPHERIC carbon dioxide traps some of the long-wave radiation emitted by the Earth's surface (principally near 15 μm wavelength), thereby tending to warm the troposphere. This so-called greenhouse effect has long been suspected<sup>1,2</sup> but only recently as the implications of a continuation of the current

If so, the actual doubling time for atmospheric CO<sub>2</sub> content is likely to be nearer 50 than 200 years.

Many attempts have been made to estimate by climatic modelling the average global rise in temperature that would result from a doubling of atmosphere CO<sub>2</sub> content. The figures obtained have ranged from 0.7 K to 9.6 K, and Schneider<sup>7</sup> has critically examined the models in an attempt to clear up the confusion created by these widely different estimates. He points out that some of the models give unrealistic results because they compute an equilibrium condition for the Earth's surface rather than for the Earth-atmosphere system as a whole. He stresses the advantages of radiative-convective models, which take into account vertical motions of the atmosphere and latent heat transport, and he compares the radiative-convective models of Rasool and Schneider<sup>8</sup>, who





## PERSPECTIVE

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nature  
climate change

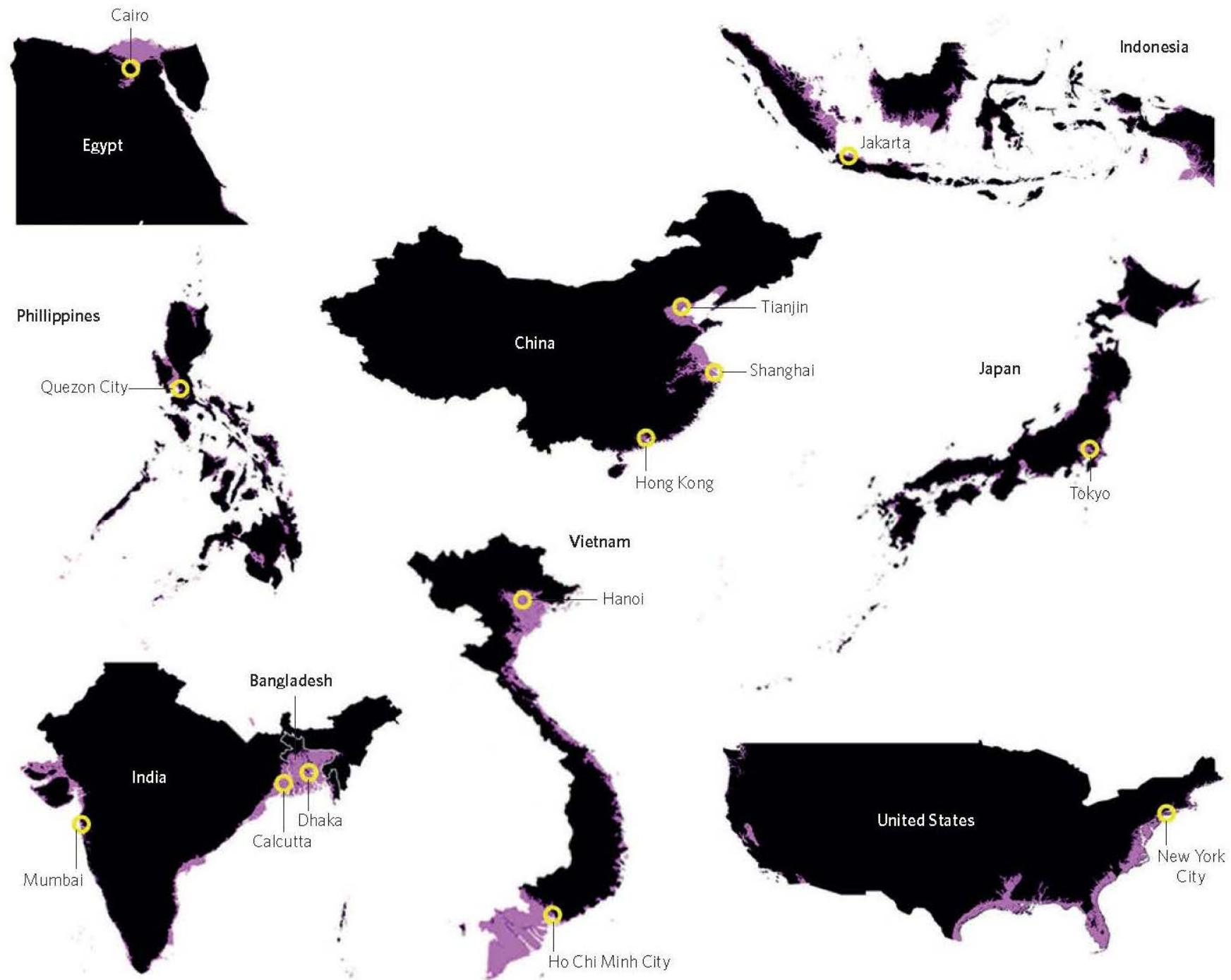
# Consequences of twenty-first-century policy for multi-millennial climate and sea-level change

Peter U. Clark<sup>1\*</sup>, Jeremy D. Shakun<sup>2</sup>, Shaun A. Marcott<sup>3</sup>, Alan C. Mix<sup>1</sup>, Michael Eby<sup>4,5</sup>, Scott Kulp<sup>6</sup>, Anders Levermann<sup>7,8,9</sup>, Glenn A. Milne<sup>10</sup>, Patrik L. Pfister<sup>11</sup>, Benjamin D. Santer<sup>12</sup>, Daniel P. Schrag<sup>13</sup>, Susan Solomon<sup>14</sup>, Thomas F. Stocker<sup>11,15</sup>, Benjamin H. Strauss<sup>6</sup>, Andrew J. Weaver<sup>4</sup>, Ricarda Winkelmann<sup>7</sup>, David Archer<sup>16</sup>, Edouard Bard<sup>17</sup>, Aaron Goldner<sup>18</sup>, Kurt Lambeck<sup>19,20</sup>, Raymond T. Pierrehumbert<sup>21</sup> and Gian-Kasper Plattner<sup>11</sup>

*“...policy decisions made in the next few years to decades will have profound impacts on global climate, ecosystems and human societies — not just for this century, but for the next ten millennia and beyond.”*



# Projected submerged areas in heavily populated areas affected by sea-level rise



Source: Clark et al., 2016 Consequences of twenty-first-century policy for multi-millennial climate and sea-level change. *Nature Climate Change*, 6, 360-369

## Contribution of Antarctica to past and future sea-level rise

Robert M. DeConto<sup>1</sup> & David Pollard<sup>2</sup>

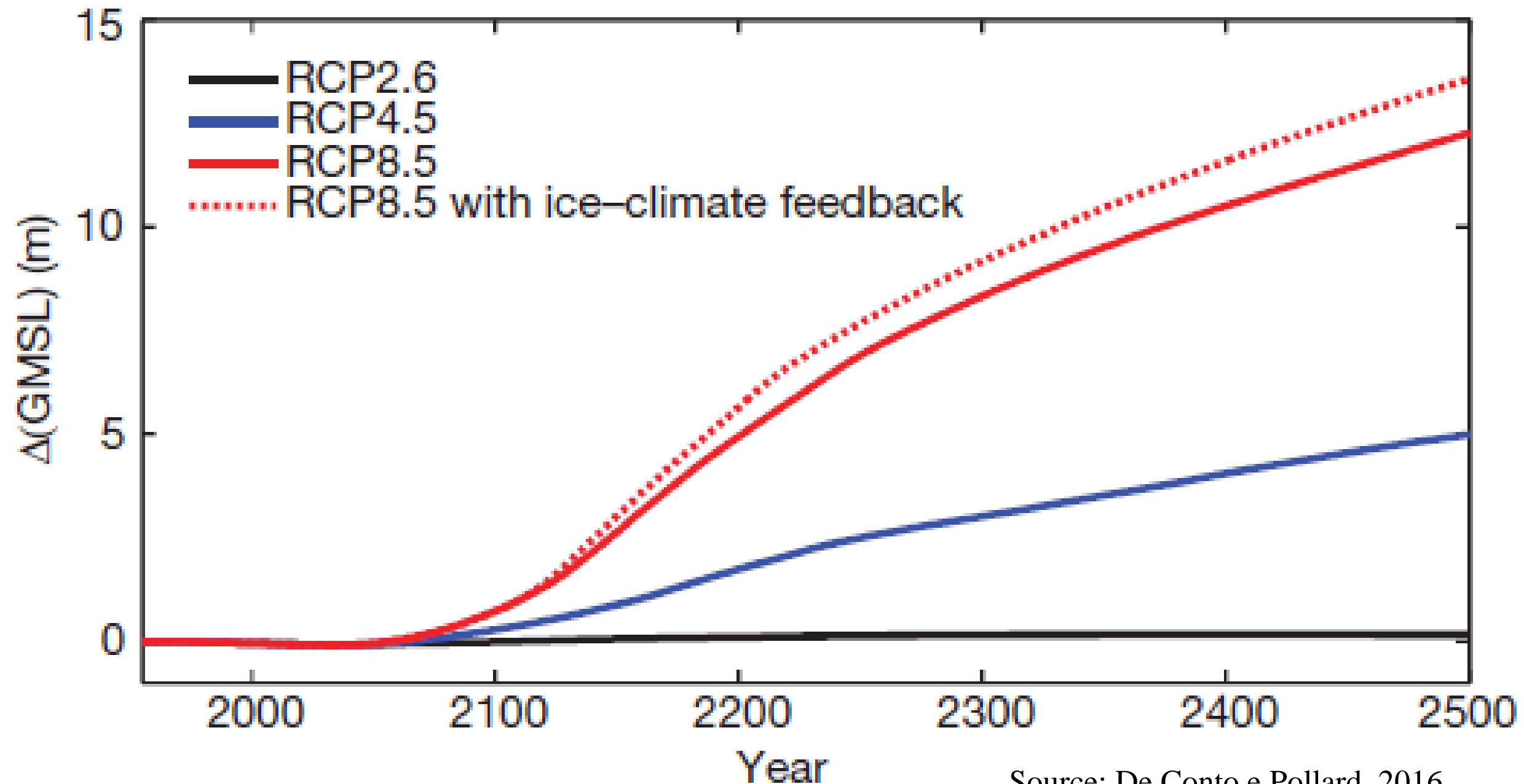
Polar temperatures over the last several million years have, at times, been slightly warmer than today, yet global mean sea level has been 6–9 metres higher as recently as the Last Interglacial (130,000 to 115,000 years ago) and possibly higher during the Pliocene epoch (about three million years ago). In both cases the Antarctic ice sheet has been implicated as the primary contributor, hinting at its future vulnerability. Here we use a model coupling ice sheet and climate dynamics—including previously underappreciated processes linking atmospheric warming with hydrofracturing of buttressing ice shelves and structural collapse of marine-terminating ice cliffs—that is calibrated against Pliocene and Last Interglacial sea-level estimates and applied to future greenhouse gas emission scenarios. Antarctica has the potential to contribute more than a metre of sea-level rise by 2100 and more than 15 metres by 2500, if emissions continue unabated. In this case atmospheric warming will soon become the dominant driver of ice loss, but prolonged ocean warming will delay its recovery for thousands of years.

*“Antarctica has the potential to contribute more than a metre of sea-level rise by 2100 and more than 15 metres by 2500, if emissions continue unabated”*

Marzo 2016

# Projection of future Antarctic contributions to global mean sea level rise from 1950 to 2500

driven by a high-resolution atmospheric model and 1° NCAR CCSM4 ocean temperatures



Source: De Conto e Pollard, 2016

**QUAND C'EST FONDU,  
C'EST FOUTU !**



**MARCHONS POUR LE CLIMAT AVANT D'AVOIR À NAGER**  
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