



Politecnico di Bari

Dipartimento di Ingegneria Civile, Ambientale, del Territorio, Edile e di Chimica



**CAMBIAMENTI CLIMATICI
CAMBIAMENTI COMPORTAMENTALI**

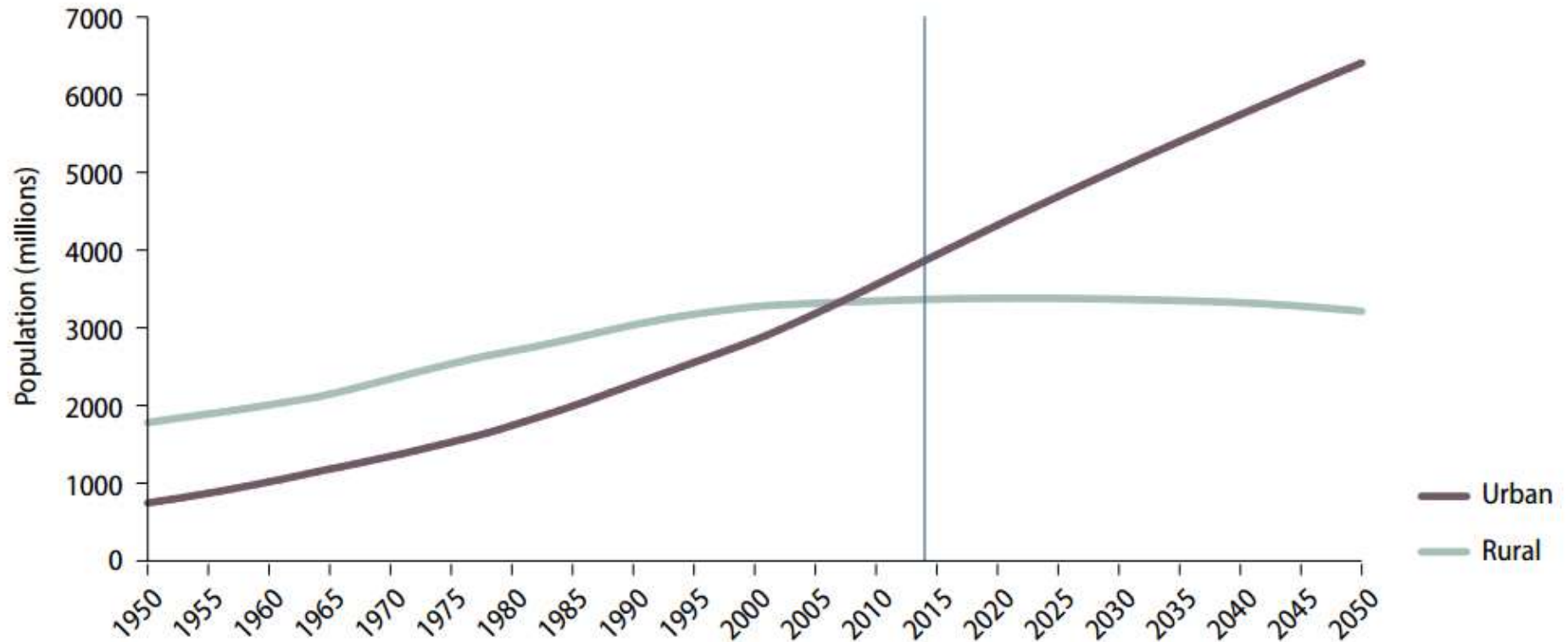
Cambiamenti Climatici nelle zone urbanizzate

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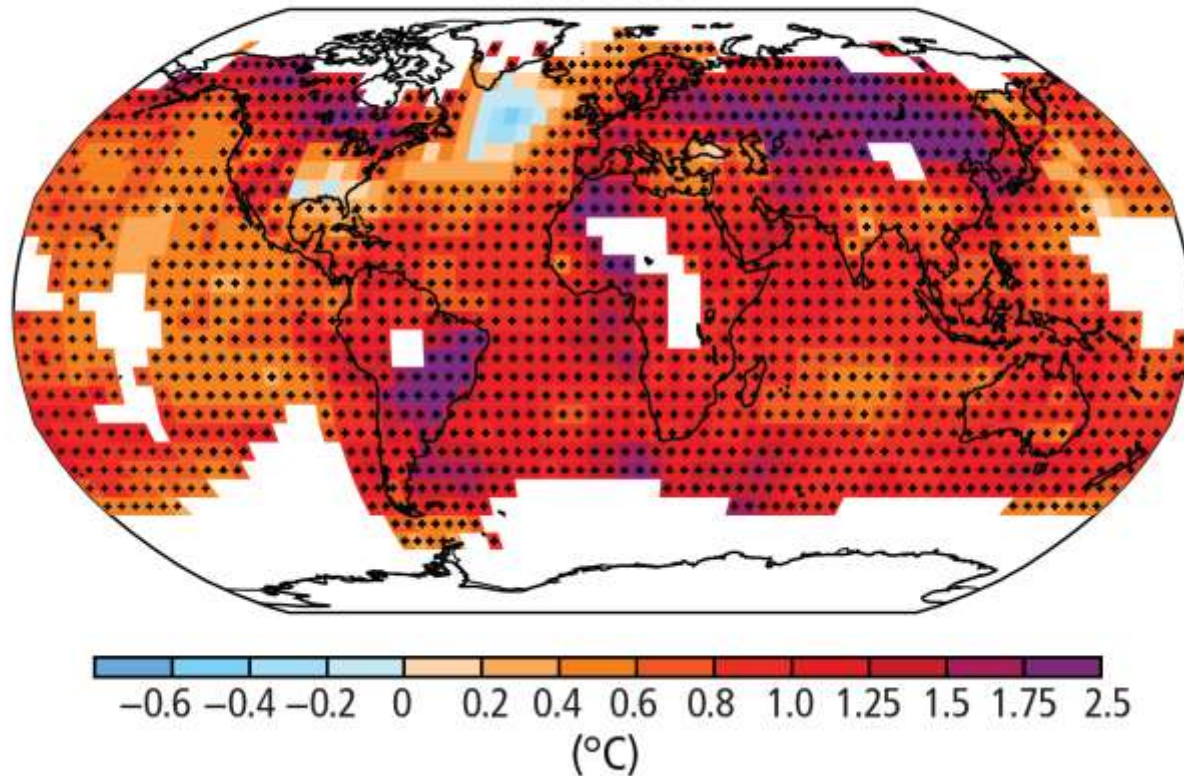
Cambiamenti Demografici e Politici



Total Global population in 2014 = 7 billion
Total Global population in 2050 = 9.5 billion

Cambiamenti Climatici

(b) Observed change in surface temperature
1901–2012



Source: IPCC (2014). "Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change." Core Writing Team, R. K. Pauchauri, and L. A. Meyers, eds., IPCC, Geneva, Switzerland, 151.

Modellazione del cambiamento climatico

Risoluzione dei report dell'**IPCC** sui cambiamenti climatici

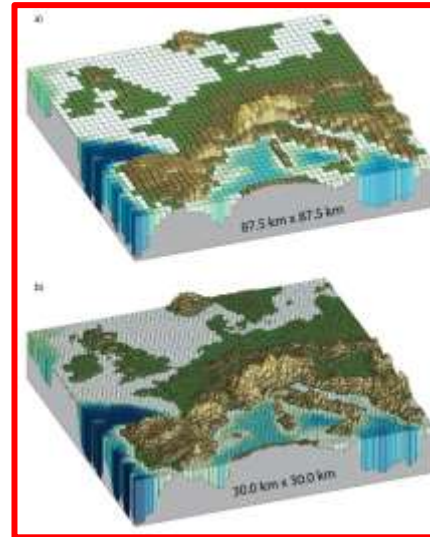
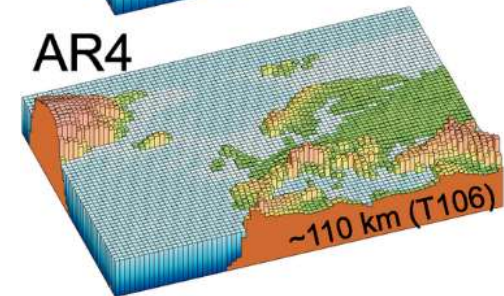
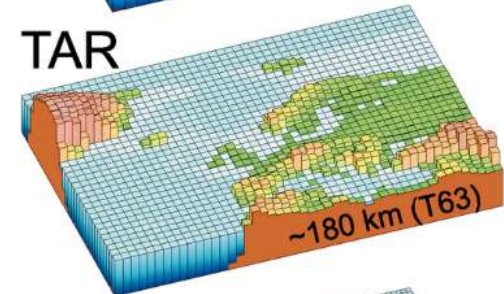
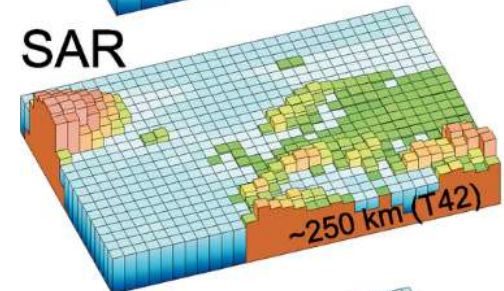
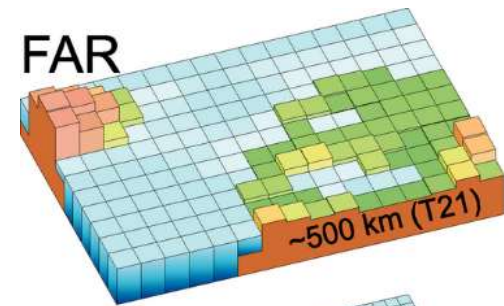
First Assessment Report 1990 (FAR)

Second Assessment Report 1996 (SAR)

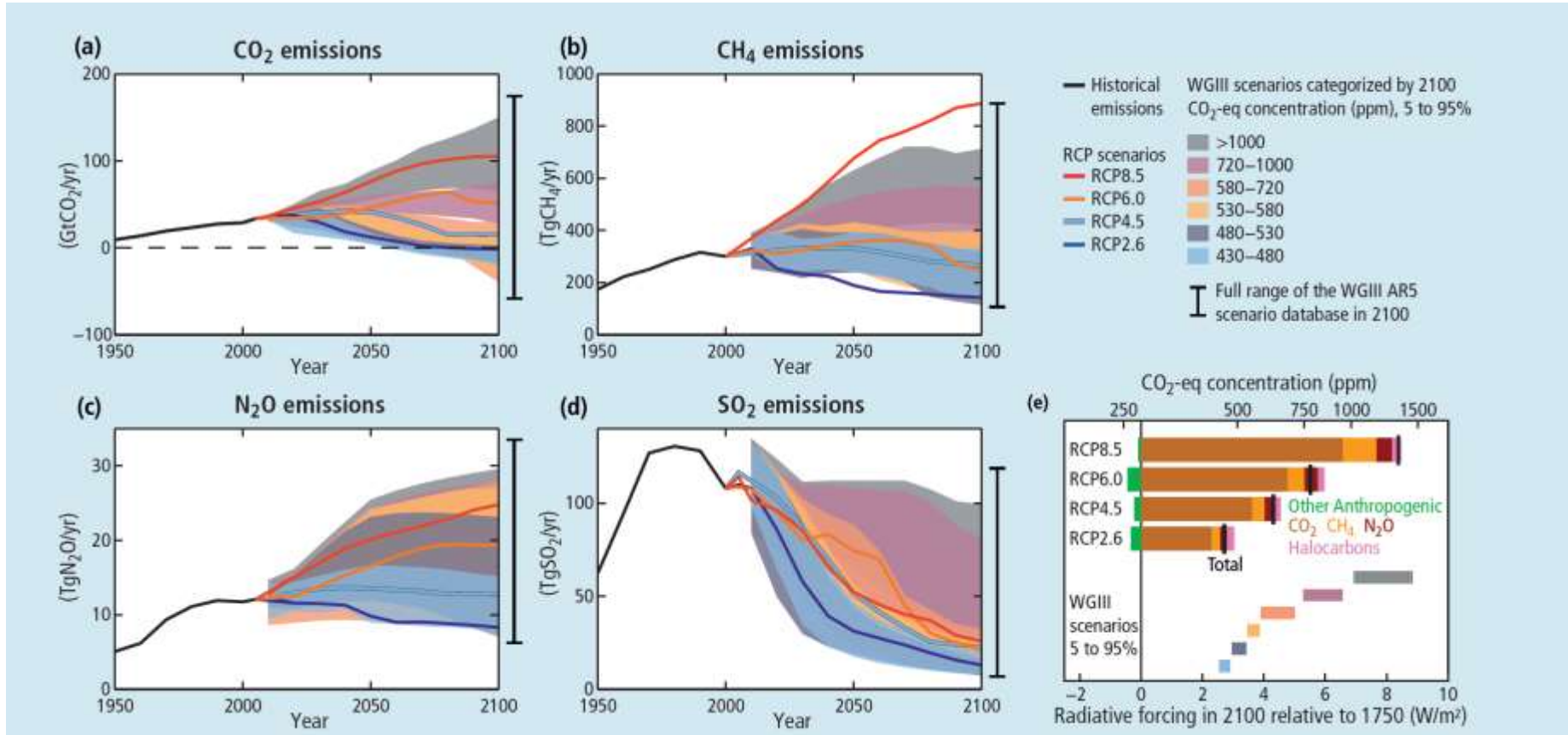
Third Assessment Report 2001 (TAR)

Fourth Assessment Report 2007 (AR4)

Fifth Assessment Report 2013/2014 (AR5)



Scenari RCP (Representative Concentration Pathways)



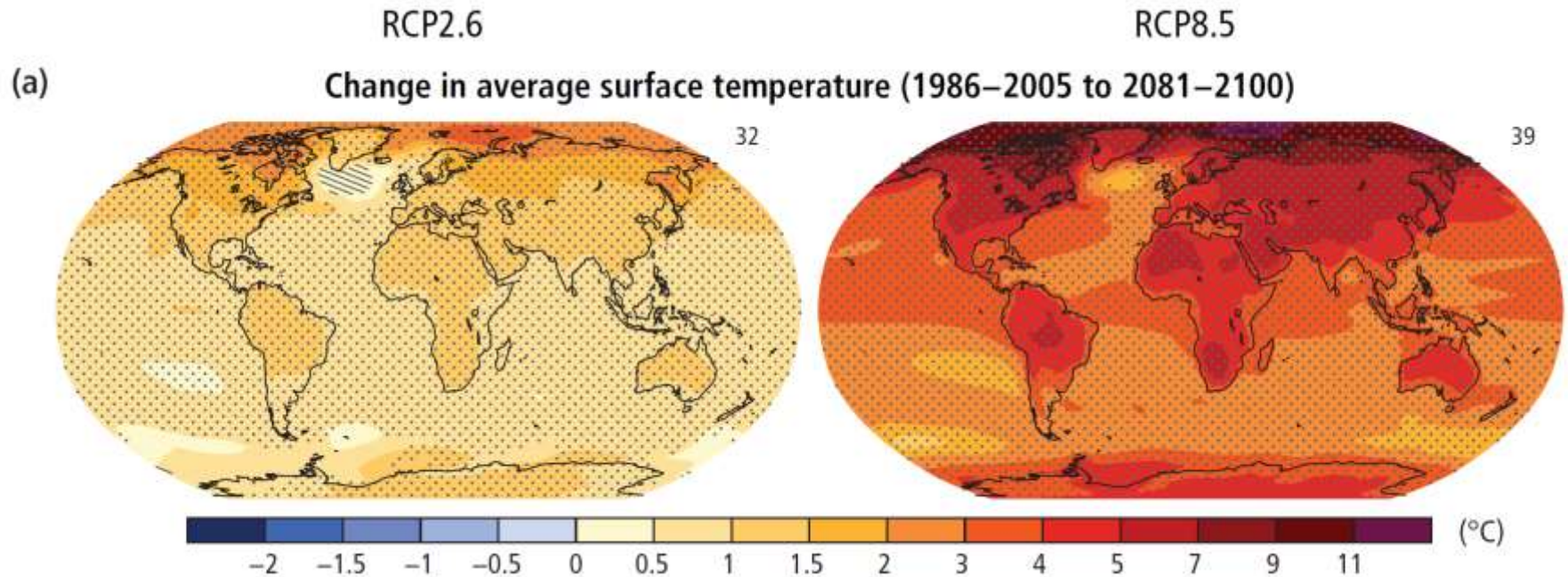
Source: IPCC, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, in: Core Writing Team, R.K. Pauchauri, L.A. Meyers (Eds.), IPCC, Geneva, Switzerland, 2014, pp. 151.

Risultati dei modelli di cambiamento climatico

		2046–2065		2081–2100	
	Scenario	Mean	Likely range ^c	Mean	Likely range ^c
Global Mean Surface Temperature Change (°C) ^a	RCP2.6	1.0	0.4 to 1.6	1.0	0.3 to 1.7
	RCP4.5	1.4	0.9 to 2.0	1.8	1.1 to 2.6
	RCP6.0	1.3	0.8 to 1.8	2.2	1.4 to 3.1
	RCP8.5	2.0	1.4 to 2.6	3.7	2.6 to 4.8
	Scenario	Mean	Likely range ^d	Mean	Likely range ^d
Global Mean Sea Level Rise (m) ^b	RCP2.6	0.24	0.17 to 0.32	0.40	0.26 to 0.55
	RCP4.5	0.26	0.19 to 0.33	0.47	0.32 to 0.63
	RCP6.0	0.25	0.18 to 0.32	0.48	0.33 to 0.63
	RCP8.5	0.30	0.22 to 0.38	0.63	0.45 to 0.82

Source: IPCC, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, in: Core Writing Team, R.K. Pauchauri, L.A. Meyers (Eds.), IPCC, Geneva, Switzerland, 2014, pp. 151.

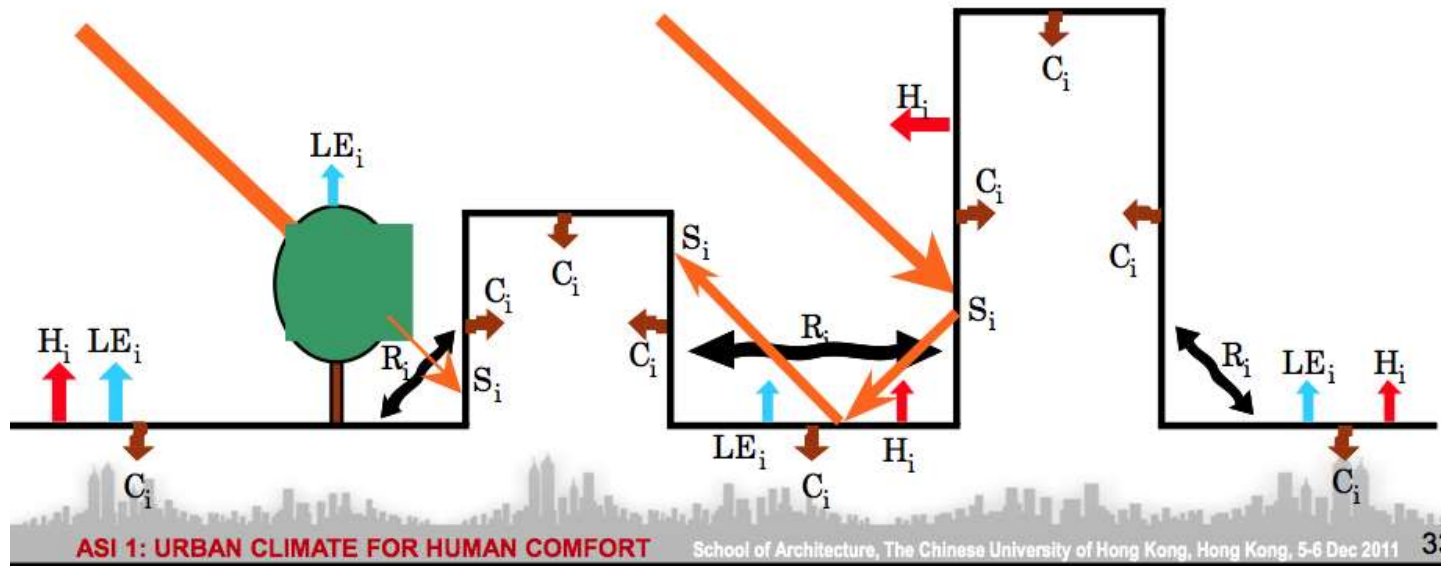
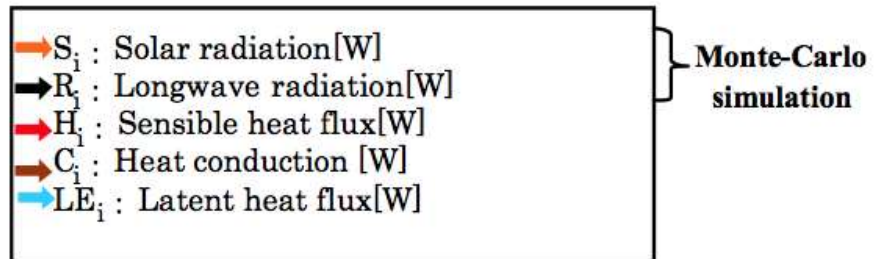
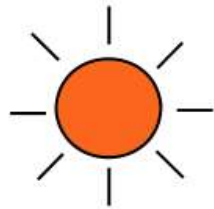
Risultati dei modelli di cambiamento climatico



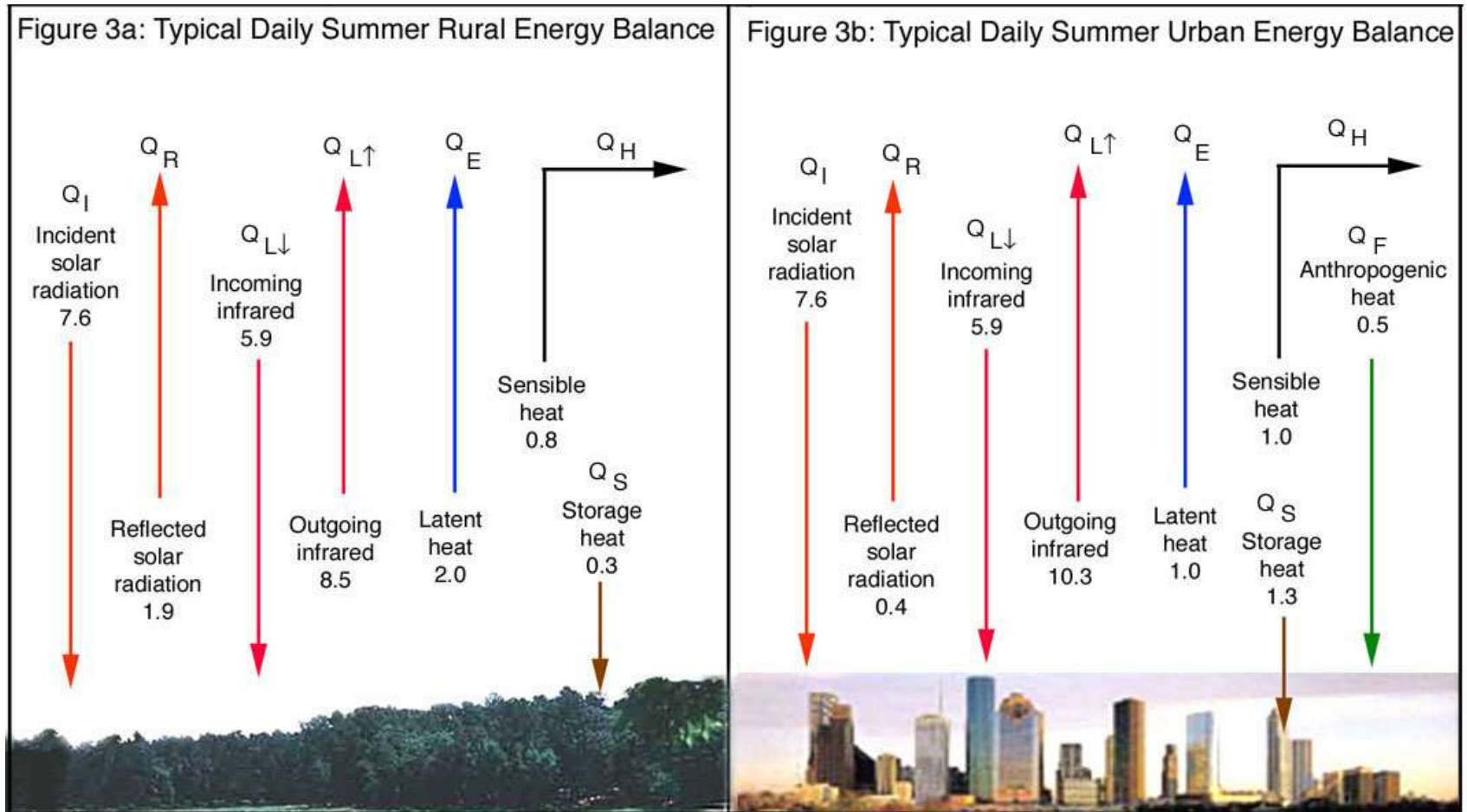
Source: IPCC, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, in: Core Writing Team, R.K. Pauchauri, L.A. Meyers (Eds.), IPCC, Geneva, Switzerland, 2014, pp. 151.

Clima urbano e cambiamenti climatici

Heat balance components considered in the coupled analysis

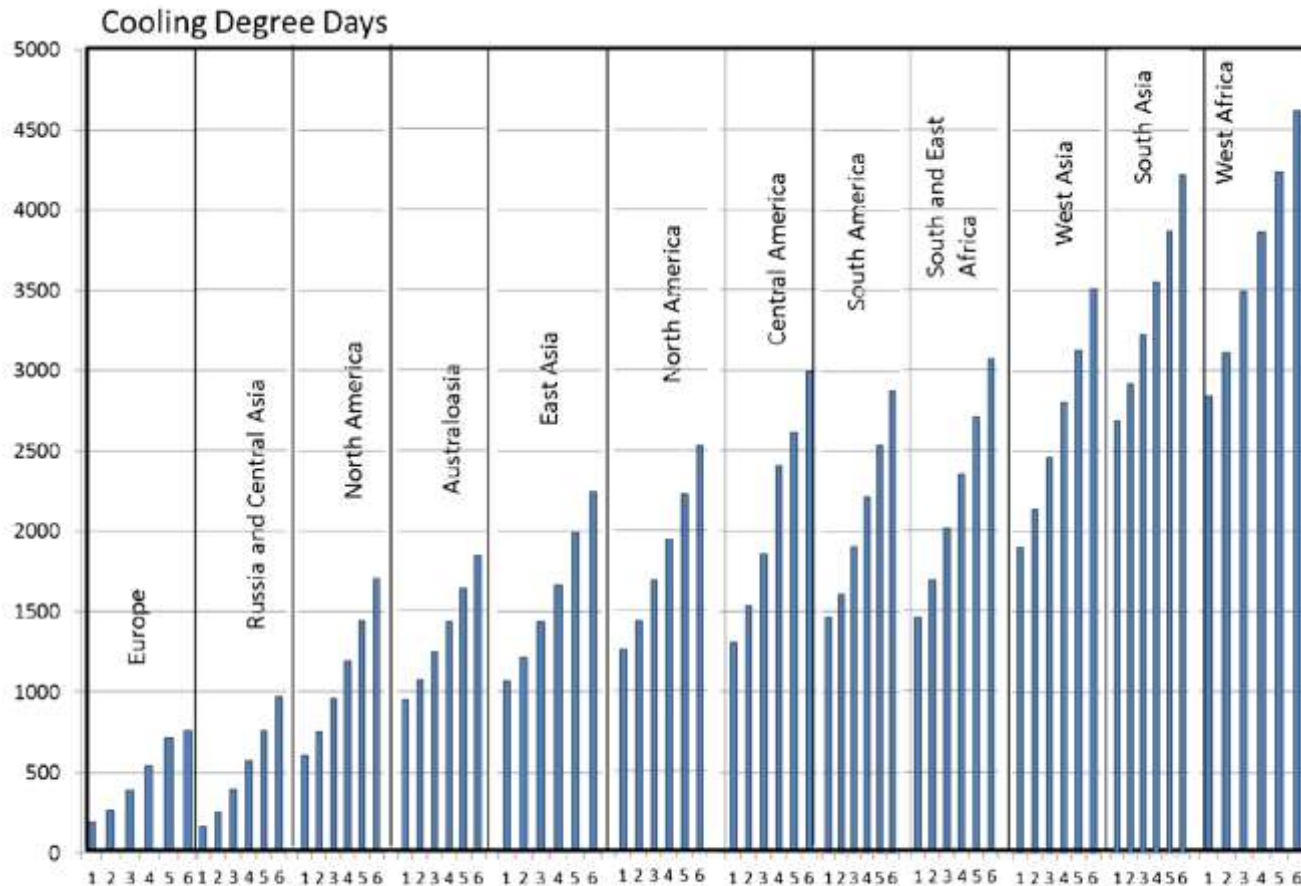


Equazioni di bilancio termico in area urbana



<http://www.ruf.rice.edu/~sass/Policy%20Stuff/Figure%203%20Sym%20.jpg>

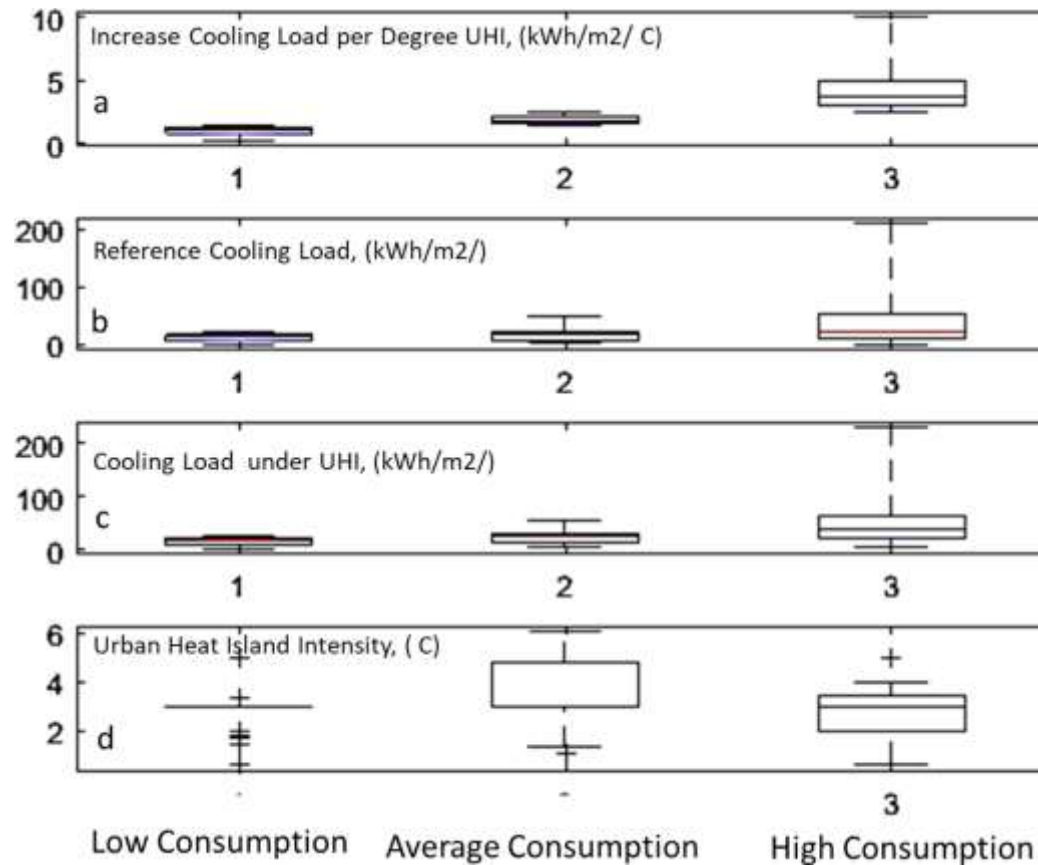
Effetti dei cambiamenti climatici sui consumi energetici degli edifici



4. Current and Future Cooling Degree Days for the Major Areas of the Planet and for different climatic scenarios, ((1) Baseline, (2) Increase between 0 and 1 K, (3) Increase between 1 and 2 K, (4) Increase between 2 and 3 K, (5) Increase between 3 and 4 K, and 6. Increase between 4 and 5 K). Data are adapted from Warren et al. [39].

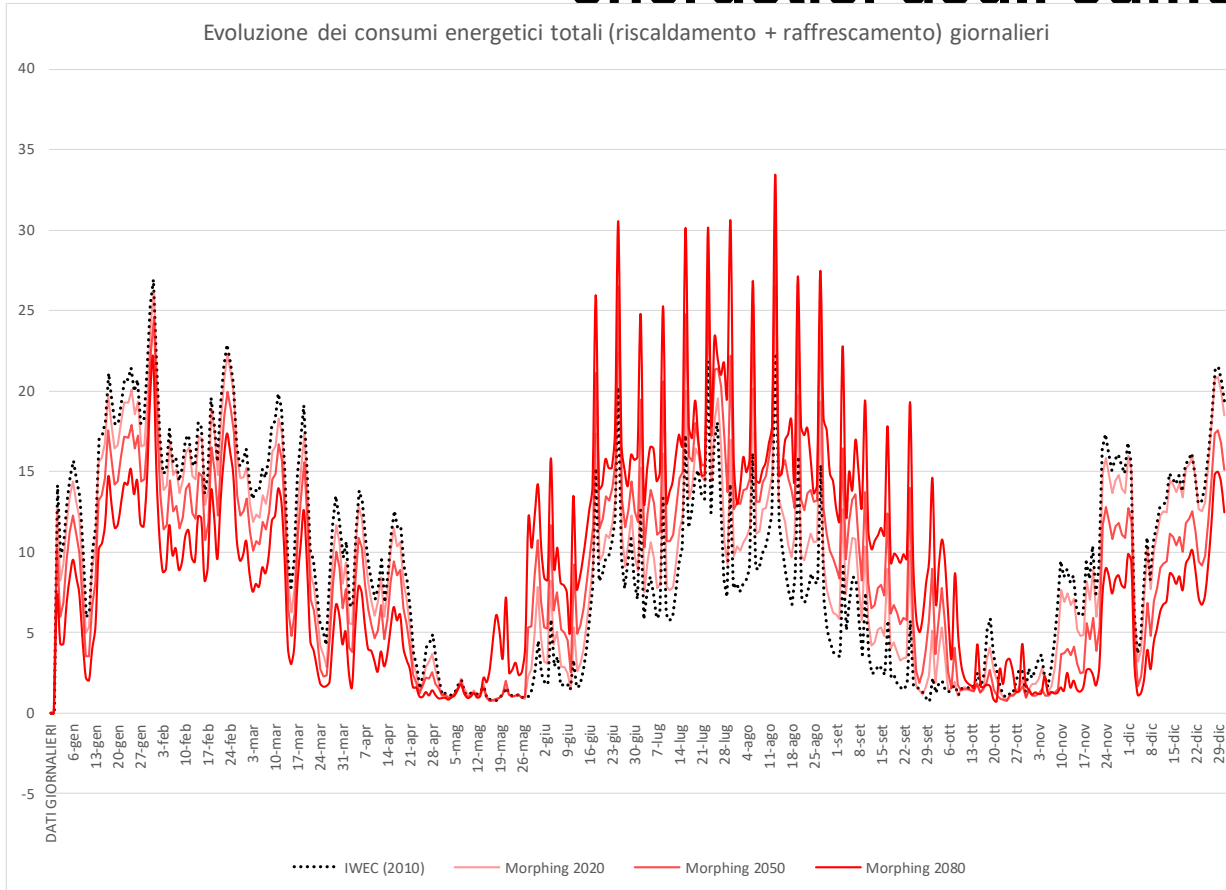
Source: M. Santamouris, Cooling the buildings – past, present and future, Energy and Buildings, 128 (2016) 617-638.

Effetti dei cambiamenti climatici sui consumi energetici degli edifici



Source: M. Santamouris (2019). Recent progress on urban overheating and heat island research. integrated assessment of the energy, environmental, vulnerability and health impact synergies with the global climate change. Energy and Buildings.

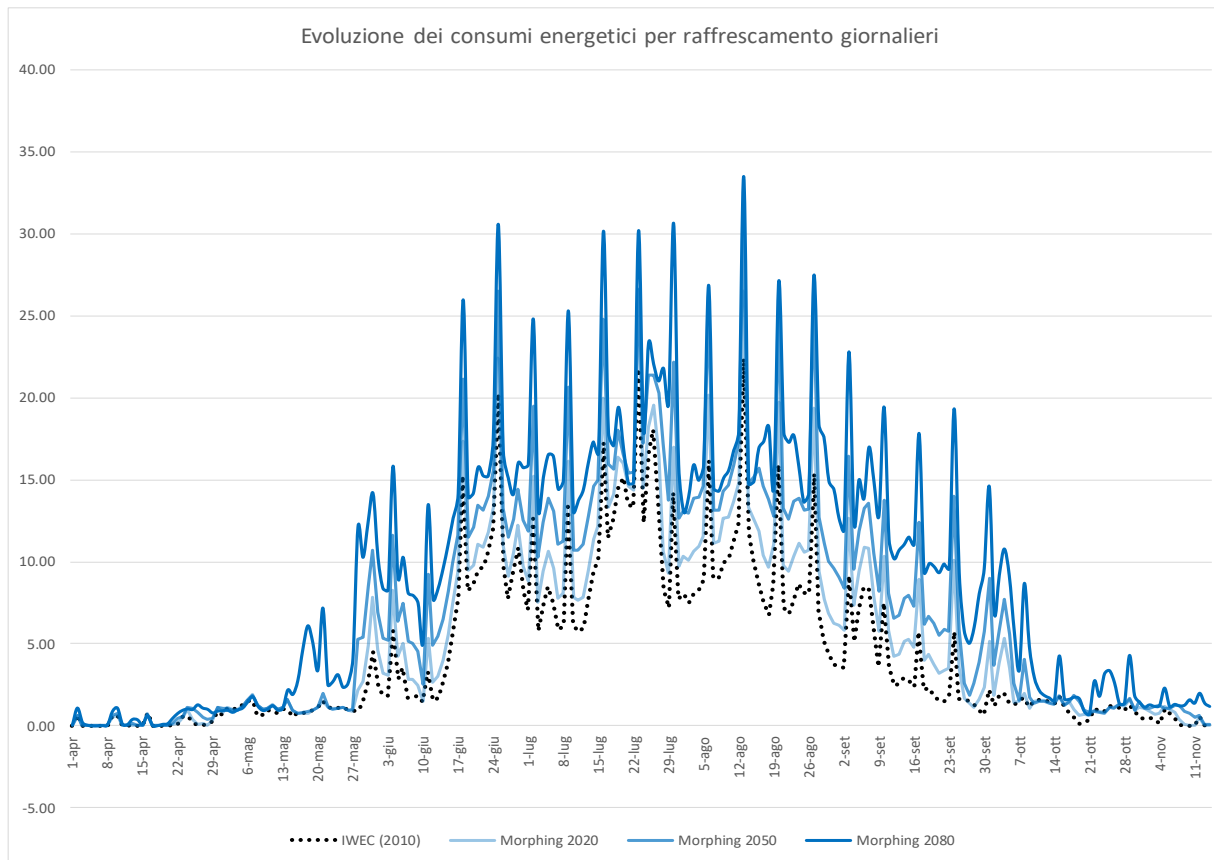
Effetti dei cambiamenti climatici sui consumi energetici degli edifici



Incremento dei consumi energetici di picco 24.2%

Studio degli effetti dei cambiamenti climatici sul benessere indoor e sui consumi energetici degli edifici.
Studio svolto in collaborazione con Jacopo Paradisi e Giandomenico Vurro (laureandi in Ingegneria dei Sistemi Edilizi) e con Salvatore Carlucci (Professore presso la Norwegian University of Science and Technology)

Effetti dei cambiamenti climatici sui consumi energetici degli edifici



Incremento dei consumi energetici totali per raffrescamento del 111.3%

Incremento dei consumi energetici di picco del 49.5%

Studio degli effetti dei cambiamenti climatici sul benessere indoor e sui consumi energetici degli edifici.
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Cambiamenti delle Politiche Energetiche

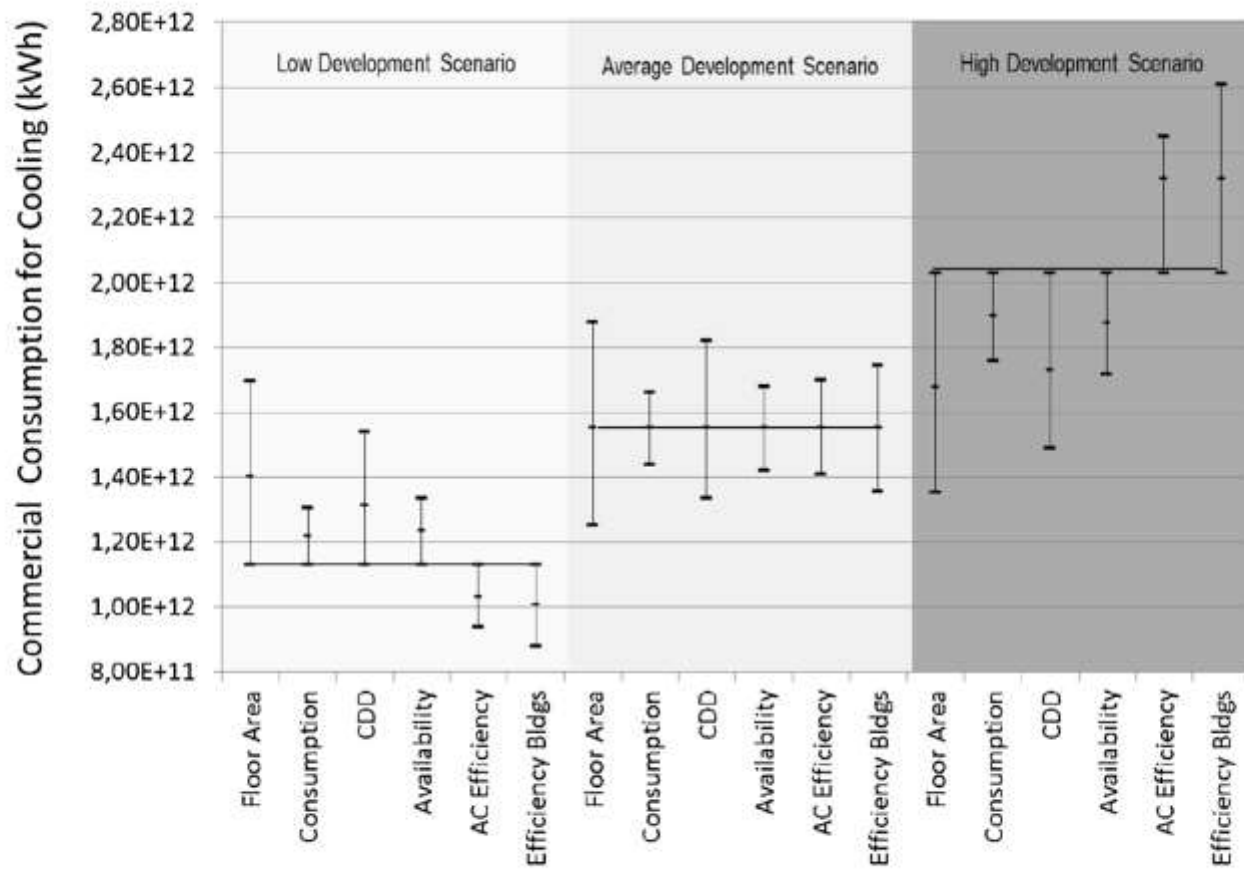


Fig. 14. Predicted Cooling Energy Consumption of the Commercial Buildings in the World, for 2050. Results of the Low, Average and High Development Scenarios and variability as a function of the main parameters and drivers.

Source: M. Santamouris, Cooling the buildings – past, present and future, Energy and Buildings, 128 (2016) 617-638.

Cambiamenti delle Politiche Energetiche

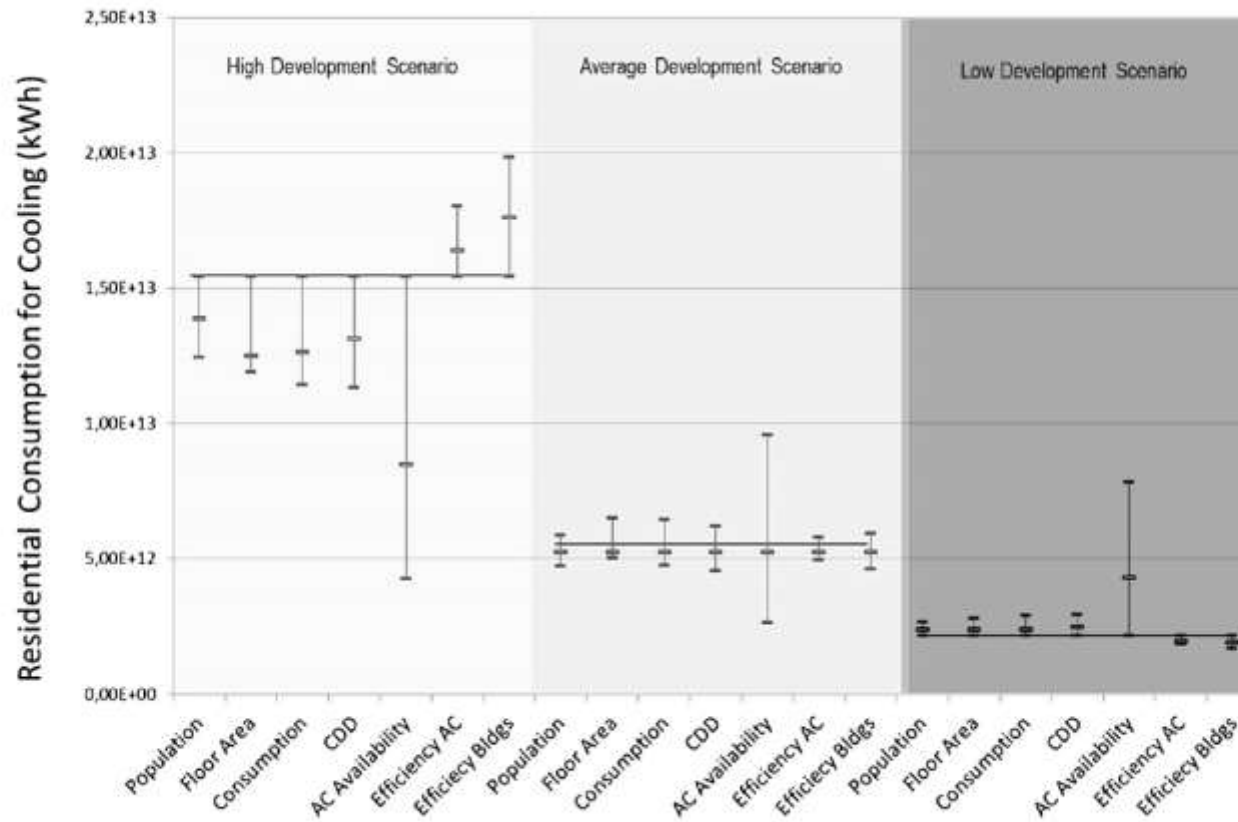


Fig. 15. Predicted Cooling Energy Consumption of the Residential Buildings in the World, for 2050. Results of the Low, Average and High Development Scenarios and variability as a function of the main parameters and drivers.

Source: M. Santamouris, Cooling the buildings – past, present and future, Energy and Buildings, 128 (2016) 617-638.

Cambiamenti climatici e salute umana

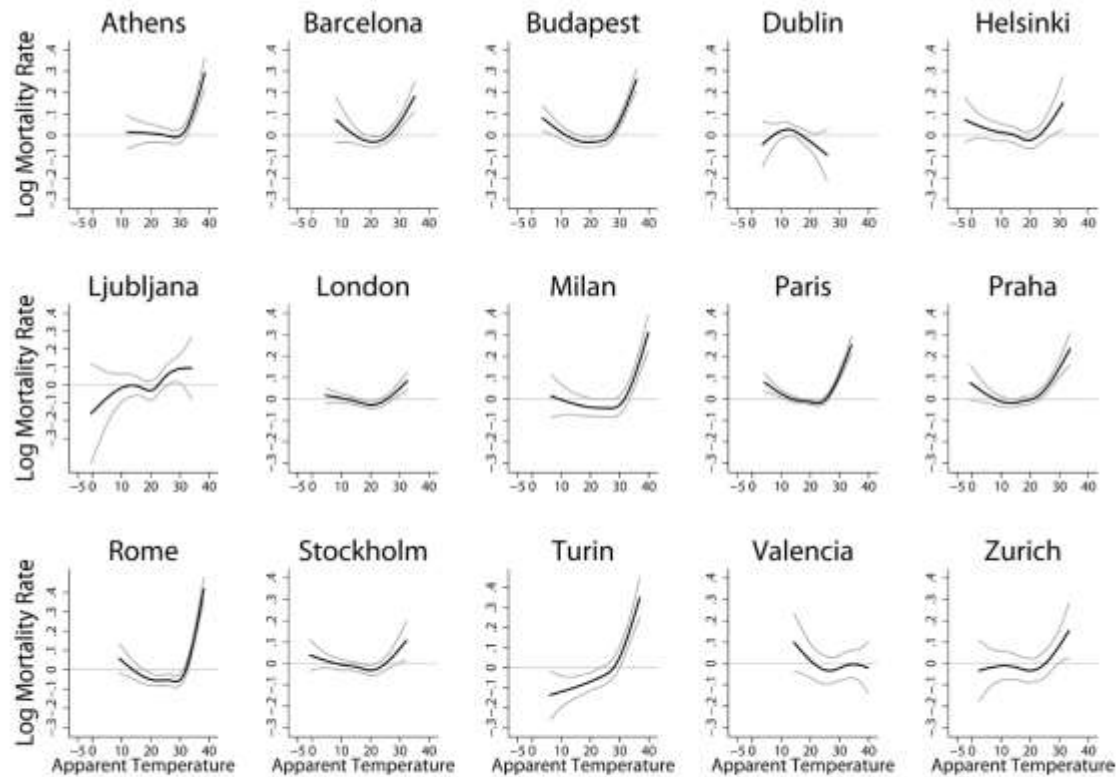


FIGURE 1. Regression splines (pointwise 95% confidence bands) describing, on log scale, the adjusted relationship between daily maximum apparent temperature (lag 0–3) and natural mortality in 15 European cities: Athens, Barcelona (mean apparent temperature), Budapest, Dublin, Helsinki, Ljubljana, London, Milan, Paris, Prague, Rome, Stockholm, Turin, Valencia and Zurich.

Source: Baccini M, Biggeri A, Accetta G, Kosatsky T, Katsouyanni K, Analitis A, et al. Heat effects on mortality in 15 European cities. *Epidemiology*. 2008;19(5):711-9. doi: 10.1097/EDE.0b013e318176bfcd.

Cambiamenti climatici e salute umana

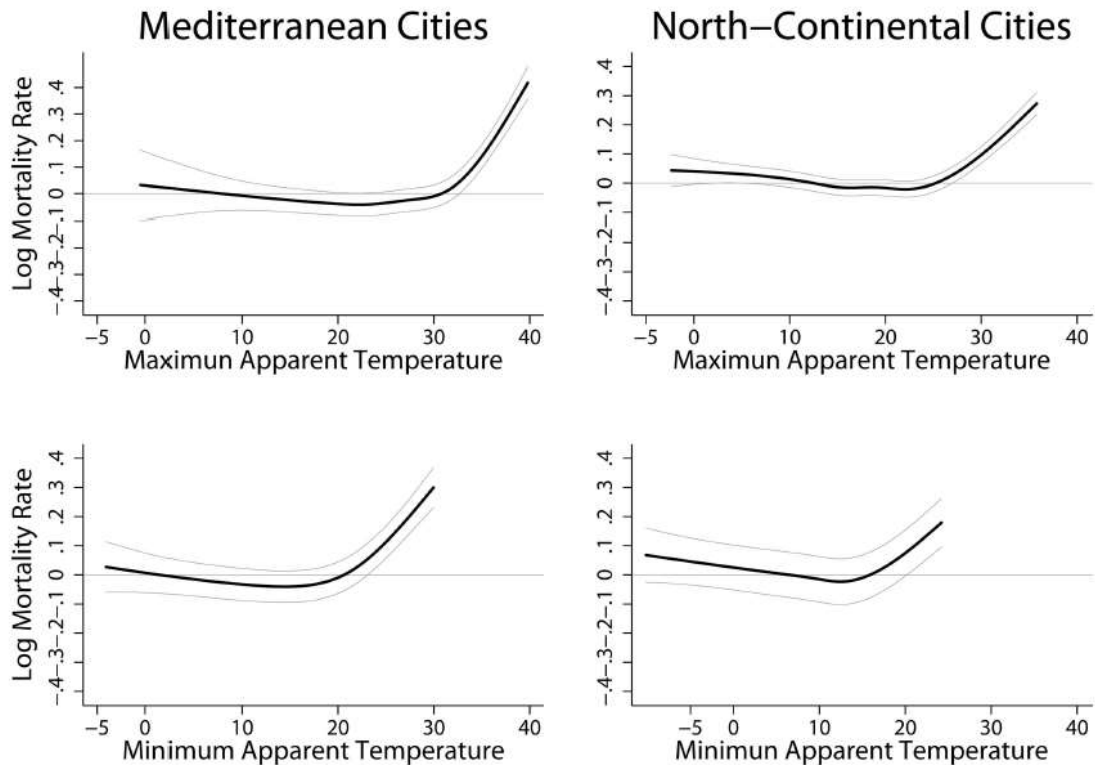
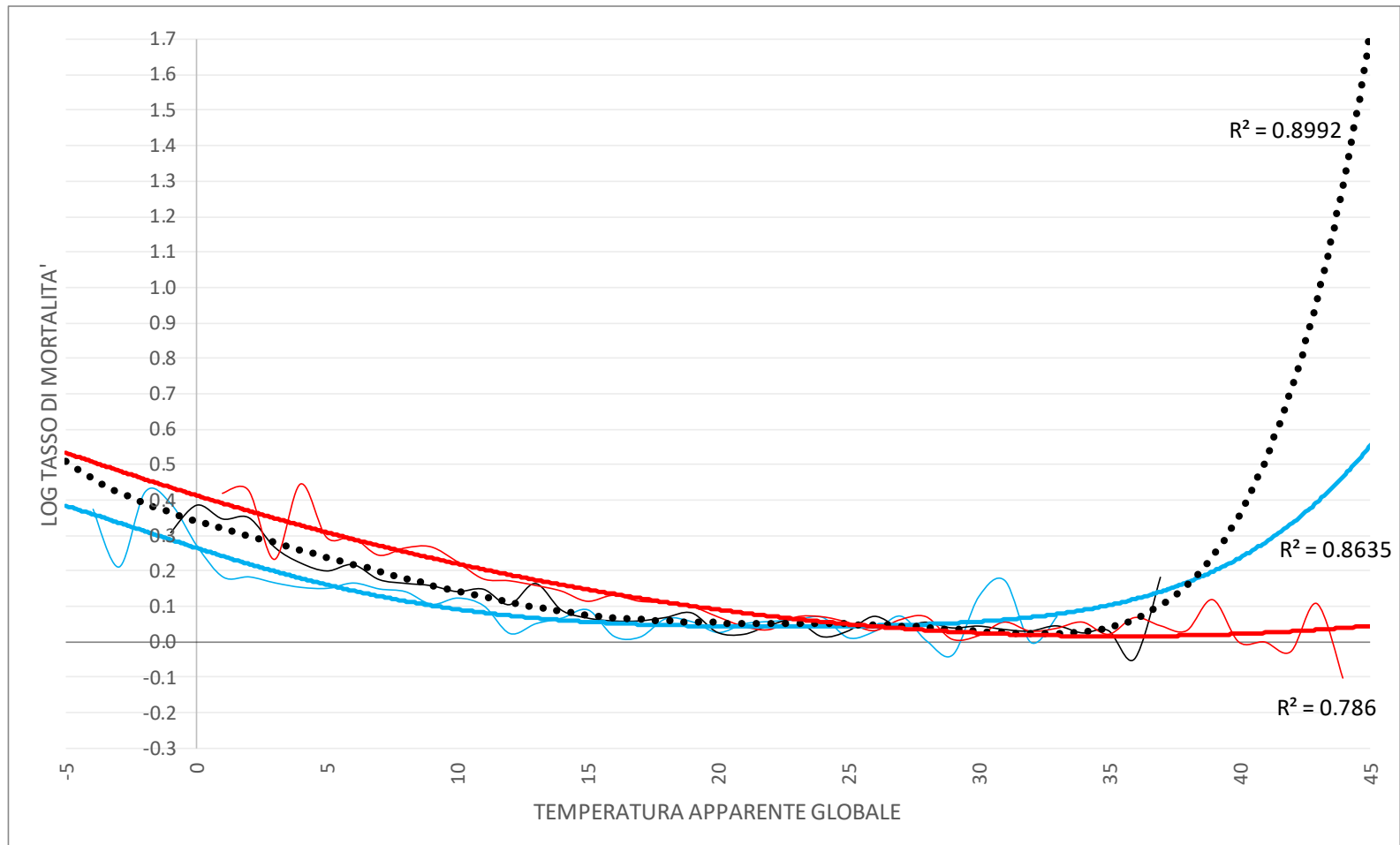


FIGURE 2. Fixed effects meta-analytic curves (pointwise 95% confidence bands) describing, on log scale, the adjusted effect of daily maximum (top) and daily minimum (bottom) apparent temperature at lag 0–3 on natural mortality. The left panel illustrates meta-analytic curves for Mediterranean cities (excluding Barcelona). The right panel shows the same curves for north-continental cities.

Source: Baccini M, Biggeri A, Accetta G, Kosatsky T, Katsouyanni K, Analitis A, et al. Heat effects on mortality in 15 European cities. *Epidemiology*. 2008;19(5):711-9. doi: 10.1097/EDE.0b013e318176bfcd.

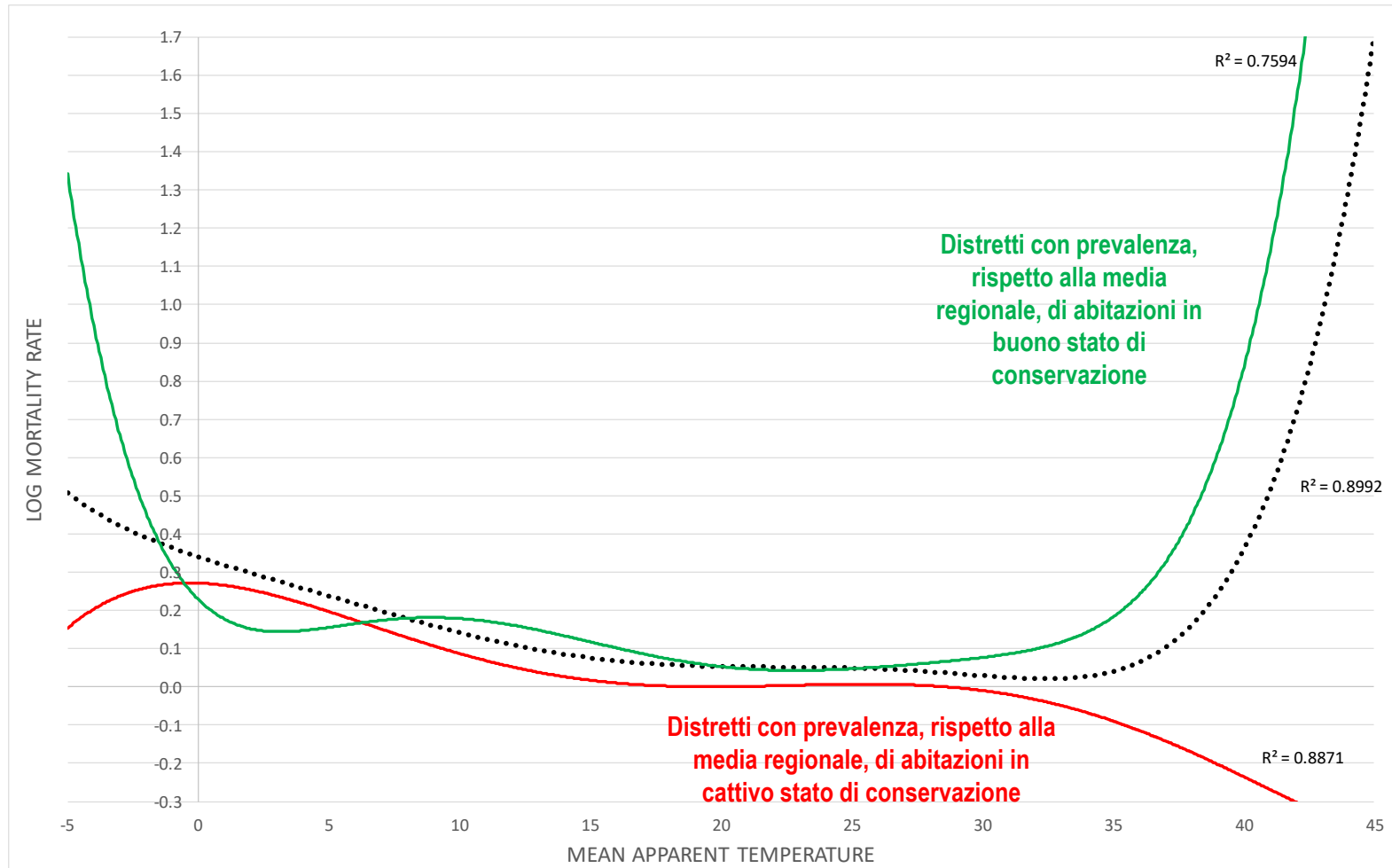
Cambiamenti climatici, qualità del costruito e salute umana



Studio degli effetti dei cambiamenti climatici e della qualità del costruito sulla salute degli abitanti in Puglia.

Studio svolto in collaborazione con Felice Lucanie (Laureando in Ingegneria dei Sistemi Edilizi) e Paola Pierucci (Dirigente Medico Malattie dell'Apparato Respiratorio presso il Policlinico di Bari)

Cambiamenti climatici, qualità del costruito e salute umana



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Risposta degli esseri viventi al cambiamento

ADATTAMENTO

Grazie per l'attenzione!



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