



# Mitigation scenarios developed to inform DEFRA at COP13

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Updated 16-10-08

# Tools

- Complex models of climate and the carbon cycle are used at the Hadley Centre.
- These models are too complex to run a very large number of simulations, so simpler models were used here.
- Adjustable parameters in the tried and tested **MAGICC climate model** were set so that the simple model reproduces the results of the complex models
- In total we have looked at 729 simulations for each emissions scenario and more than 7million simulated years in total.



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# The scenarios

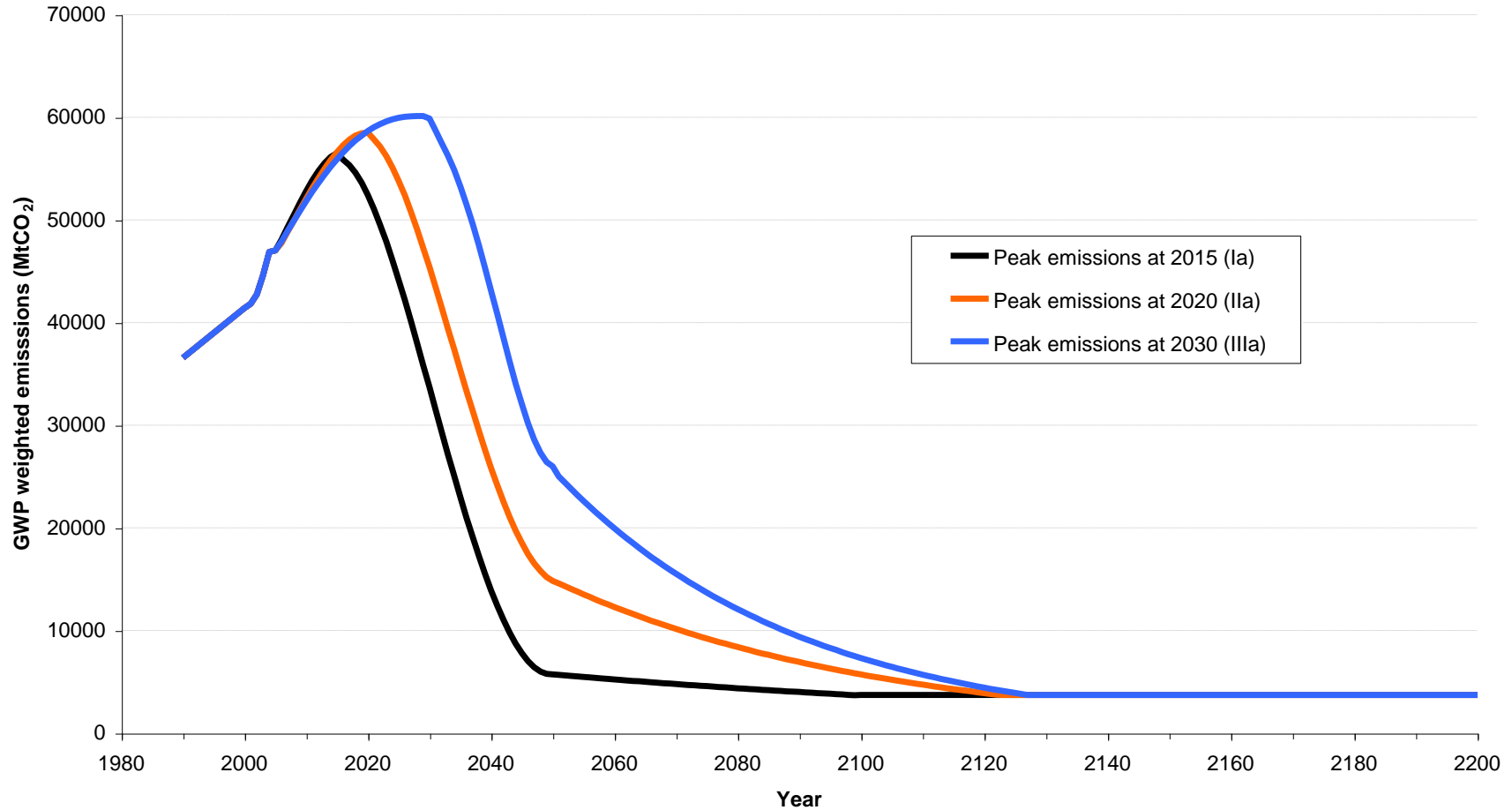
- **Scenario I:** Global GHG emissions peak in 2015 and decline.
  - Type “a” reduce to 85% below 1990 levels by 2050 and to 90% below 1990 levels by 2100.
  - Type “b” reduce to 50% below 1990 levels by 2050 and to 80% below 1990 levels by 2100.
- **Scenario II:** Global GHG emissions peak in 2020 and decline.
  - Type “a” declines to 60% below 1990 levels by 2050 and to 85% below 1990 levels by 2100.
  - Type “b” reduce to 30% below 1990 levels by 2050 and to 80% below 1990 levels by 2100.
- **Scenario III:** Global GHG emissions peak in 2030 and decline.
  - Type “a” declines to 30% below 1990 levels by 2050 and to 80% below 1990 levels by 2100.
  - Type “b” reaches 5% above 1990 levels by 2050 and to 60% below 1990 levels by 2100.
- Emissions supplied by James Davey (DEFRA)

# Assumptions made for Bali scenarios

- The CO<sub>2</sub> other contribution that is not from fossil fuel or LULUCF was combined with the fossil fuel contribution as input to MAGICC (MAGICC has no other option apart from fossil or LULUCF)
- The F gas emissions were represented by HFC-134a only. The difference between individually representing the gases and a one gas representation for these emissions values is less than 2%
- The NO<sub>x</sub>, CO and VOC emissions were set to zero as emissions for these gases were not provided.
- The A1B SRES emissions were used for aerosol. The aerosol emissions were reduced linearly to zero from the action years corresponding to the peak GHG emissions in each scenario (2015, 2020 and 2030).

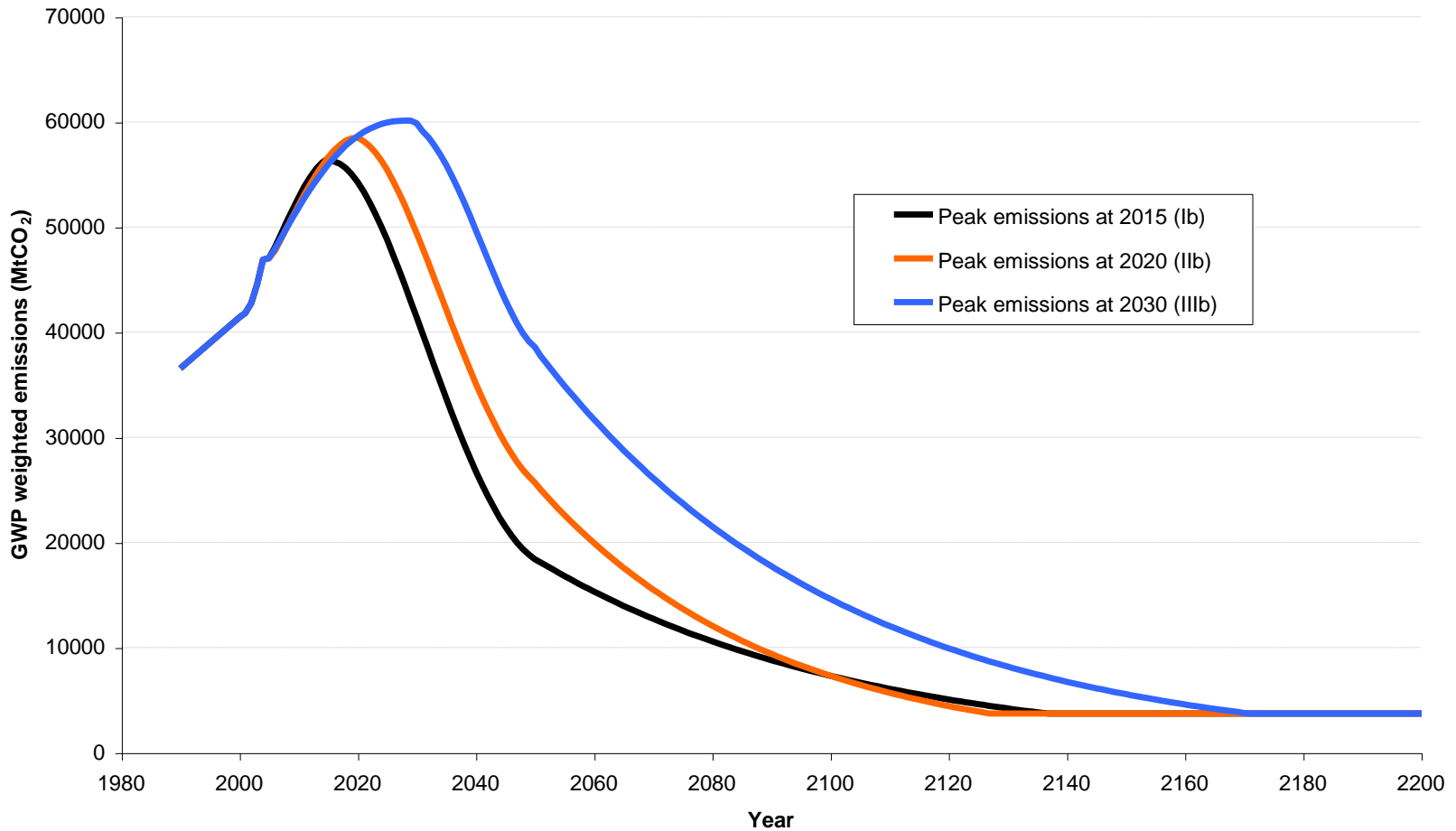
# GWP weighted emissions for type "a" scenarios

The GWP weighted emissions for type "a" scenarios



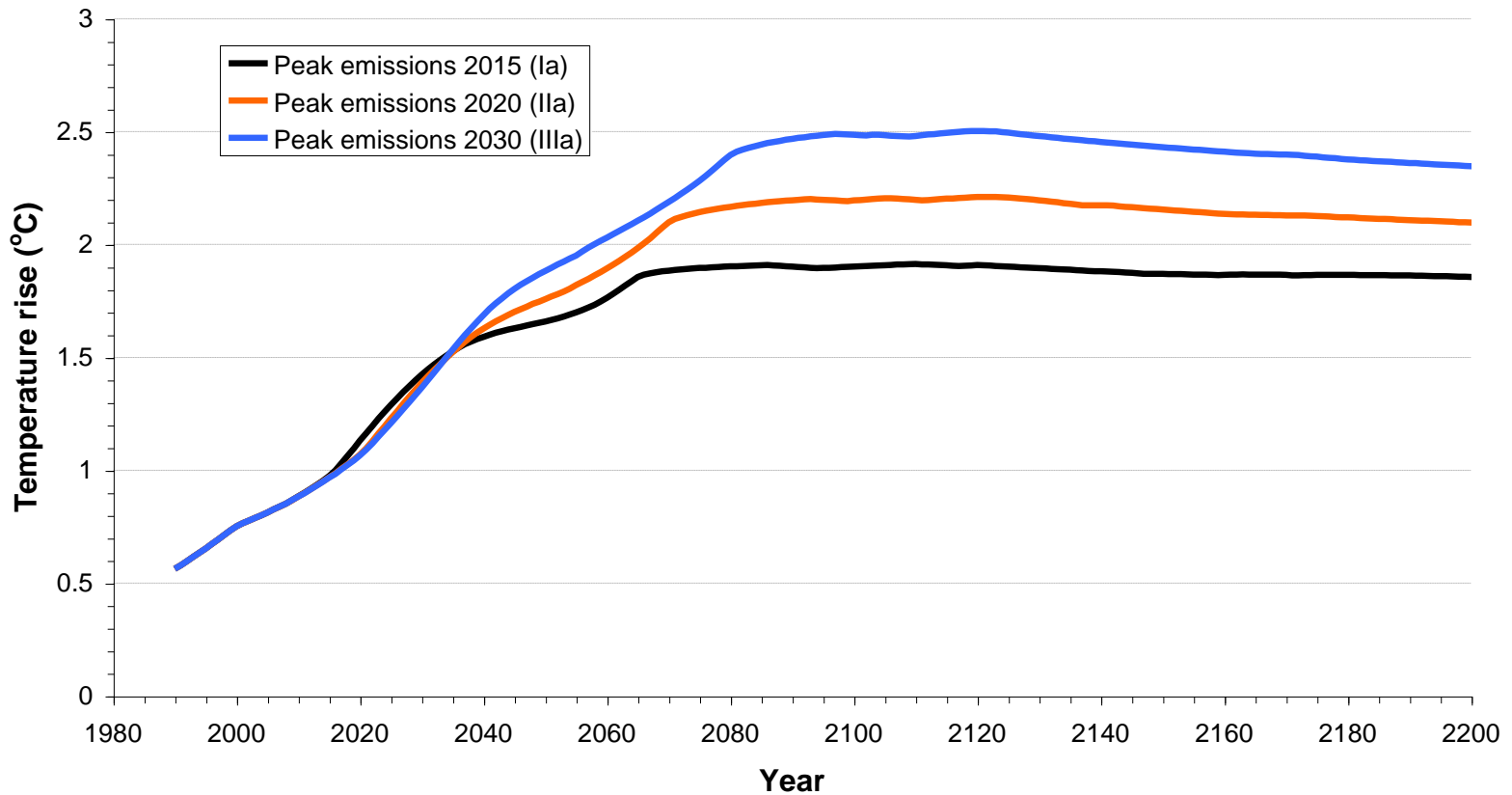
# GWP weighted emissions for type "b" scenarios

The GWP weighted emissions of the type "b" scenarios



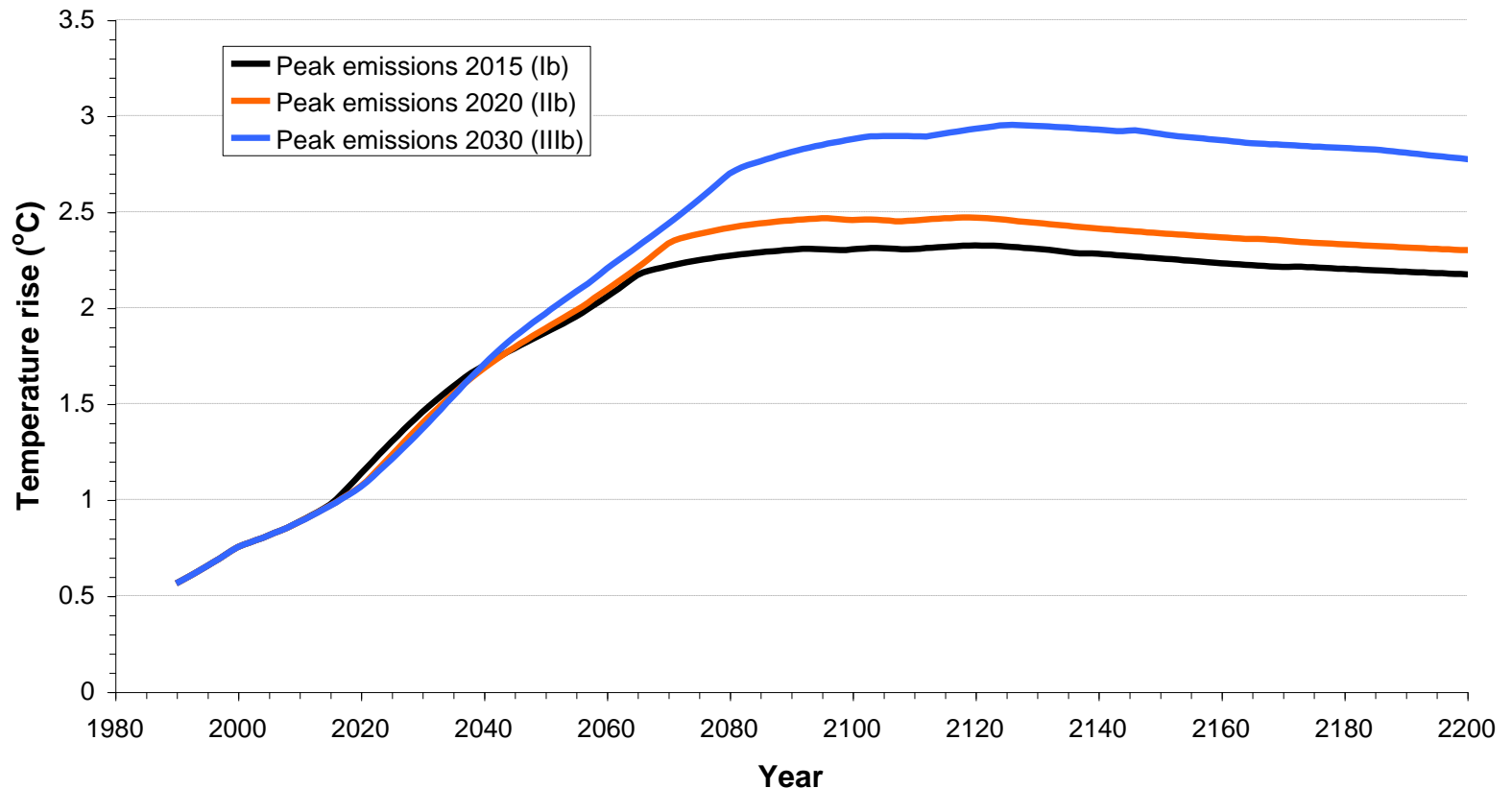
# The time history of the median response temperature rise for type “a” scenarios

The time history of the global mean surface temperature rise estimate from scenarios Ia, IIa and IIIa



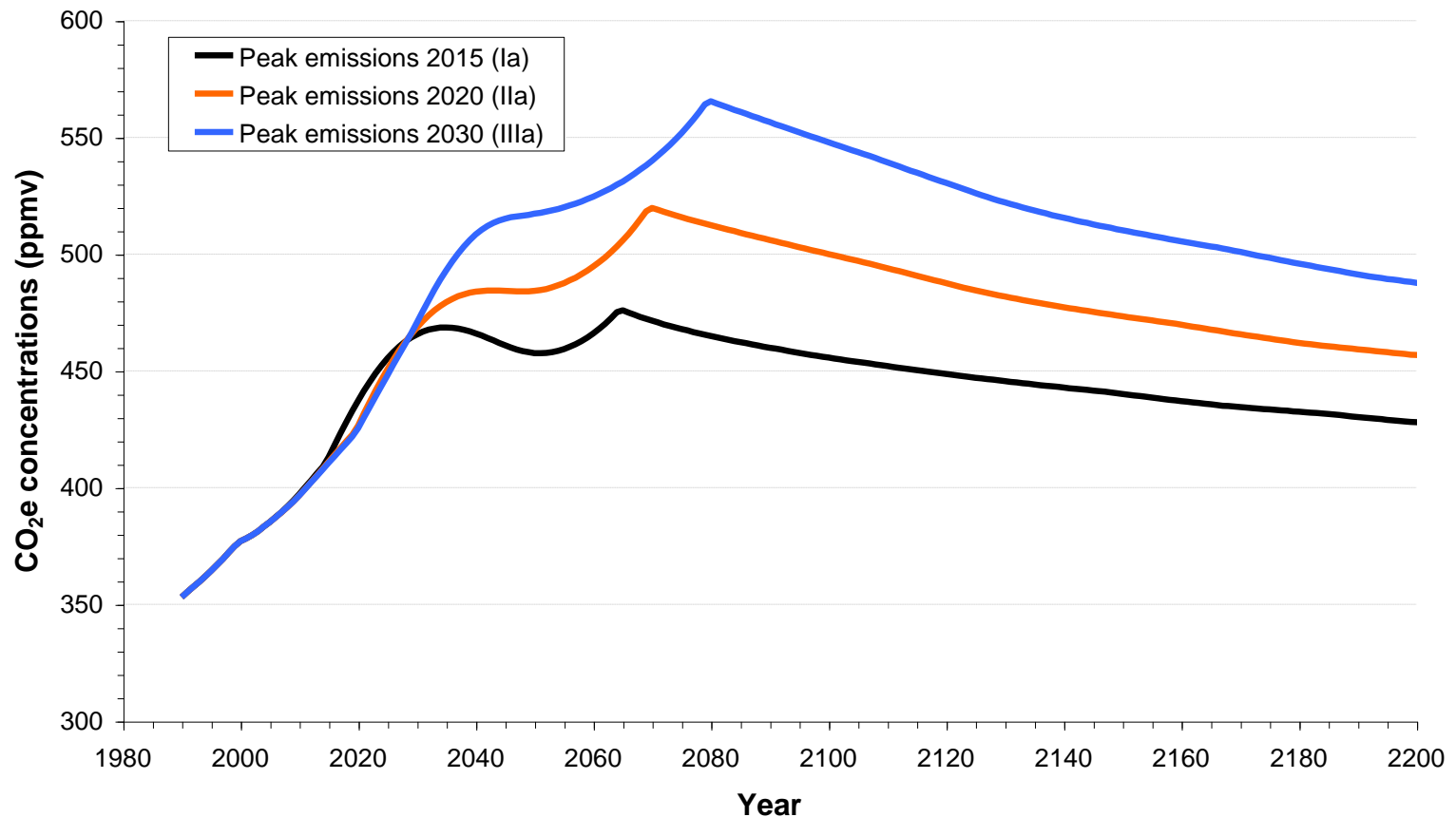
# The time history of the median response temperature rise for type “b” scenarios

The time history of the global mean surface temperature rise estimate from scenarios Ib, IIb and IIIb



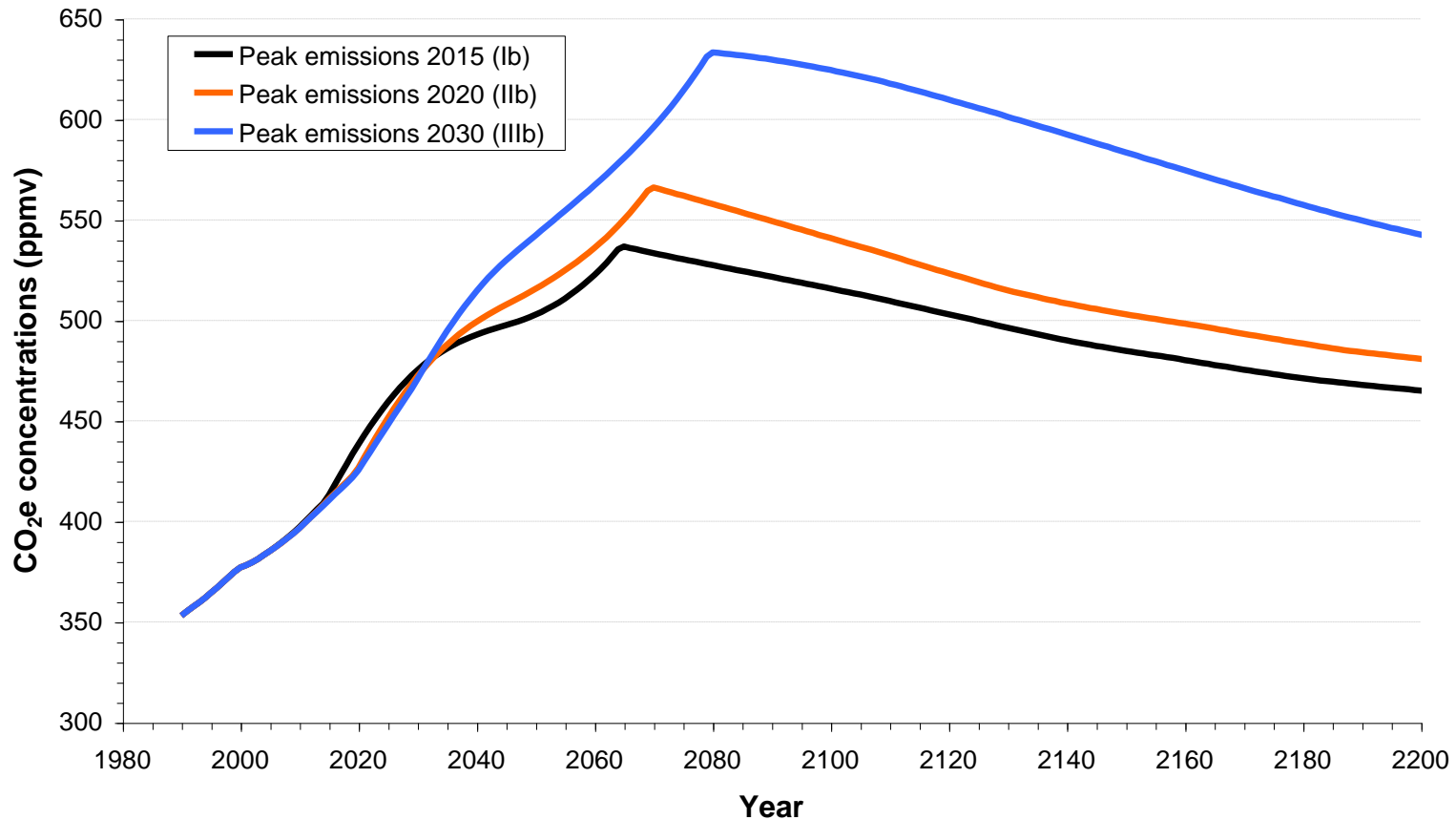
# The time history of the median response total CO<sub>2</sub>e for type “a” scenarios

Time history of the total CO<sub>2</sub>e for scenarios Ia, IIa and IIIa



# The time history of the median response total CO<sub>2</sub>e for type “b” scenarios

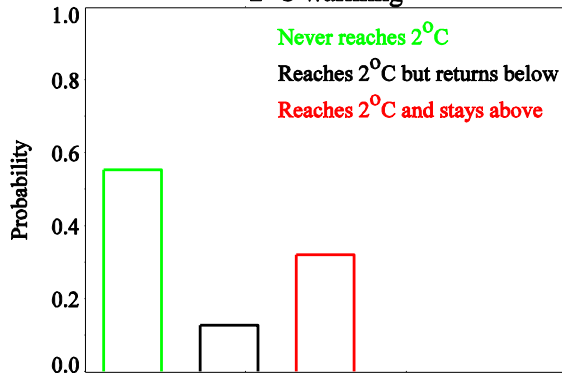
Time history of the total CO<sub>2</sub>e for scenarios Ib, IIb and IIIb



# Probabilities of exceeding 2°C and 3°C for “a” scenarios

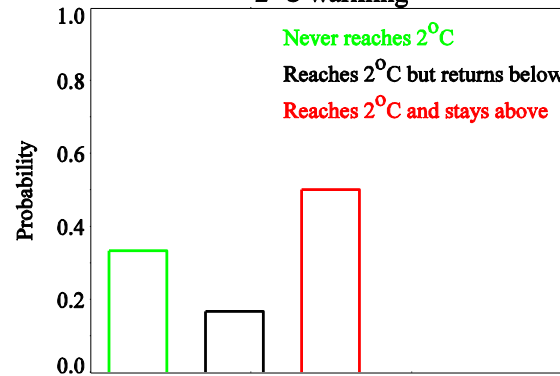
Ia

2°C warming



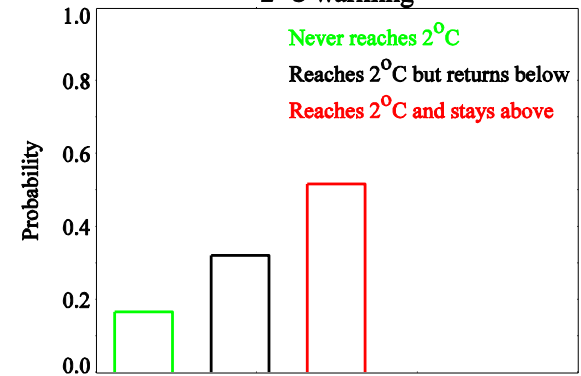
IIa

2°C warming

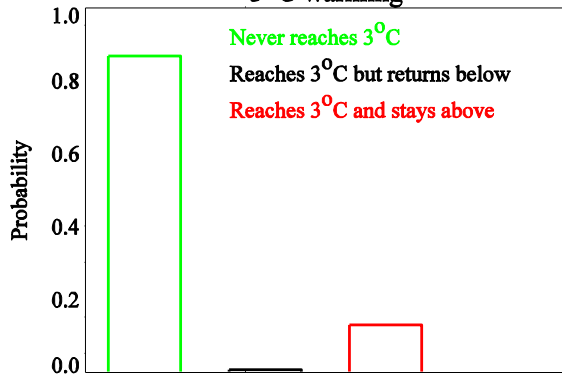


IIIa

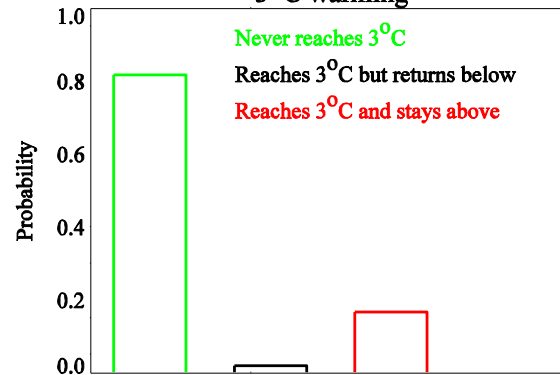
2°C warming



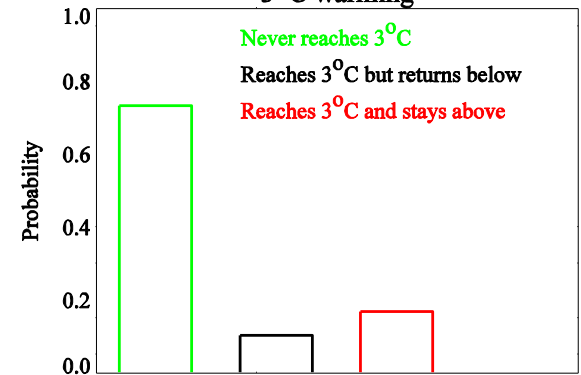
3°C warming



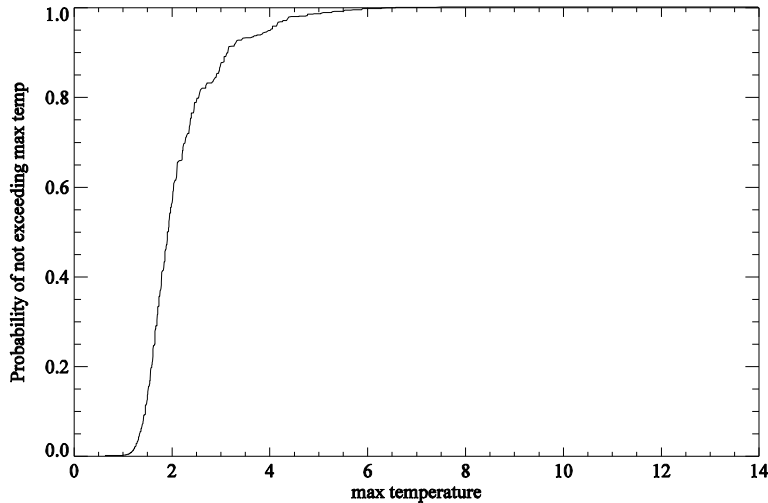
3°C warming



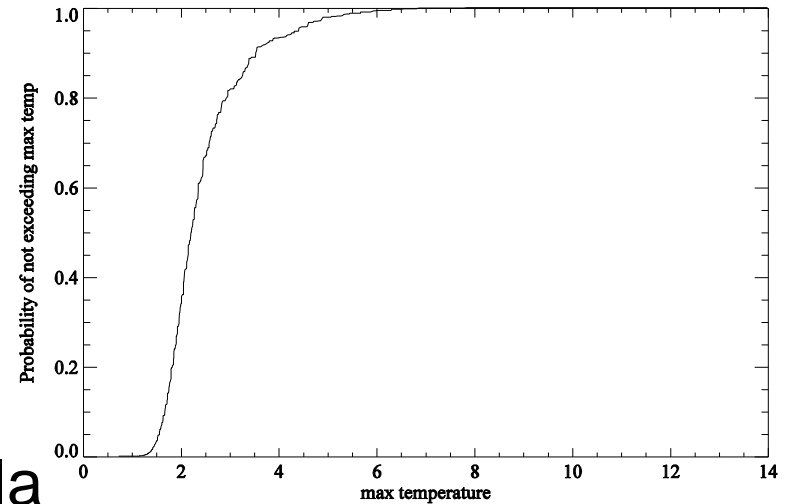
3°C warming



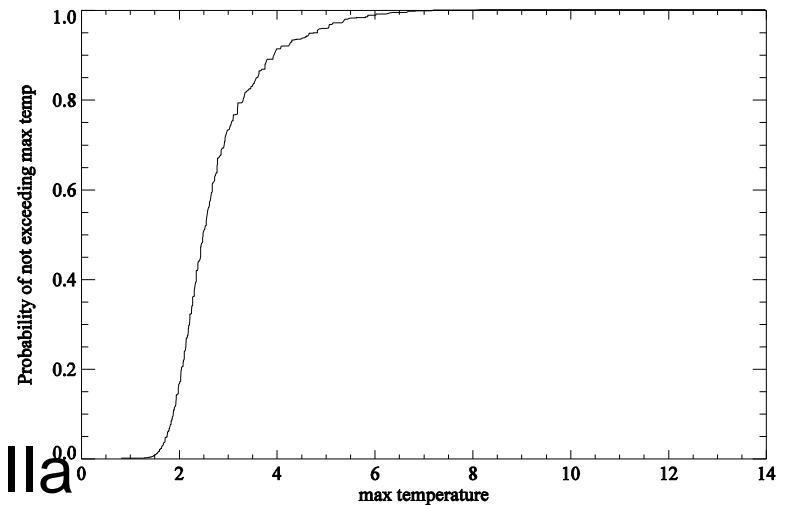
# Maximum temperature cdf for type "a" scenarios



Ia

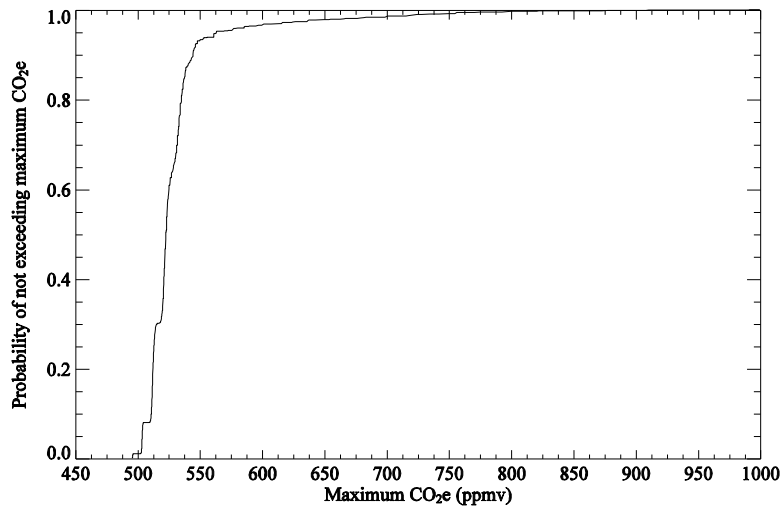


IIa

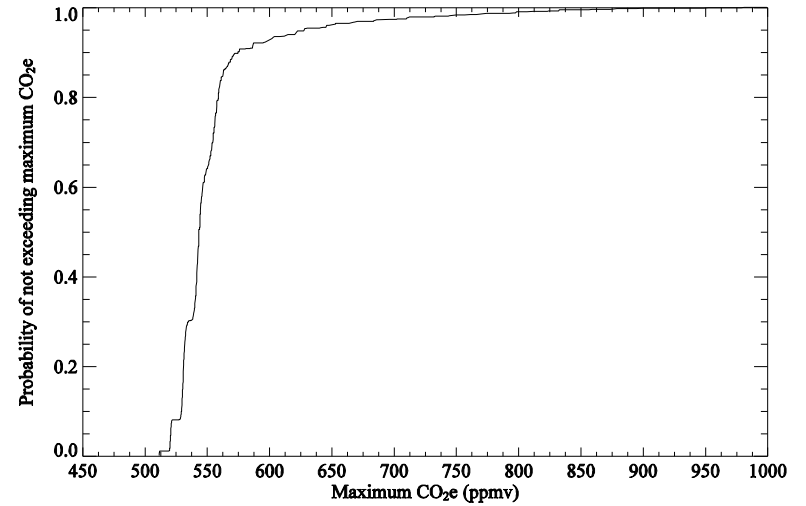


IIIa

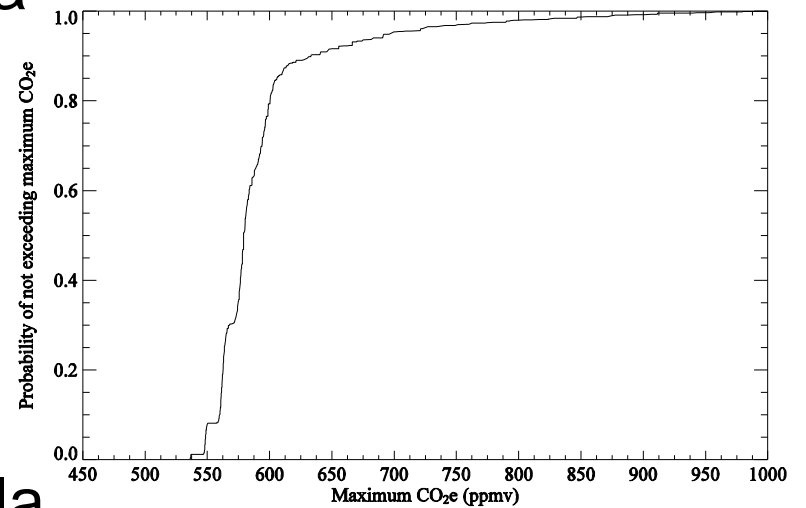
# CO<sub>2</sub>e cdfs for type “a” scenarios



Ia

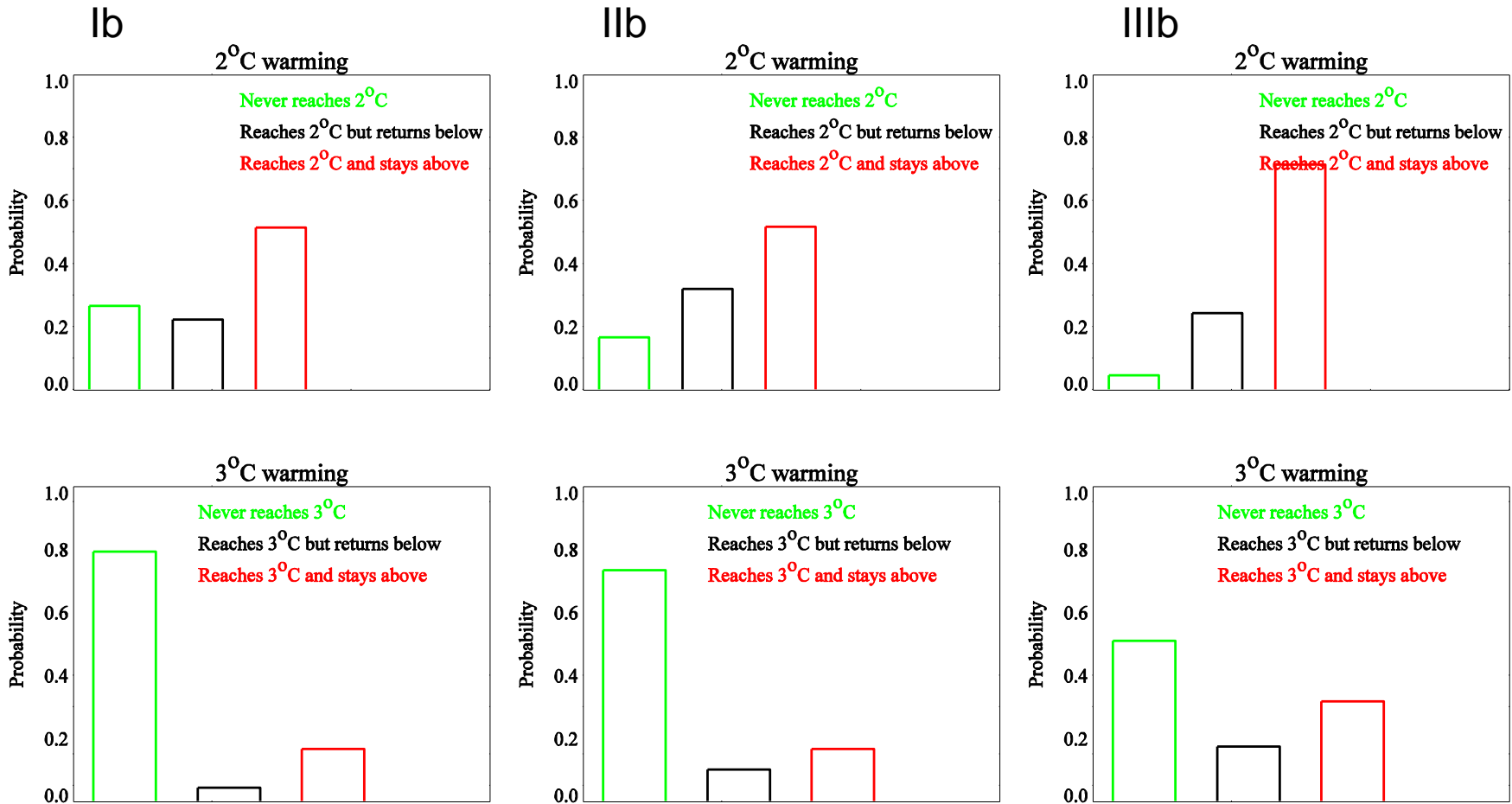


IIa

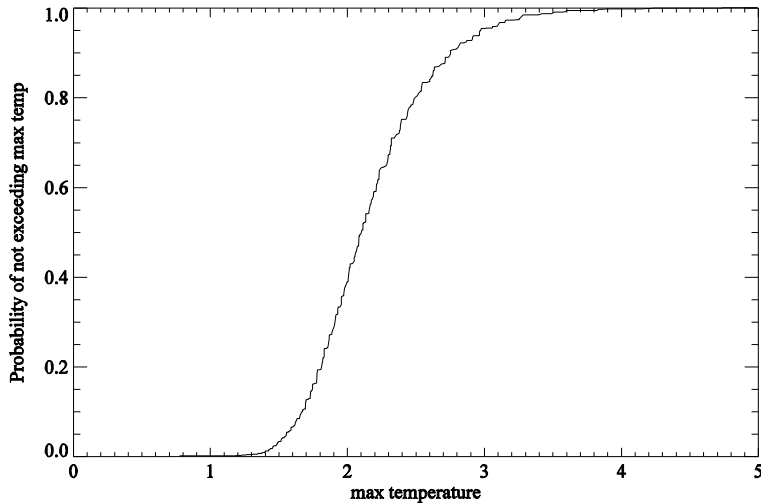


IIIa

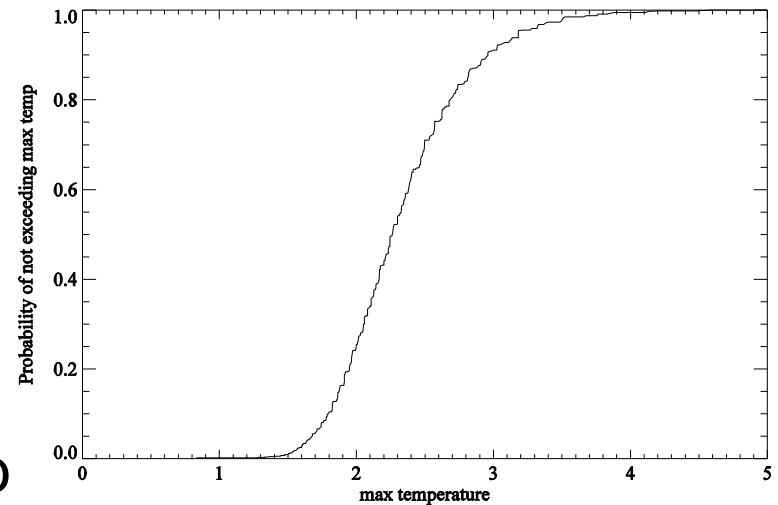
# Probabilities of exceeding 2°C and 3°C for “b” scenarios



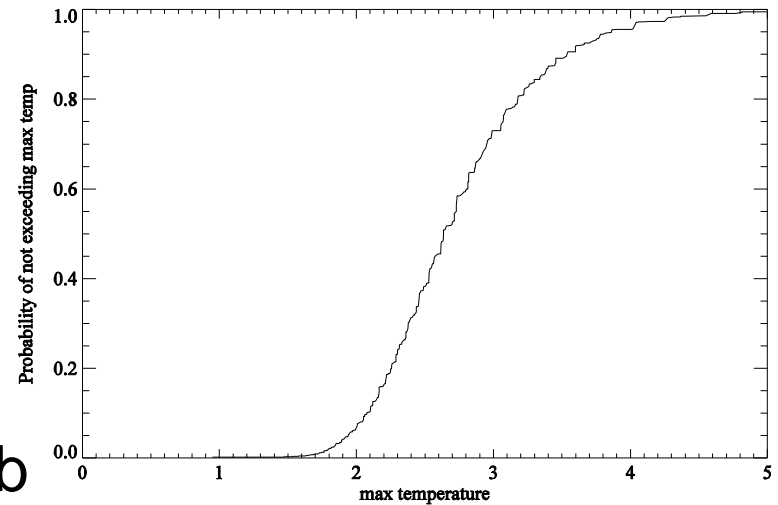
# Maximum temperature cdfs for type "b" scenarios



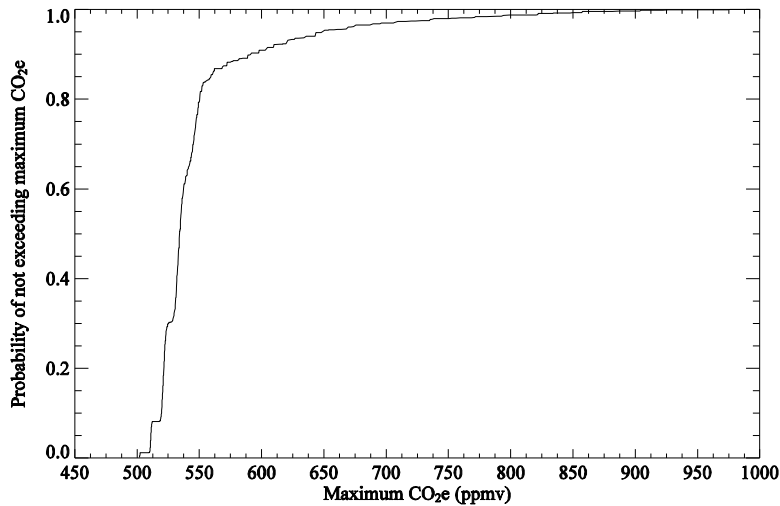
I**lb**



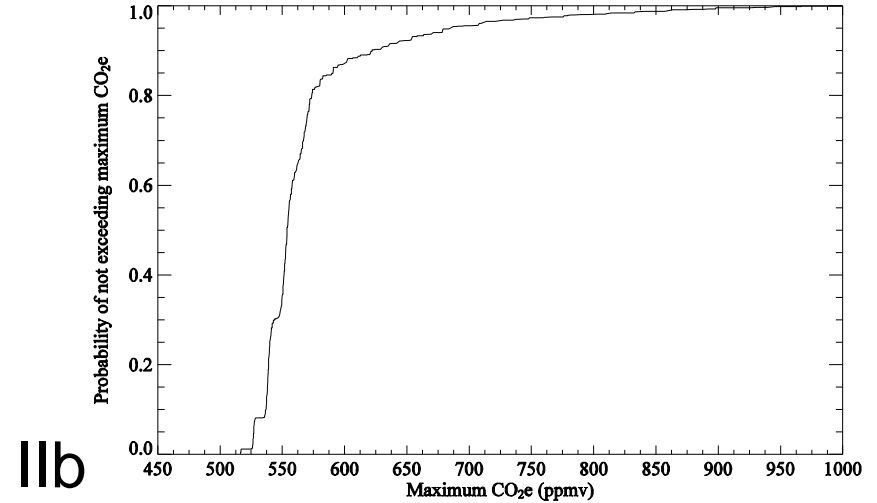
III**b**



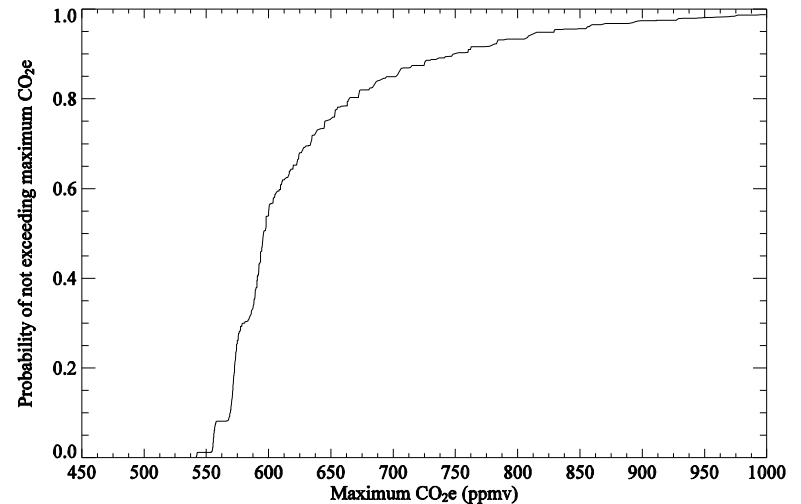
# CO<sub>2</sub>e cdfs for type “b” scenarios



Ib



IIb



IIIb