# IPCC Fifth Assessment Report
# Synthesis Report

## Structured Expert Dialogue
## 2nd December
## Lima, Peru



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# Key Messages

- ➜ **Human influence on the climate system is clear**
- ➜ **The more we disrupt our climate, the more we risk severe, pervasive and irreversible impacts**
- ➜ **We have the means to limit climate change and build a more prosperous, sustainable future**

AR5 WGI SPM, AR5 WGII SPM, AR5 WGIII SPM



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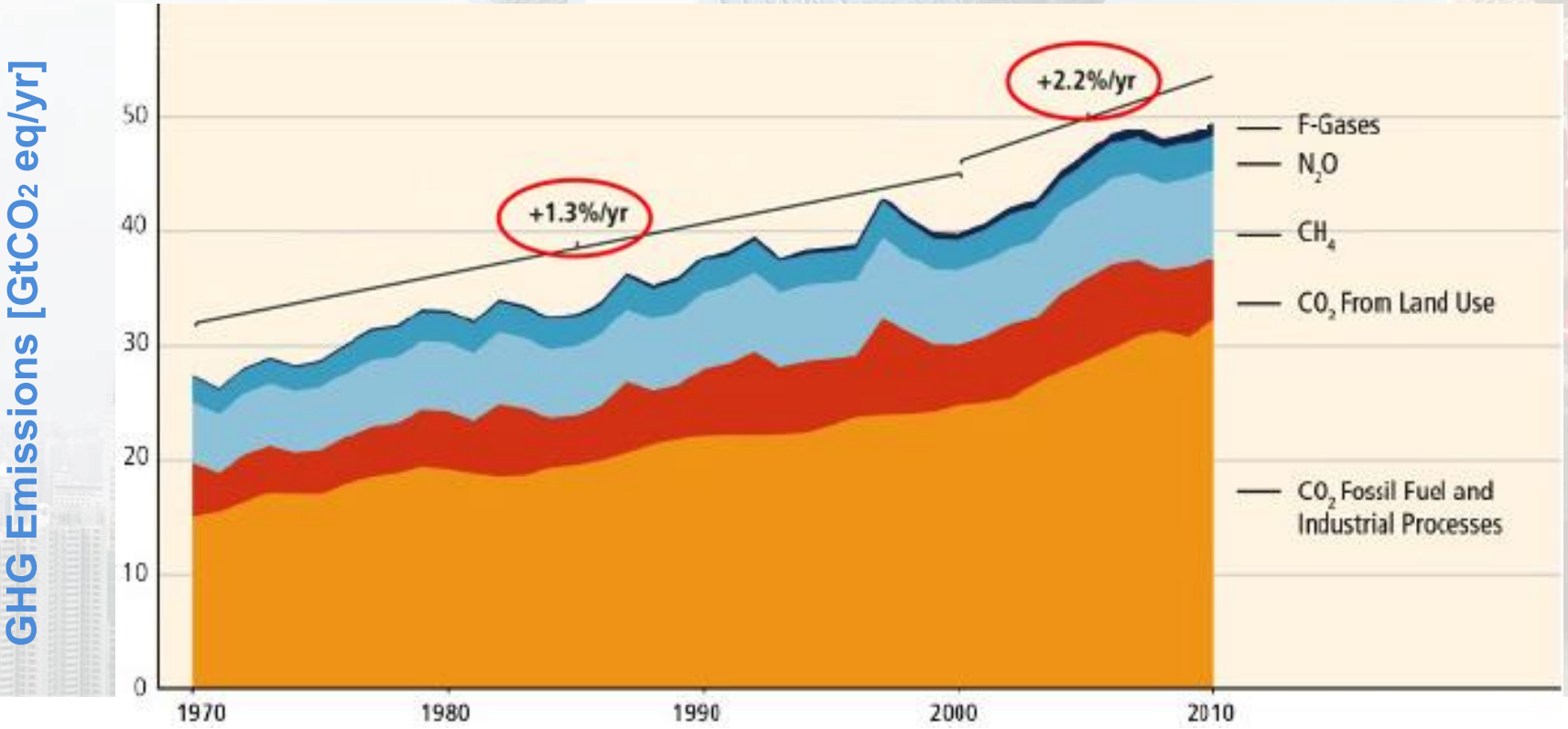
## Anthropogenic GHG emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever.

### The atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years.



# Some of the changes in extreme weather and climate events observed since about 1950 have been linked to human influence

Impacts are already underway in a number of regions:

- decrease in cold temperature extremes
- increase in warm temperature extremes
- increase in extreme high sea levels
- increase in the number of heavy precipitation events

AR5 WGI SPM



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# Continued emissions of greenhouse gases will cause further warming and changes in the climate system

Continued warming increases the risks of severe, pervasive, and irreversible impacts

Some risks are considerable even at 1 ° C global temperature increase above pre-industrial levels, and high to very high for increases of
4 ° C or more.

People who are socially, economically, culturally, politically, institutionally or otherwise marginalized are especially vulnerable to climate change



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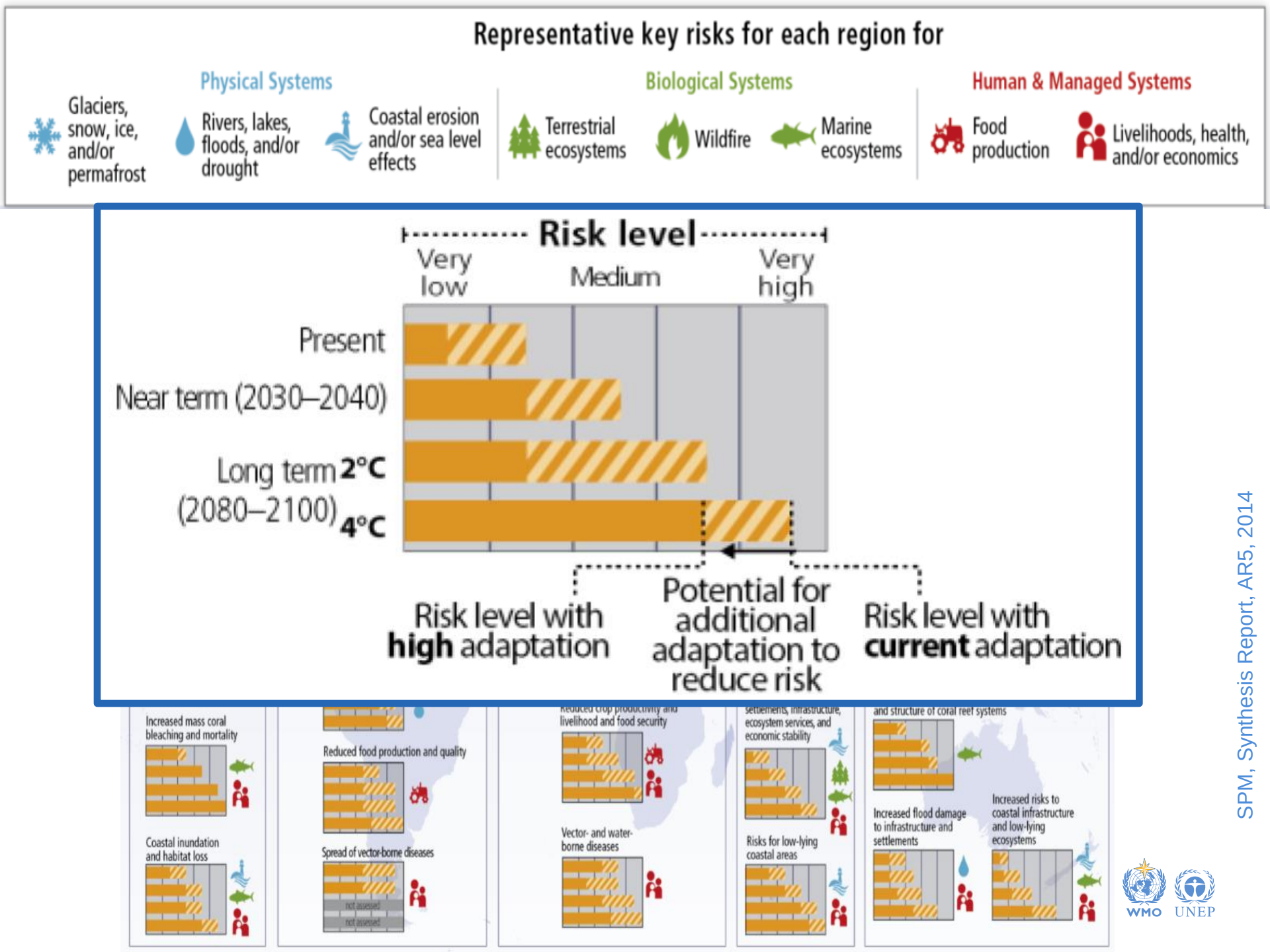



SPM, Synthesis Report, AR5, 2014

# Limiting Temperature Increase to 2˚C

A combination of adaptation and substantial, sustained reductions in greenhouse gas emissions can limit climate change risks

Measures exist to achieve the substantial emission reductions required to limit likely warming to 2˚ C (40-70% reduction in GHGs globally by 2050 and near zero or below emissions levels in 2100)

Implementing reductions in greenhouse gas emissions poses substantial technological, economic, social, and institutional challenges

Ambitious mitigation is affordable and translates into delayed but not foregone growth (economic growth reduced by ~ 0.06% / BAU growth 1.6-3%). Estimated costs do not account for the benefits of reduced climate change

But delaying mitigation will substantially increase the challenges associated with limiting warming to 2˚ C

# Mitigation Measures

## More efficient use of energy

## Greater use of low-carbon and no-carbon energy

- Many of these technologies exist today
- Nearly a quadrupling of zero- and low-carbon energy supply from renewable energy by 2050

## Improved carbon sinks

- Reduced deforestation and improved forest management and planting of new forests
- Bio-energy with carbon capture and storage

## Lifestyle and behavioural changes

AR5 WGIII SPM

# Ethical dimensions, value judgments and risk perceptions

Very likely more intense and frequent extreme precipitation events in many regions.

A likely nearly ice-free Arctic Ocean in September before mid-century (RCP8.5).

Very likely that global sea-level rise will continue in the 21st century (0.26-0.55m in RCP2.6 / 0.45-0.82m in RCP8.5).

Projections of reductions of renewable surface- and groundwater resources in some regions.

Projections of increasing displacement of people, and risks of violent conflicts.

The risk associated with crossing certain thresholds increases with rising temperatures.

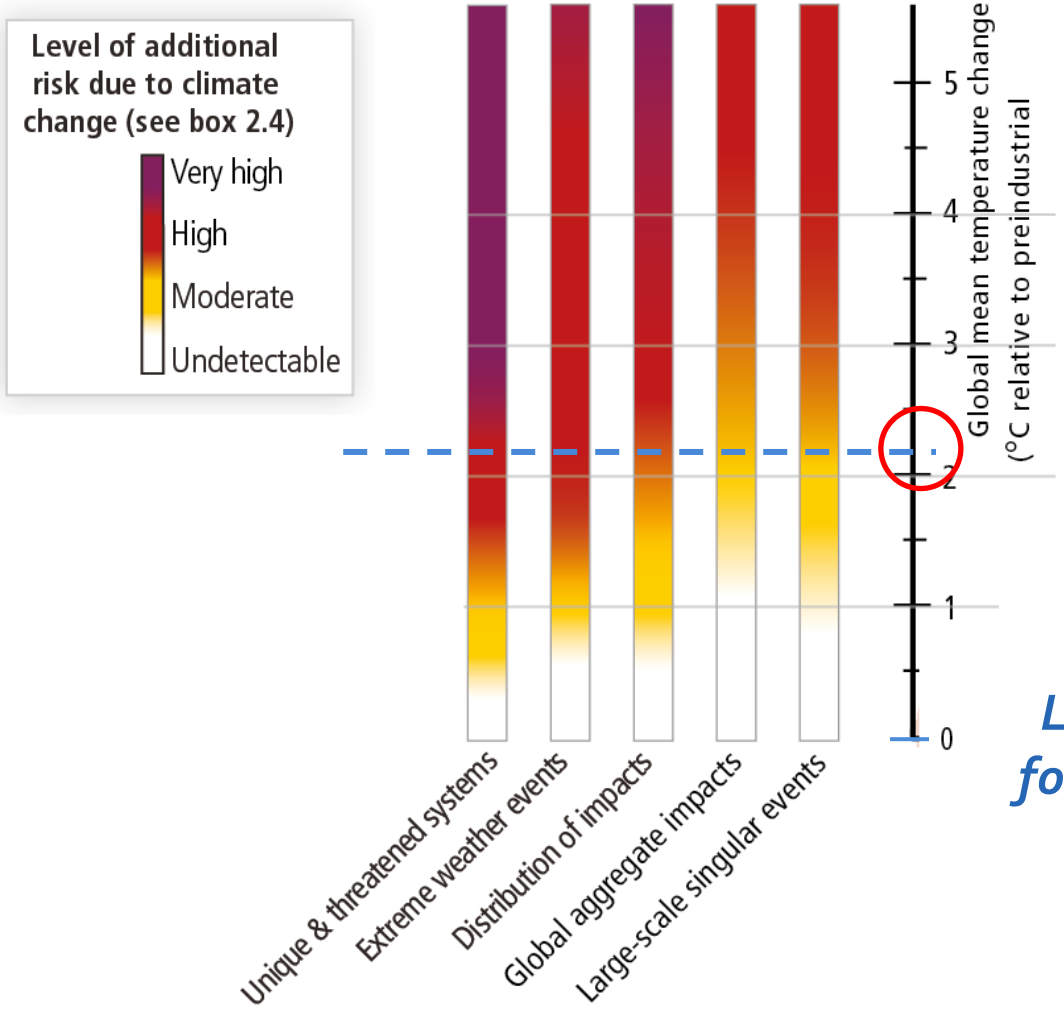
# Climate change and equity

Issues of equity, justice, and fairness arise with respect to mitigation and adaptation:

- Different past and future contributions to the accumulation of GHGs in the atmosphere
- Different capacities to address mitigation and adaptation
- Varying challenges and circumstances

Options for equitable burden-sharing can reduce the potential for the costs of climate action to constrain development.

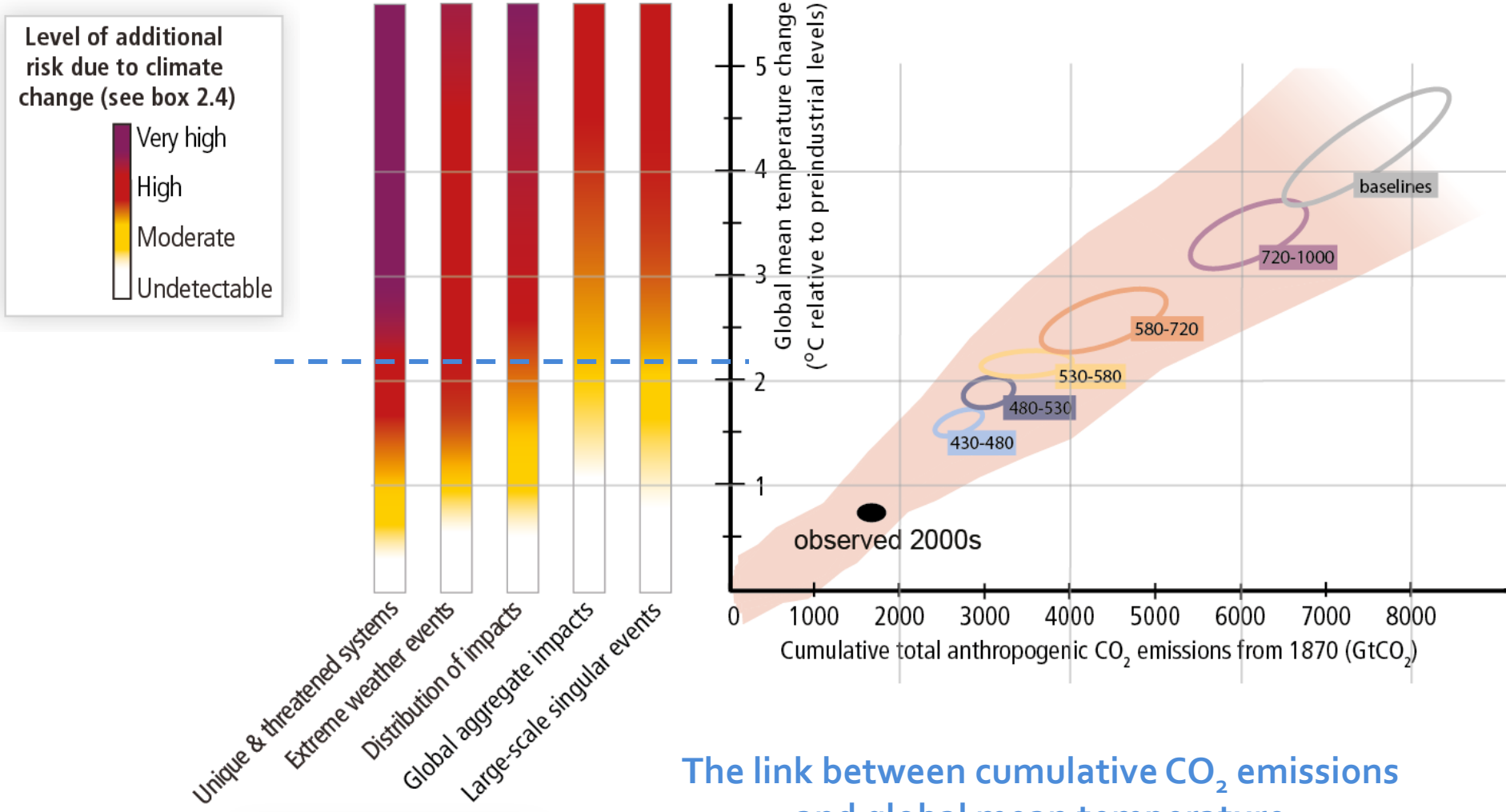
AR5 WGIII




**The risks from climate change, assessed by the WGII of the IPCC AR5, and aggregated in five "Reasons for Concerns"**

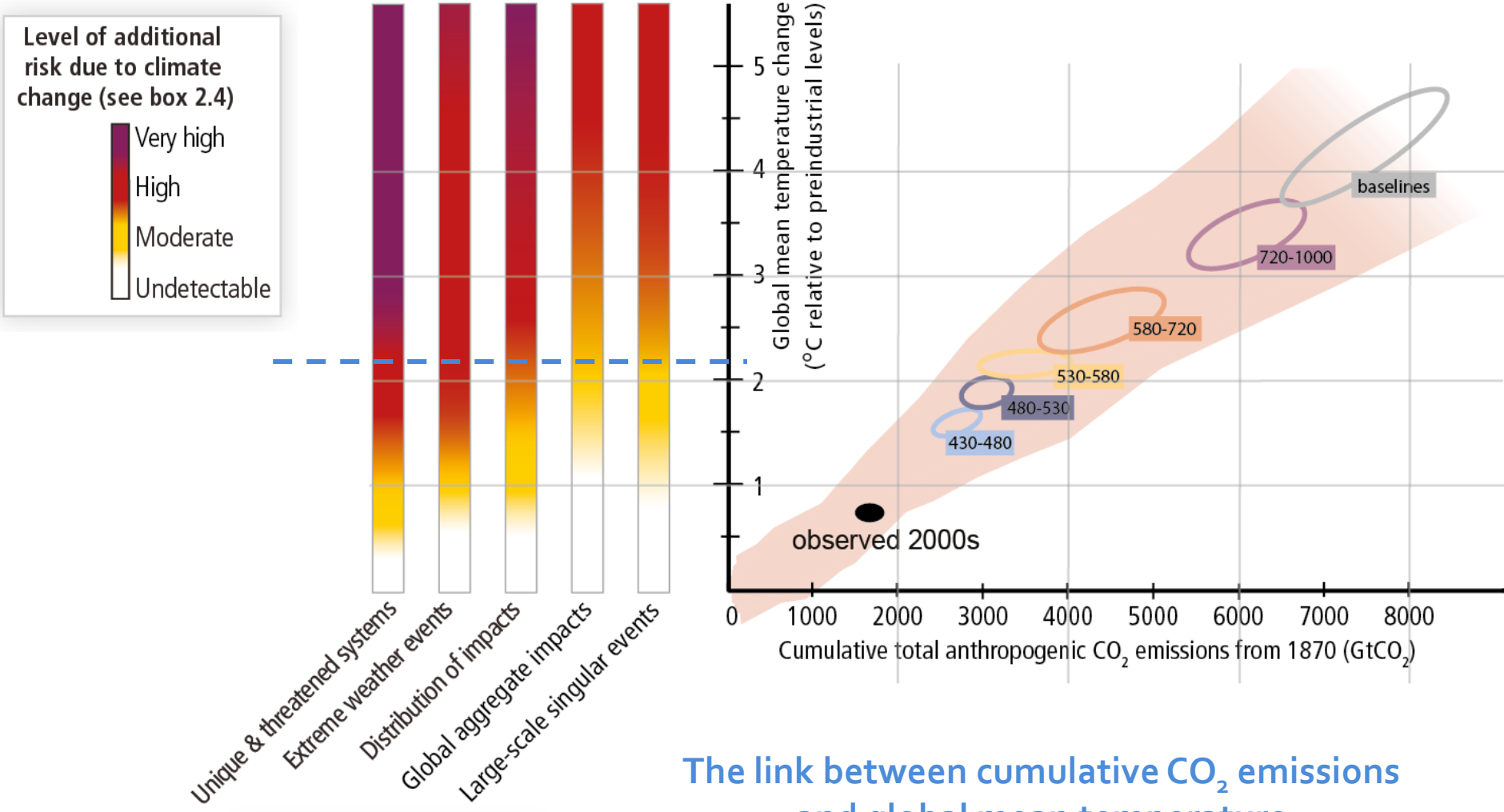
***Levels of risk across the Reasons for Concern can be associated with a level of global temperature change.***

***Here shown for a random warming level***



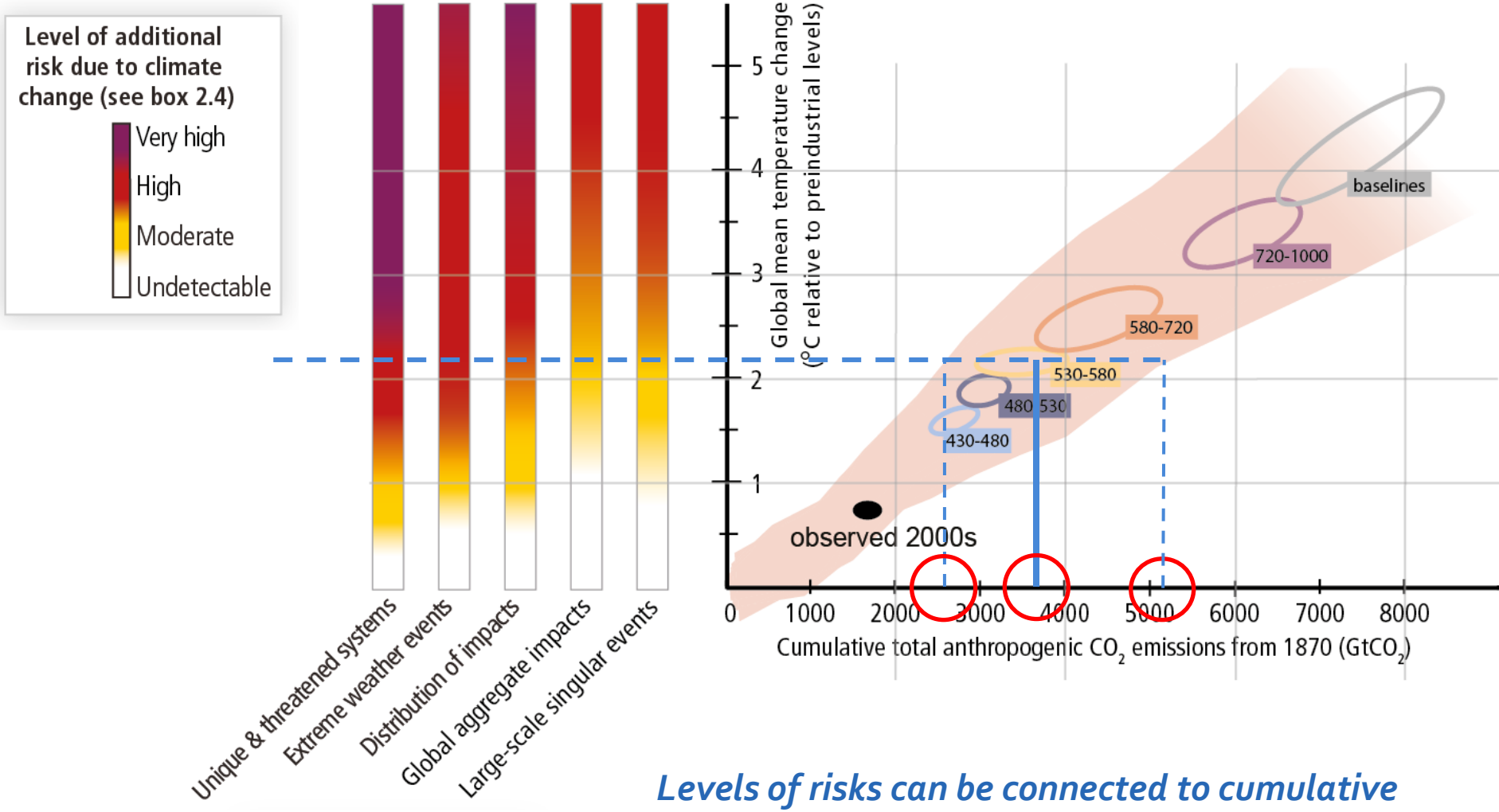

The link between cumulative $CO_2$ emissions and global mean temperature

The pink plume is from WGI complex models. It includes the uncertainty from non-$CO_2$ gases and climate and carbon cycle uncertainty, using the likely range

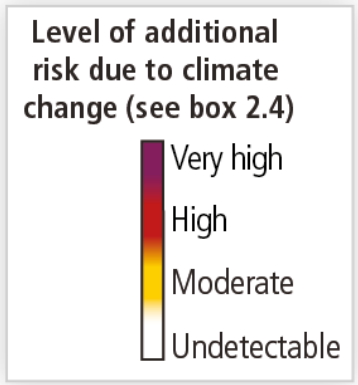


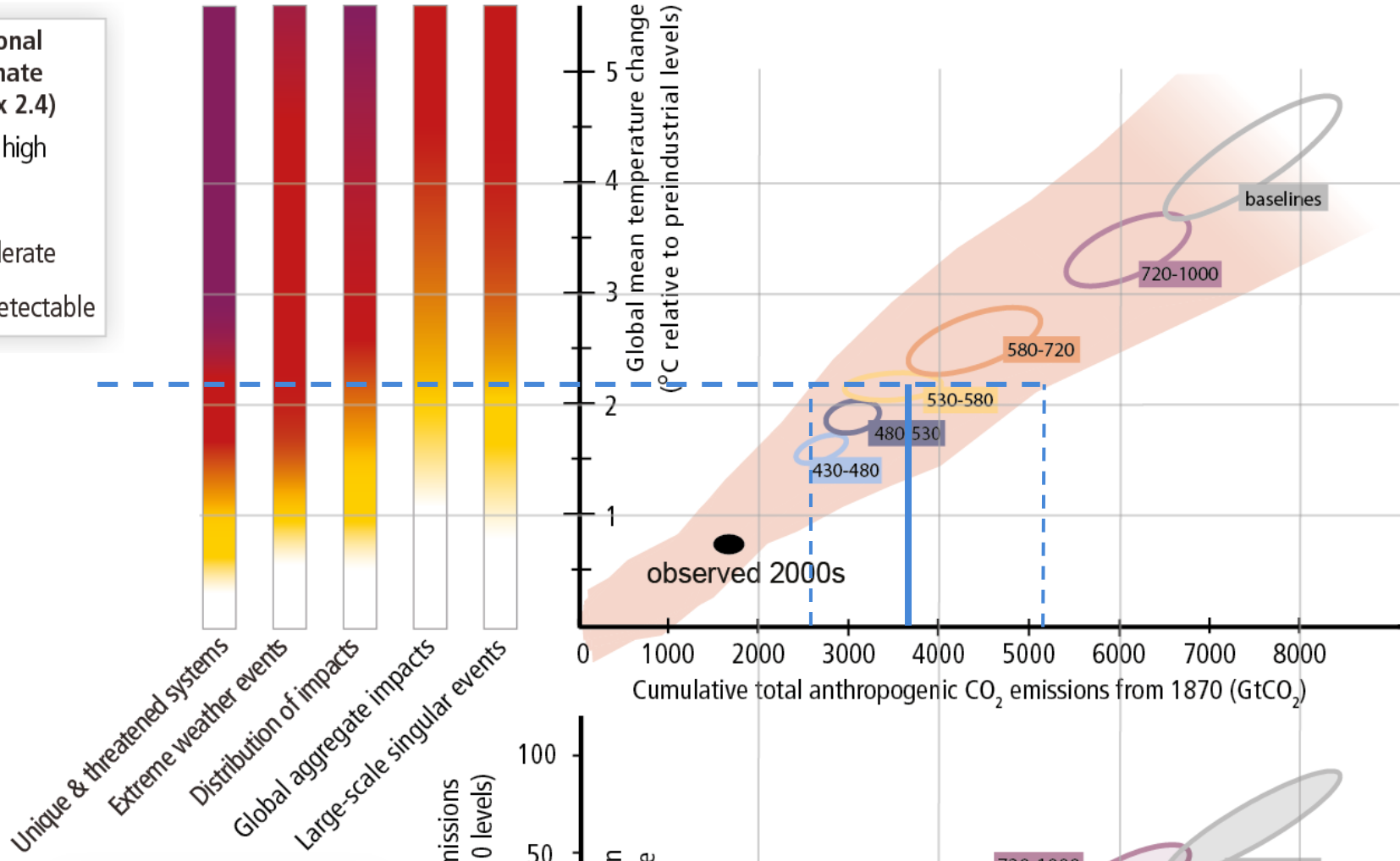

The link between cumulative $CO_2$ emissions and global mean temperature

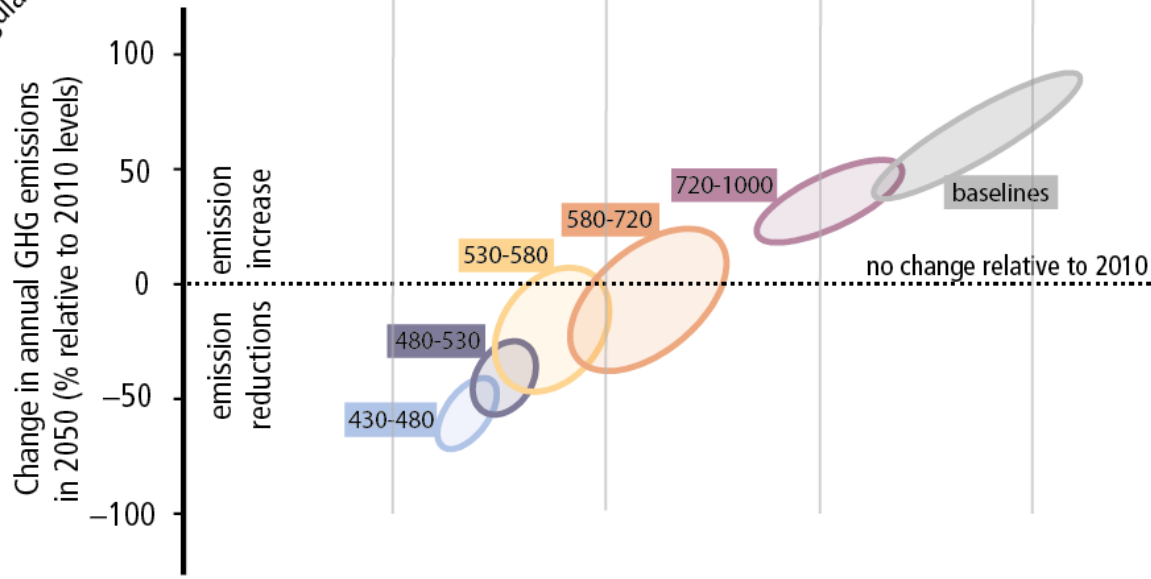
The ellipses show results from the WGIII models, using a simple climate model. It does not include climate and carbon cycle uncertainty, but explores more comprehensively the scenario uncertainty from a range of CO2 and non-$CO_2$ pathways



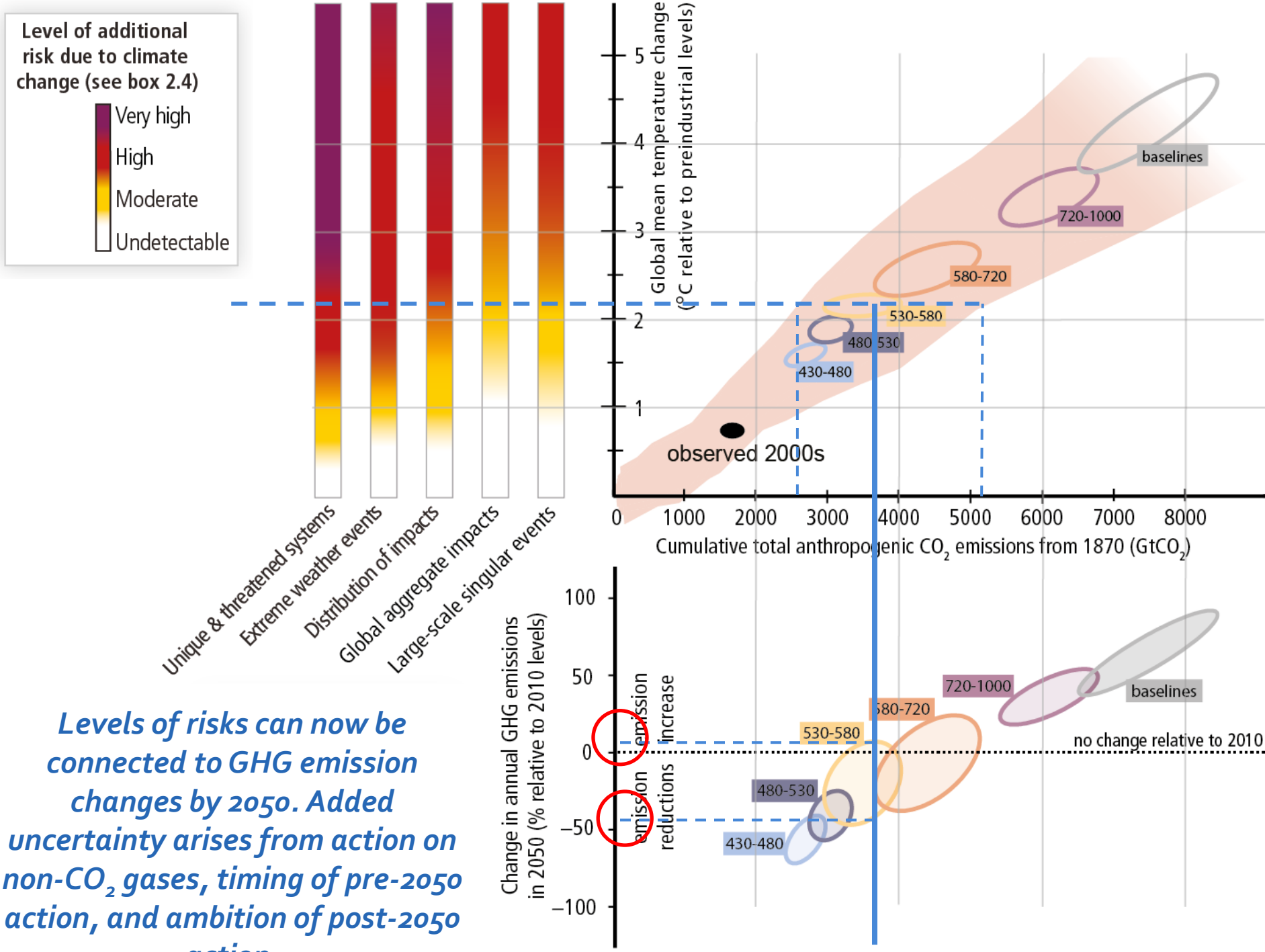

***Levels of risks can be connected to cumulative $CO_2$ emission levels, for the average climate response,***



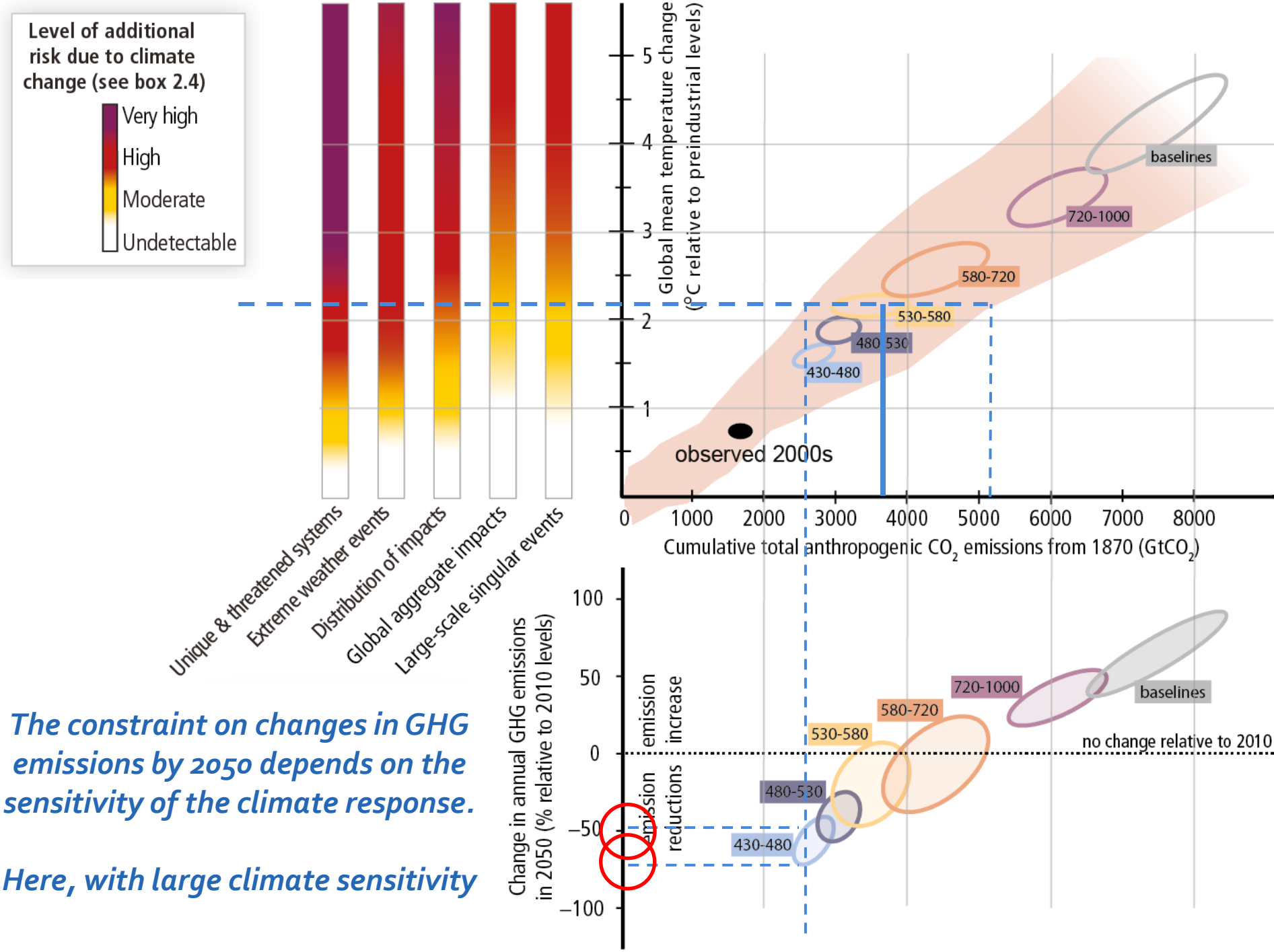




**The link between changes in annual GHG emissions by 2050 and the cumulative $CO_2$ emissions by 2100 of the WGIII scenario categories**

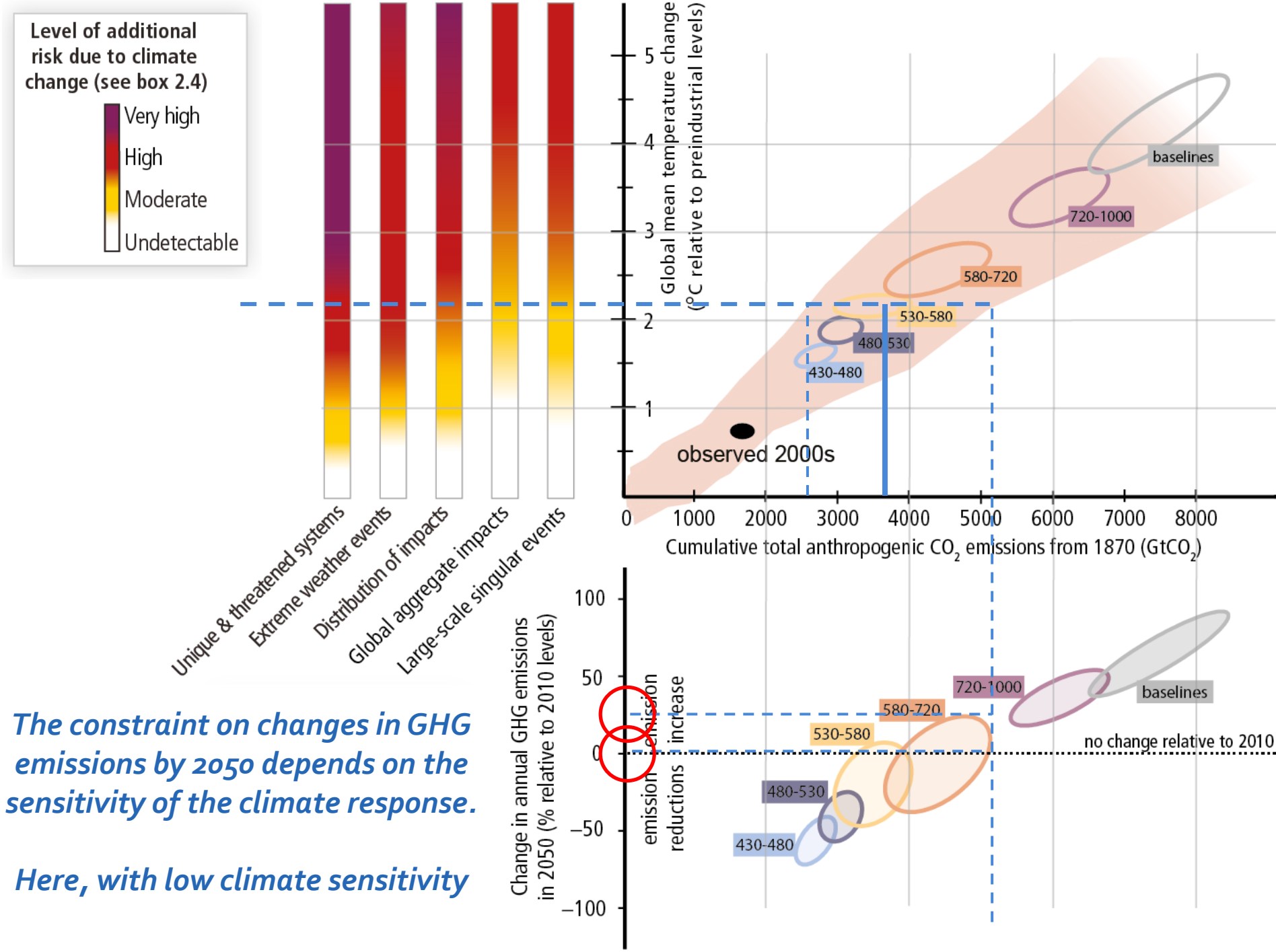



***Levels of risks can now be connected to GHG emission changes by 2050. Added uncertainty arises from action on non-$CO_2$ gases, timing of pre-2050 action, and ambition of post-2050***



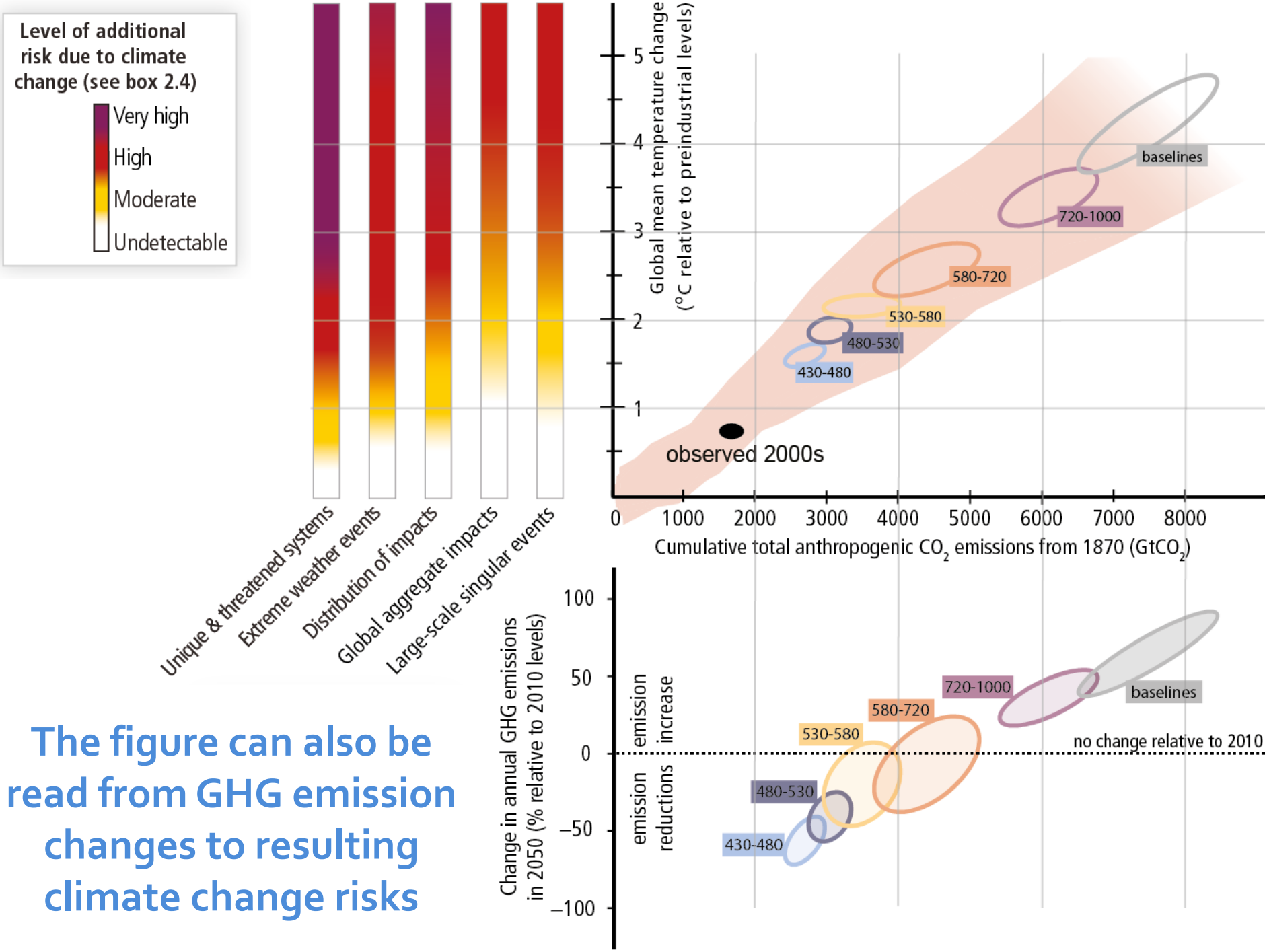

***The constraint on changes in GHG emissions by 2050 depends on the sensitivity of the climate response.***

***Here, with large climate sensitivity***

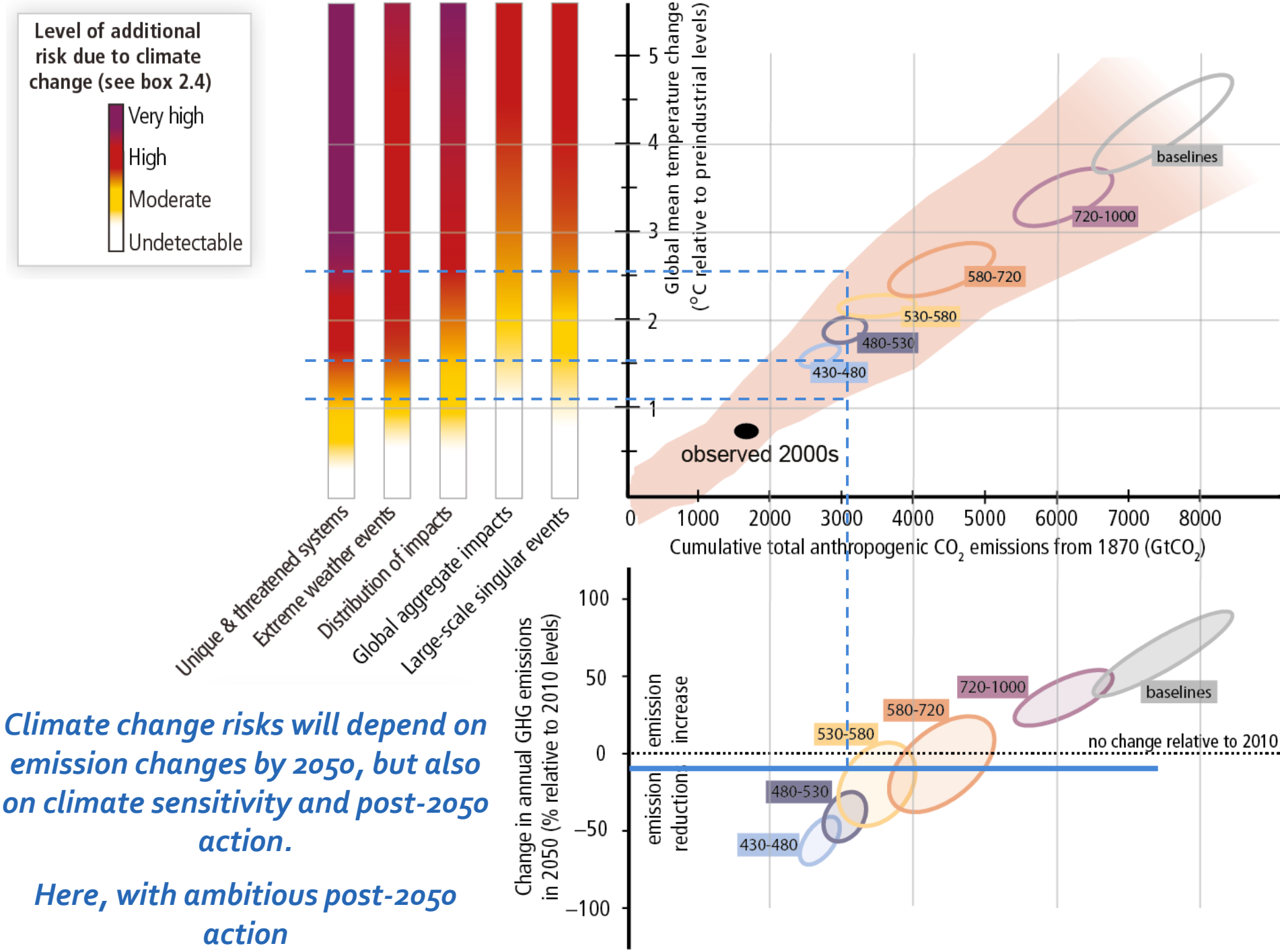



***The constraint on changes in GHG emissions by 2050 depends on the sensitivity of the climate response.***

***Here, with low climate sensitivity***

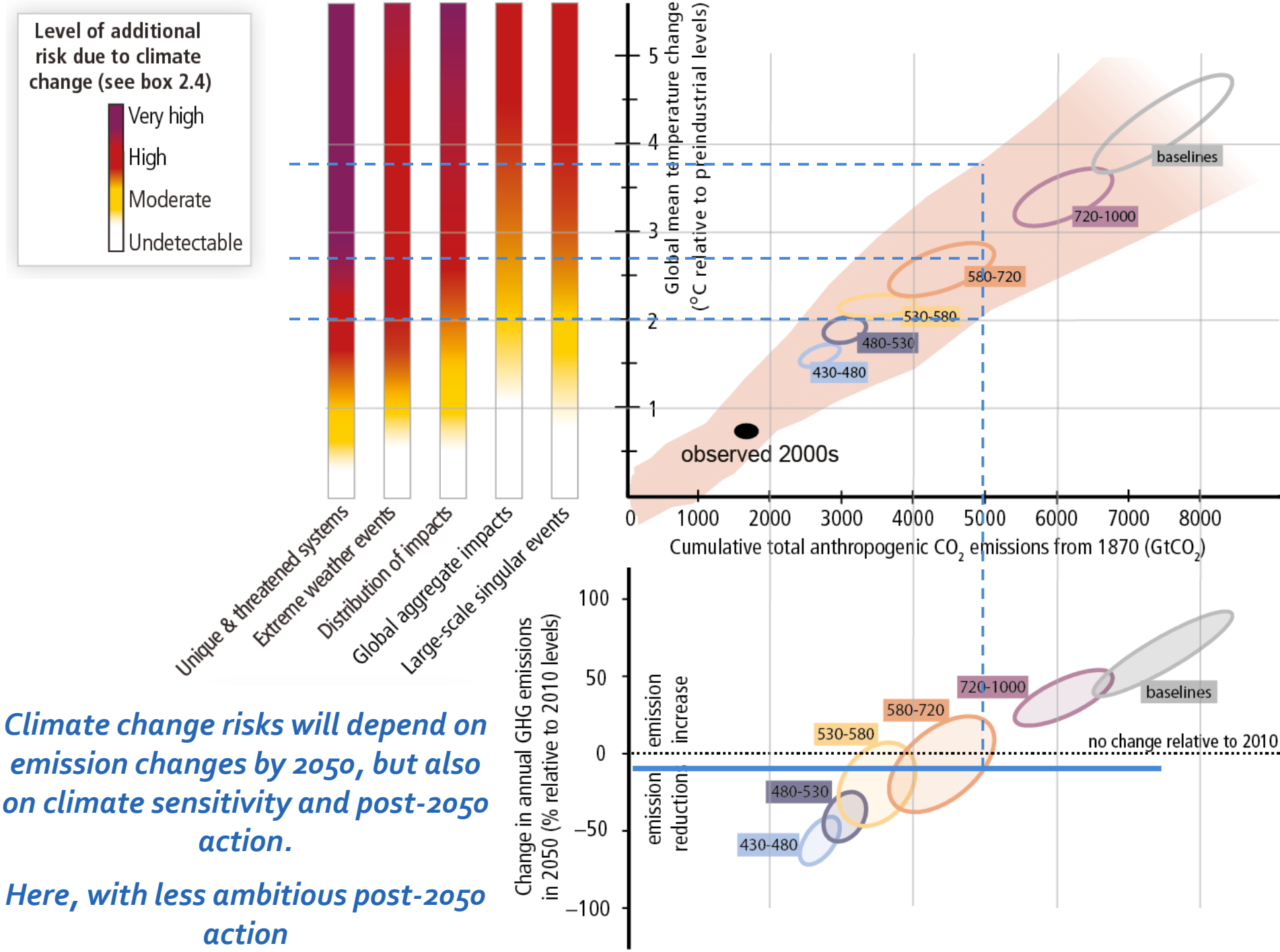



**The figure can also be read from GHG emission changes to resulting climate change risks**



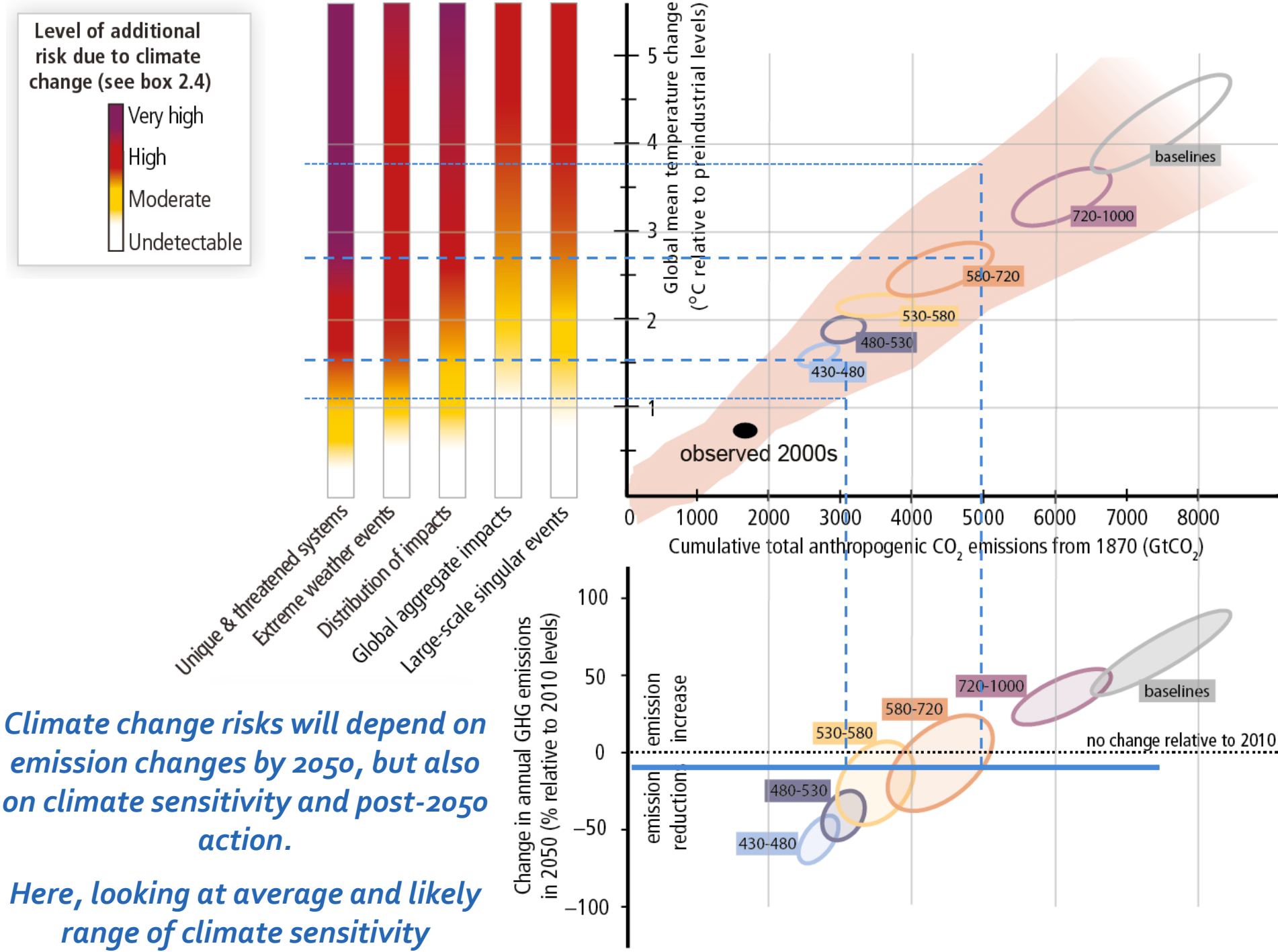

***Climate change risks will depend on emission changes by 2050, but also on climate sensitivity and post-2050 action.***

***Here, with ambitious post-2050 action***




***Climate change risks will depend on emission changes by 2050, but also on climate sensitivity and post-2050 action.***

***Here, with less ambitious post-2050 action***




***Climate change risks will depend on emission changes by 2050, but also on climate sensitivity and post-2050 action.***

***Here, looking at average and likely range of climate sensitivity***

# The figure does not include likelihood information. Table SPM.1 provides this information

| $CO_2$-eq Concentrations in 2100 ($CO_2$-eq)[6] Category label (conc. range) | Subcategories | Relative position of the RCPs[4] | Change in $CO_2$-eq emissions compared to 2010 (in %)[3] | | Likelihood of staying below a specific temperature level over the 21st century (relative to 1850-1900)[4,5] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2050 | 2100 | 1.5°C | 2°C | 3°C | 4°C |
| < 430 | *Only a limited number of individual model studies have explored levels below 430 ppm $CO_2$-eq*[10] | | | | | | | |
| 450 (430 – 480) | Total range[1,,7] | *RCP2.6* | -72 to -41 | -118 to -78 | *More unlikely than likely* | *Likely* | *Likely* | *Likely* |
| 500 (480 – 530) | No overshoot of 530 ppm $CO_2$-eq | | -57 to -42 | -107 to -73 | *Unlikely* | *More likely than not* | | |
| | Overshoot of 530 ppm $CO_2$-eq | | -55 to -25 | -114 to -90 | | *About as likely as not* | | |
| 550 (530 – 580) | No overshoot of 580 ppm $CO_2$-eq | | -47 to -19 | -81 to -59 | | *More unlikely than likely*[9] | | |
| | Overshoot of 580 ppm $CO_2$-eq | | -16 to 7 | -183 to -86 | | | | |
| (580 – 650) | Total range | *RCP4.5* | -38 to 24 | -134 to -50 | | | | |
| (650 – 720) | Total range | | -11 to 17 | -54 to -21 | | *Unlikely* | *More likely than not* | |
| (720 – 1000)[2] | Total range | *RCP6.0* | 18 to 54 | -7 to 72 | *Unlikely*[8] | | *More unlikely than likely* | |
| >1000[2] | Total range | *RCP8.5* | 52 to 95 | 74 to 178 | | *Unlikely*[8] | *Unlikely* | *More unlikely than likely* |