Climate Impacts in Integrated Assessment Models

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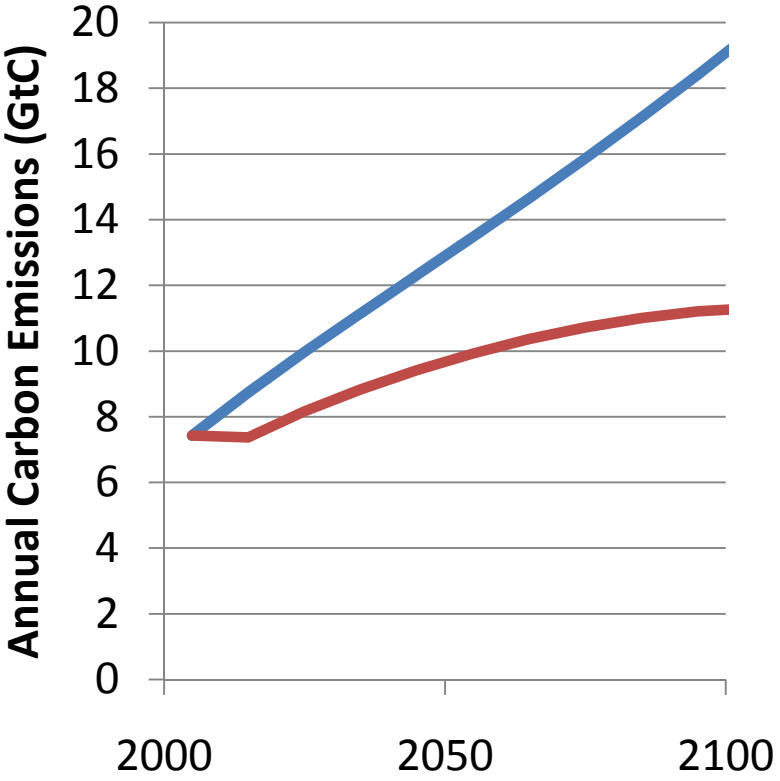
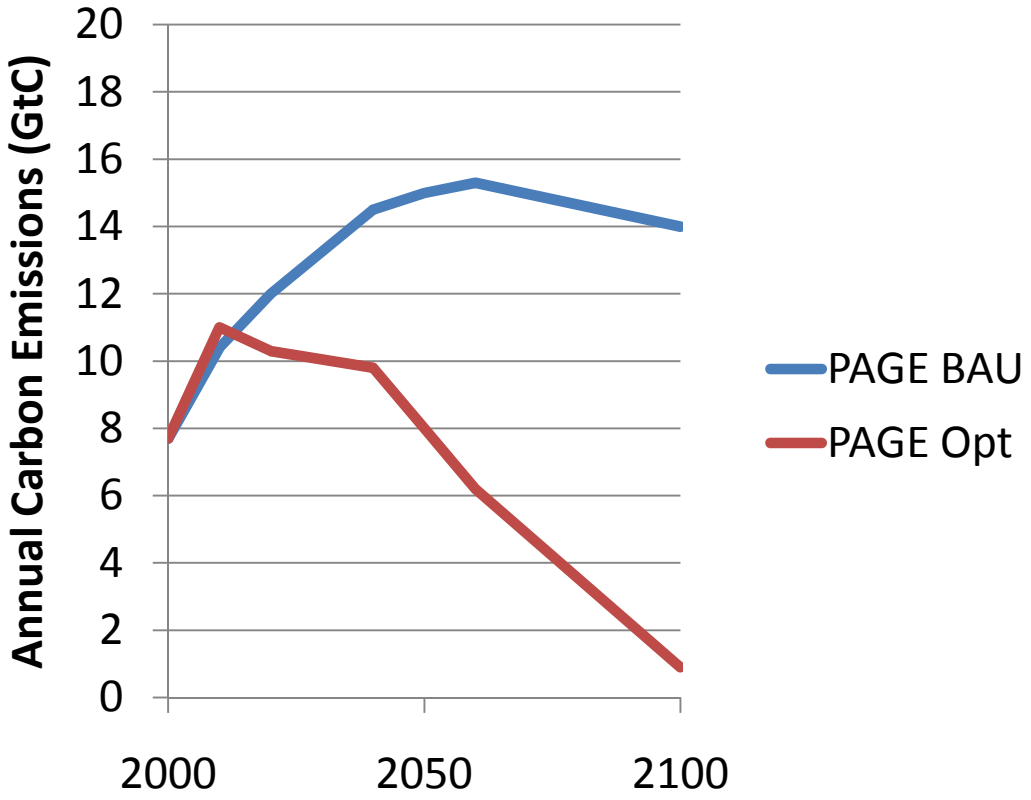
Integrated Assessment Models

- **Policy evaluation models**
  - Quantify the consequences of alternate scenarios in terms of environmental, economic, and social performance measures.

- **Policy optimization models**
  - Calculate the “best” scenario that optimizes a single performance measure.
  - Often used for formal cost-benefit analysis (CBA) of climate mitigation policies.

“Optimal” Solutions





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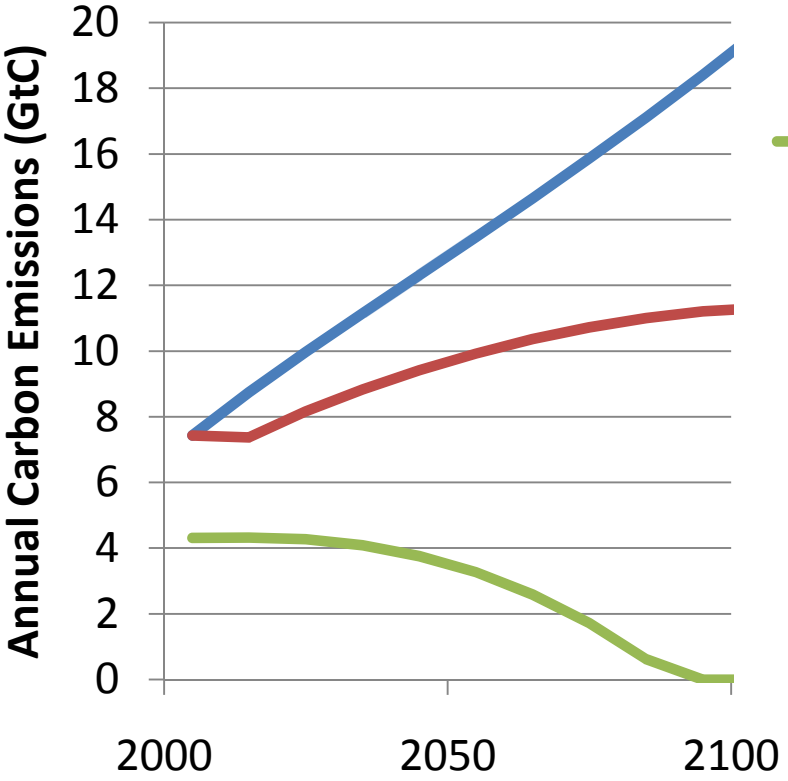
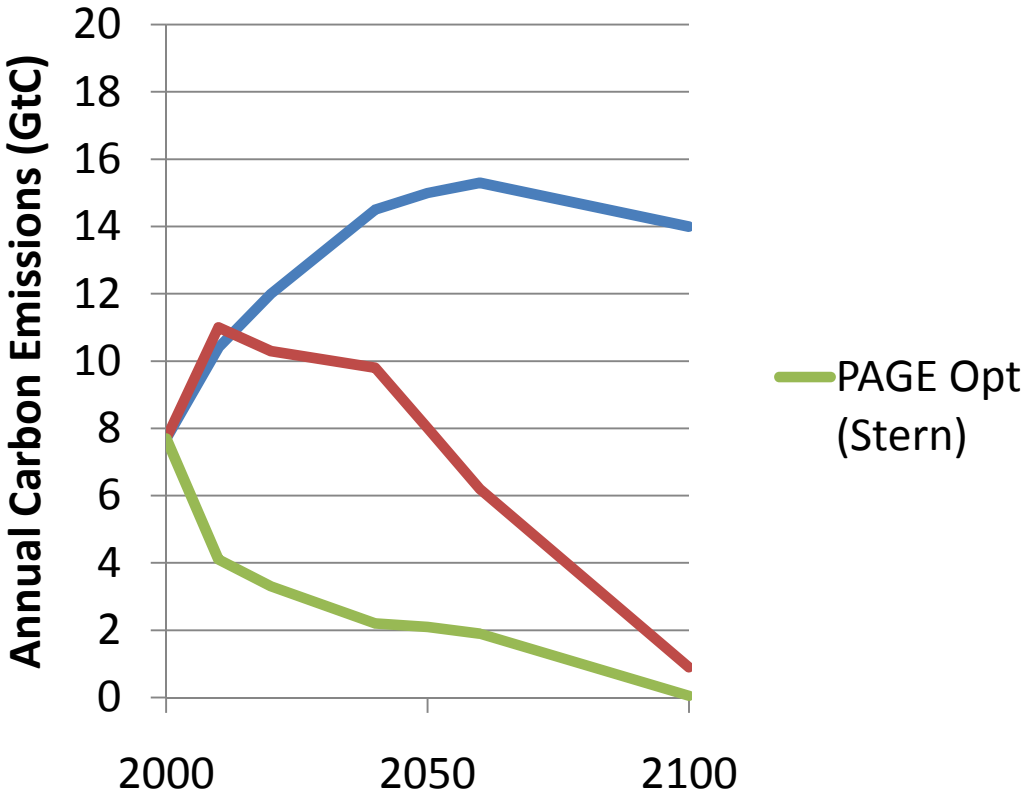
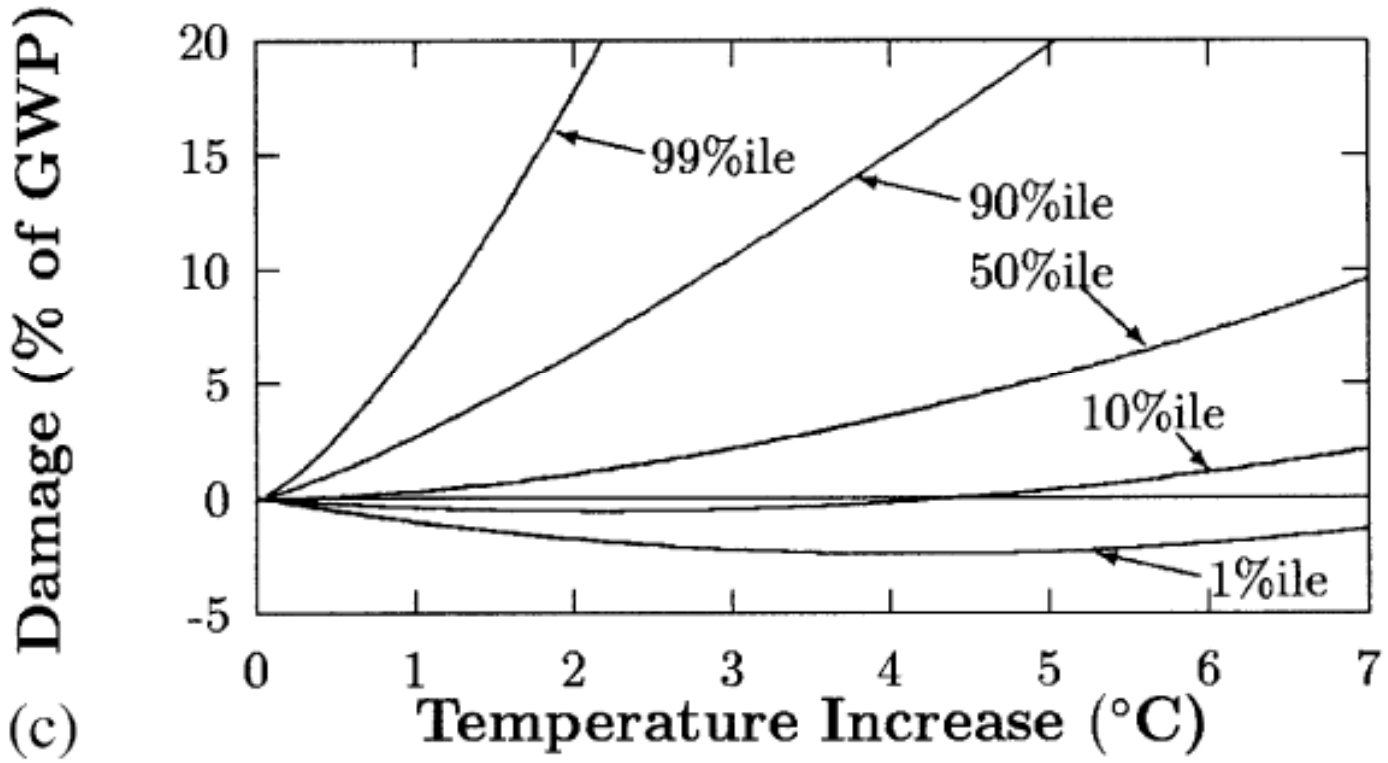




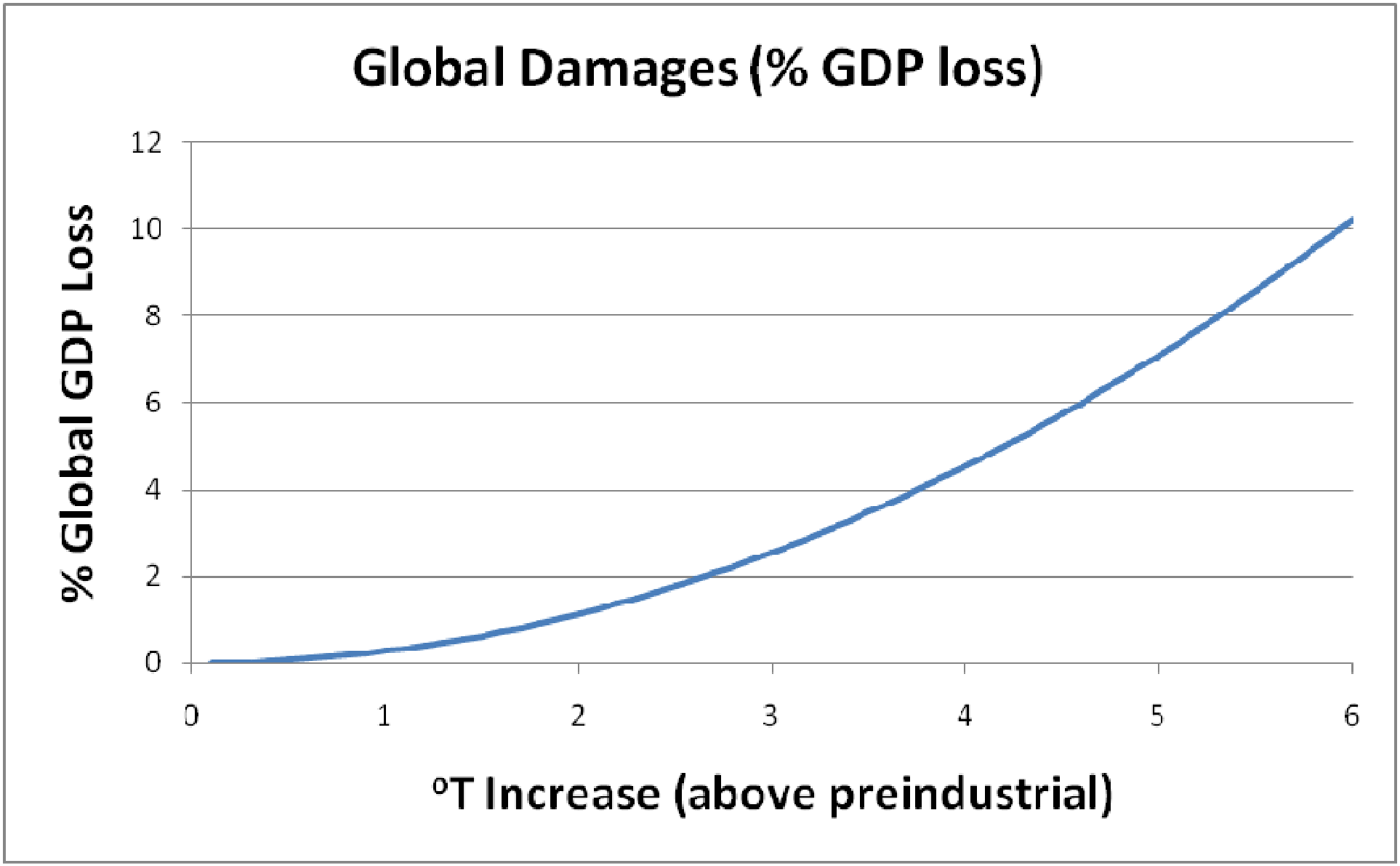
Climate Damages



Roughgarden and Schneider, 1997

More sensitive damage function increases optimal policy controls.

Climate Damages (DICE)



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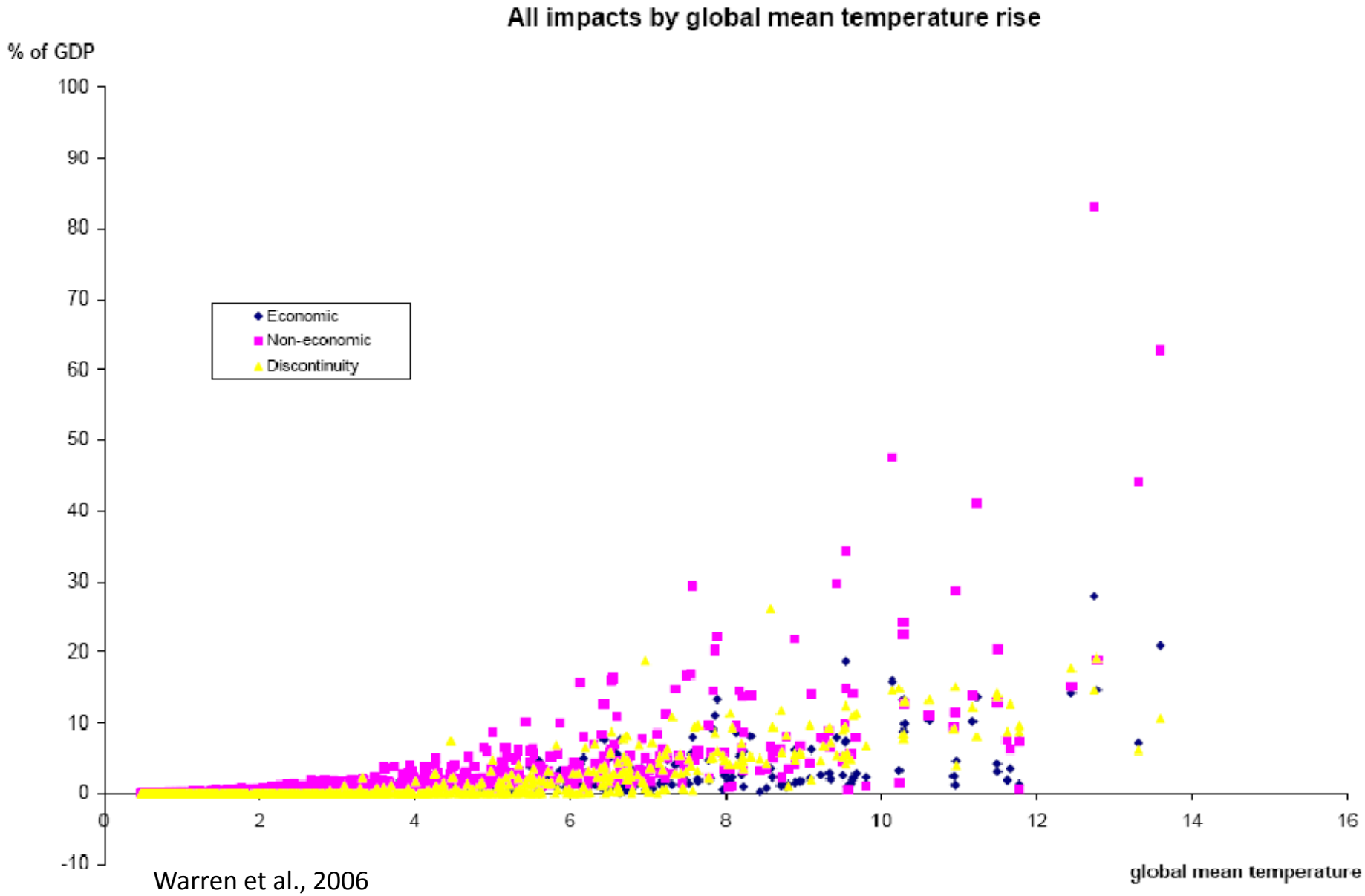
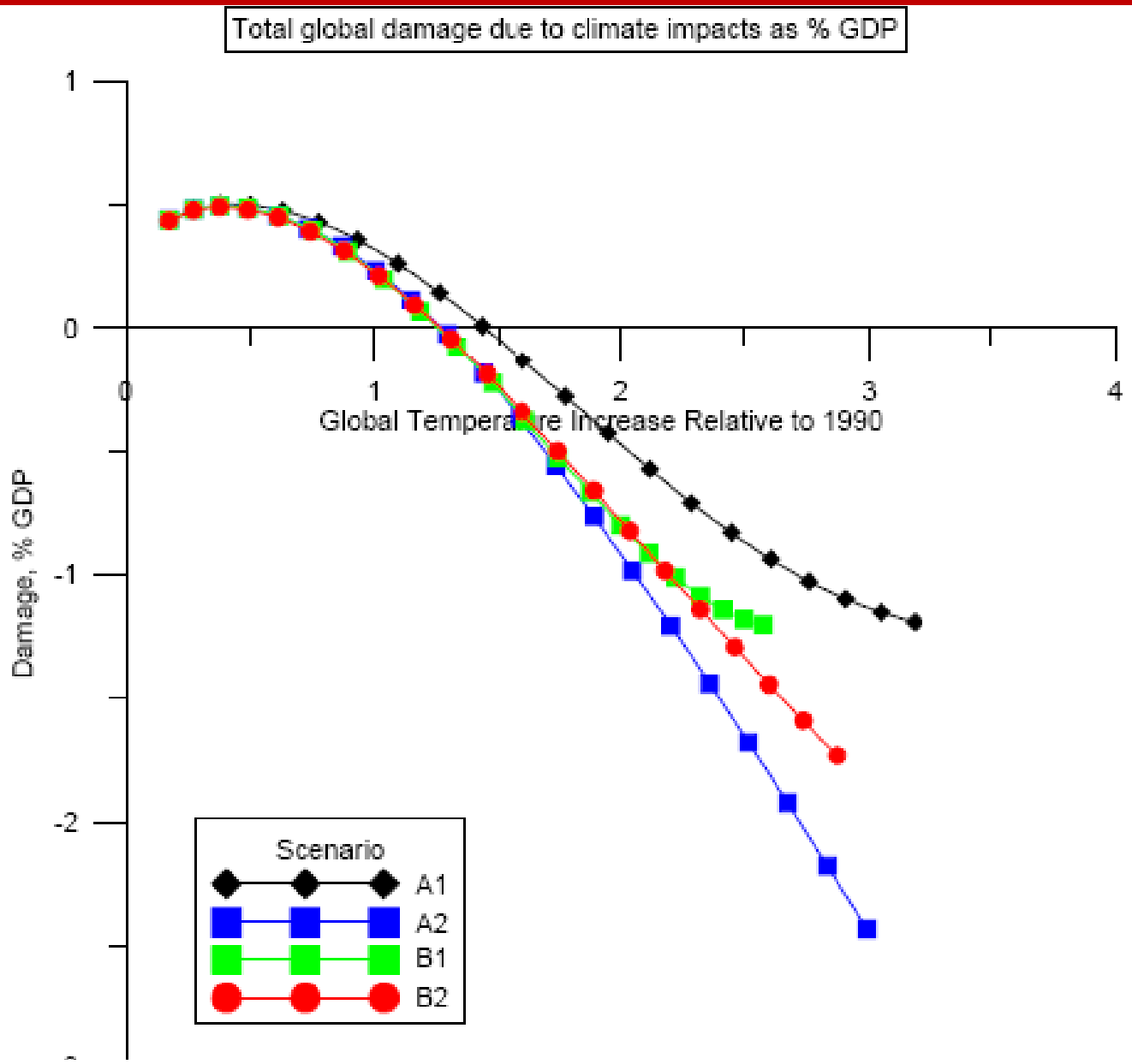


Warren et al., 2006

Climate Damages



Warren et al., 2006

Comparison with Current Science

- Core impact estimates of most IAMs are based on literature from 2000 and earlier

- Greater risks are now associated with lower levels of temperature increase

- Potential for greater damages from impacts previously omitted or underestimated
  - Extreme weather events
  - Ocean acidification
  - Ecosystem services
  - Abrupt climate changes

Conclusions

- Explicit incorporation of the following will generally increase climate damages in IAMs:
  - A broader set of climate impacts
  - New advances in scientific understanding
  - A probabilistic representation of impacts

- Models that do not take these factors into account are likely to underestimate climate damages and recommended emissions reductions.