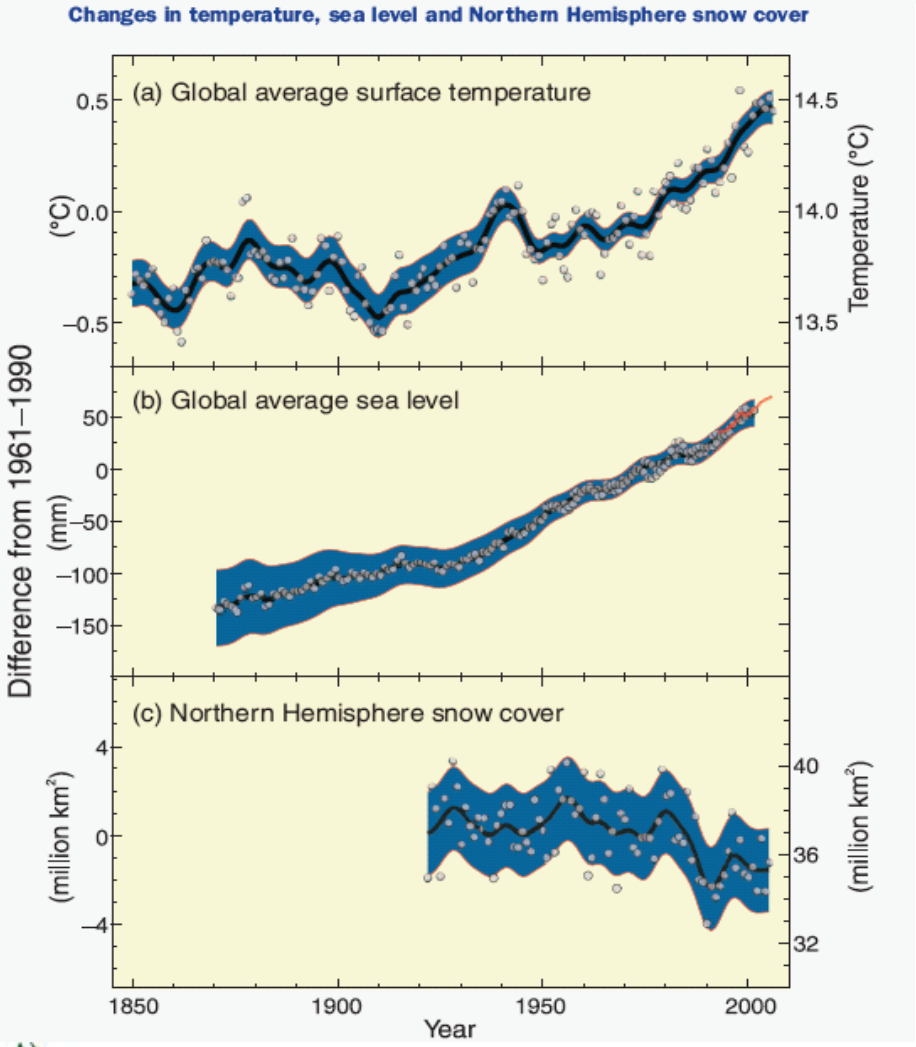
Leveraging CAT Models to Quantify Future Climate Impacts

Pete Dailey, Ph.D.

Despite the Uncertainties, Climate Appears to Be Changing in Unprecedented Ways

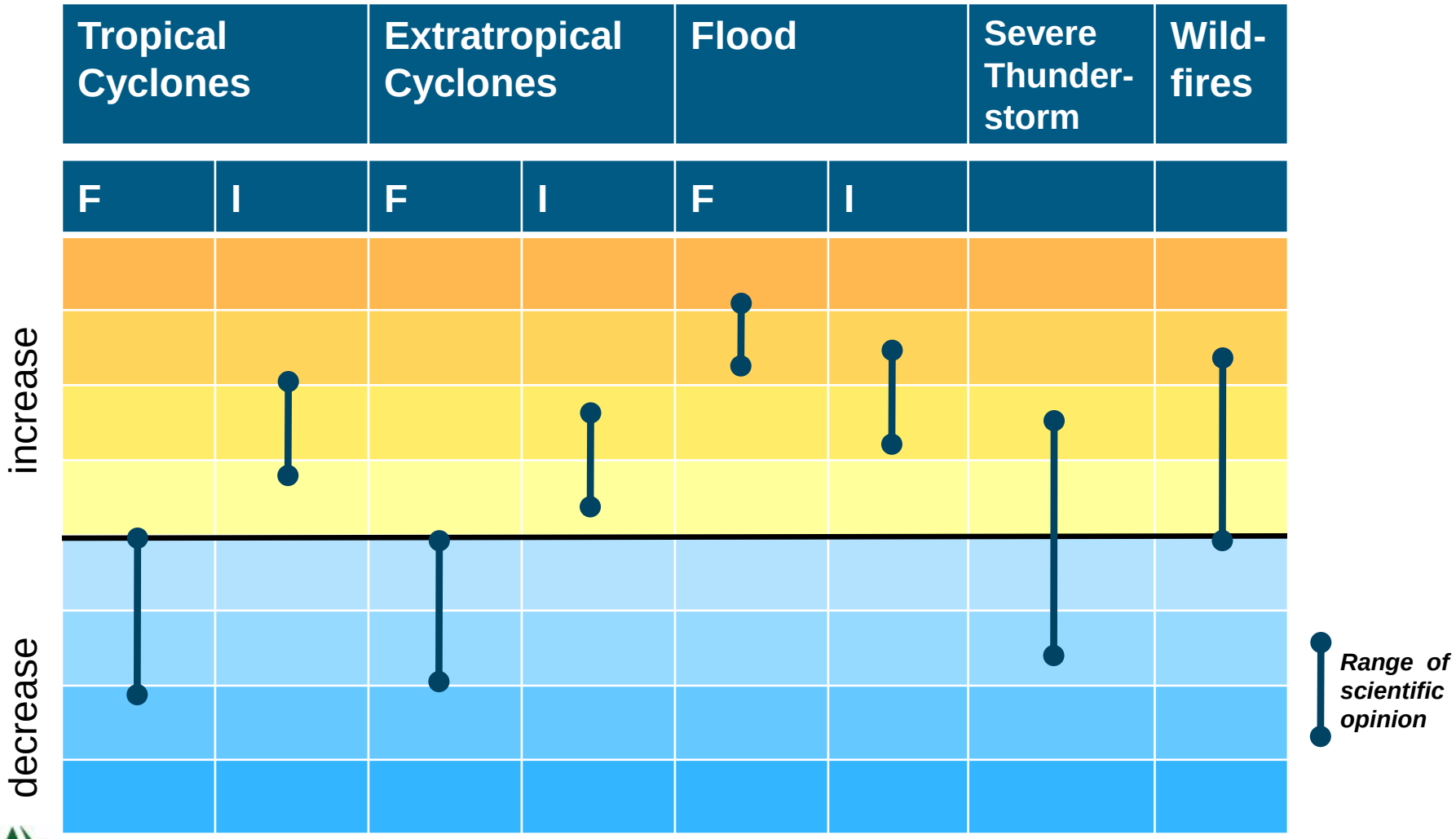


- The change in average surface temperature, average sea level and snow cover is startling
- Many attribute the change to human activities
- Models are in better agreement on temperature projections compared to cascade of impacts on sea level, snow cover, and especially extreme events

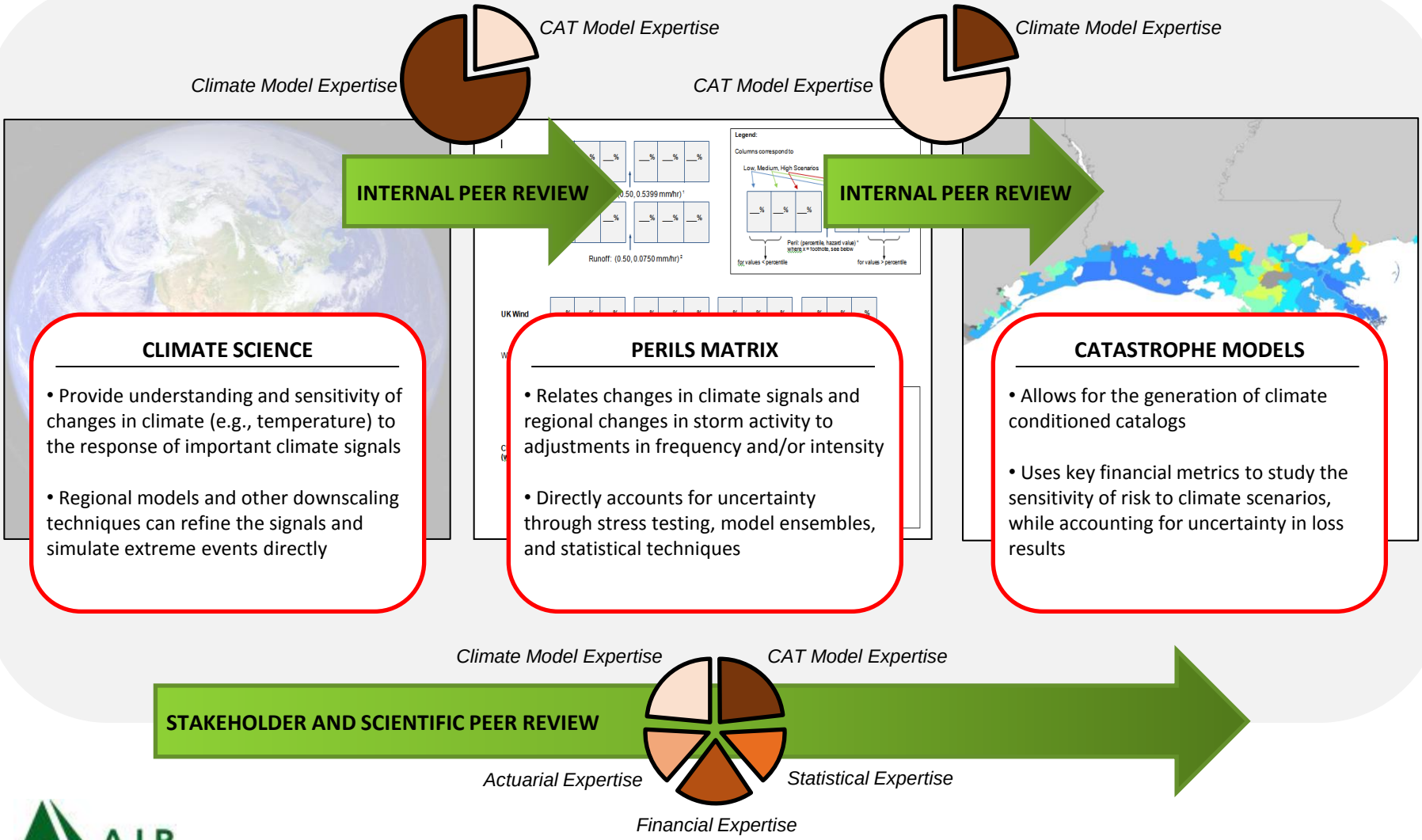
Challenges Posed to Climate Scientists Should Not Inhibit Actionable Research

- Uncertainties are large, but can be used to gauge relative confidence in results
- Global results cannot necessarily be applied to individual regions or locations, and uncertainty grows with finer scales
  - Climate model results become less robust with finer spatial and temporal scales
- Even amongst experienced climate scientists, opinions vary regarding the potential impacts of future climate
- Despite wide range of plausible climate scenarios, all credible climate models show continued trend in globally increasing temperatures
  - Results vary as to how temperature changes will affect extreme events

Qualitative Comparison of the State of Research on the Financial Impact of Climate Change on Atmospheric Perils

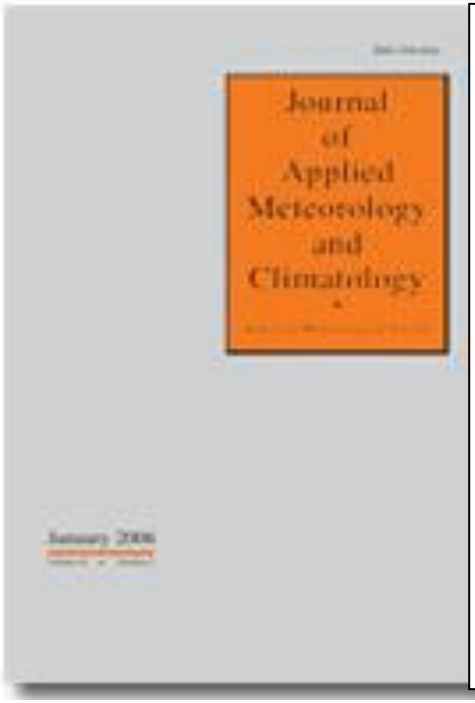


Applying an Objective Framework to the Potential Financial Impacts of Climate Change



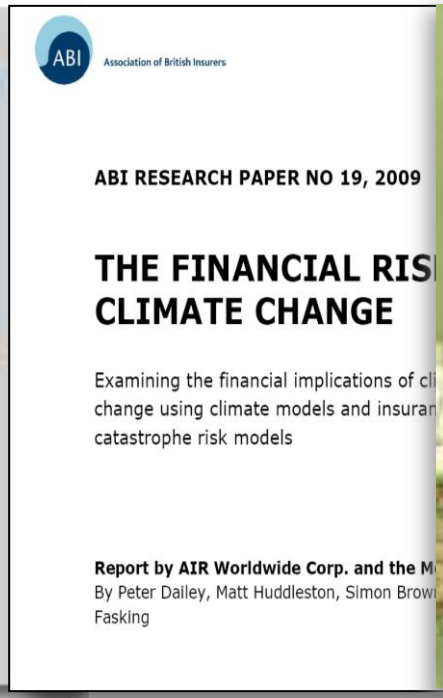
AIR Continues to Conduct and Publish Research Customized for the Risk Management Industries

2009



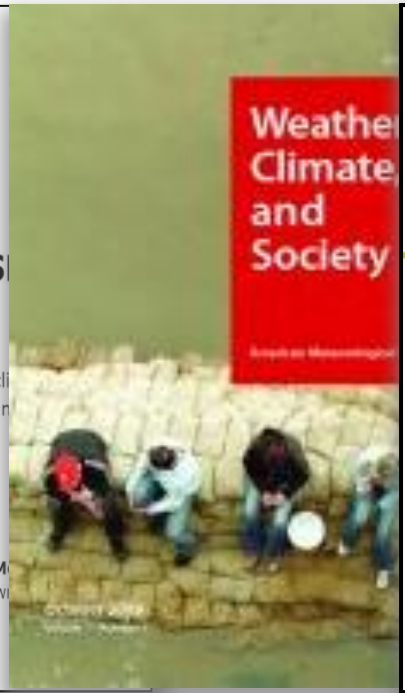
Sensitivity of US Hurricane Risk to Atlantic SSTs

2009



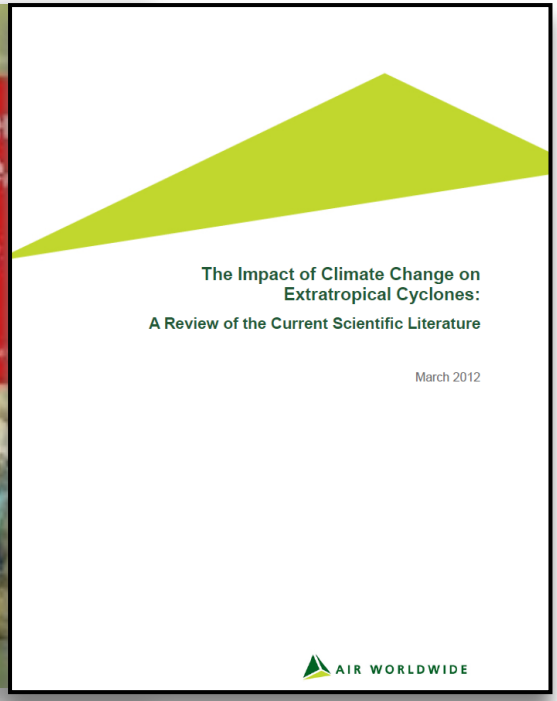
ABI Financial Risks of Climate Change

2010



Sensitivity of US Storm Surge Risk to Rising Sea Levels

2012



Impacts of Climate Change on Extratropical Cyclones

Some Takeaways

- Advances in climate science will lead to
  - Improved regional long-term (decadal) projections
  - Improved inputs to catastrophe models, even to quantify *current* risks
- Future mean temperatures will be warmer than today's
  - Projected increases in temperature give rise to a strengthened hydrological cycle, and a cascade of complex interactions and impacts
- Uncertainties are large, but not intractable
- An objective framework developed to quantify financial impacts of climate should address key sources of uncertainty
  - Incorporate statistical/actuarial best practices
  - Leverage climate model ensembles, the new scientific standard
  - Apply catastrophe models and their inherent probabilistic approach to risk assessment