Reduction of Uncertainties in Arctic Sea Ice Prediction

From Decadal to Century Scales Through Climate Sensitivity Constraint

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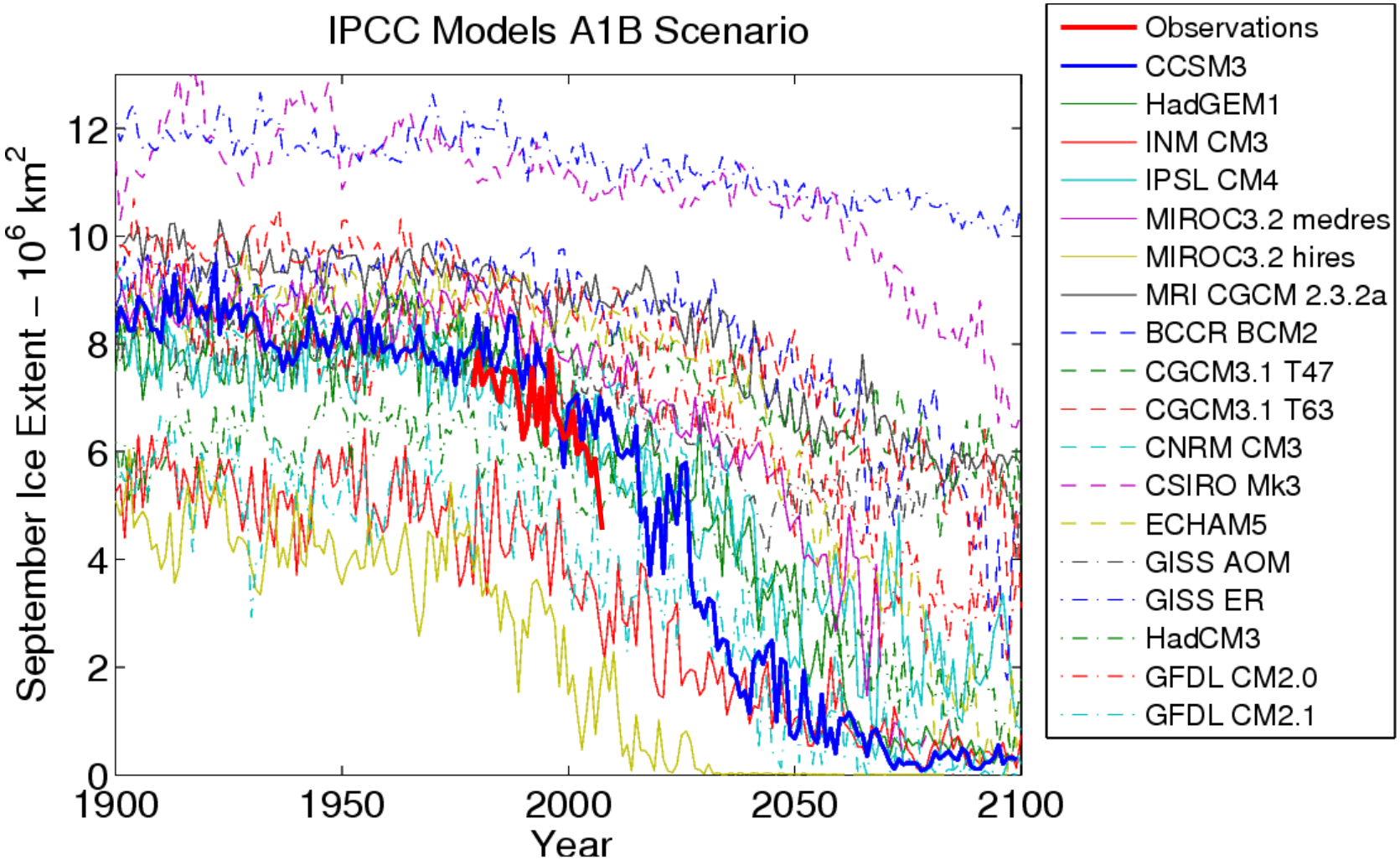
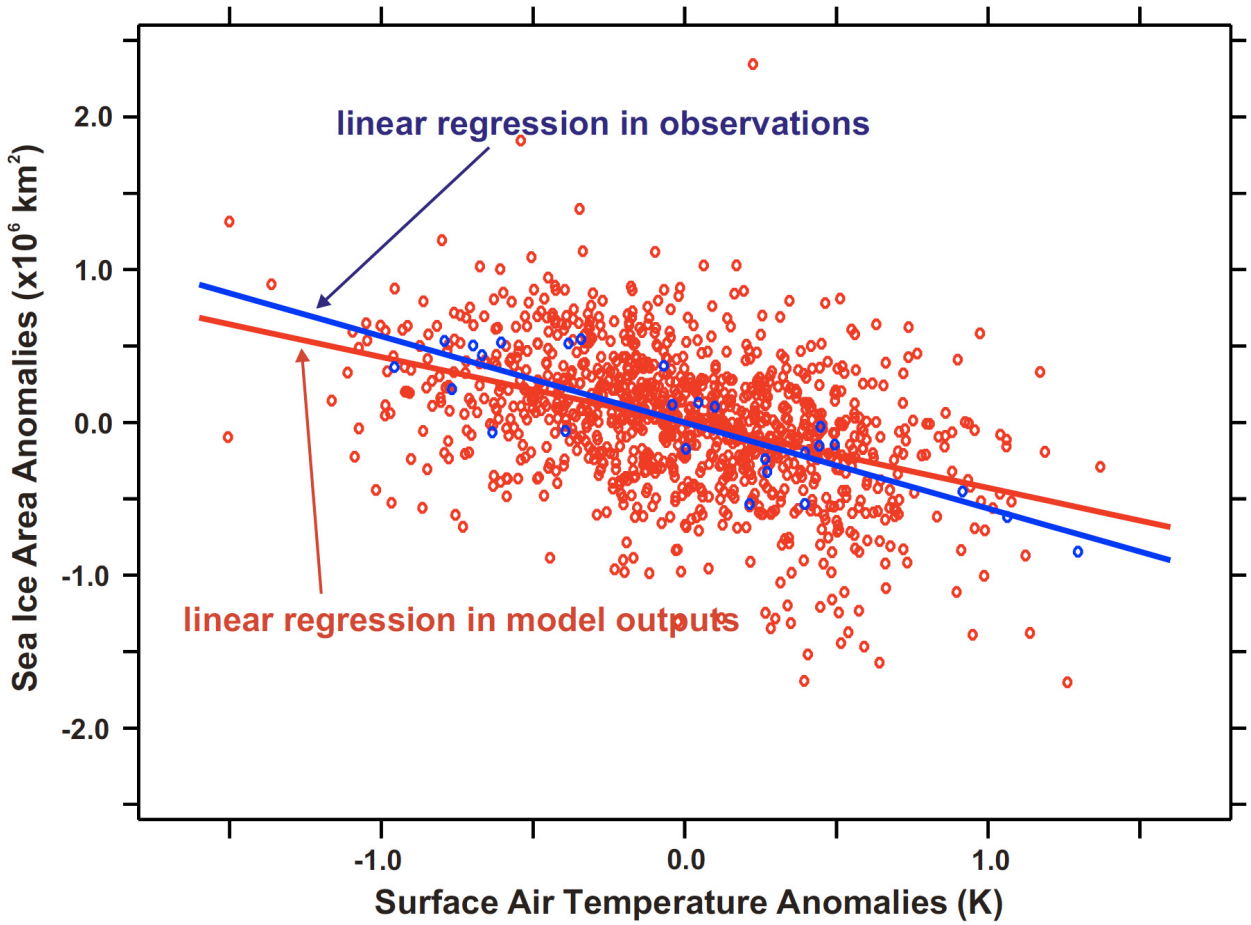
IPCC AAR4 models:
Simulated Arctic sea ice extent (September)



- ***Transient climate sensitivity analysis*** $\Delta A_{ice} = -Y*\Delta Ts$

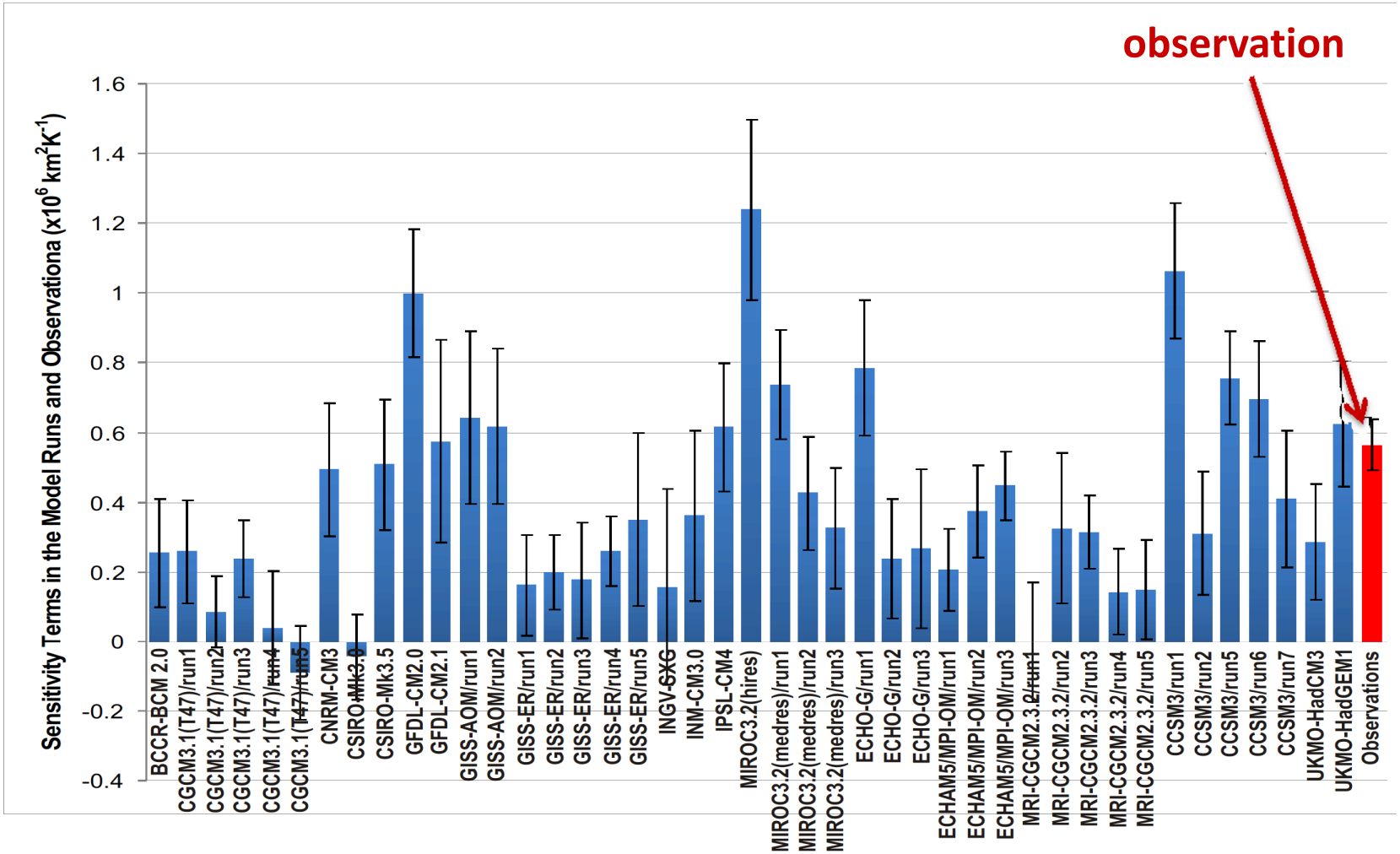
CMIP3 models as a group underestimated observed sensitivity



ΔTs: no matter whether it is caused by external forcing or internal variability.

X. Zhang, 2010

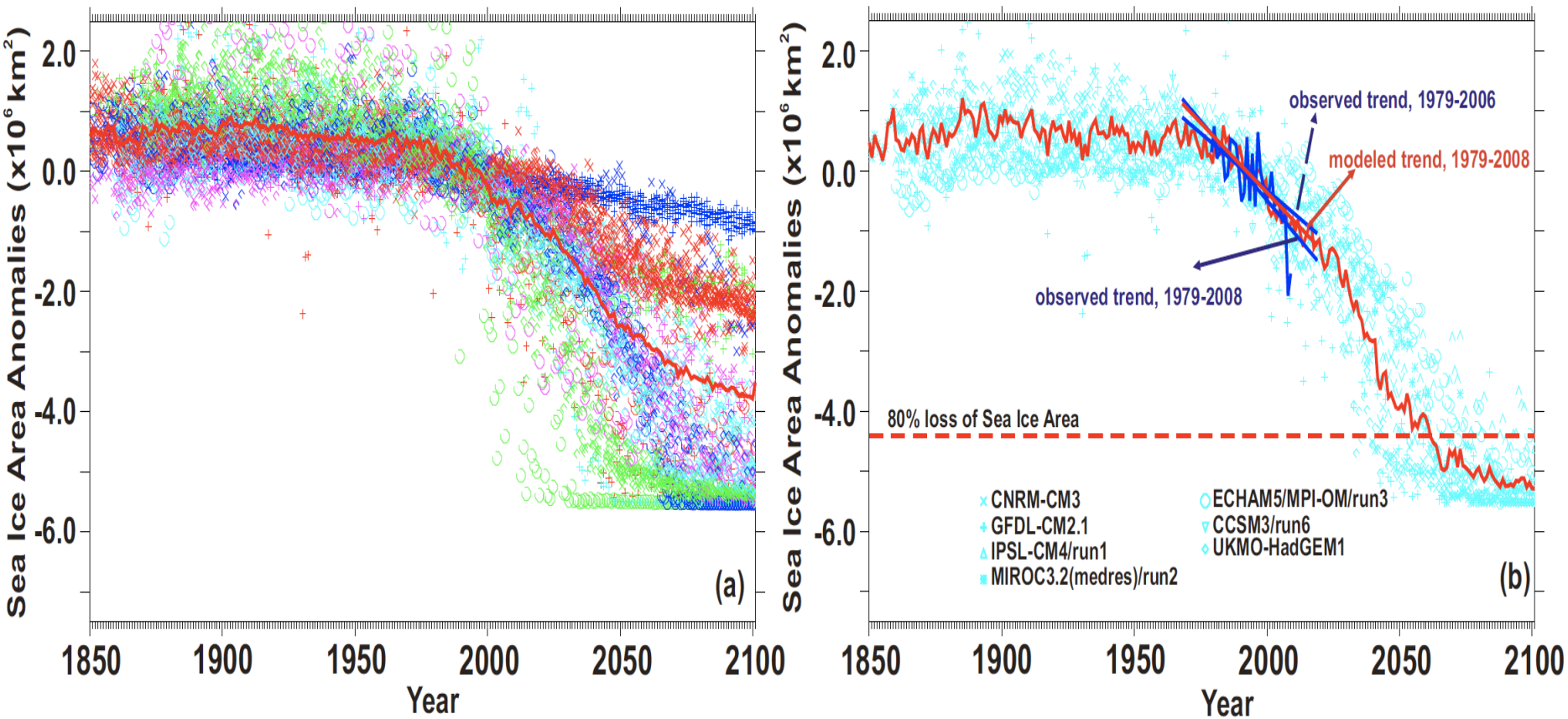
•*The sensitivity terms for each model are largely diversified*



X. Zhang, 2010

•Reduce model uncertainties by two criteria:

1. **99% confidence interval of observed sensitivity term;**
2. **Capture of rapid change episode**



X. Zhang, 2010

Summary:

- Large uncertainties in the Arctic sea ice cover changes result from the large spread of sensitivities or feedback strengths in the models.

- The transient-sensitivity-constrained selection of the subset of the model ensembles substantially reduced uncertainties.

- The capture of rapid change episode also crucially impacts the projection of future sea ice change trajectories.

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Sensitivity of arctic summer sea ice coverage to global warming forcing: towards reducing uncertainty in arctic climate change projections

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