

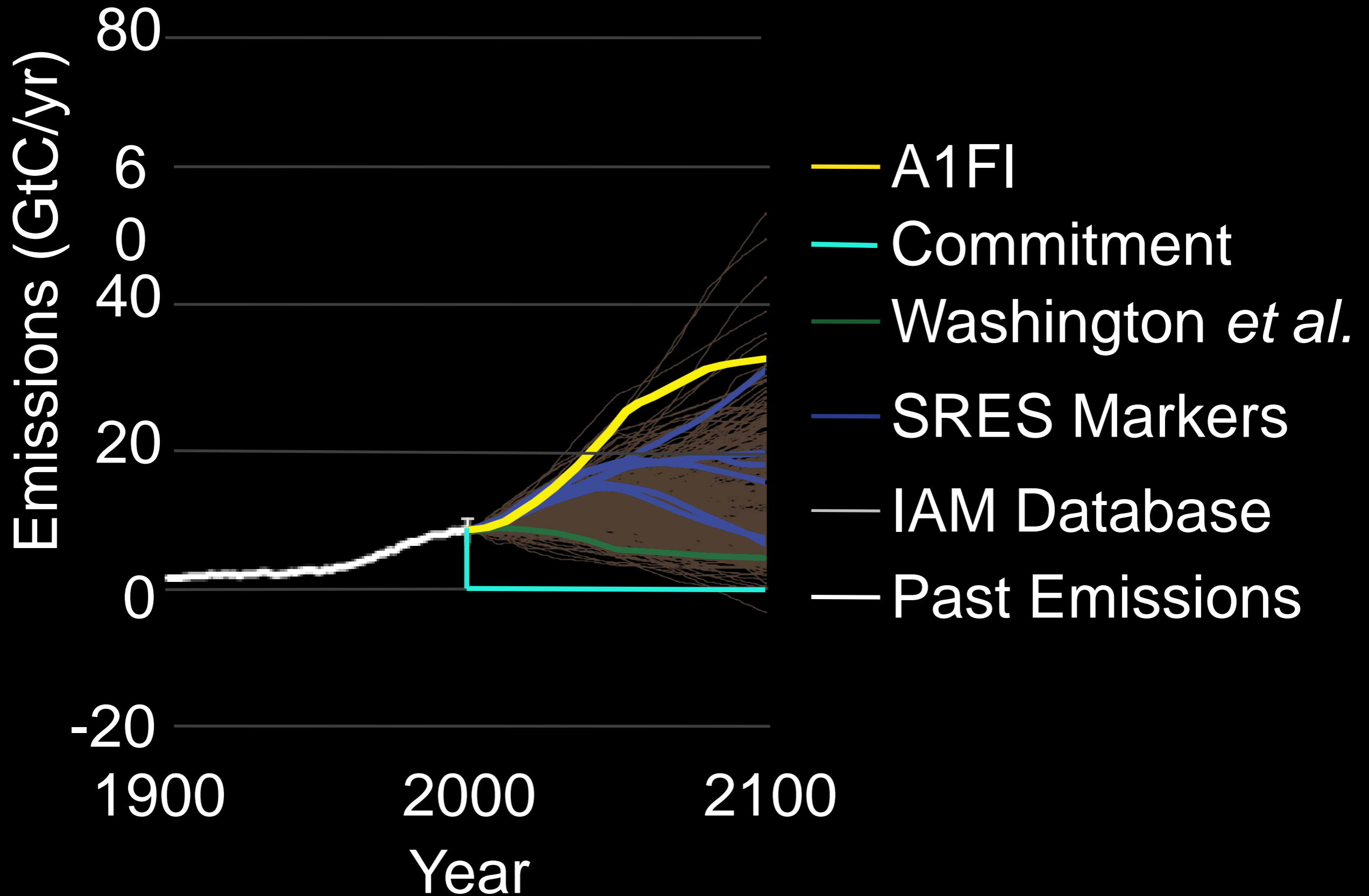
High Emission Scenarios

Simulating the extremes of future anthropogenic greenhouse gas forcing

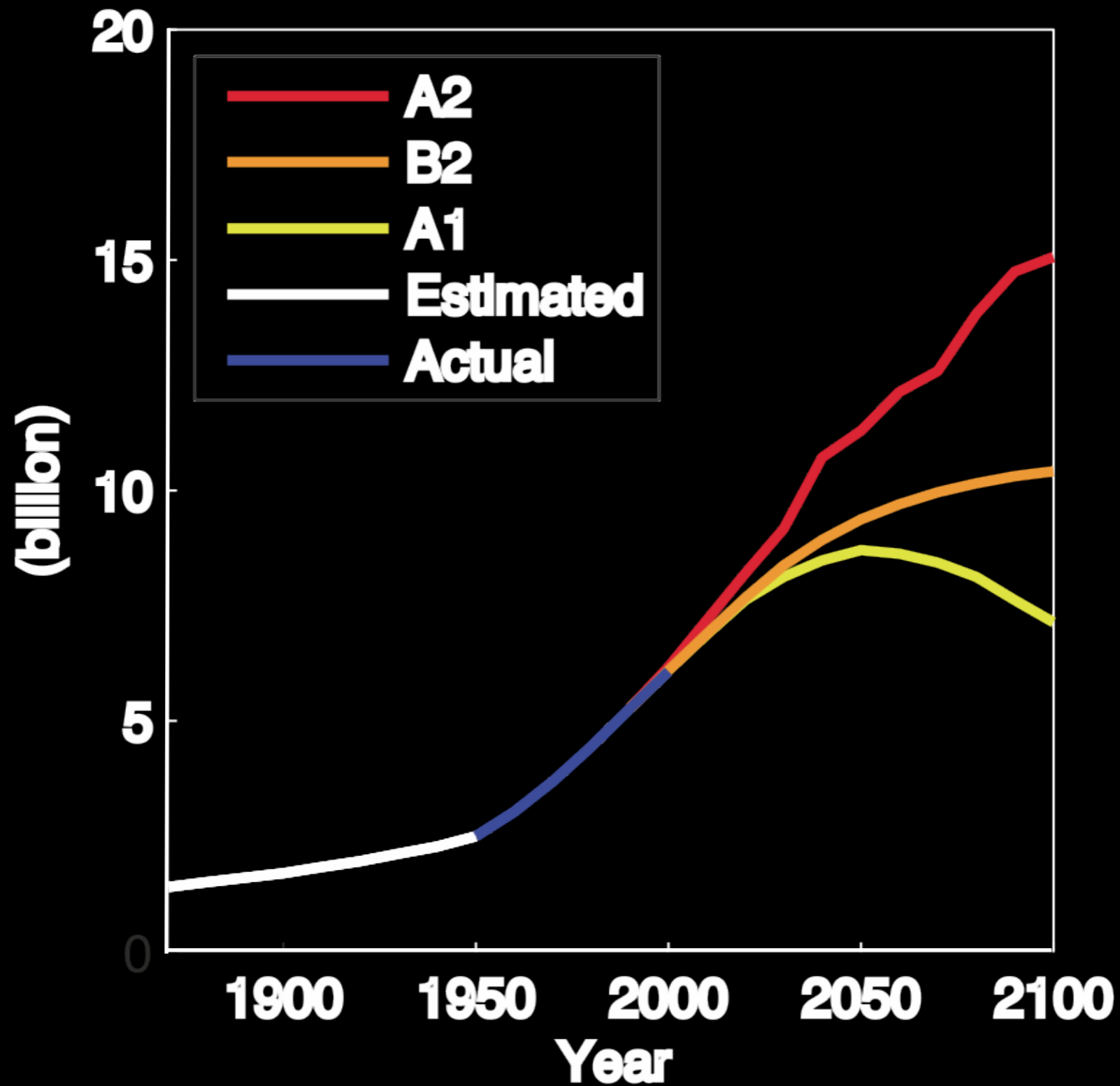


Ben Sanderson
Brian O'Neill, Jeff Kiehl
Gerald Meehl, Reto Knutti

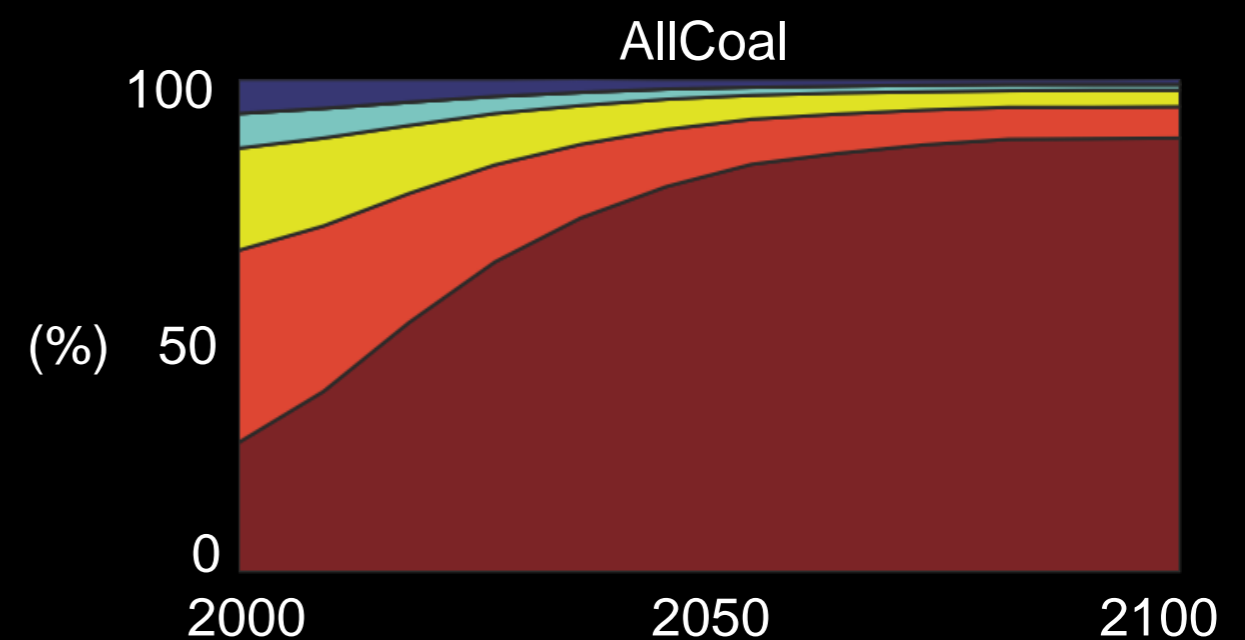
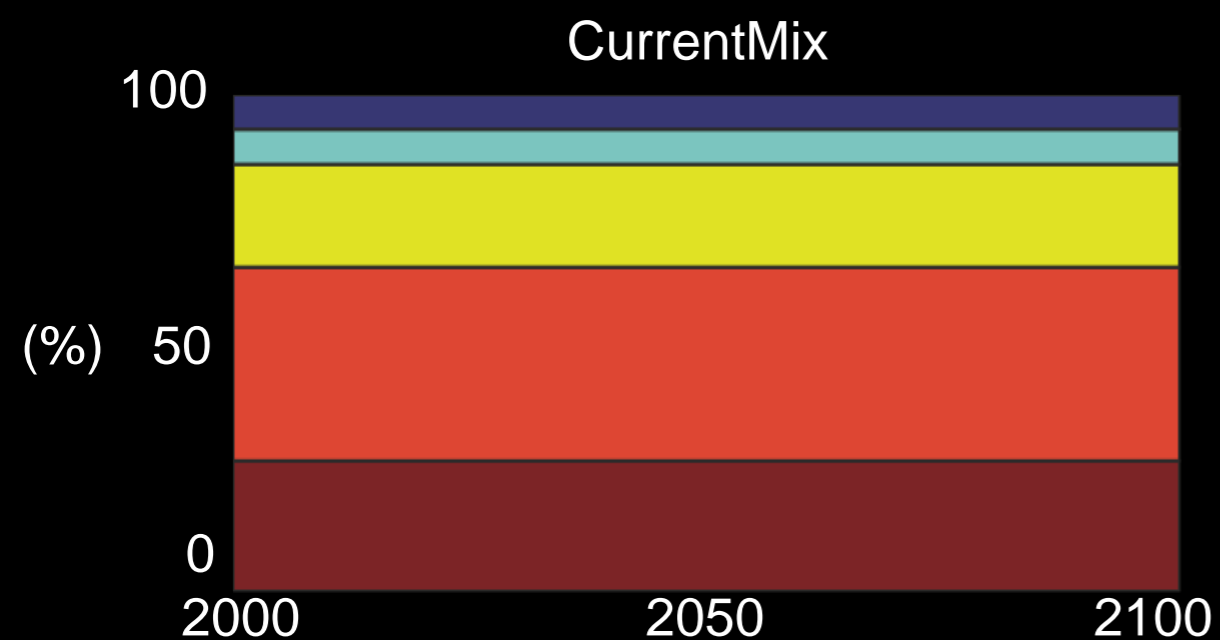
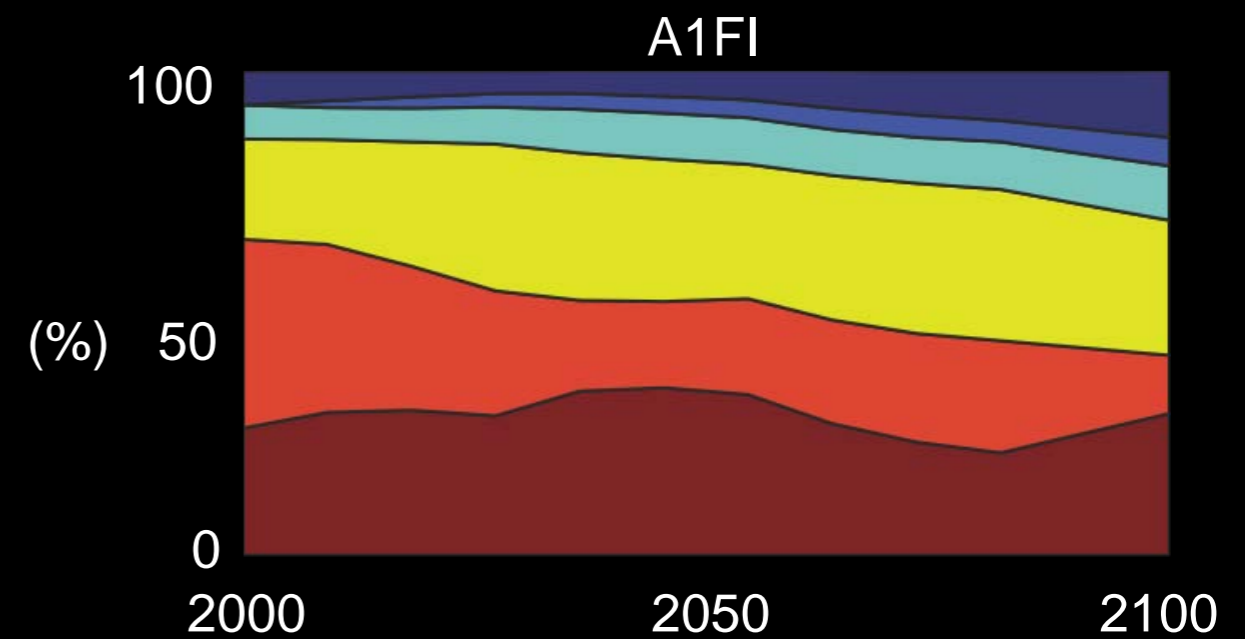
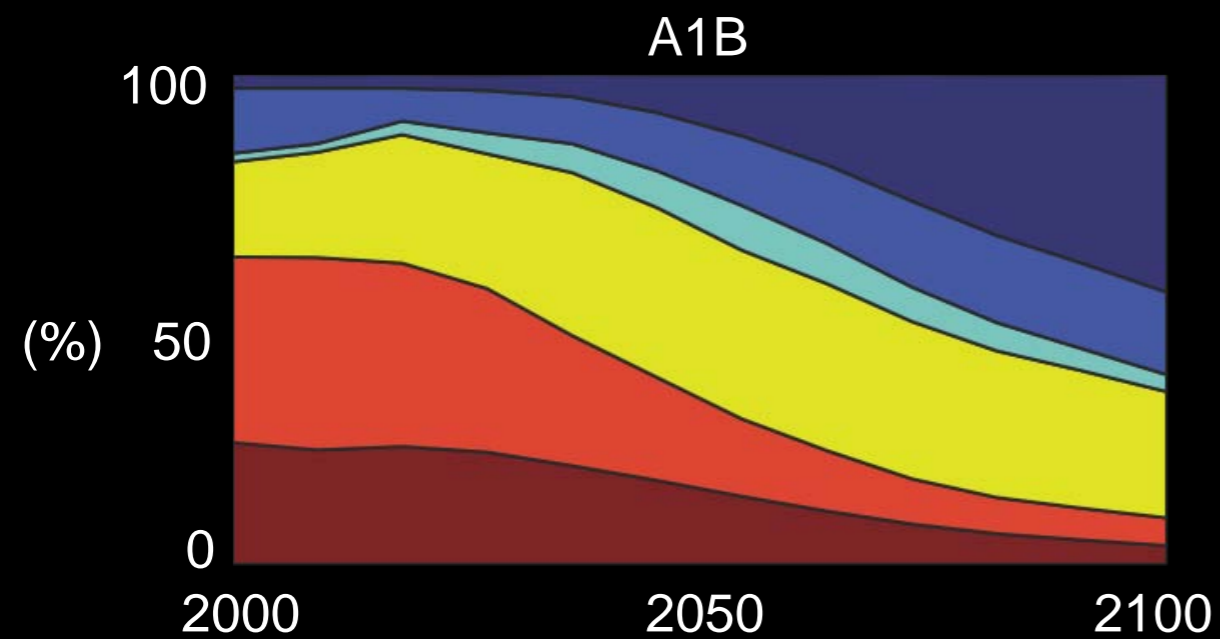
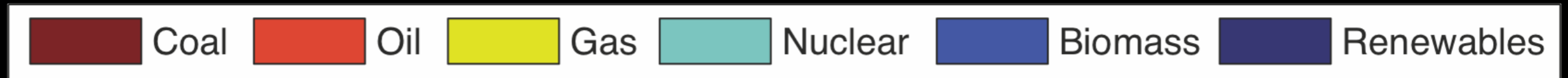
Net Anthropogenic CO₂ Emissions

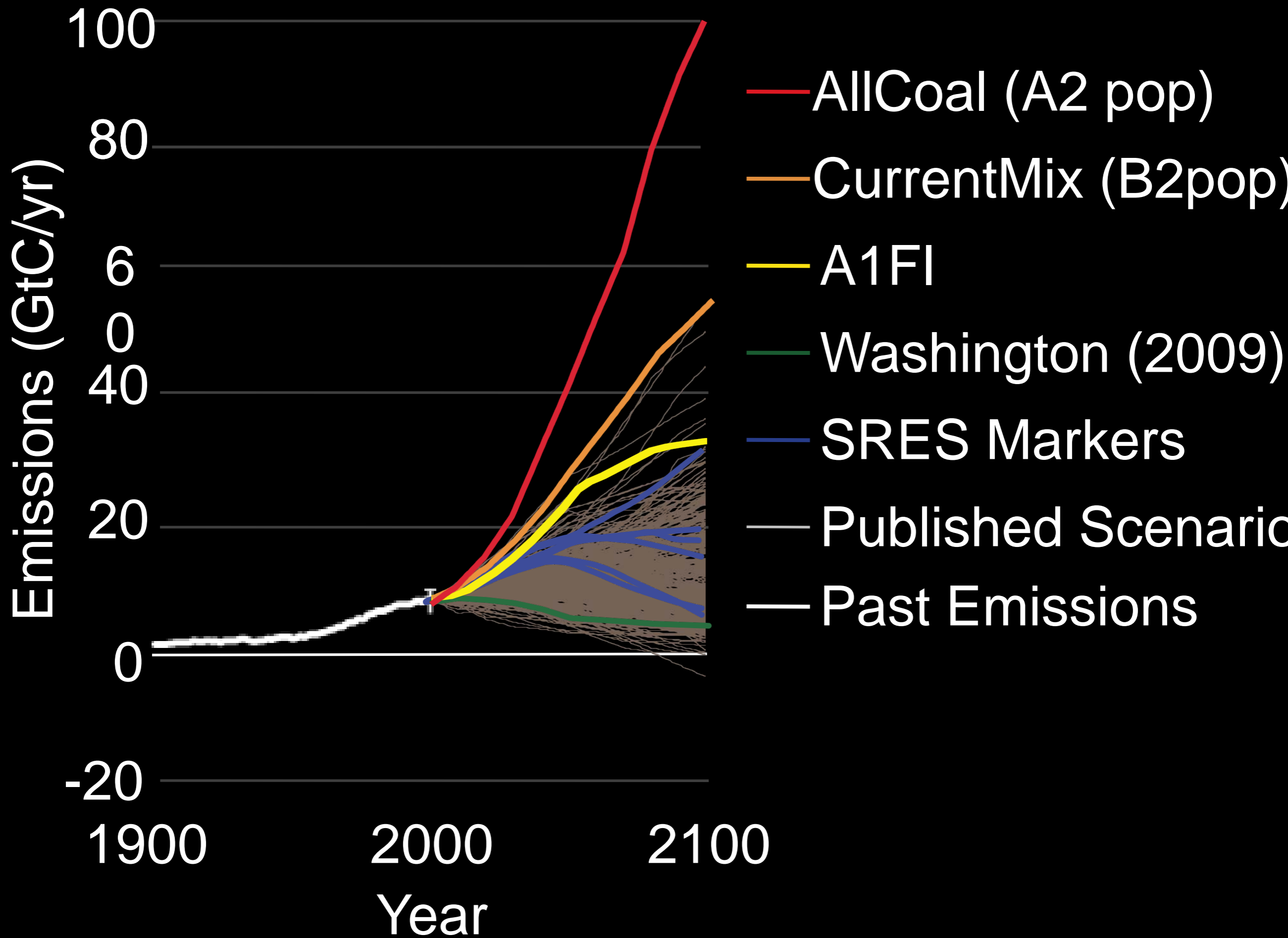


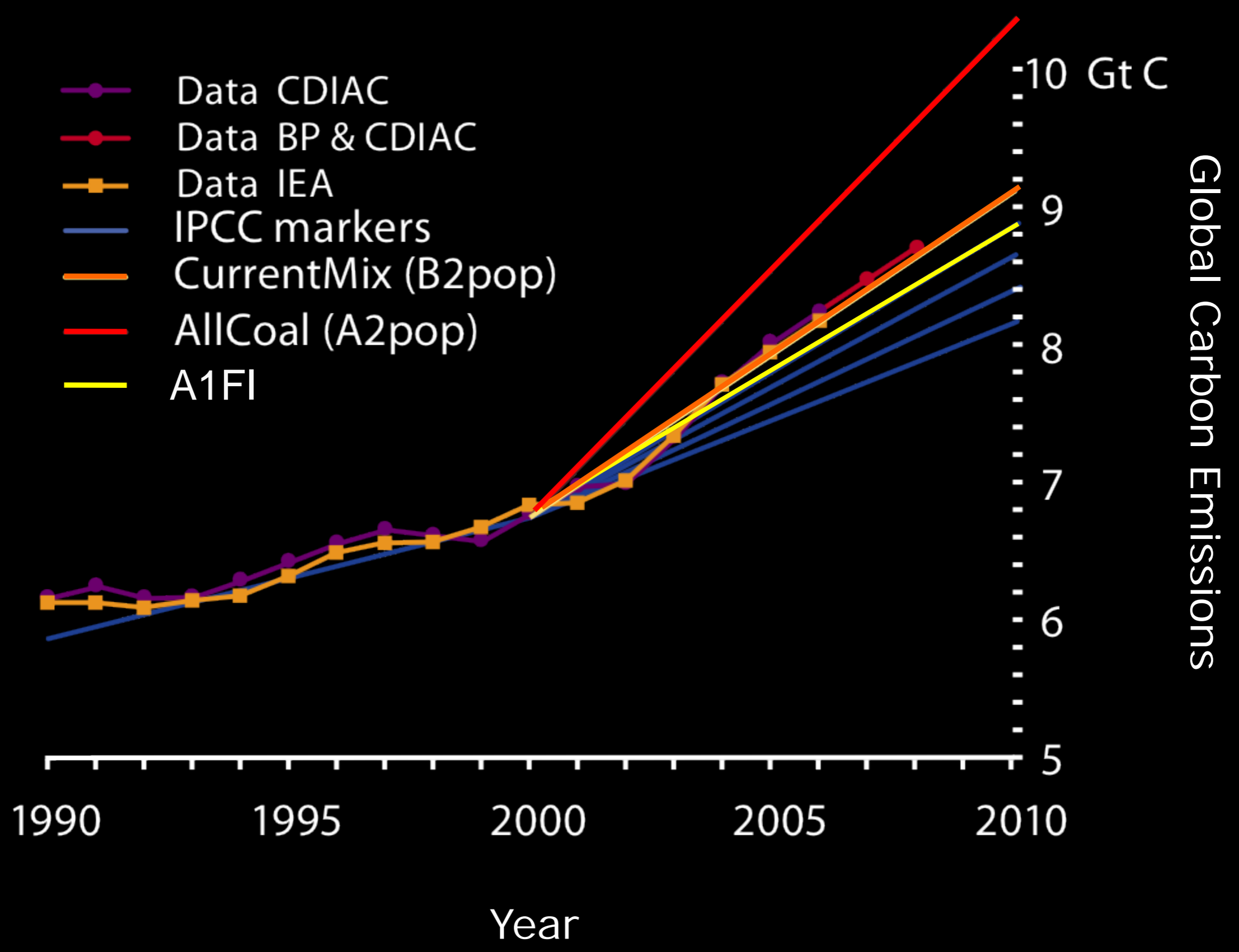
Global Population Estimates



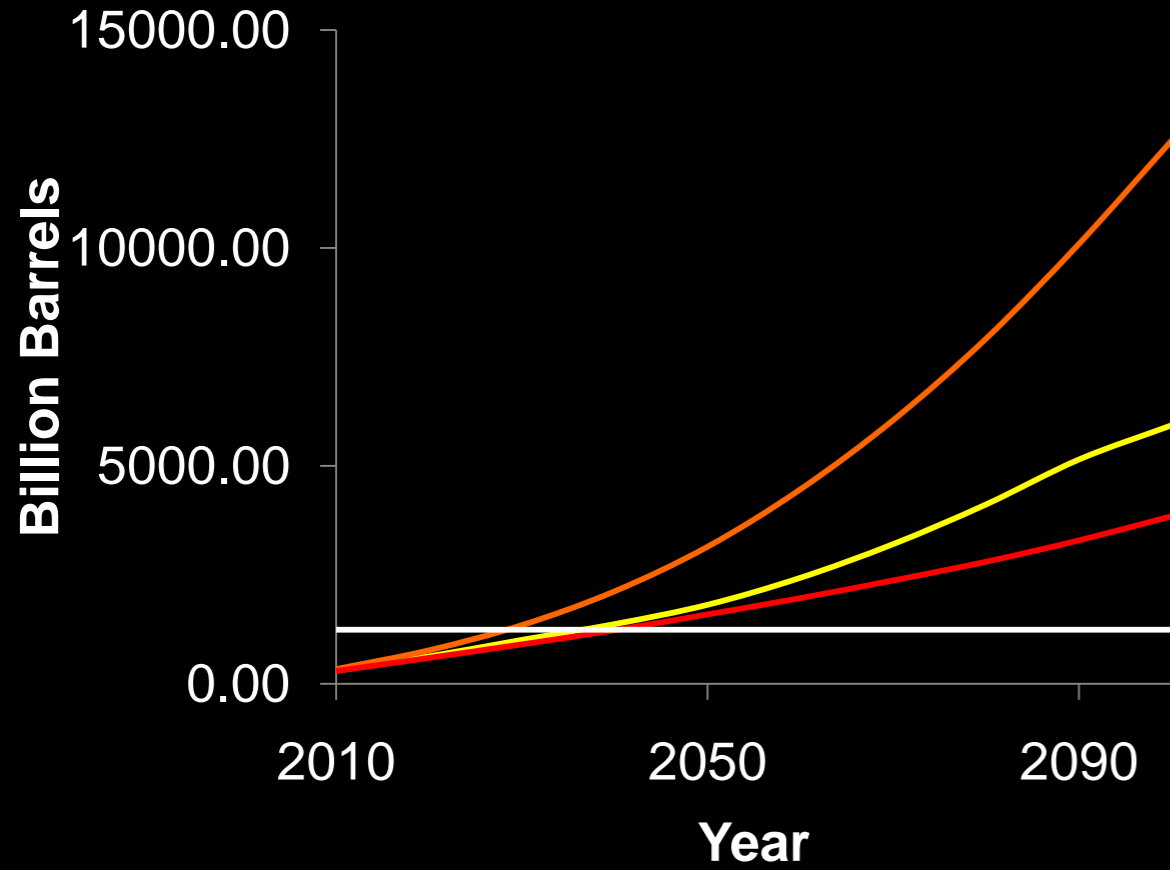
Fractional Primary Energy Production by Sector



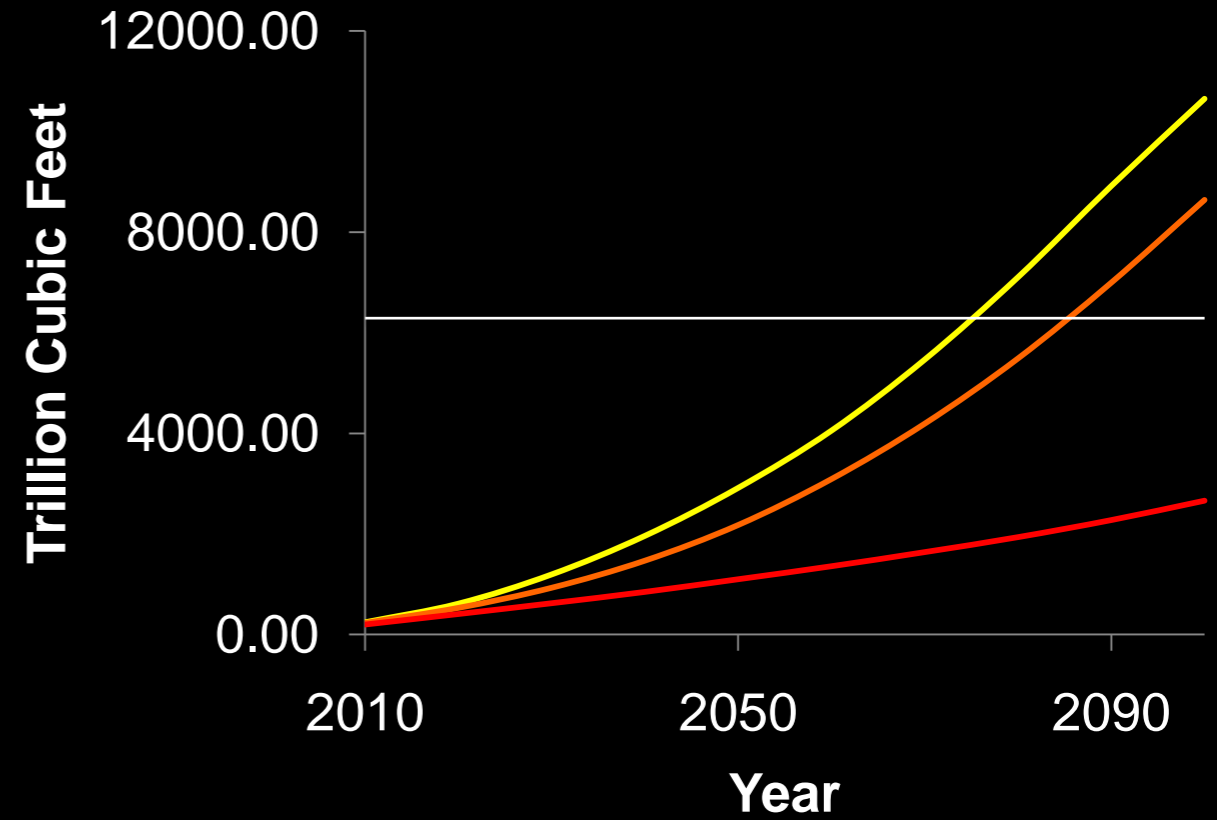




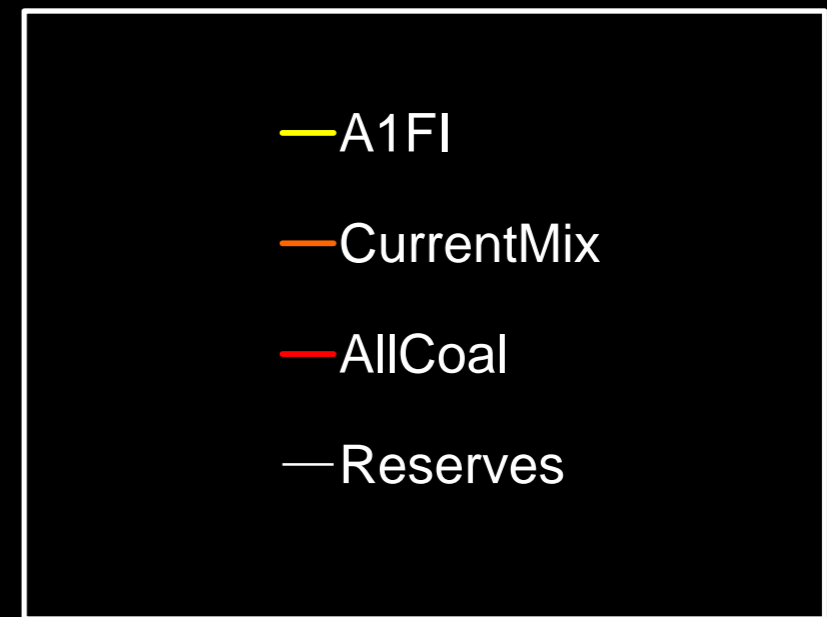
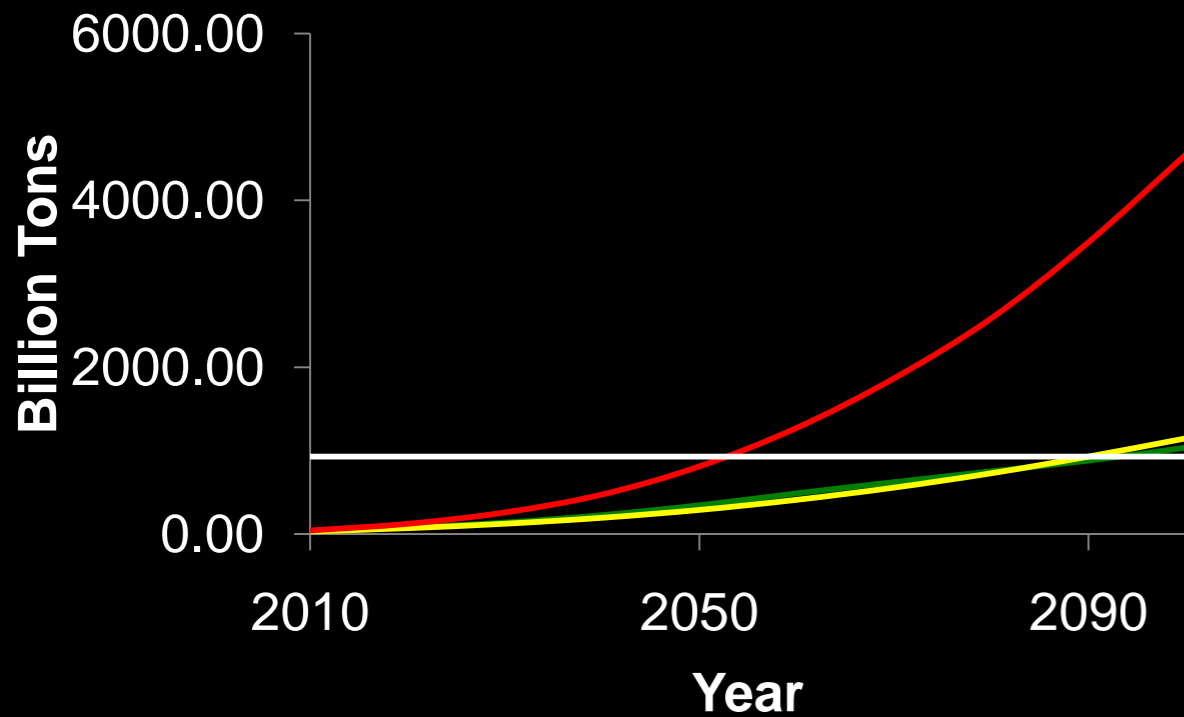
Cumulative Oil Usage



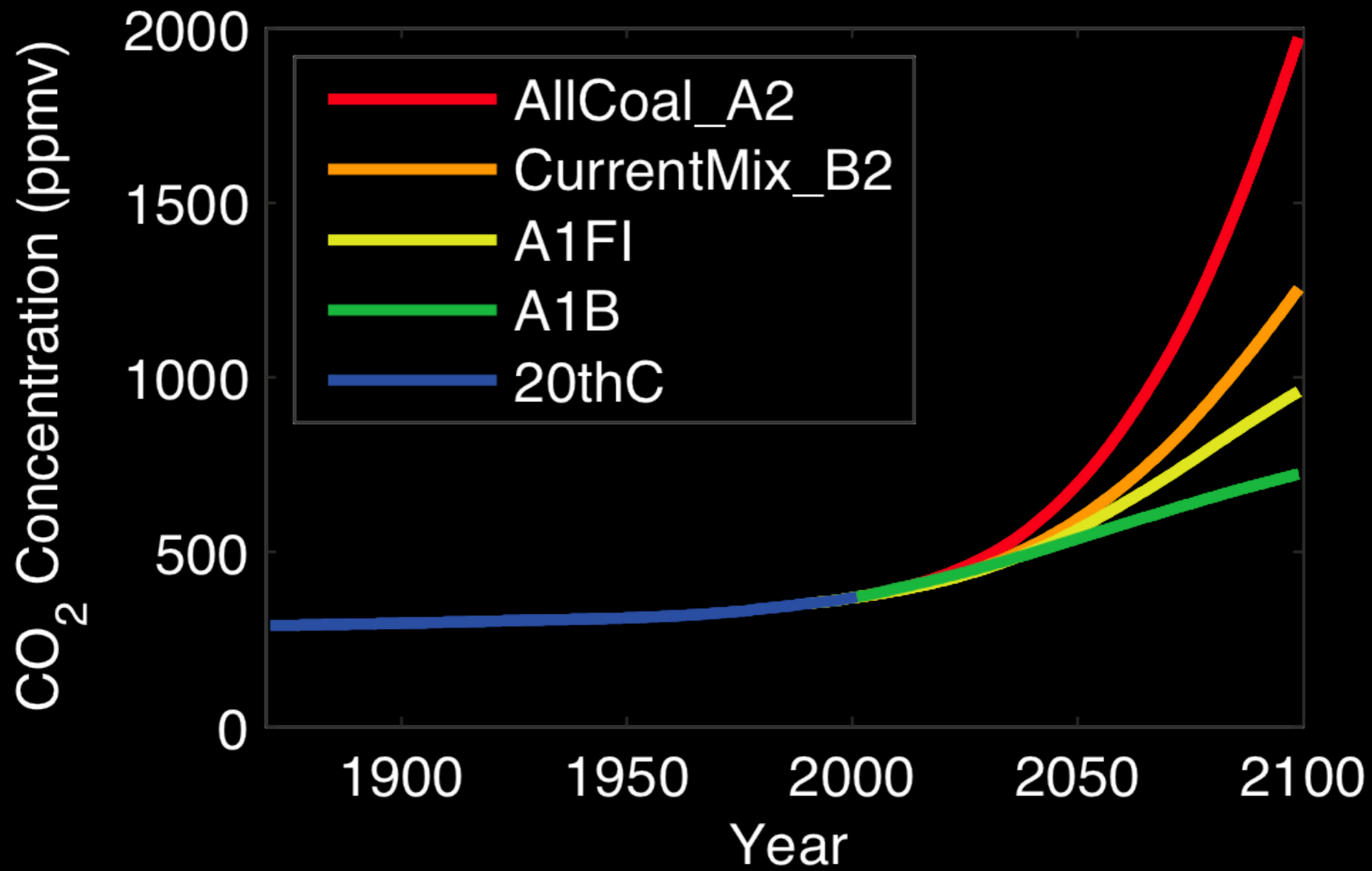
Cumulative Nat. Gas Usage



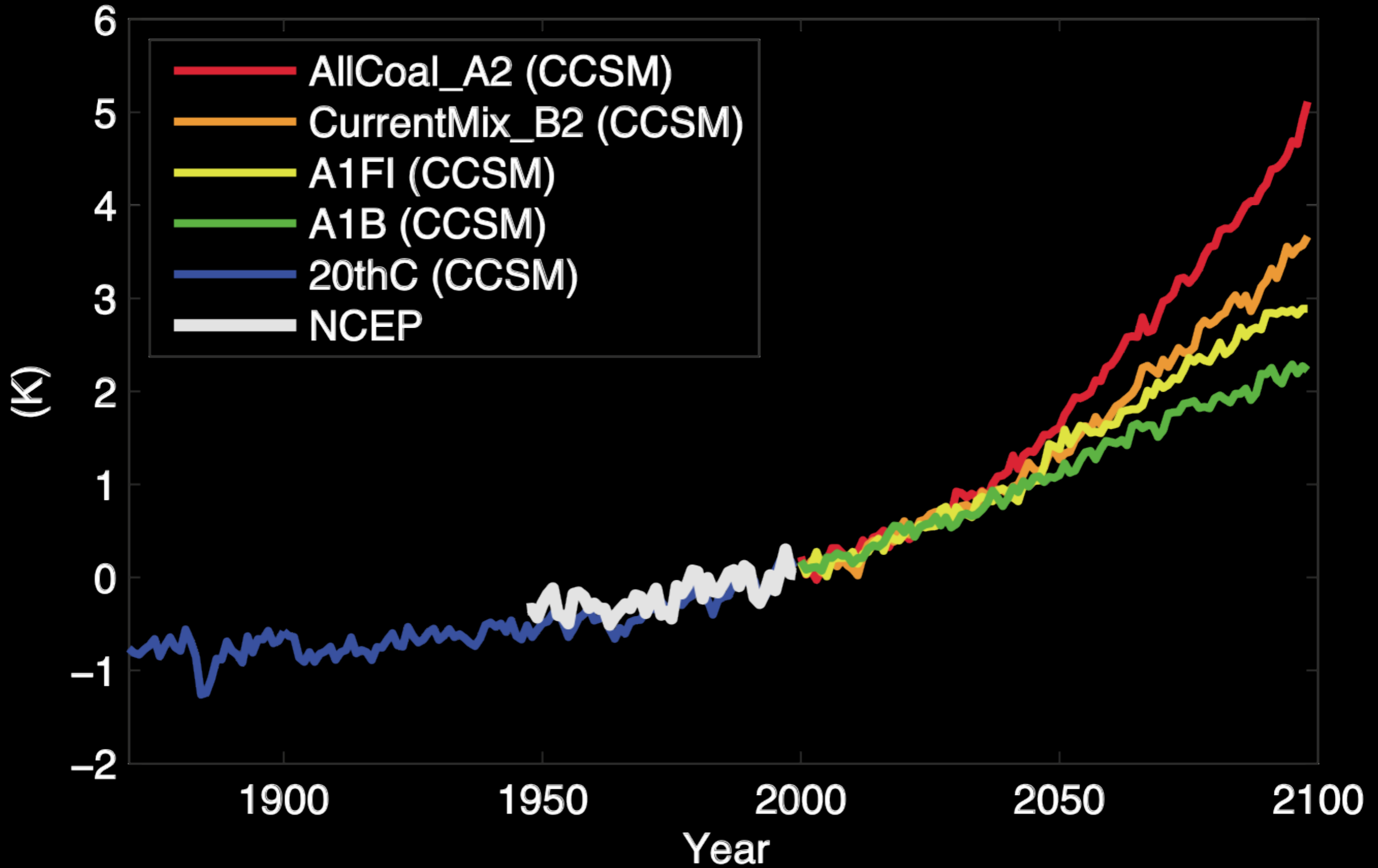
Cumulative Coal Usage

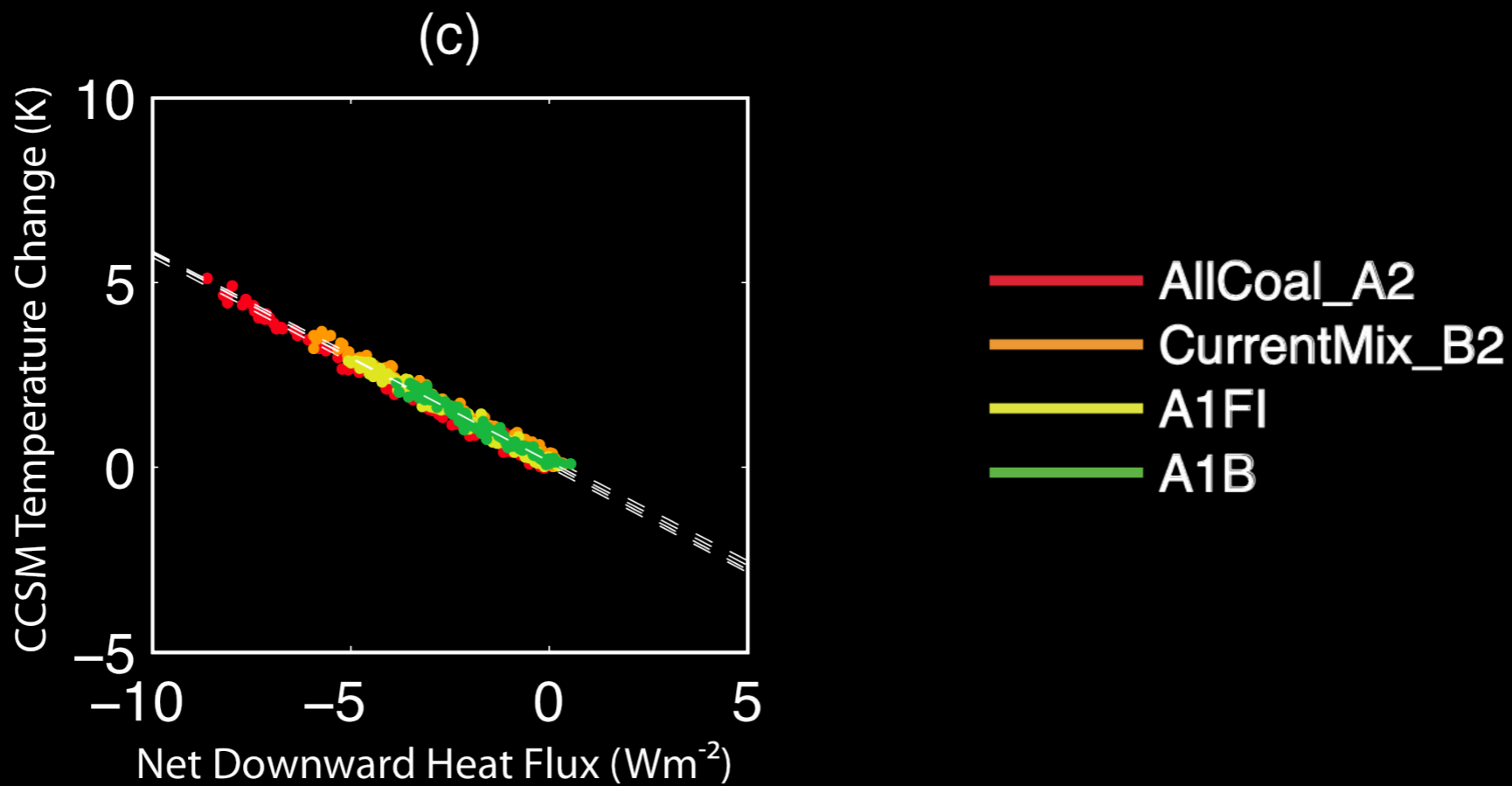
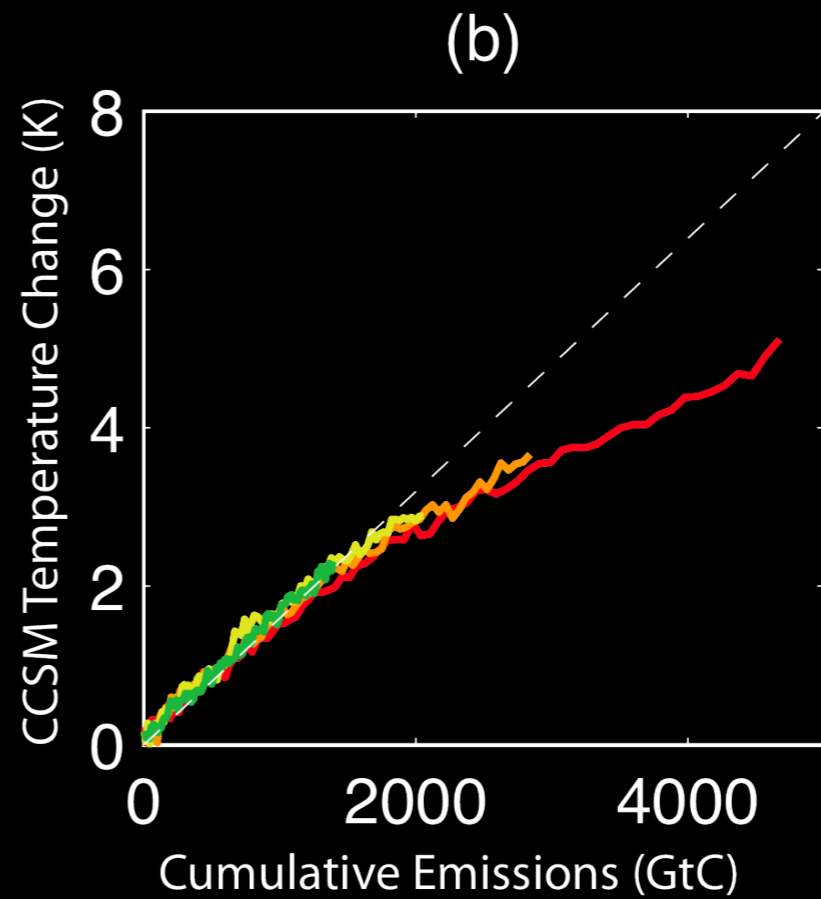
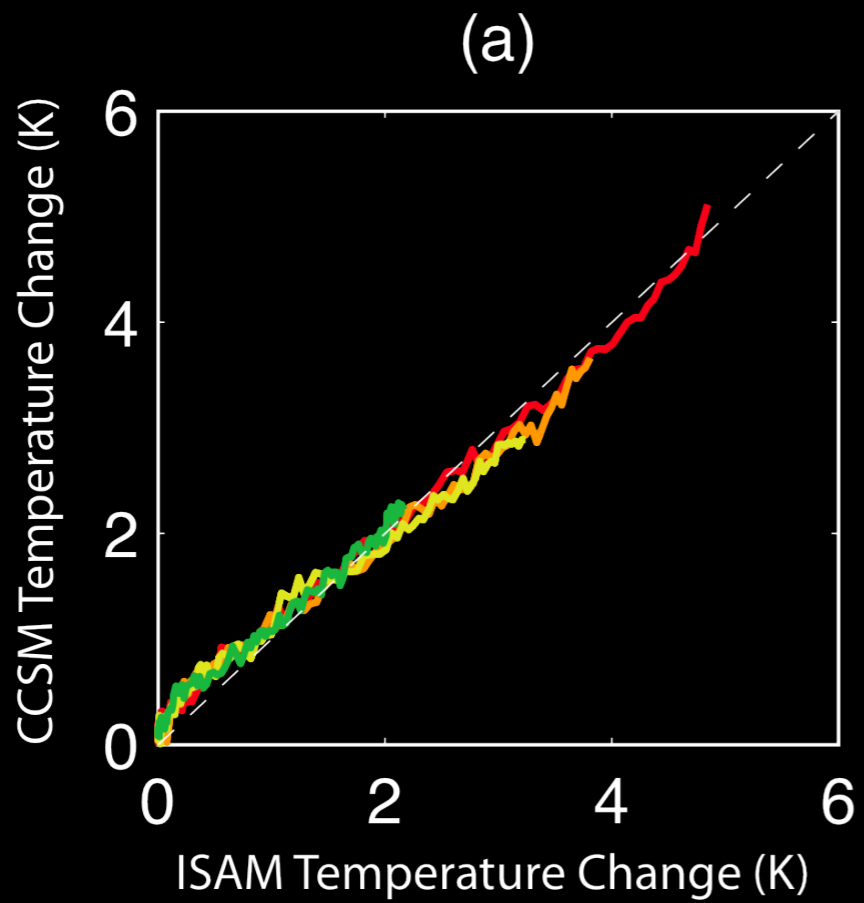


(b)

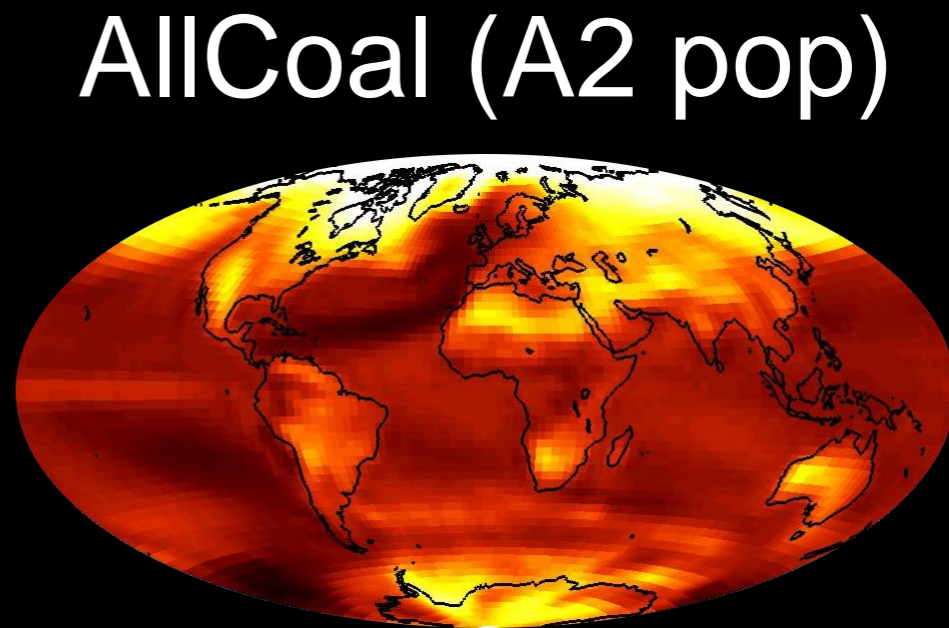
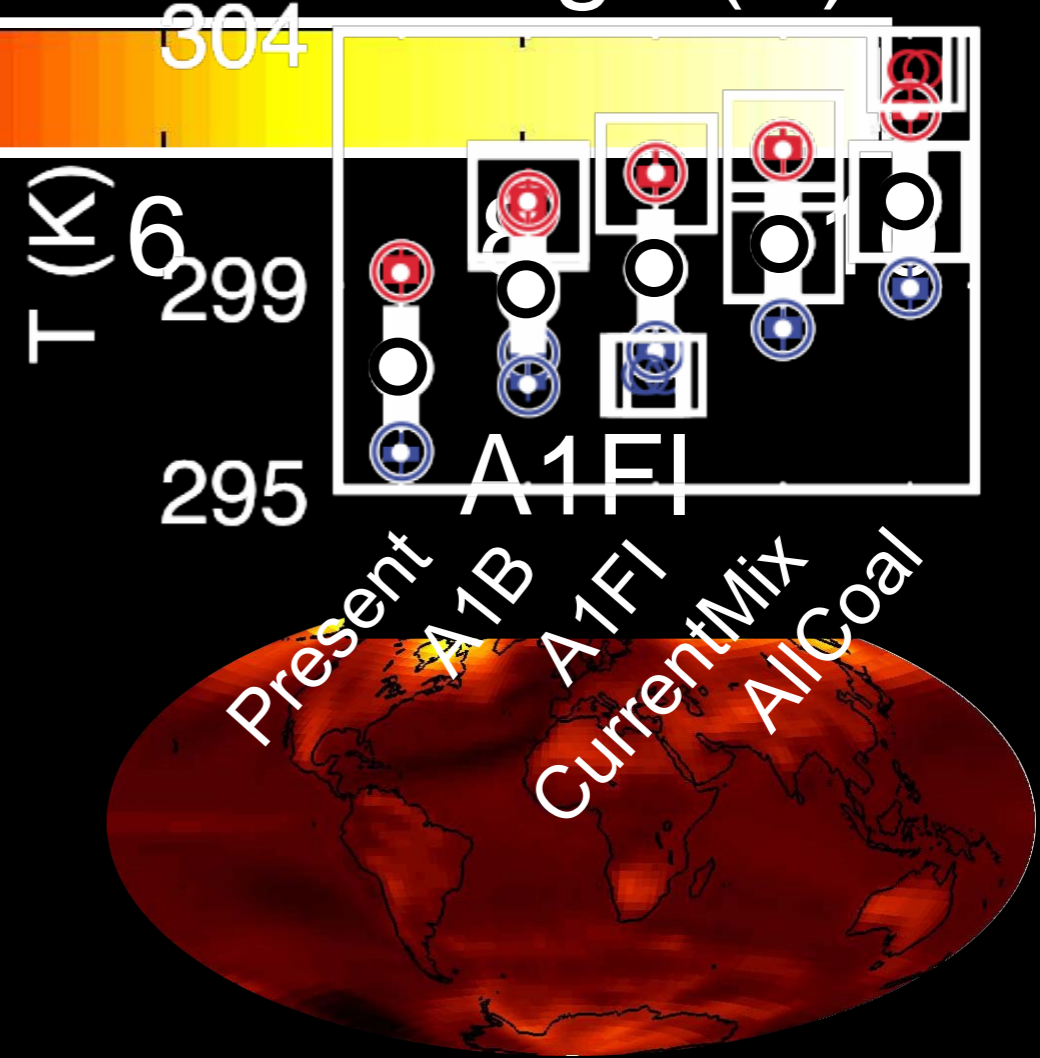
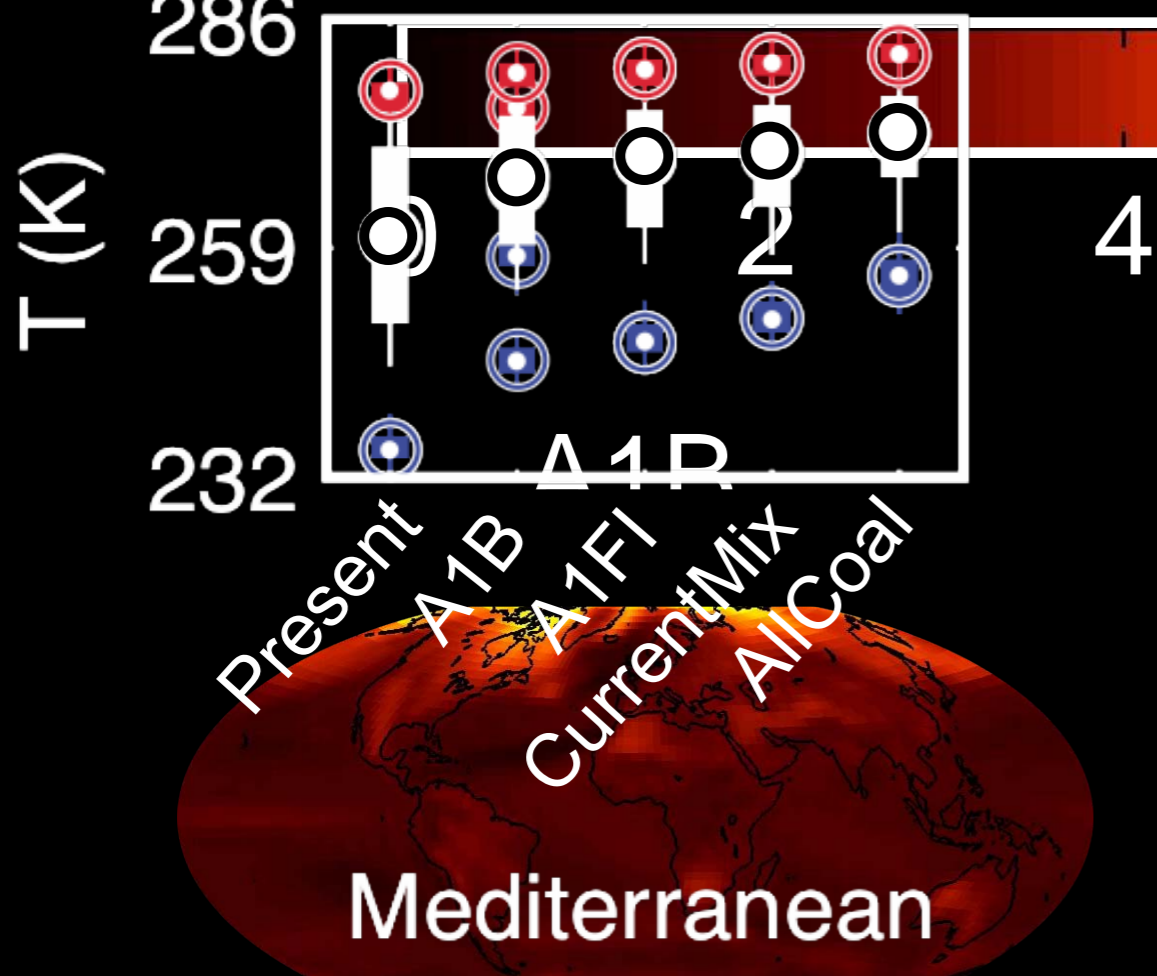


(a) – Global Mean Temperature

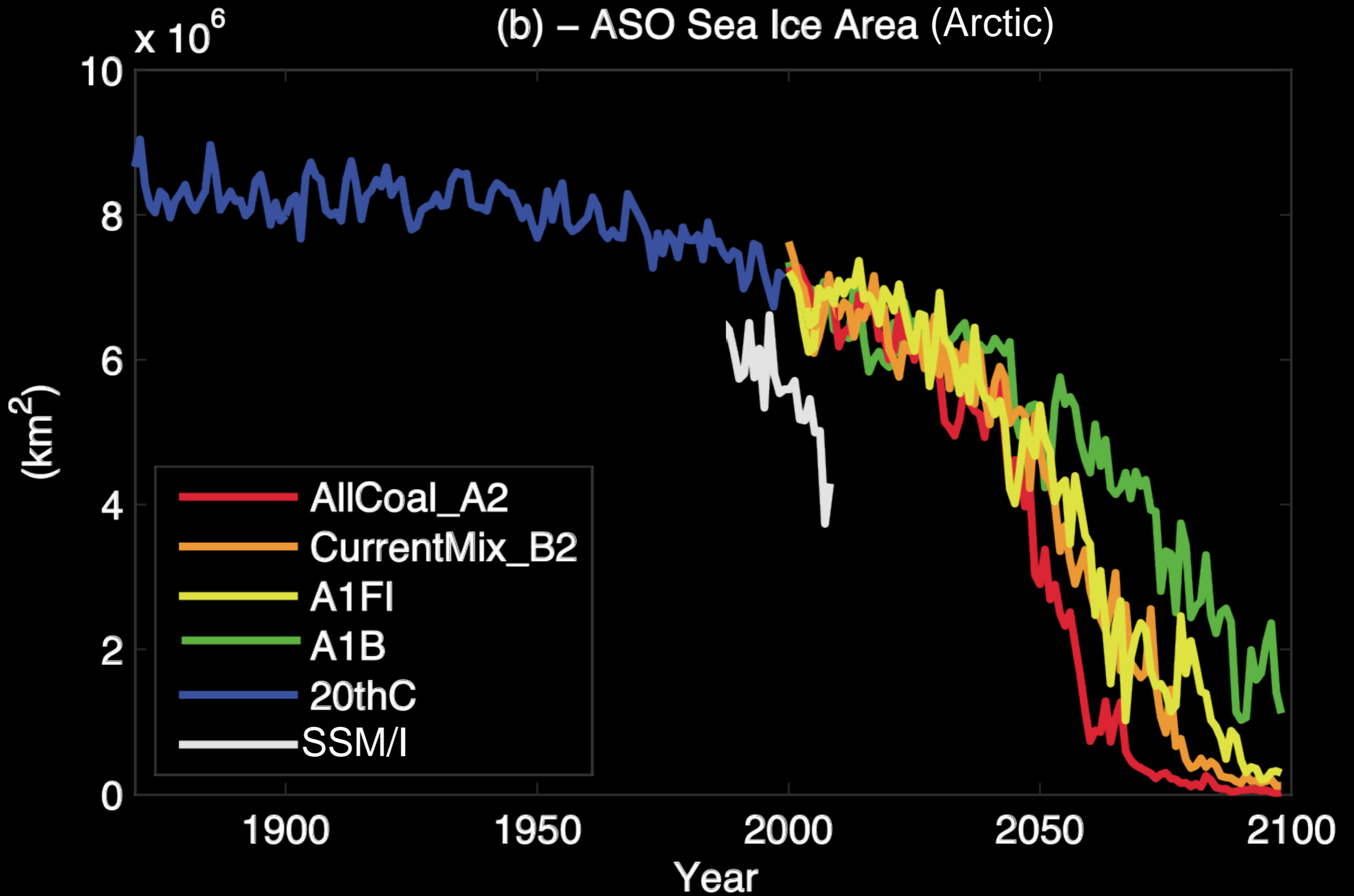




2100-2000 Temperature Change (K)



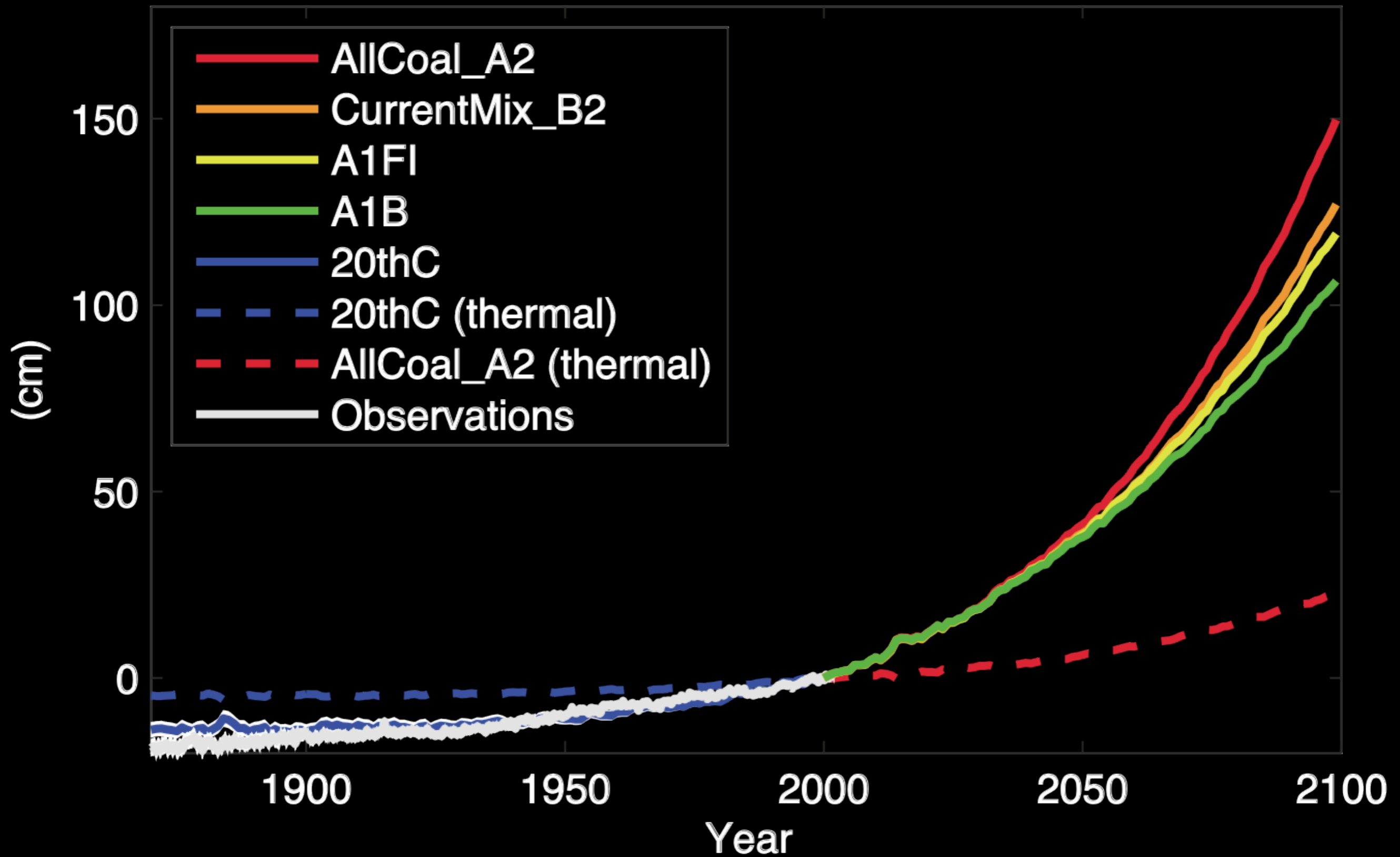
(b) – ASO Sea Ice Area (Arctic)



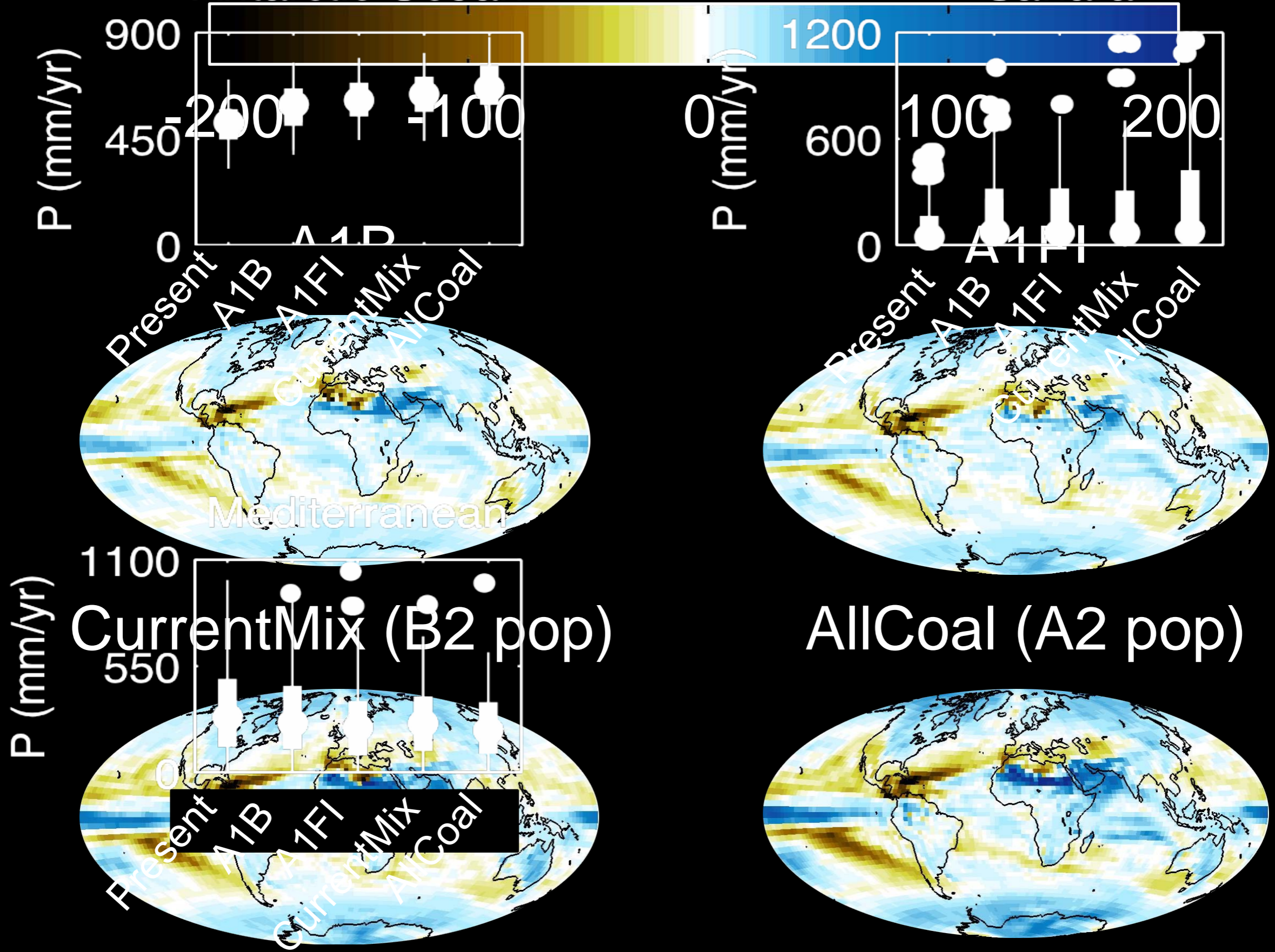
$$\frac{dH}{dt} \approx a(T - T_0) + b \frac{dT}{dt}$$

Vermeera & Rahmstorf (2009)

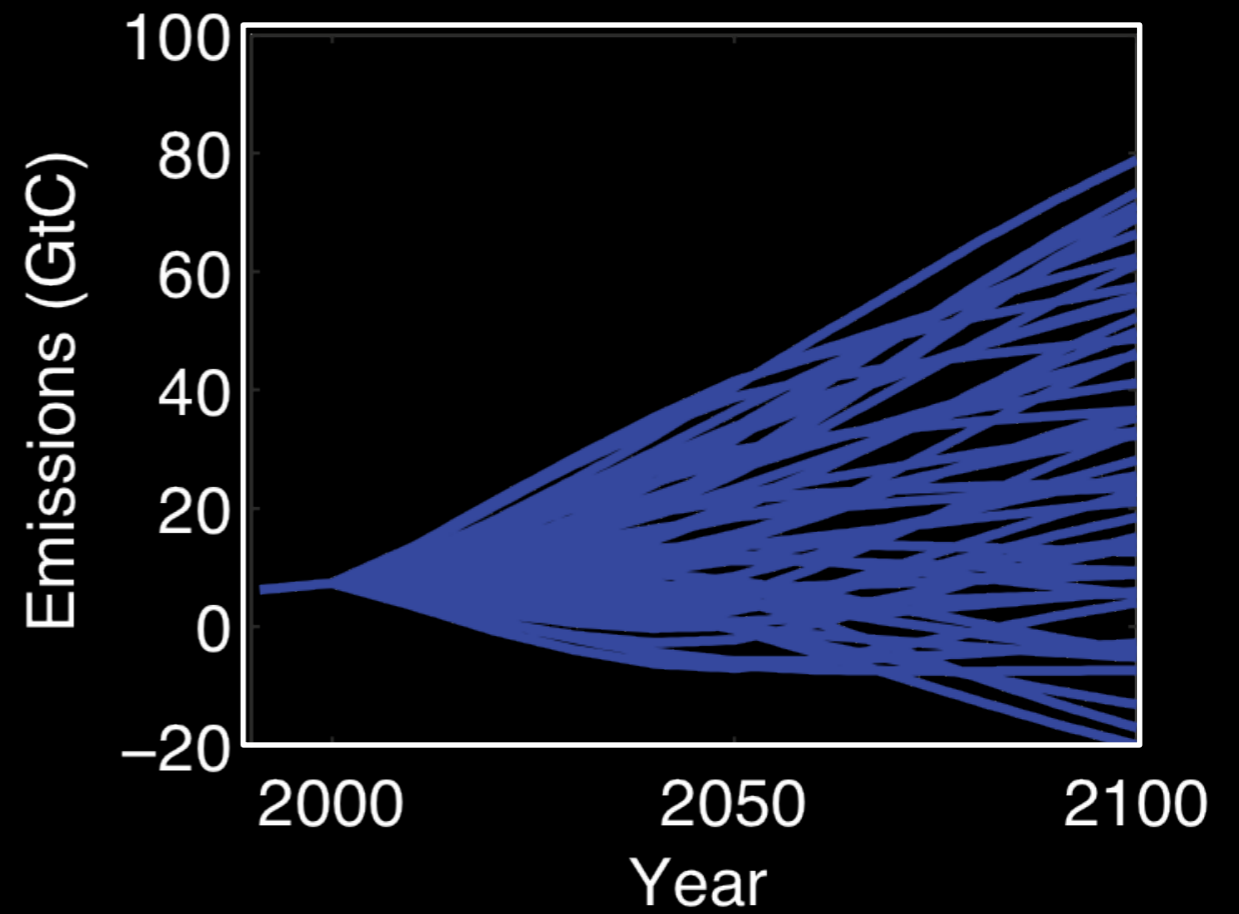
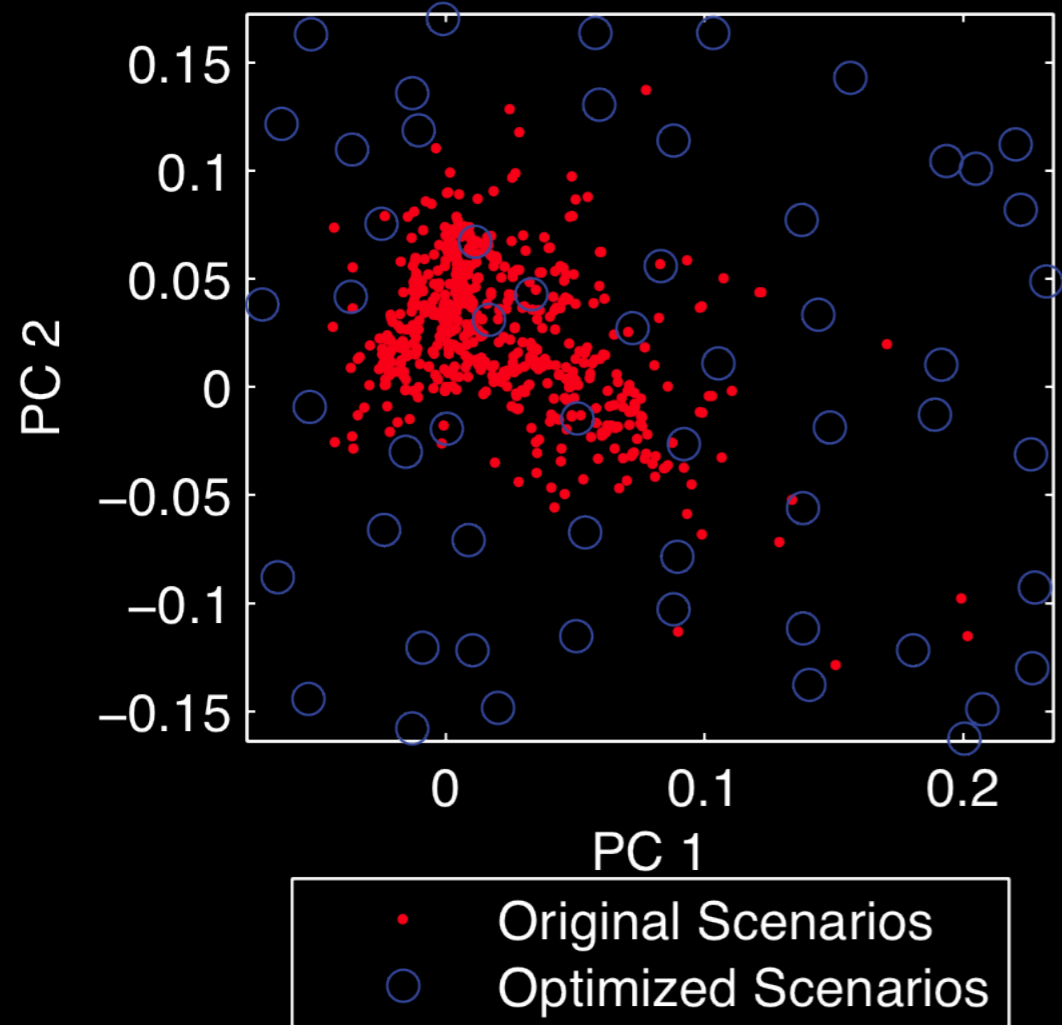
(c) – Global Av. Sea Rise



2100-2000 Precipitation Change (%)



What's Next?



Conclusions

- High emission scenarios give pathways to double A1FI CO₂ concentrations by 2100
- CCSM3 shows no variation in global sensitivity up to 2000ppm
- Total arctic sea ice loss seen as early as 2050 in All-Coal emissions scenario
- CESM simulations for a full range of hypothetical scenarios in preparation