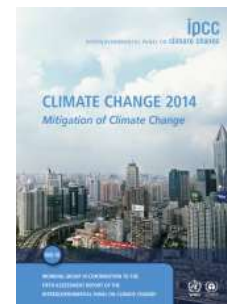
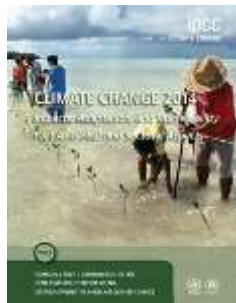


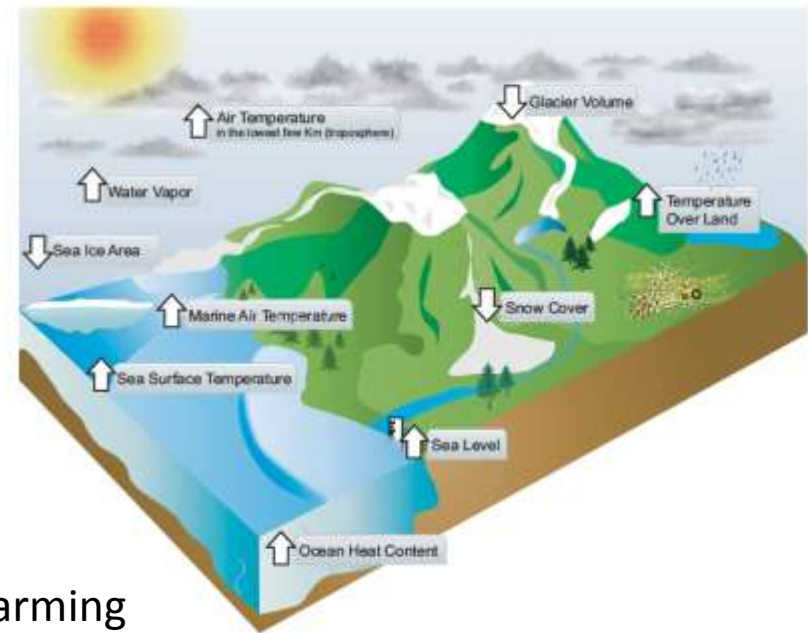
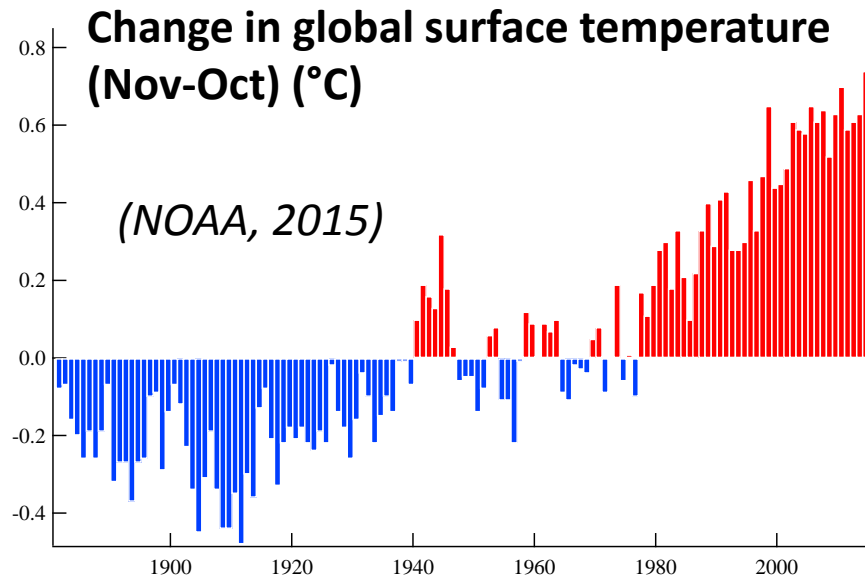
# Physical science basis perspective

## IPCC Working Group 1

Valérie Masson-Delmotte



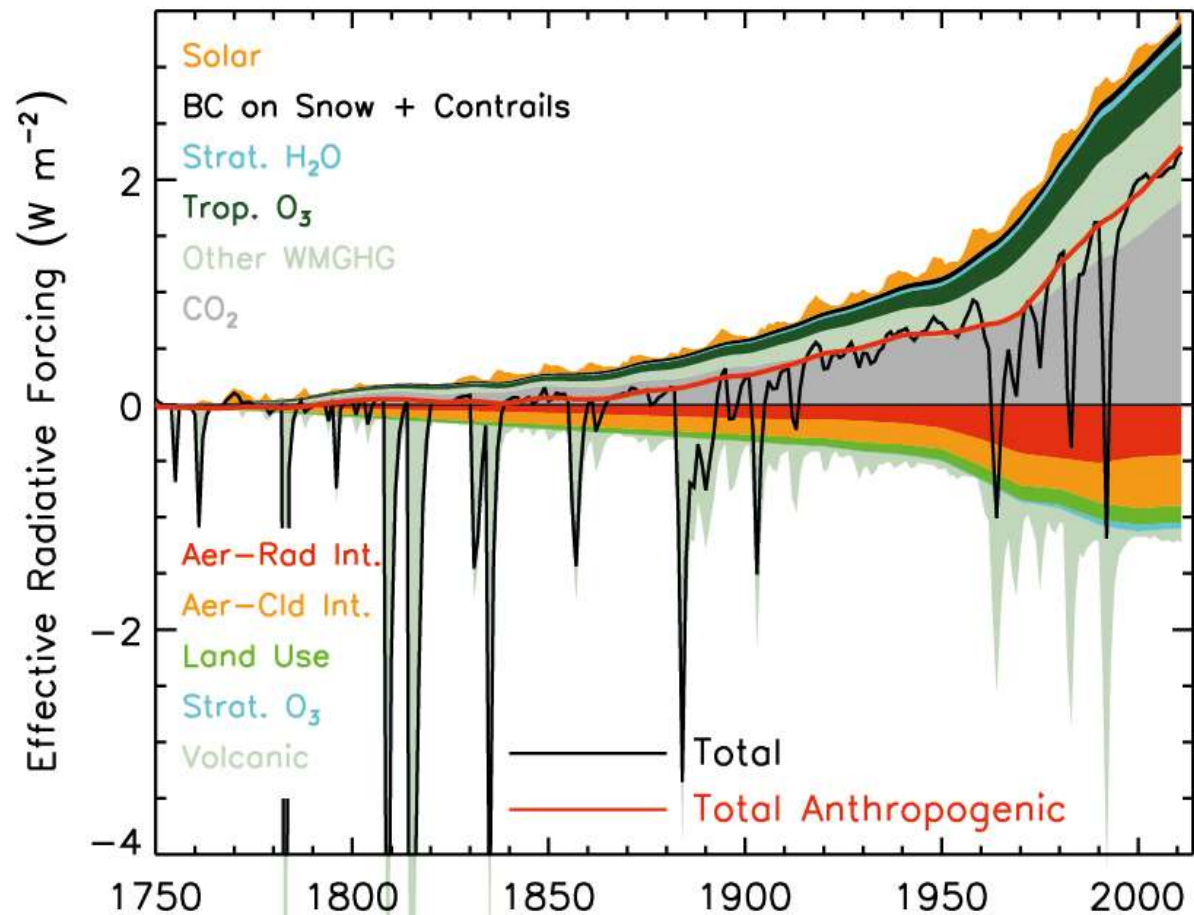
# The climate system is accumulating energy



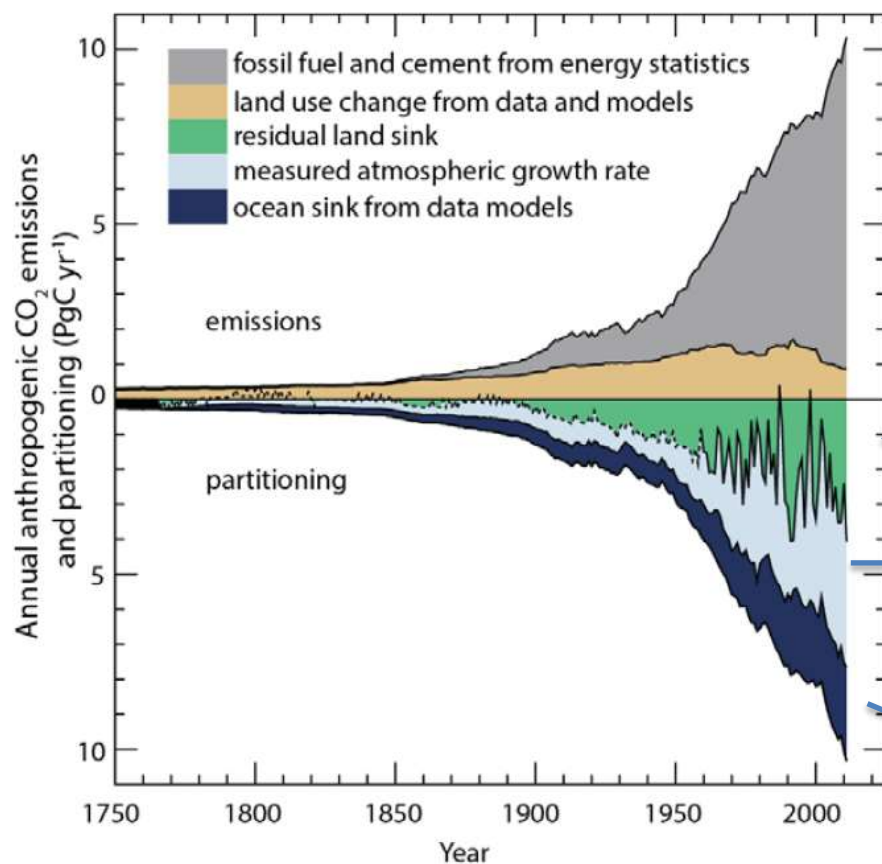
>90% increase in  
energy : ocean warming

**Uptake of energy in the climate system is caused  
by increase in greenhouse gas concentrations**

# Uptake of energy in the climate system is caused by increase in greenhouse gas concentrations



# Carbon dioxide concentrations have increased by 40% since pre-industrial times



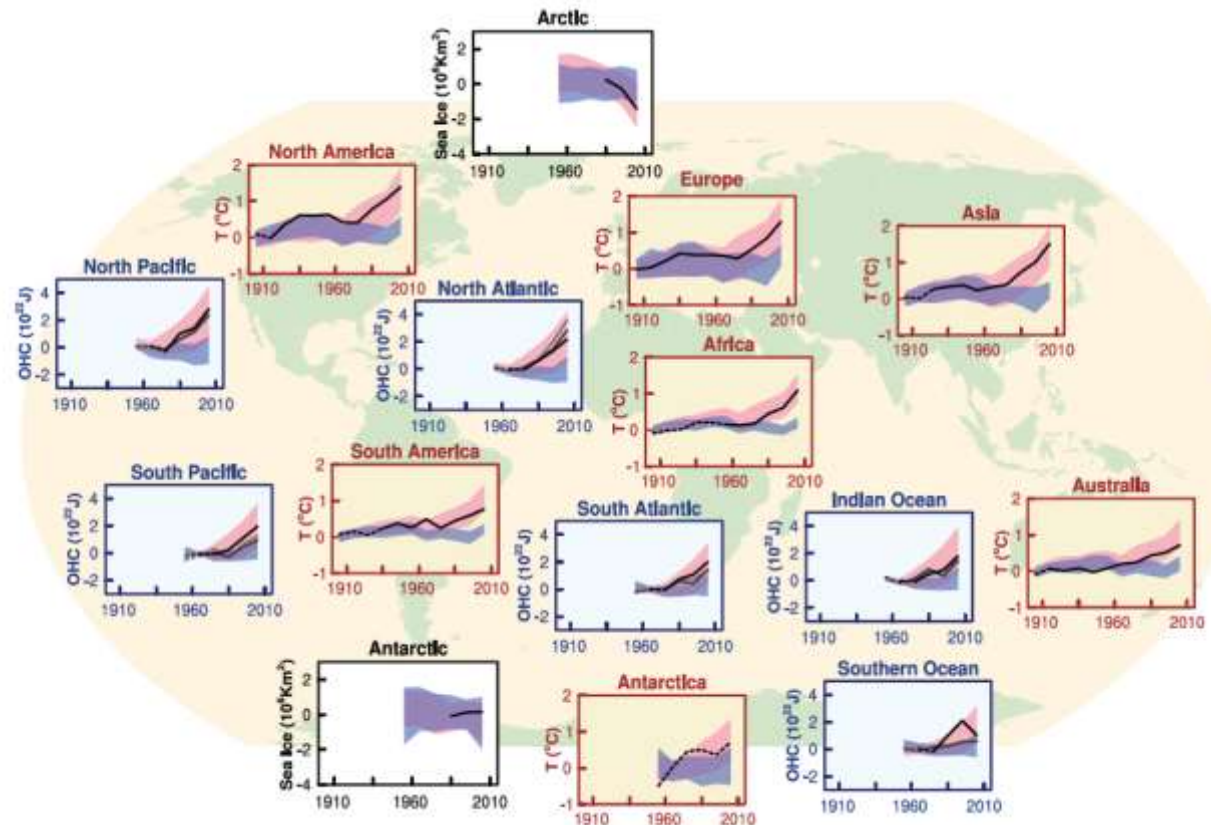
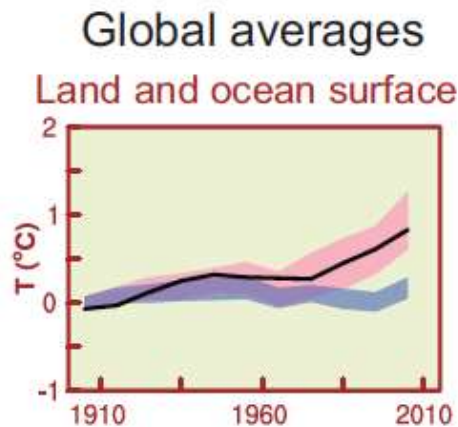
Land carbon sink is sensitive to climate

15 to 40% of emitted CO<sub>2</sub> will remain in the atmosphere longer than 1,000 years

ocean has absorbed 30% of emitted CO<sub>2</sub> causing acidification

*(Global Carbon Project update planned on Dec 7)*

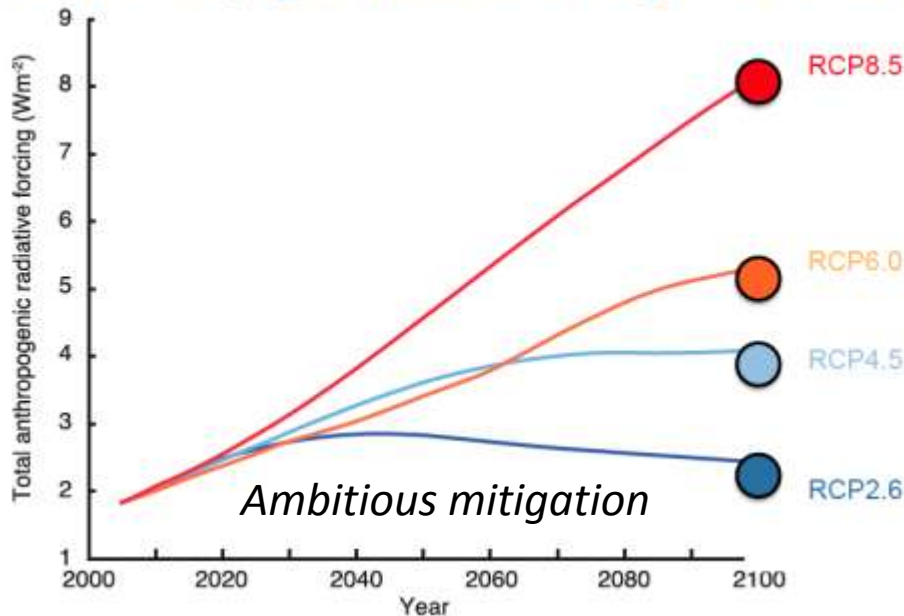
# Human influence is already detected in warming, sea level rise, changes in the global water cycle, and some climate extremes





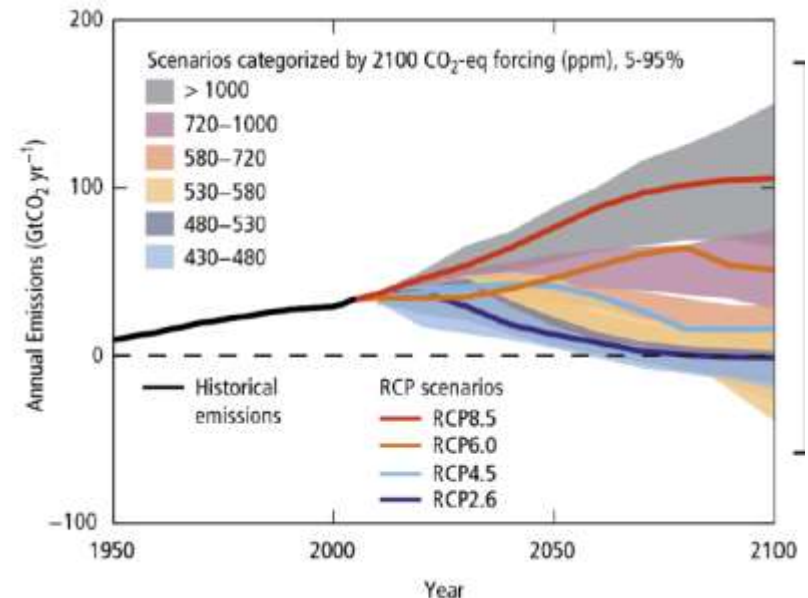
# Future climate will depend on radiative perturbations (RCP)

Indicative anthropogenic radiative forcing for the RCPs



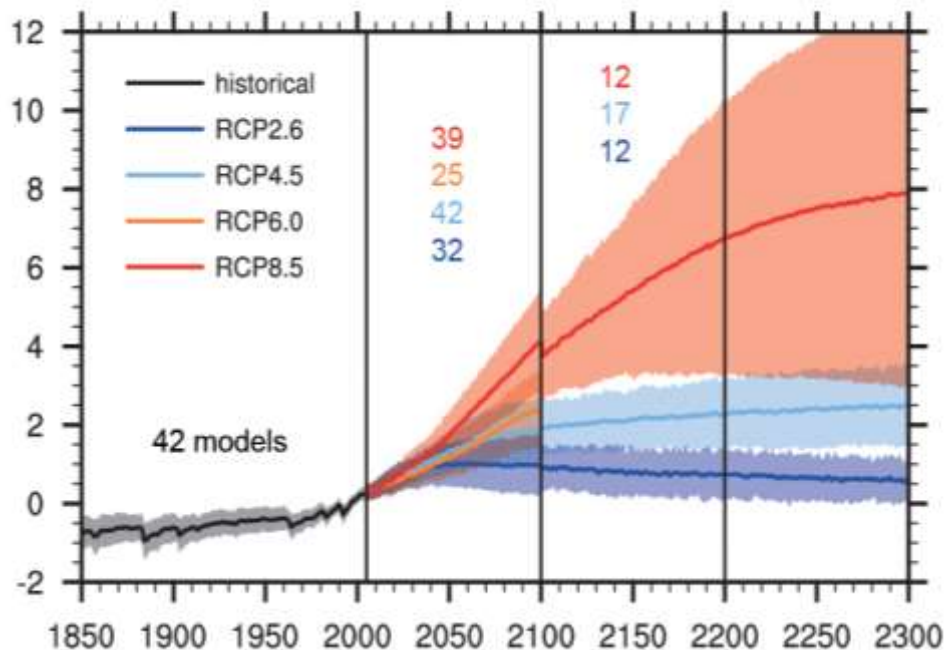
*Business as usual*

*Stabilization*

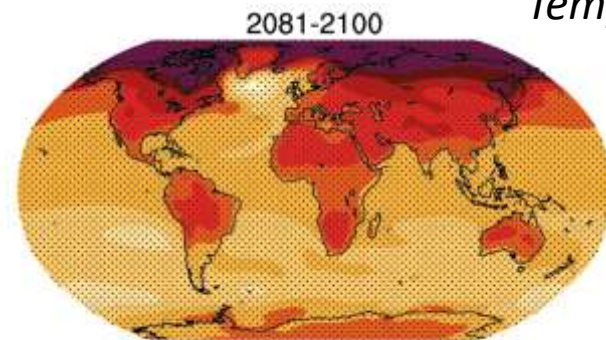


# Global surface temperature change in 2100 is likely to exceed 1.5°C for all scenarios except for ambitious mitigation

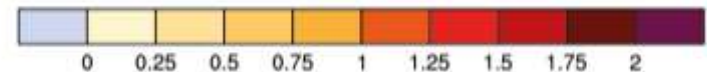
*Projected temperature change*



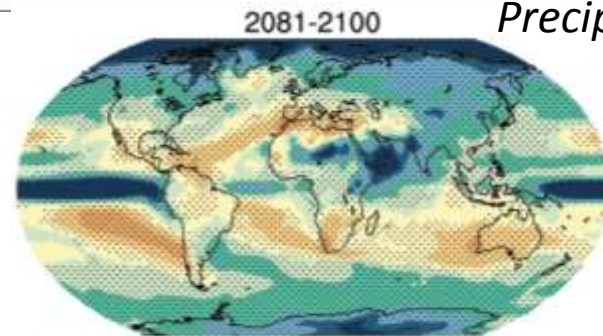
*Temperature*



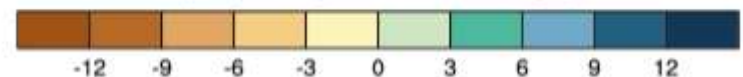
(°C per °C global mean change)



*Precipitation*

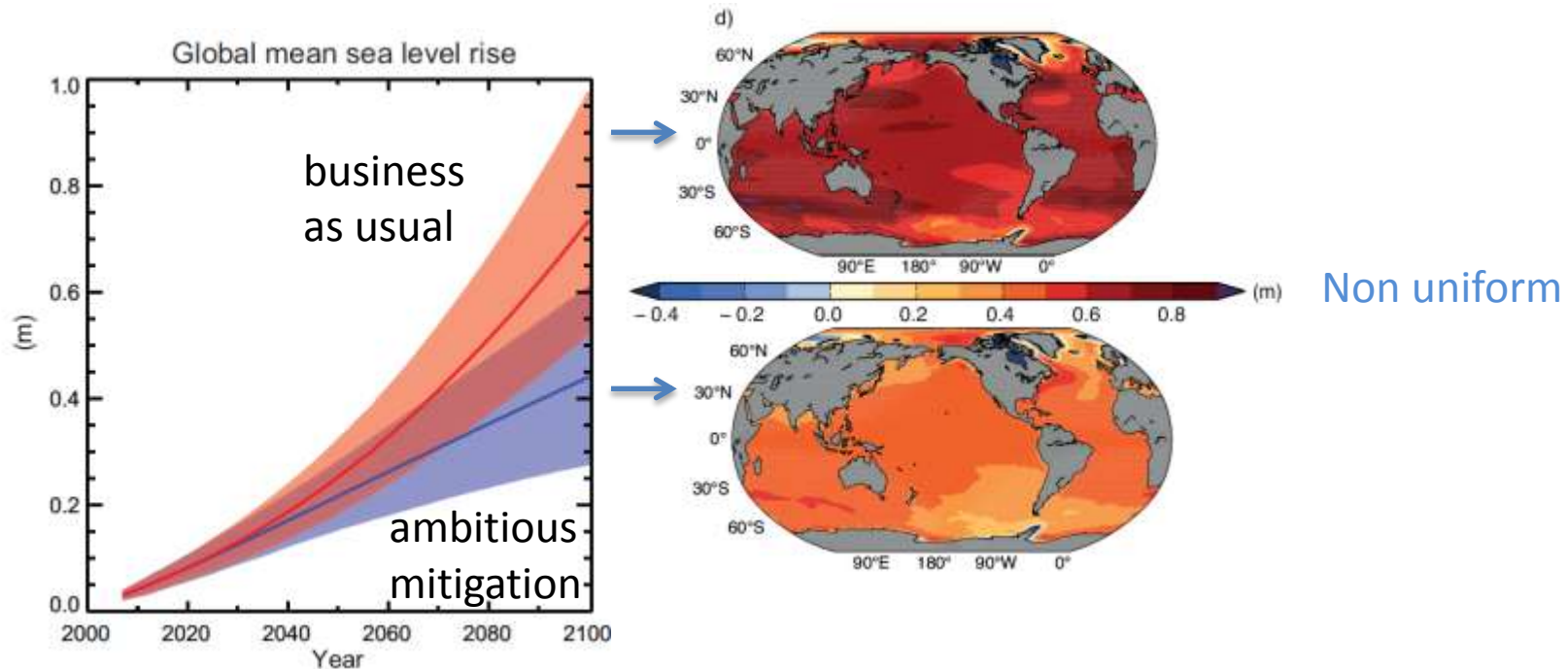


(% per °C global mean change)

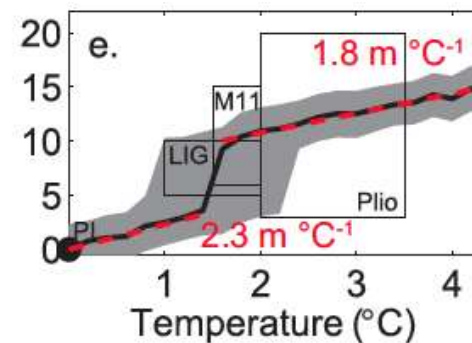




# Global mean sea level will continue to rise during the 21<sup>st</sup> century and beyond

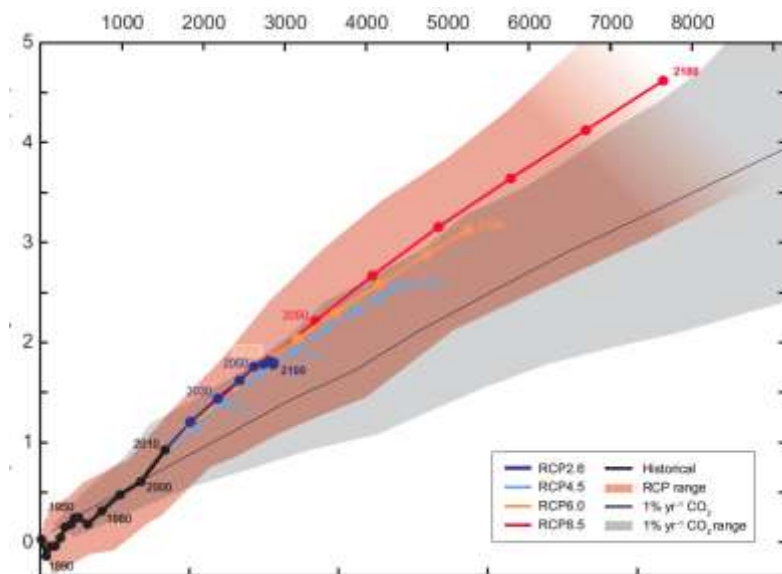


Multi-millennial sea level commitment will depend on magnitude of global warming



# Cumulative emissions of CO<sub>2</sub> will largely determine global mean surface warming by the late 21st century and beyond

Temperature change since 1861-1880 (°C)



Cumulative CO<sub>2</sub> emissions (Gt CO<sub>2</sub>)

For warming < 2°C :

2900 Gt CO<sub>2</sub> (66%)

-

2000 Gt CO<sub>2</sub> (emissions 1870-2011)

=

Remaining: 900 Gt CO<sub>2</sub>

*may be reached in 20-30 years*