

# Climate Change 2013: The Physical Science Basis

Working Group I contribution to the IPCC Fifth Assessment Report



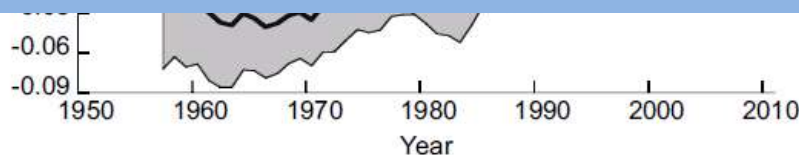
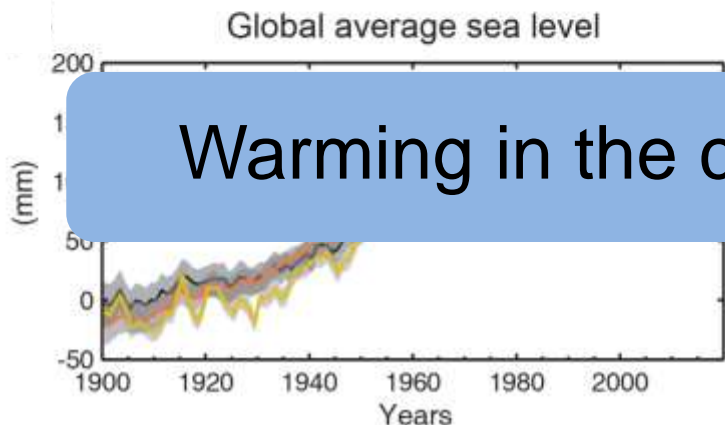
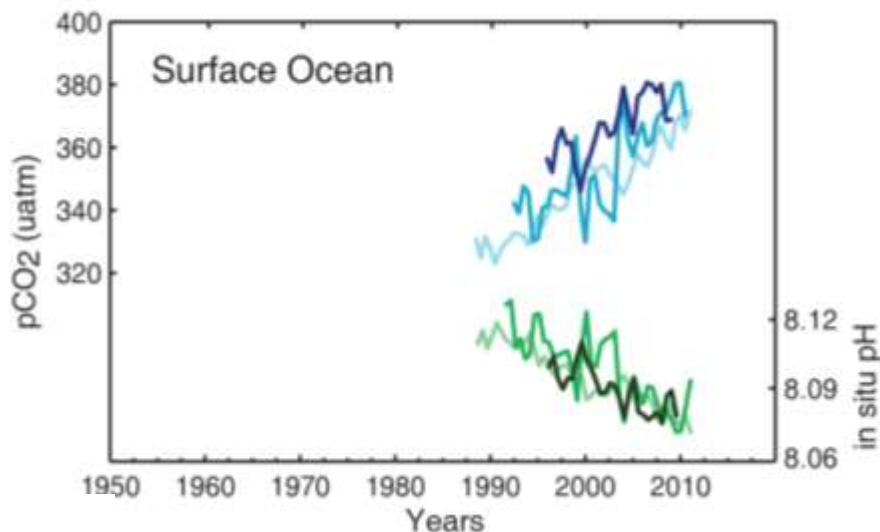
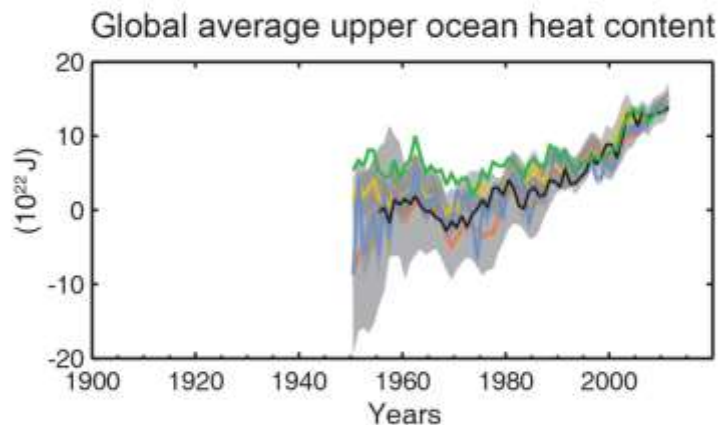
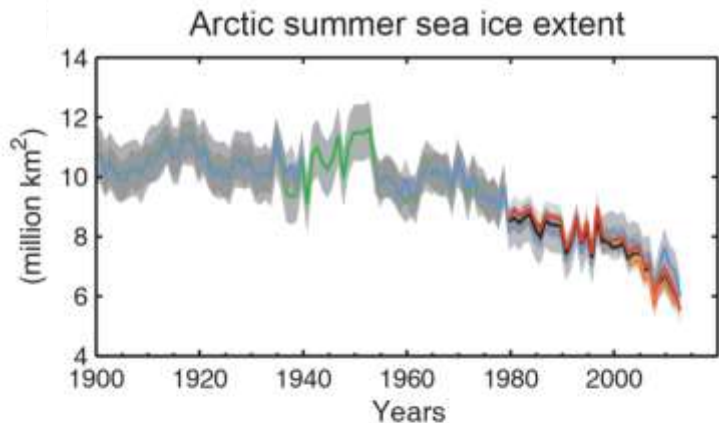
## Sea level rise

Nathaniel Bindoff

6 October 2017, Lautoka, Fiji

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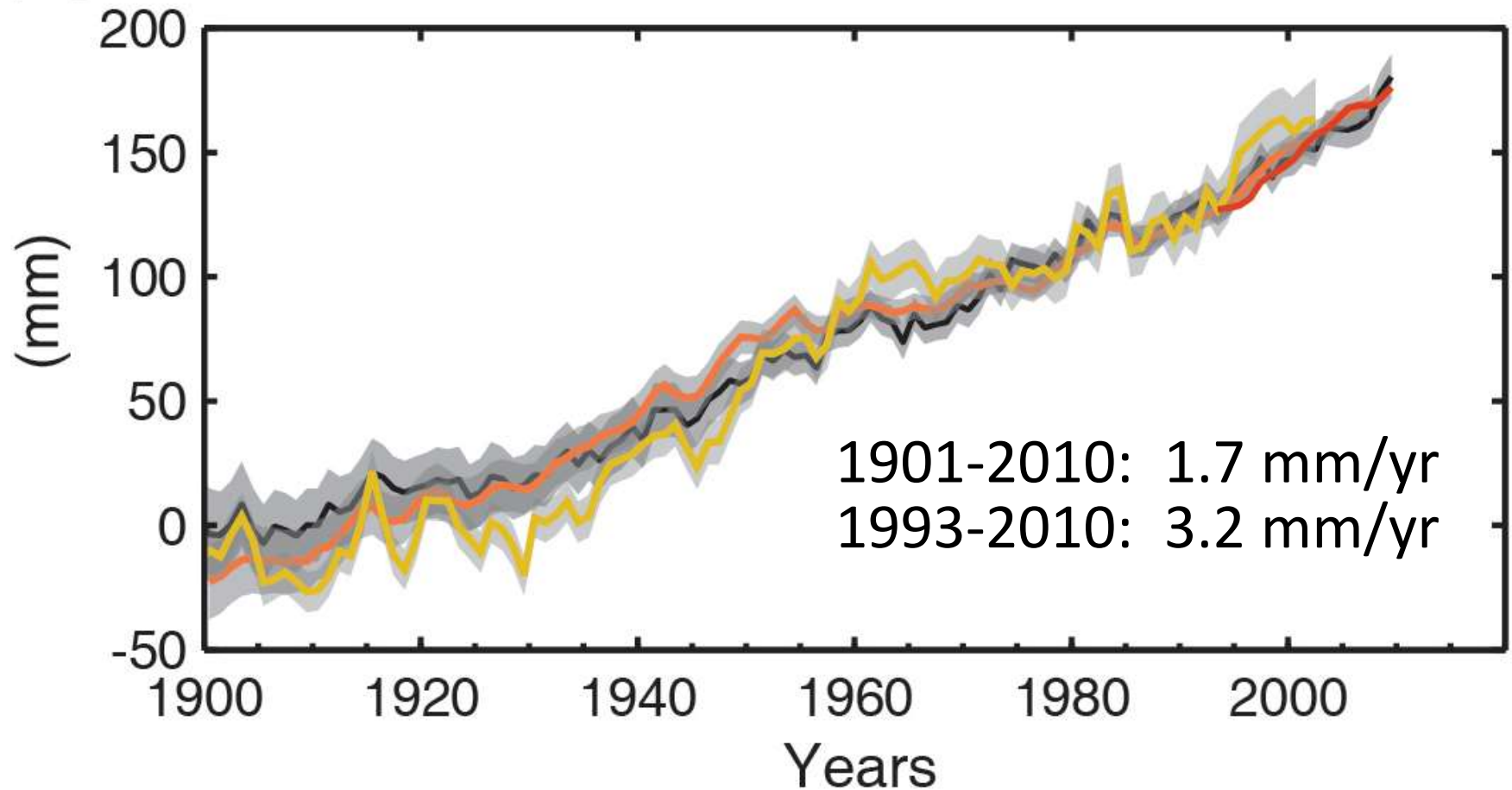
***Multiple lines of robust evidence support the conclusion that many aspects of the climate system have changed.***



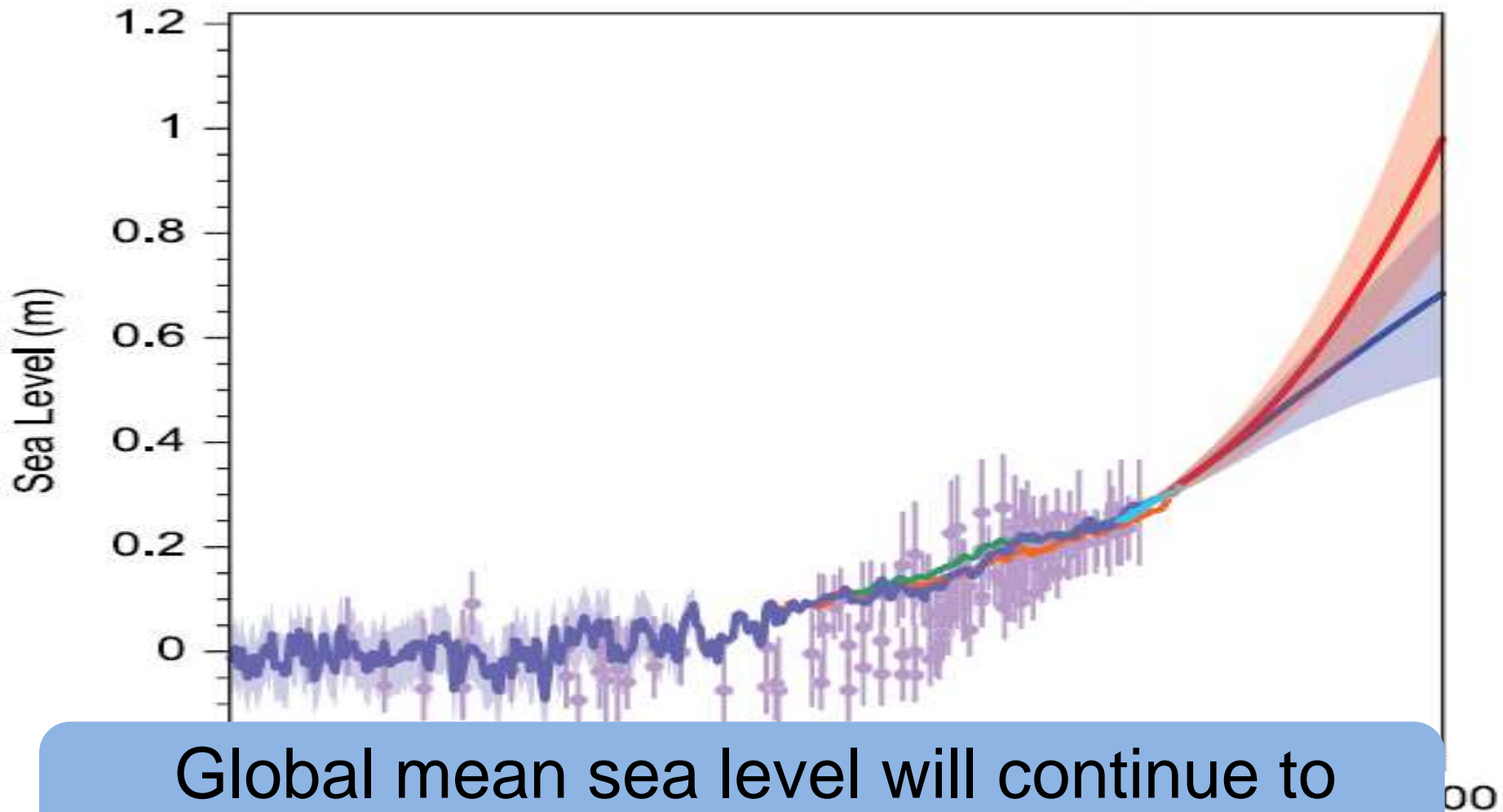
**Warming in the climate system is unequivocal**

# Global mean sea level increased by 0.19 [0.17 to 0.21] m between 1901 and 2010

## Global average sea level



# Sea level rise of 0.52 to 0.98 m by 2100, under the high emissions scenario.

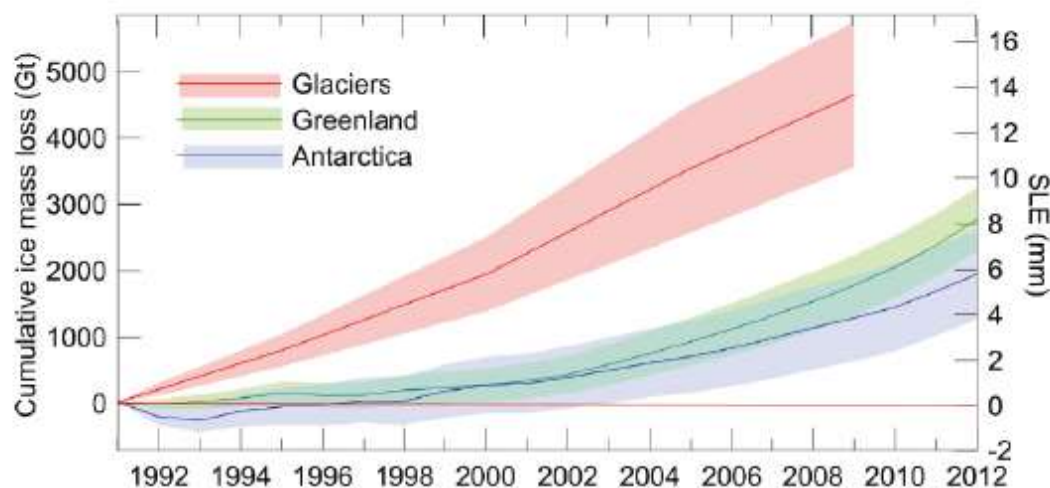


Global mean sea level will continue to rise during the 21st century

**In the well measured time period 1993-2010, global mean sea level is consistent with the sum of observed contributions (*high confidence*).**

### Contribution to sea level rise in 1993-2010

Ocean warming:	38%
Changes in glaciers:	28%
Greenland ice sheet:	10%
Antarctic ice sheet:	10%
Land water storage	14%



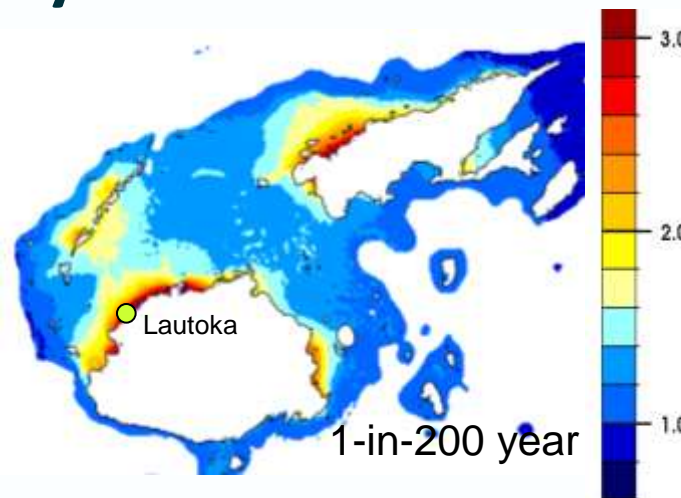
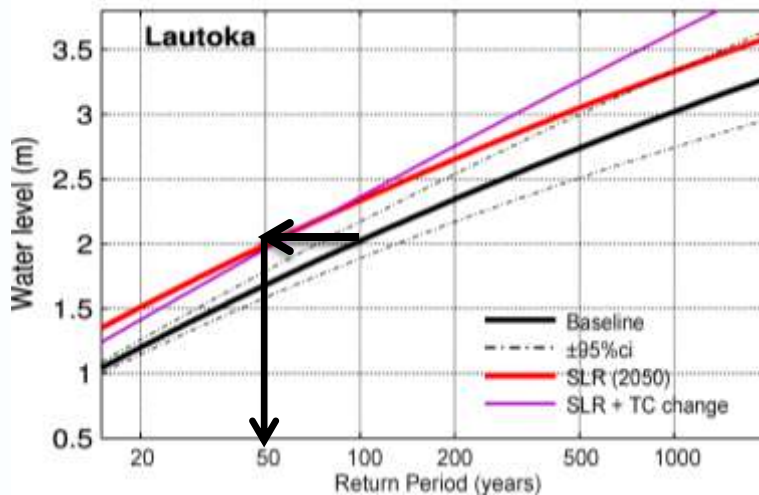
year

TS Figure 3

# Storm tides evaluated from stochastic cyclones

## Fiji:

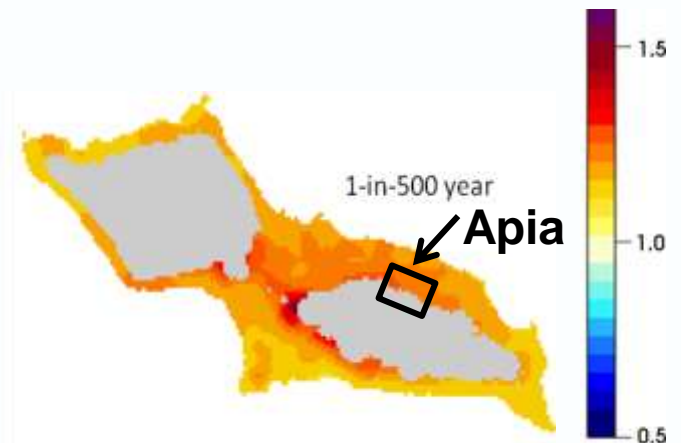
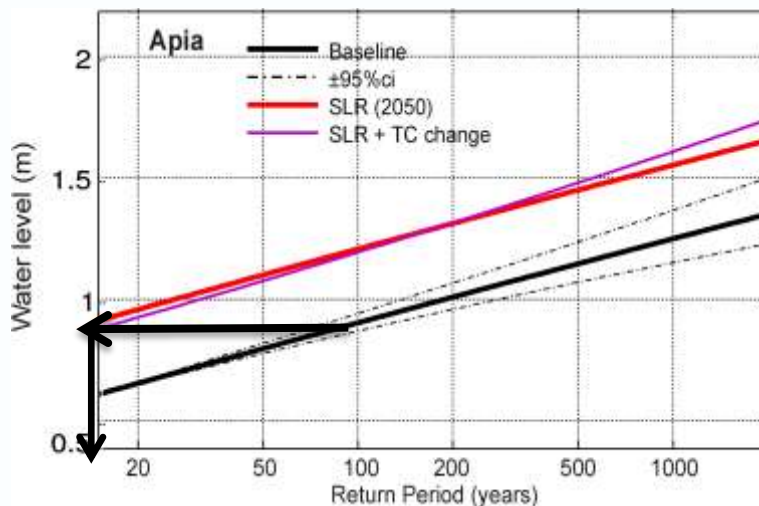
Storm tides are largest on northwest coastlines of the Fiji Islands



Source: McInnes et al, *Glob. Planet. Change.* (2014)

## Samoa:

Storm tides are more uniform around the coastlines of the Samoan Islands



Source: McInnes et al, *Nat. Haz.* (2015)

# Sealevel

- **Extraordinary that we can measure global sea-level**
- **Sea-level is different to warming oceans –**
  - it will continue to rise long after the earth's temperature has stabilised
- **The Antarctic and Greenland ice sheets are a big contributors global sea-level.**
  - Key risk going into the future
  - Have we already made a decisions about the ice sheets?

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Further Information  
[www.climatechange2013.org](http://www.climatechange2013.org)

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# Sea level rise will increase the frequency of extreme sea levels

