



Overview of the observed and projected impacts of climate change on biodiversity and biodiversity – based livelihood in the region

Capacity development workshop on NBSAP, Mainstreaming of Biodiversity and Integration of climate change
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Outline

1. Introductory Science
2. Impacts on biodiversity
 - 2.1 Sea level rise
 - 2.2 Increasing water temperature
- 3.0 Suggested way forward

1.0 INTRODUCTORY SCIENCE

- **ENSO**
- **INCREASE IN CO₂**
- **VARIABILITY AND SEA LEVEL CHANGES**

- El Niño – Southern Oscillation

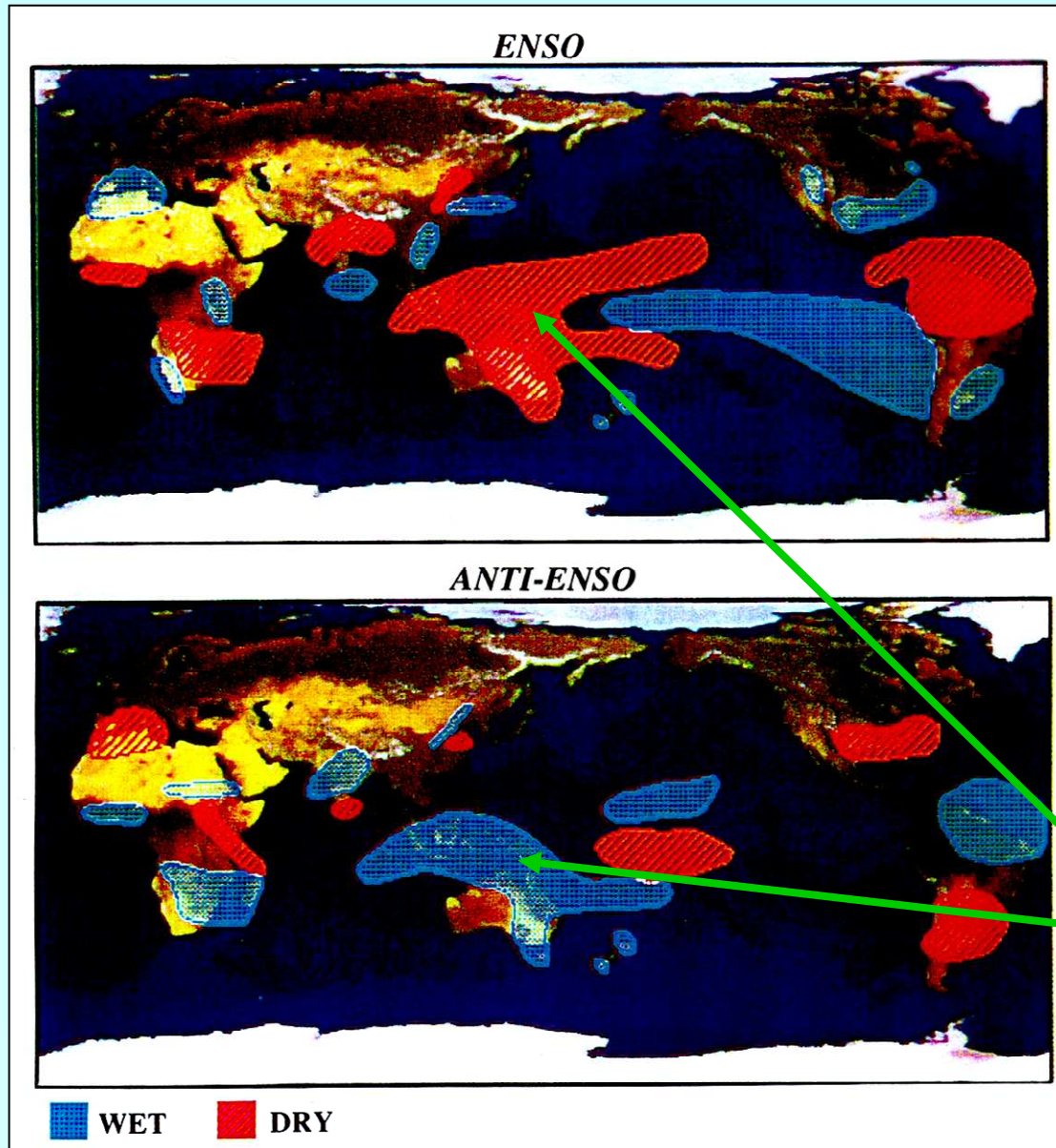
is the result of ocean – atmospheric interactions internal to the tropical ocean and the overlying atmosphere.

Unusually warm temp in eastern equatorial Pacific reduce normally large sea surface temperature difference between the eastern and western sides of the Pacific

Result in:

- NE & SE trade winds weaken and sea level fall in the west and rise in the east as warmer temp move eastward along the equator.

El Niño Southern Oscillation (ENSO) Impacts



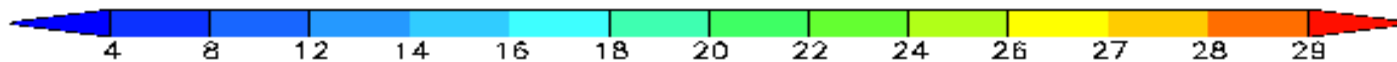
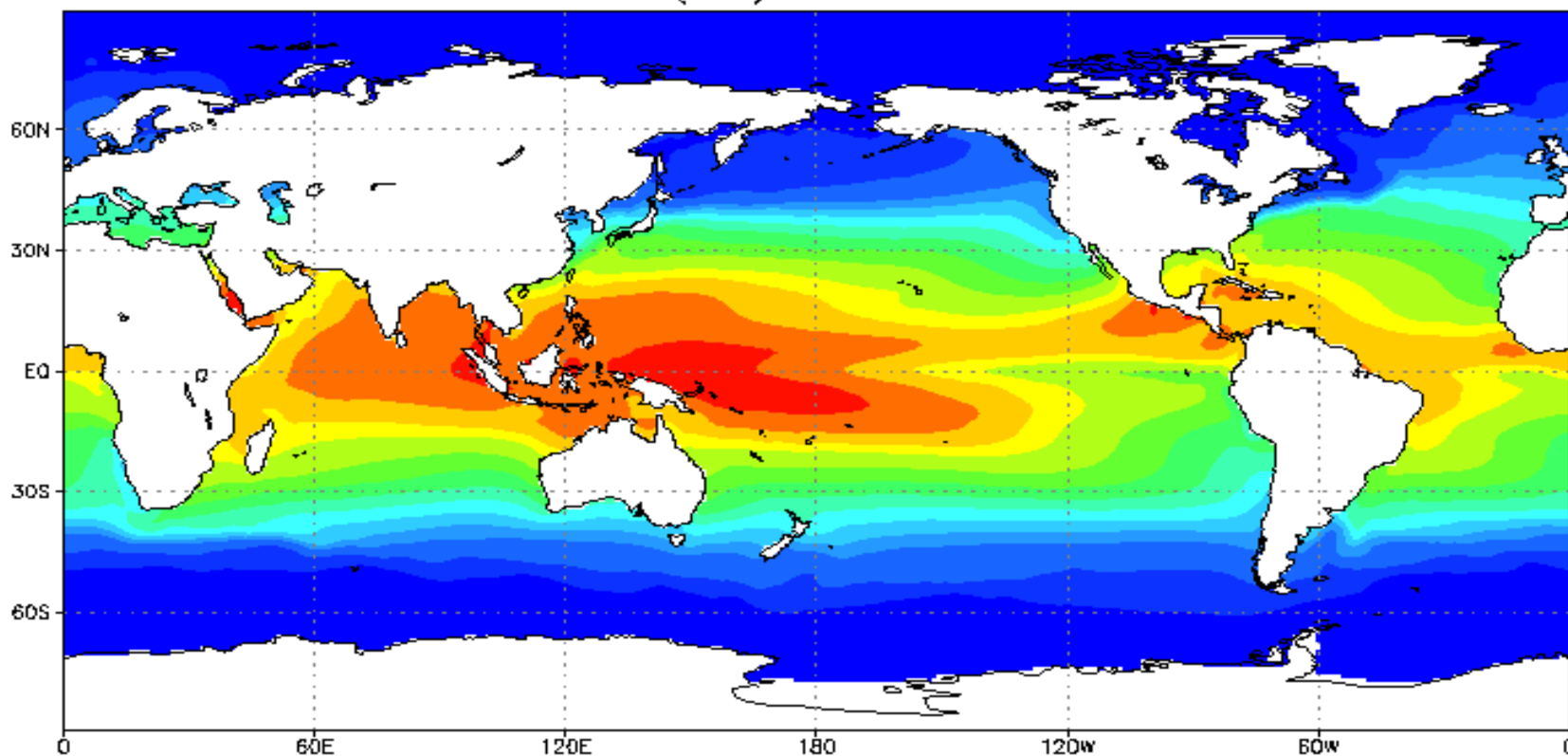
Wetter and **Drier** regions associated with *ENSO* and *La Nina (anti-ENSO)* episodes

PNG

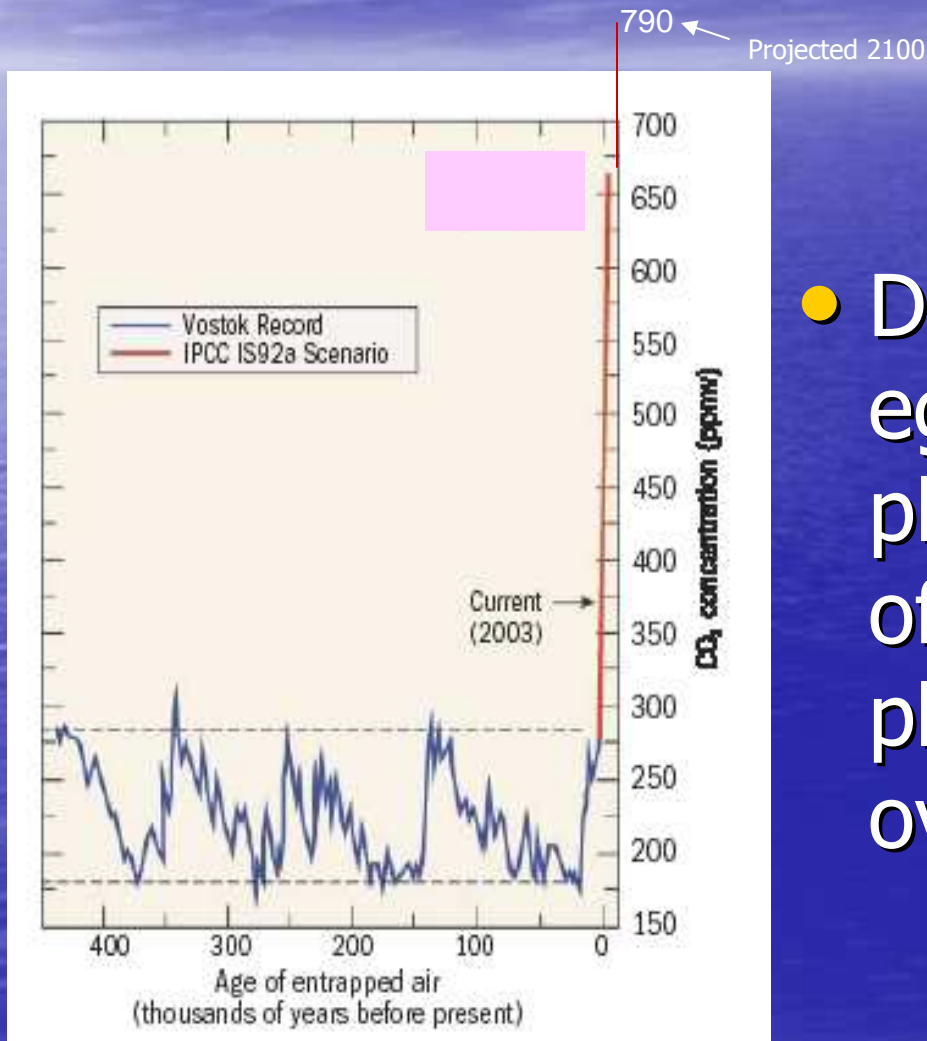
GLOBAL MEAN SEA SURFACE TEMPERATURE

Pentad mean SST ($^{\circ}\text{C}$):

Annual mean



2.0 Rise in carbon dioxide



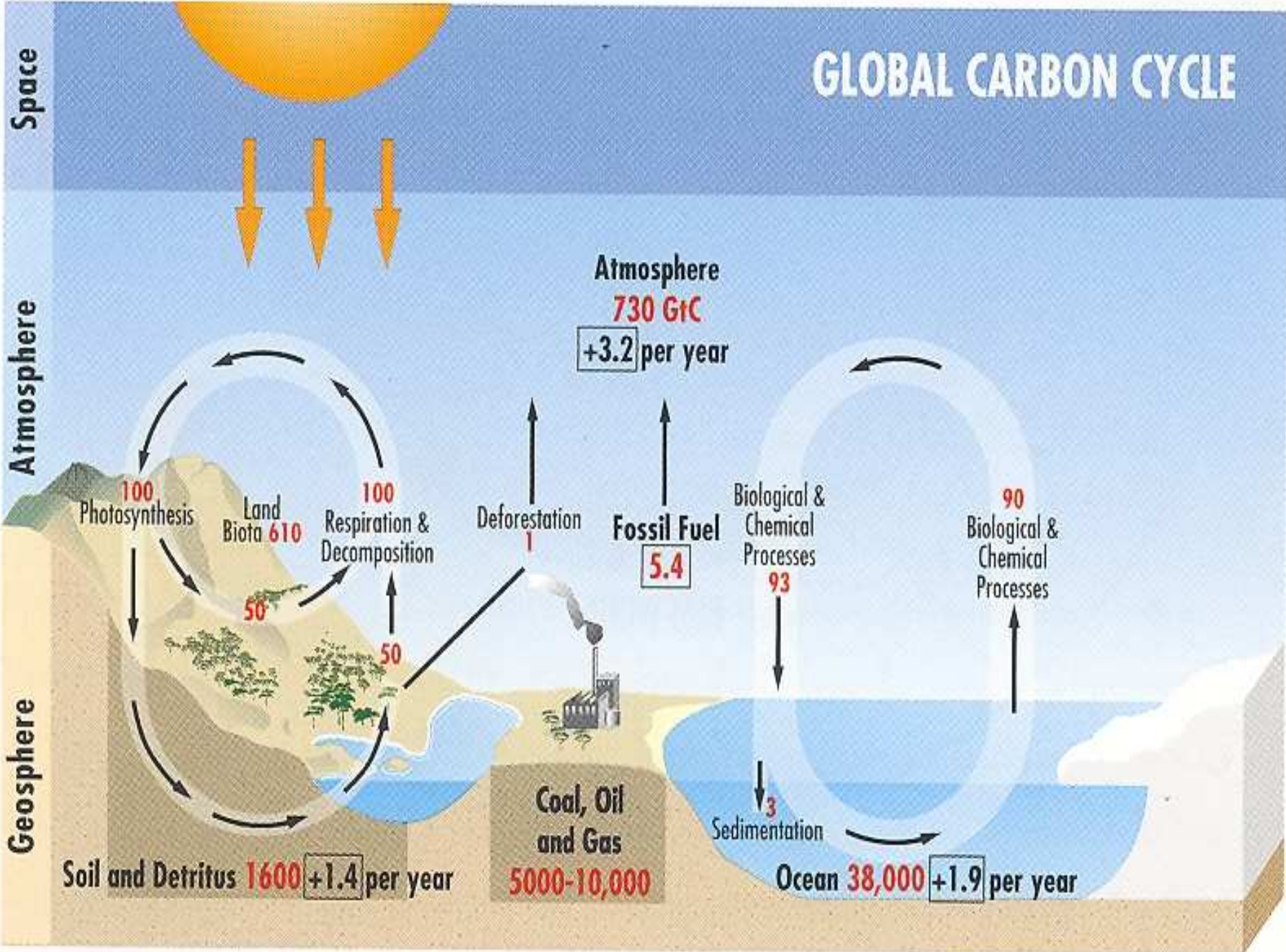
- Direct impacts eg on growth of plants – growth of some types of plants favoured over others.

GLOBAL CARBON CYCLE

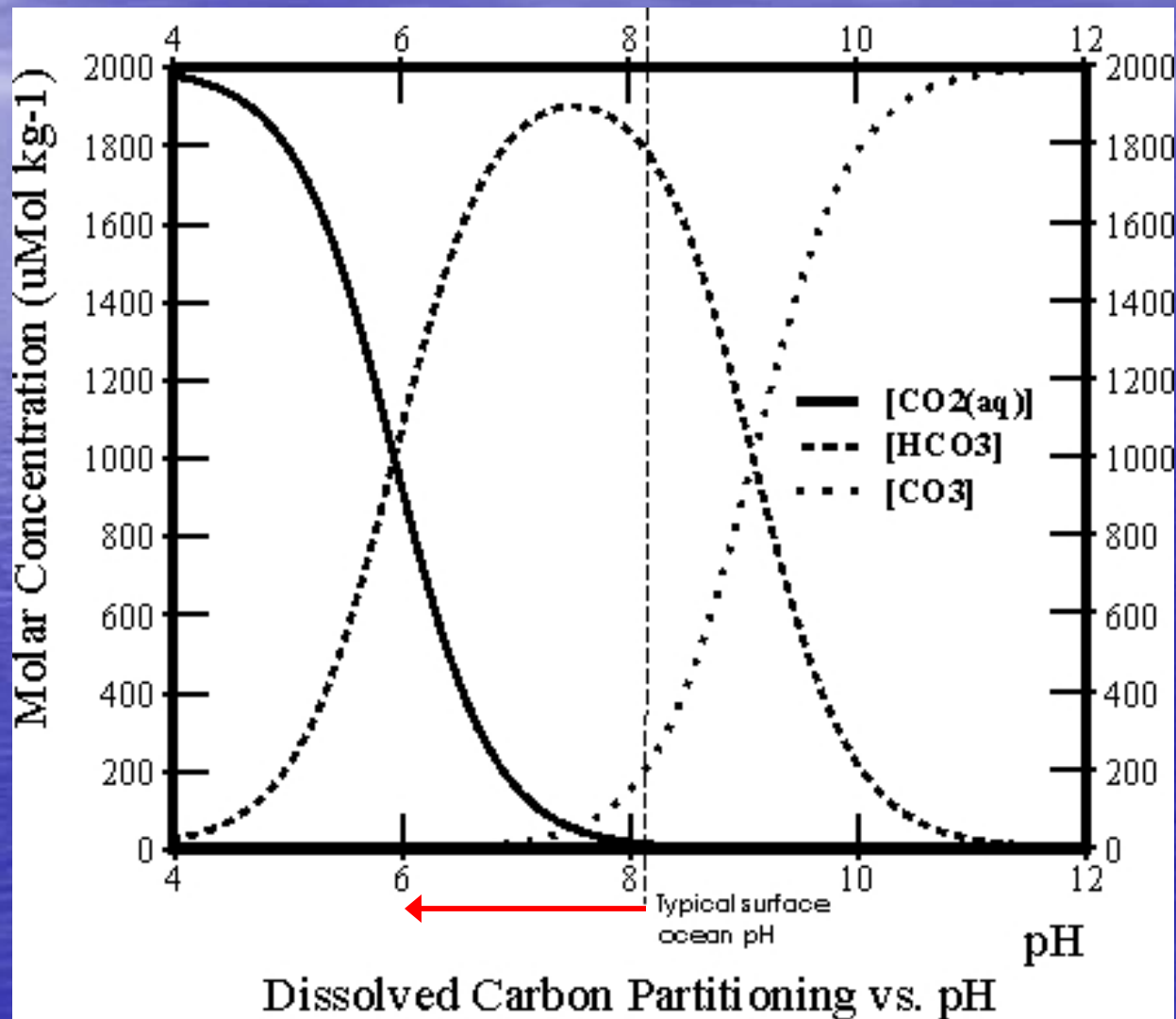
Space

Atmosphere

Geosphere

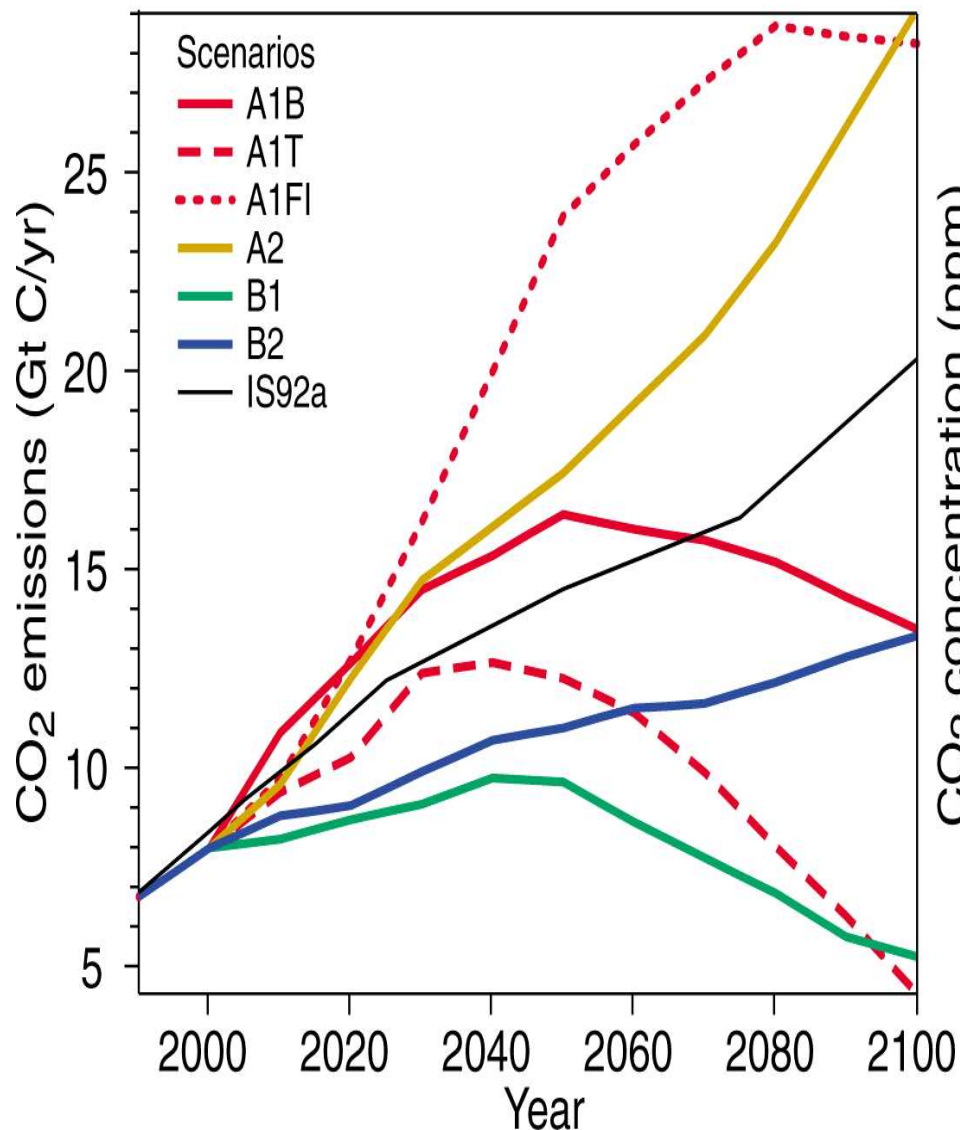


Ocean acidification

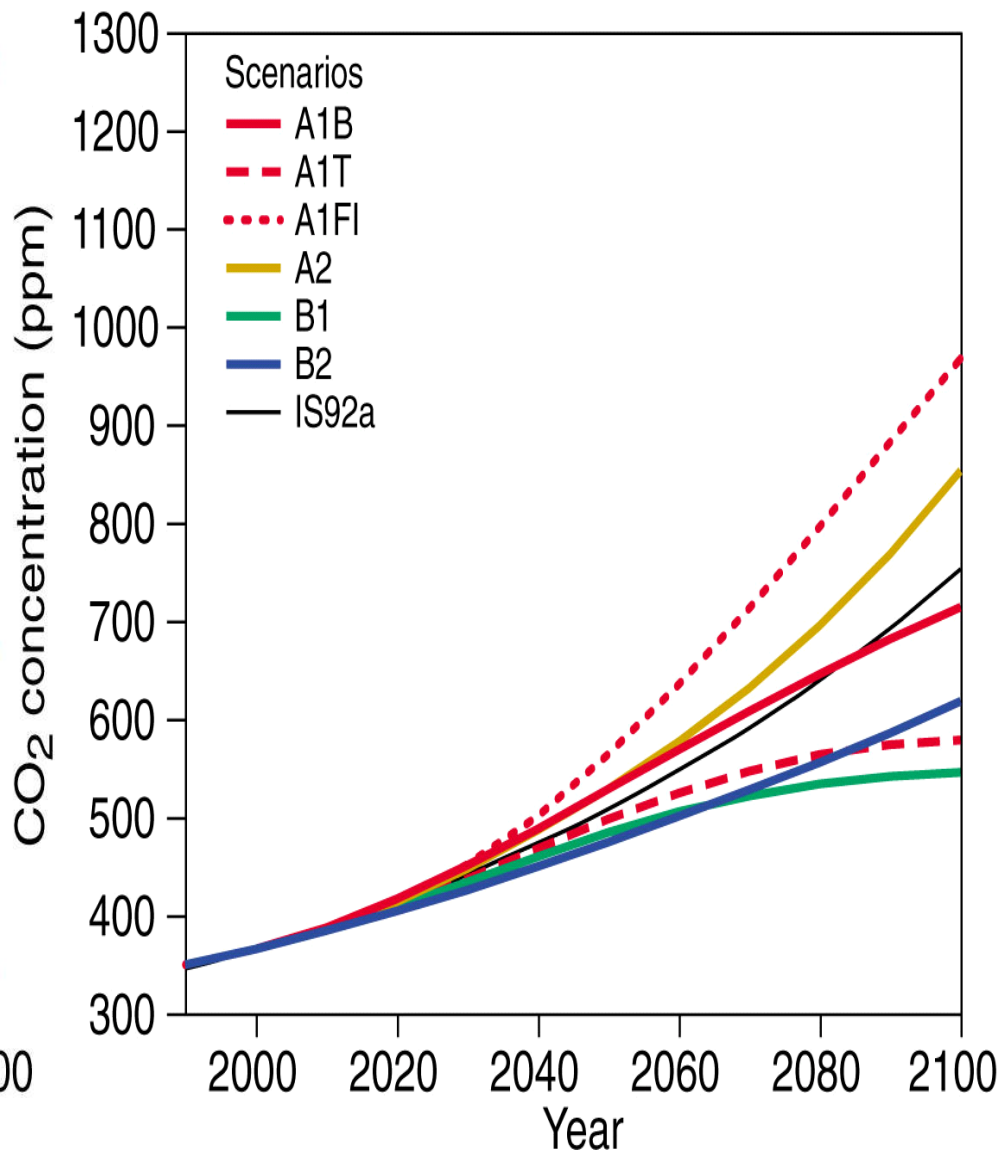


IPCC scenarios

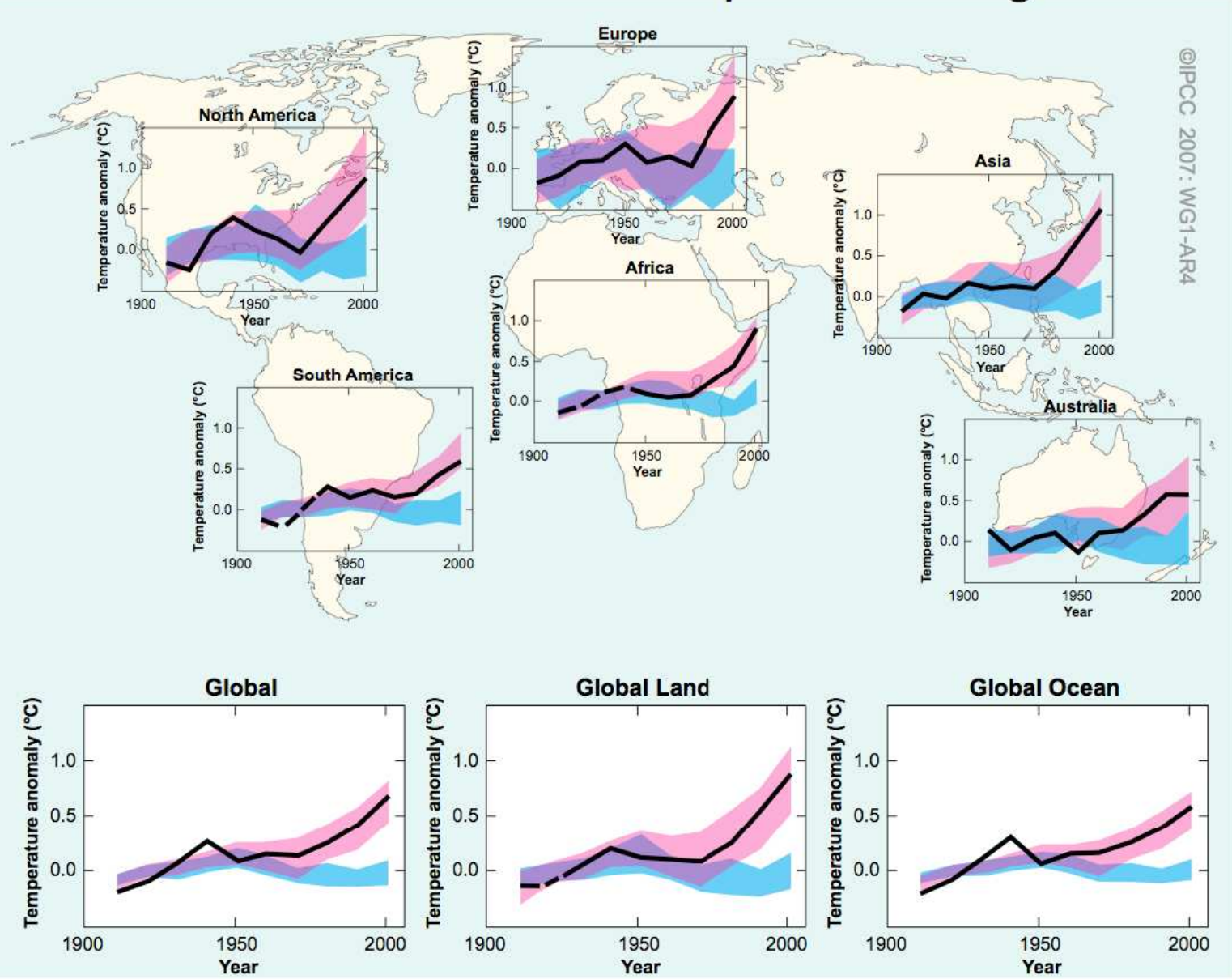
(a) CO₂ emissions



(b) CO₂ concentrations

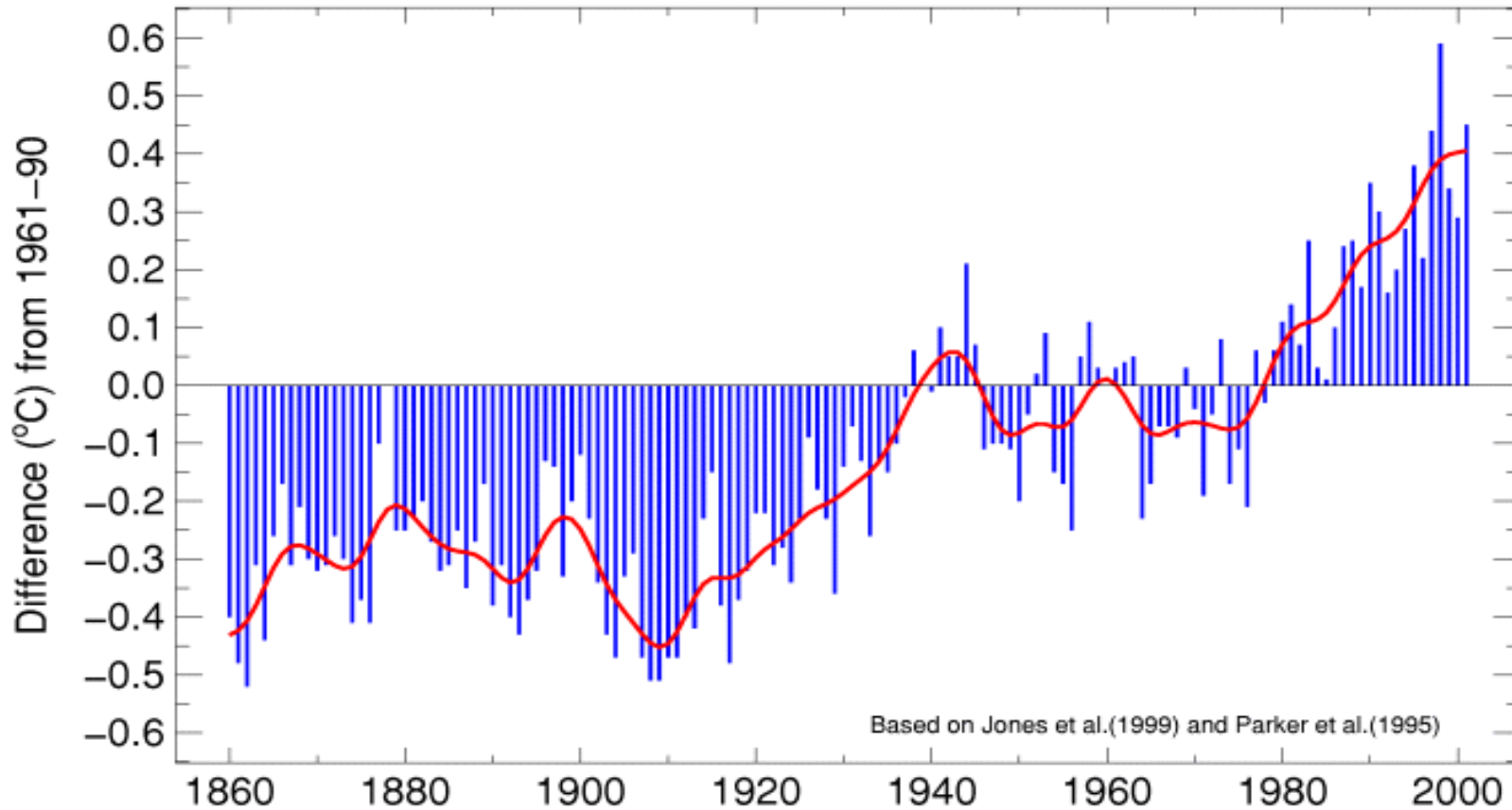


Global and Continental Temperature Change



THE EARTH IS WARMING

Global Average Near-Surface Temperatures
Annual anomalies, 1860 – Aug 2001



Sea Level Rise/Changes =

TIDE LEVEL + WIND EFFECT +

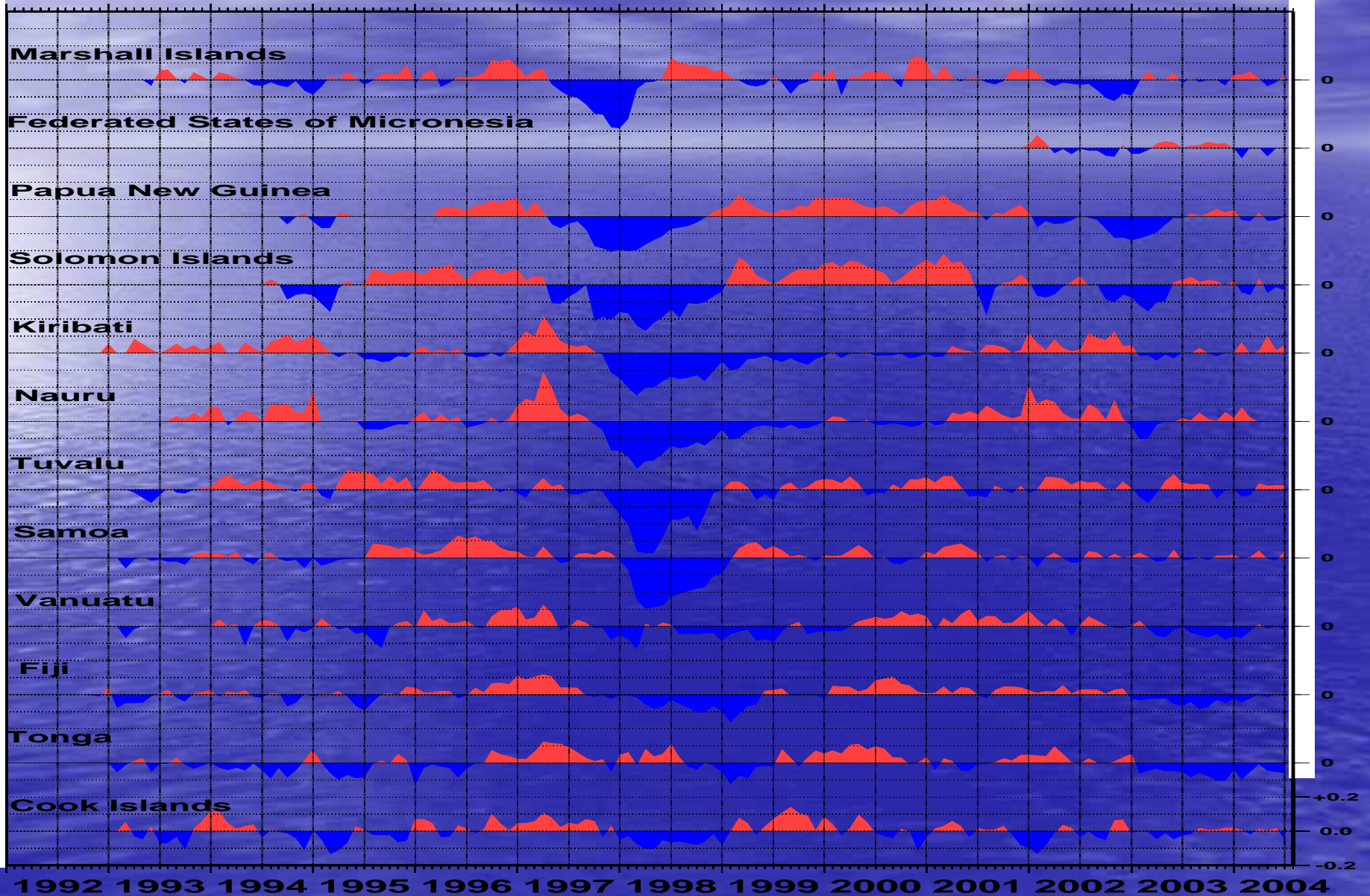
ATMOSPHERIC EFFECT + LAND

MOVEMENT+ OCEANOGRAPHIC EFFECT +

GHG Signals

SEA LEVEL ANOMALIES THROUGH JUNE 2004 (m)

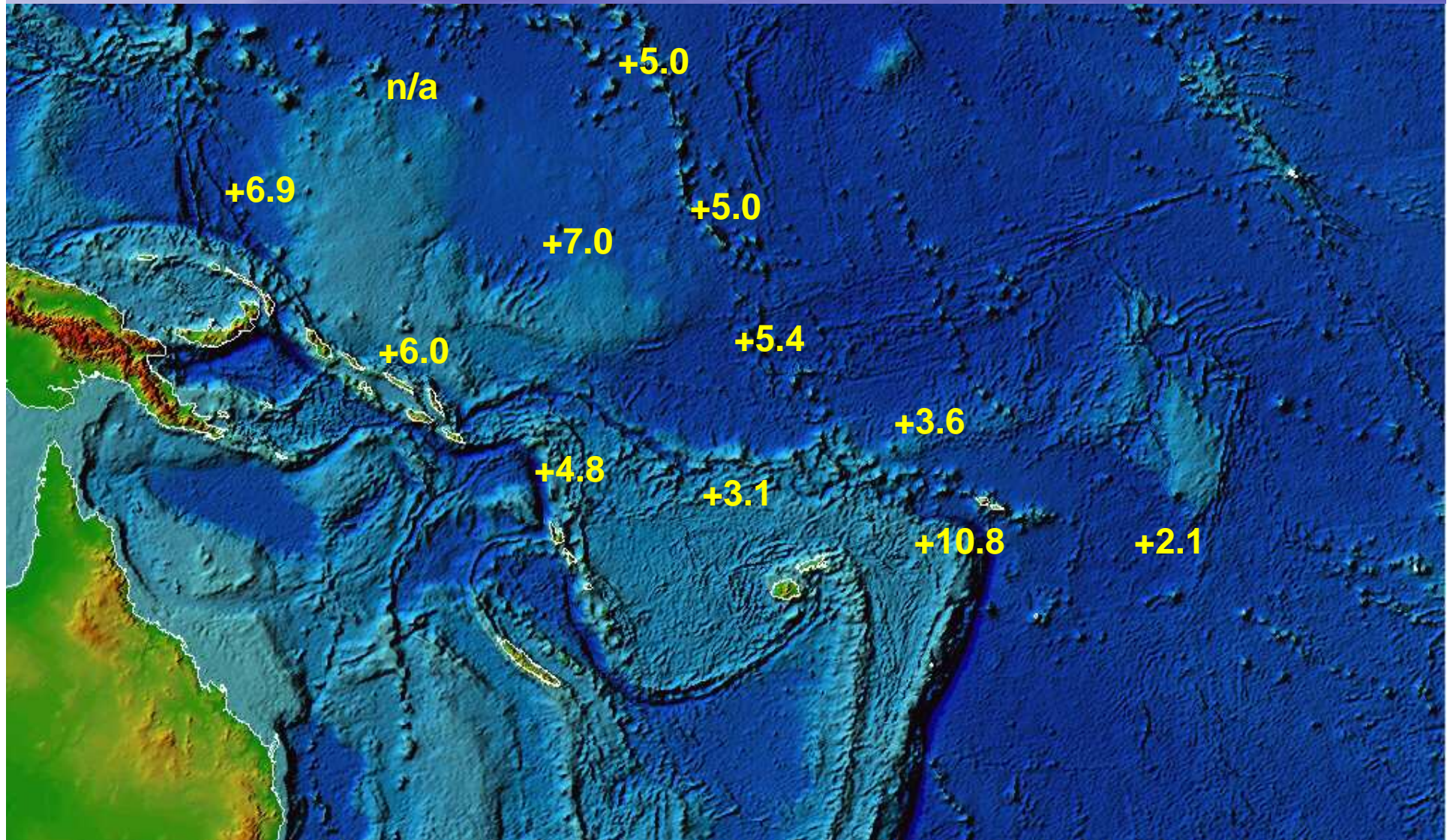
1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004



1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004

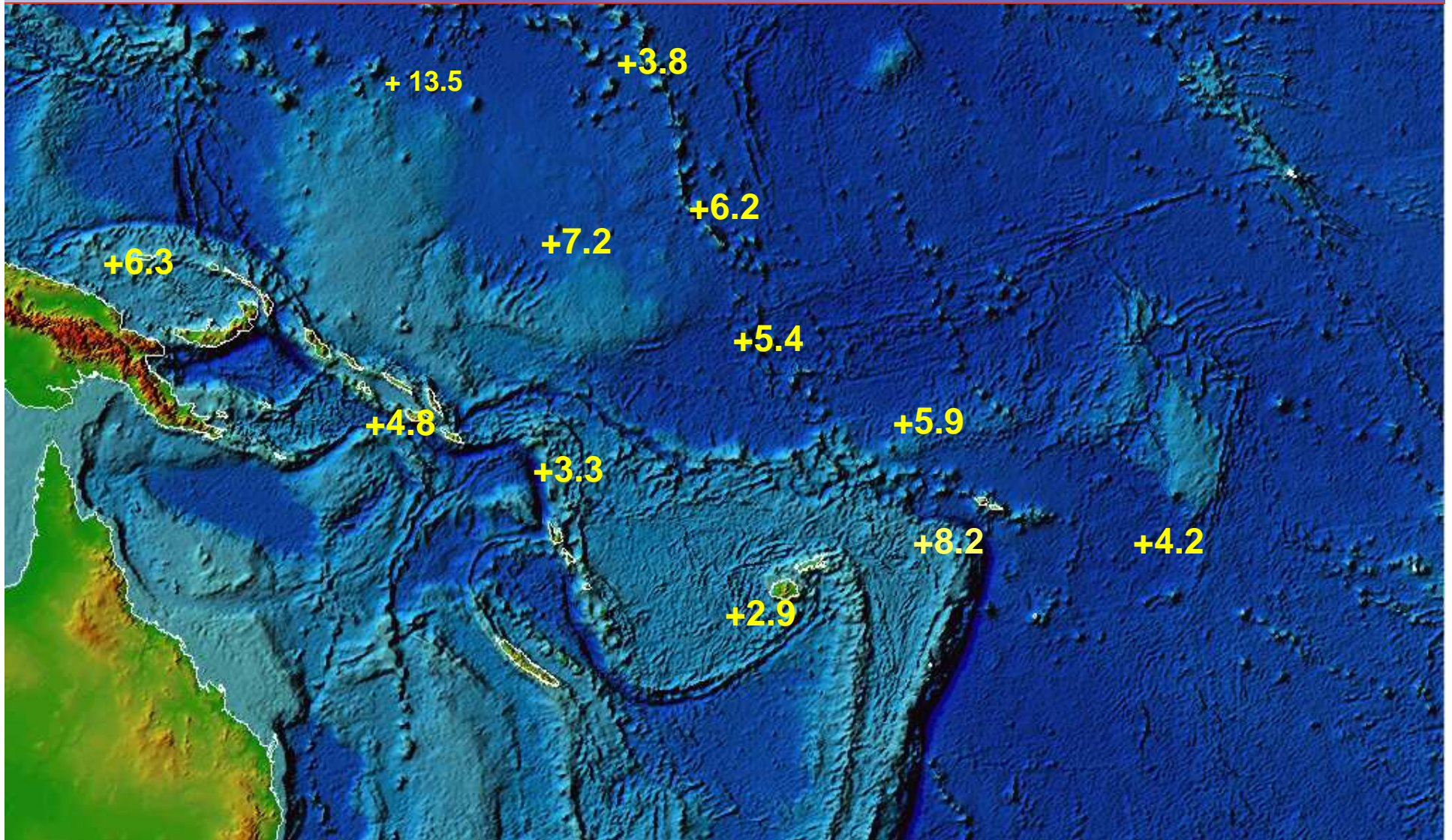
Results to end of June 2004

Net relative sea level rise (mm/year)



Results to end of March 2007

Net relative sea level rise (mm/year)

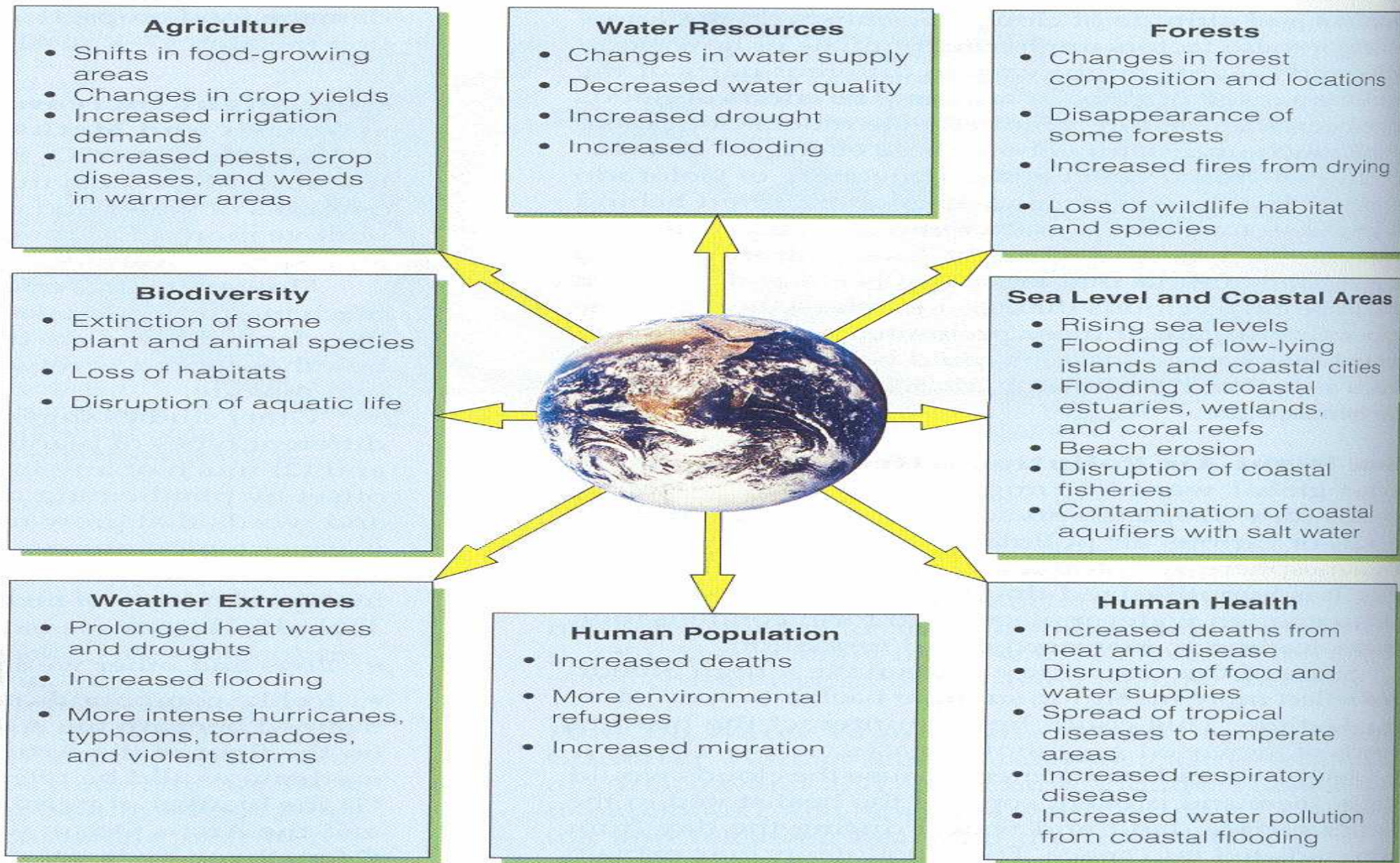


4TH IPCC-2007 Conclusions: Pacific Region

- Sea Level Rise: **2-9 mm/yr**
- Increase in air temp: **1.6-3.40C by 2100**
- Rainfall: mostly rise in the eastern and fall in the western Pacific - up to 20%
- Increase in **El Nino-like** Conditions
- Increase in Extreme Events

2.0 Impacts on biodiversity

- Climate change is threatening the very basis of life. (species, forestry, agriculture etc)
- Of the 20 –30% of species assessed so far face increased risks of extinction if global temperatures increase by 1.5–2.5°C, and critical ecosystems are already being degraded.
- (from fact sheet)



POSSIBLE EFFECTS OF A WARMER CLIMATE (Miller 2004)

2.1 Sea Level Rise

- 1.** Sea-level rise is expected to have many impacts on marine and coastal species. Sea turtle nesting beaches will come under threat, especially in low-lying islands.

- 2.** Sea level rise will also threaten inland ecosystems; for example, Kiribati could experience inundation of 18–80 percent in parts of North Tarawa (Buariki) by 2050.
- 3.** Most of Tuvalu is only 1m above the high water mark; as such projected sea level rises of up to 58cm by 2050 could lead to the destruction of many coastal and inland ecosystems.



4. Mangroves can move inland while maintaining a functioning coastal ecosystem so long as the inland route is not blocked by development.



Wewak Storm-Water
Drainage Project

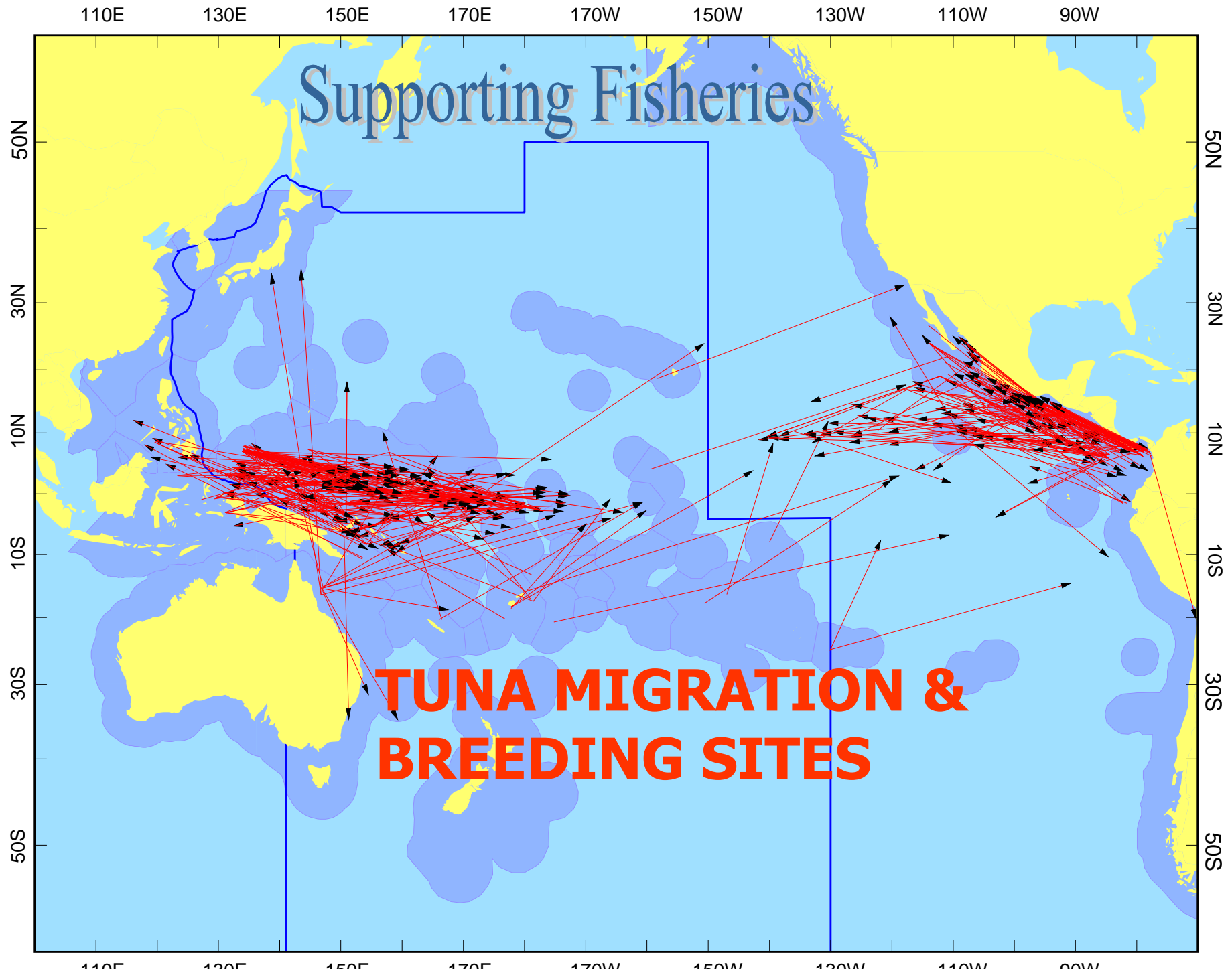
Seafront mangrove specie
Rhizophora apiculata
now grows further inland
where it never
grew before

2.2 Increasing water temperature

- Stresses on many coastal and reef ecosystems which are already highly vulnerable. For example, from 2000-2006 the size of coral reefs around Fiji's remote Lau Islands contracted by about 50 percent, in part because of **coral bleaching** events associated with climate change.



Causes:
Elevated Temperature
Freshwater Plumes
Increased UV Radiation
linkage to GHG, G Warming





**CORAL REEF PROTECTION &
SOCIAL CHALLENGES**



LE MIGRATING & RESETTLEMENT??



**ENTIRE ISLAND BIODIVERSITY LOST DUE
TO CYCLONES AND STORM SURGES IN 2
DAYS**

3.0 Suggested Way forward

- Science evidence is critical in addressing the Impacts of Climate Change and Variability and are REAL.
- Adopt Vulnerability and Adaptation Measures to protect the Island Biodiversity.
- Ensure government Policies are aligned to meet these new emerging issues.

A tropical island with a white sandy beach and a cluster of palm trees, viewed from the water. The sky is blue with some light clouds. The water in the foreground is a vibrant turquoise color with gentle ripples.

TENK YU TRU