Climate hazards: concepts and scenarios

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Outline

- Concepts of Risk, Vulnerability, Adaptation
- Climate variability and climate change
- Climate scenarios

Key concepts for any hazard

Vulnerability: the potential to be harmed

Adaptation: adjustments to reduce vulnerability

More on concepts

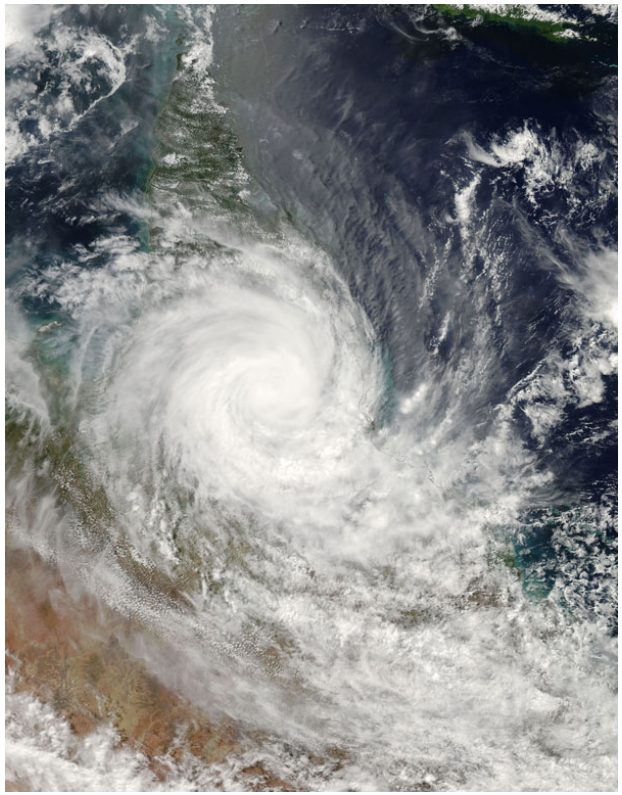
Risk = vulnerability – adaptation

Risk = (consequences of hazard)

X (probability of hazard)

Example : insuring a house against fire, flood or theft

Climate already has extremes, to which Pacific people have adapted



Adaptations to predictable climate hazards: examples

- **Appropriate Technologies ('climate proofing' infrastructure – get it right the first time!) - e.g. stilt houses on floodplain**
- **Traditional Knowledge (e.g. drought foods, rebuildable houses)**

Policy:

- **'mainstreaming', capacity building, disseminating good practice**

Annee Pacifique de Changement Climatique, 2009

Climate and Climate Change

- **Climate** is the (30 year) average of weather, including ranges (variability) and patterns
- **Climate change** is change over decadal time scales

Example:

- Day to day variability : raining today but not yesterday
- Seasonal variability: more rain in January than July
- Year to year variability: floods in 2009 but not 2008
- Long-term change: last 10 years consistently drier than the previous 30 years.

Climate and Climate Change

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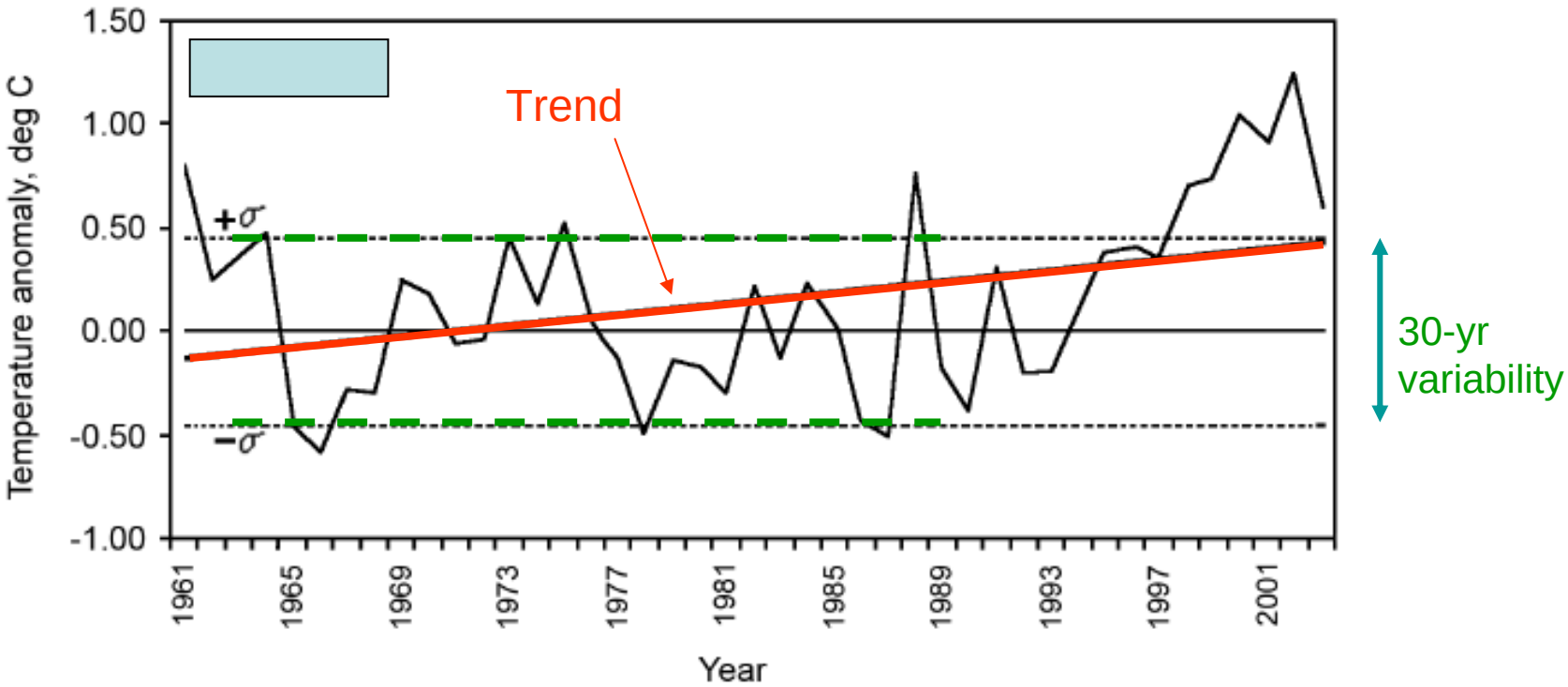
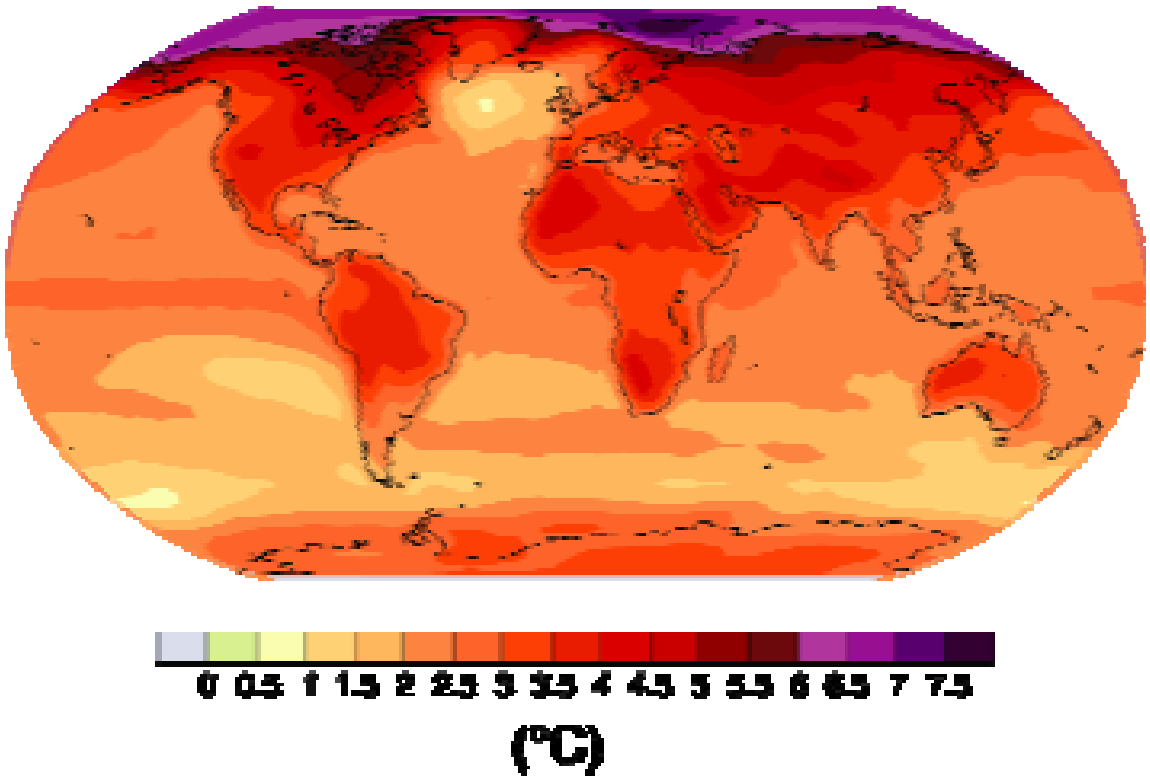
Minimum temperature at Suva 1961-2003



Climate change
= global warming

(IPCC- A1B, av 2090-99 rel to av 1980-99)

Geographical pattern of surface warming



What Does this mean for the Pacific?

Sea Level Rise

(adds to effects of storms and high tides)

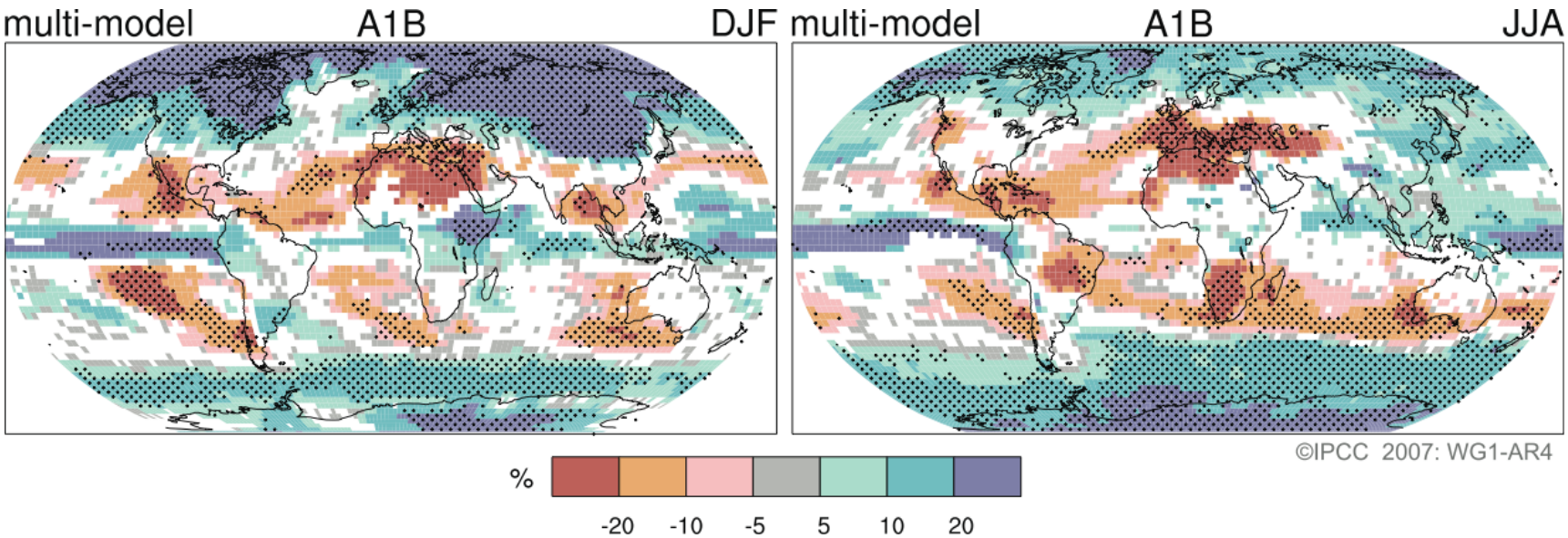
Kiribati

Water Sources

• As sea level rises, salty water enters the freshwater water lens of an atoll and ruins drinking water and crops

Changes in Rainfall

- Difficult to predict in detail
- Dry season in Fiji may get drier
- Summer rainfall may be more intense



Projected changes in global precipitation patterns for the period 2090-2099 relative to 1980-1999

Stronger cyclones

Perhaps no more frequent but probably more intense (and possibly more in Eastern Pacific)

TC Heta January 2004

Coral Bleaching

The increasing water temperature is too much for coral

As the coral becomes bleached, fish habitat is lost – affects food and tourism

Increased Temperatures

- Increased temperatures can have adverse health effects
    - Heat stress
    - Increased risk of disease

Implications for adaptation

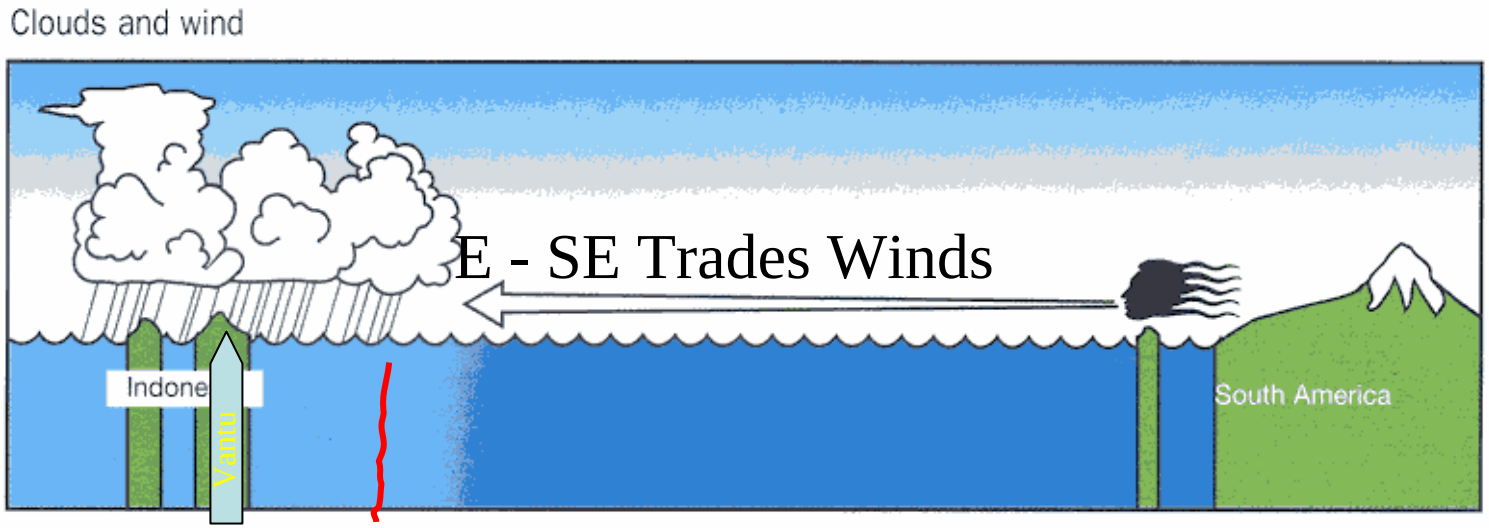
- Dealing with climate change is mainly dealing with **extreme** climate events like those we already encounter.
- But the extremes may be more severe and/or more frequent than now.
- Pacific people **adapted** in the past to such events and can do much to do so now.
- It's like the step-up from club football to international football: **same game but it's tougher.**

Exception: **Long term** sea level rise may require migration to higher ground or even to other countries

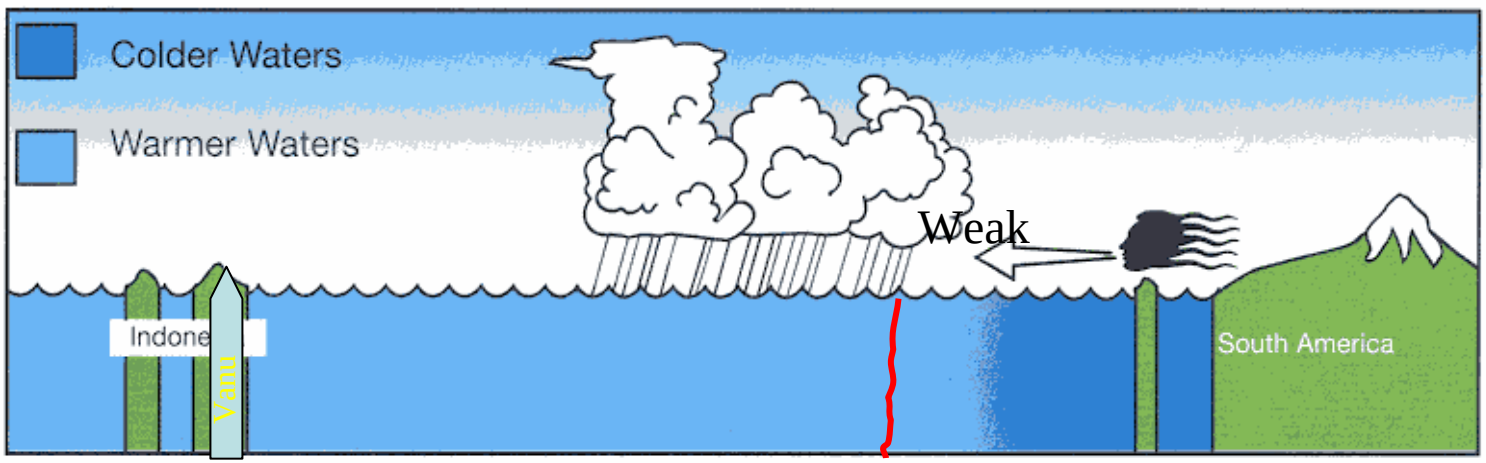
How bad will CC be? Science and scenarios

El Niño Southern Oscillation (ENSO)

'normal'



El Nino



Chain of physical effects

Annual emissions of CO2 and other GHGs exceed natural sinks

--→ increase in total GHG in atmosphere

--→ increase in temperature

--→ increase in sea level

(GHG = greenhouse gas = 'heat-trapping' gas)

(Climate sensitivity = av. temp rise for doubling of CO2 ; best estimate 3^{o}C but could be 2^{o} or 6^{o})

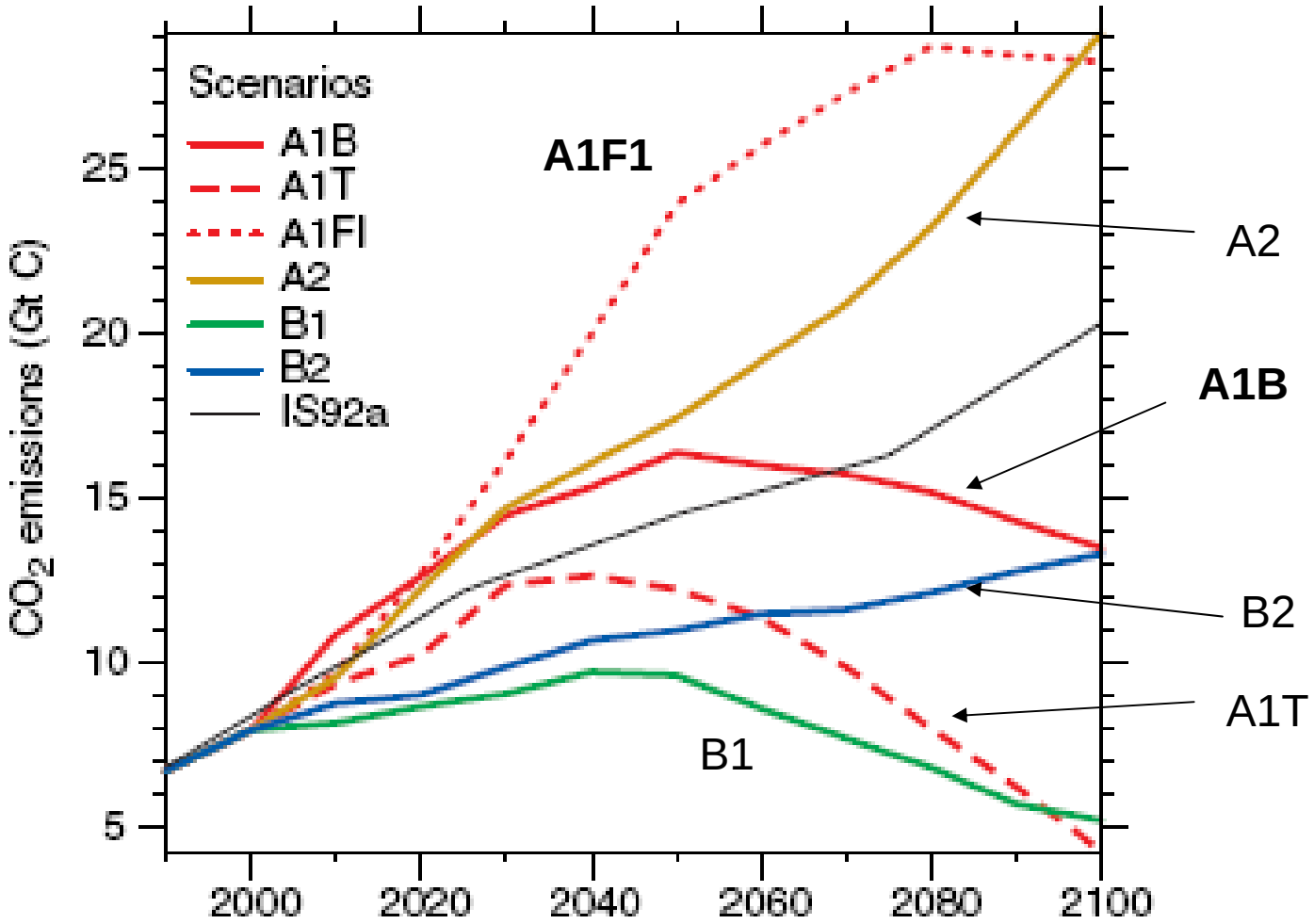
Future GHG Emission Rates

A ***scenario*** is a coherent, internally consistent and plausible description of a possible future state of the world.

- GHG Emissions –
Three Major Factors

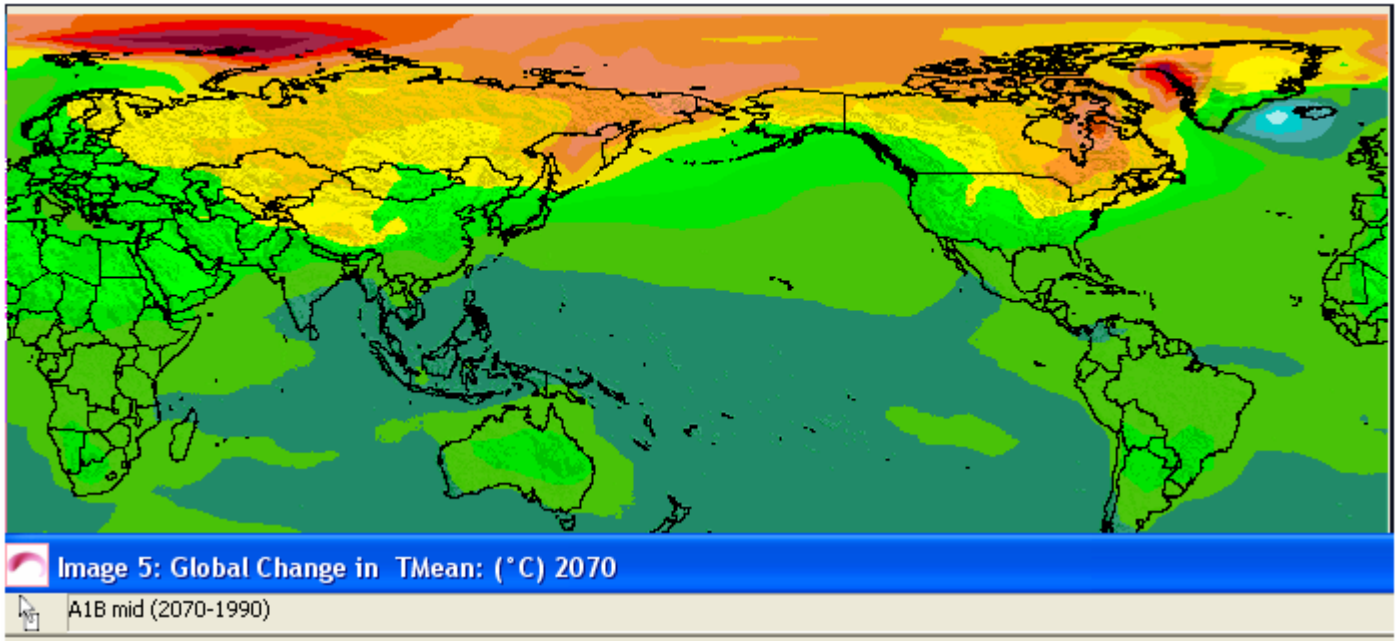
- Demographic change
- Socio-economic development
- Technological change

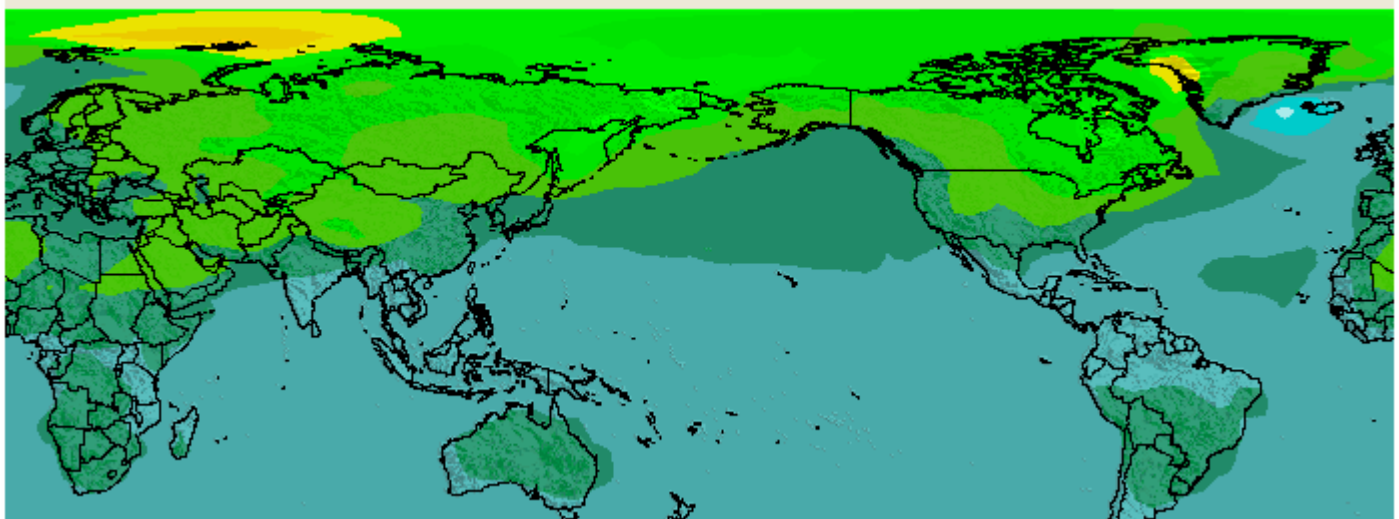
SRES scenarios (emissions)

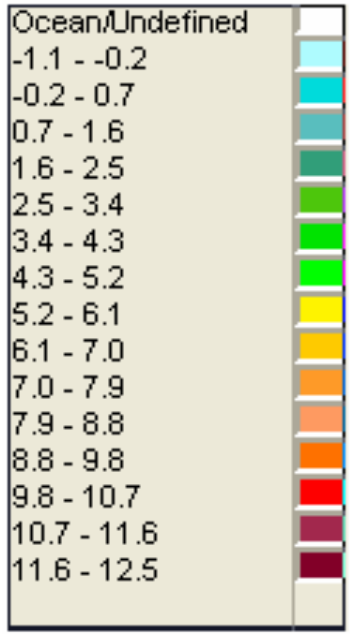


Two scenarios for temperature increase to 2070

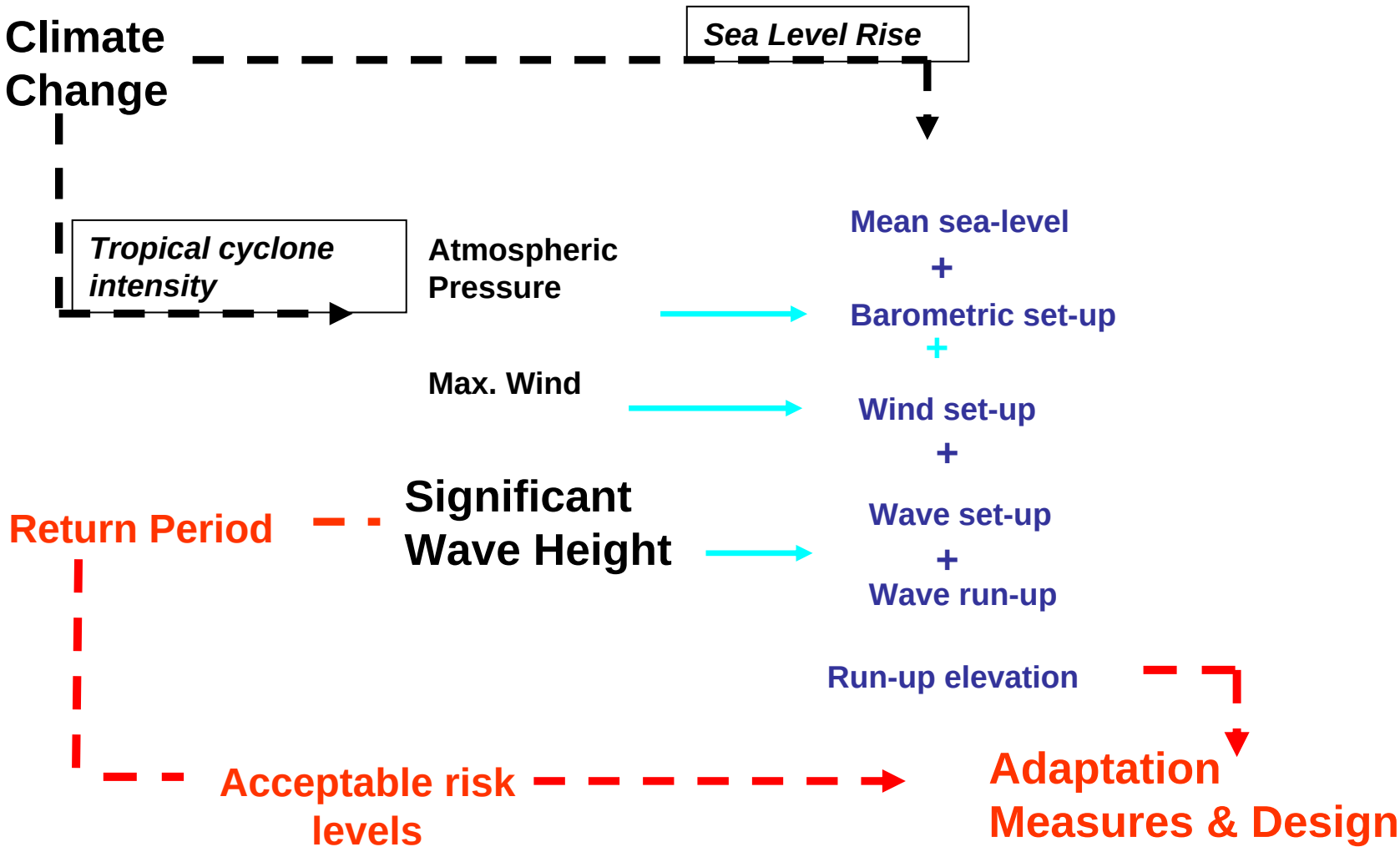
(top A1FI high; below A1B mid) – SimCLIM modelling



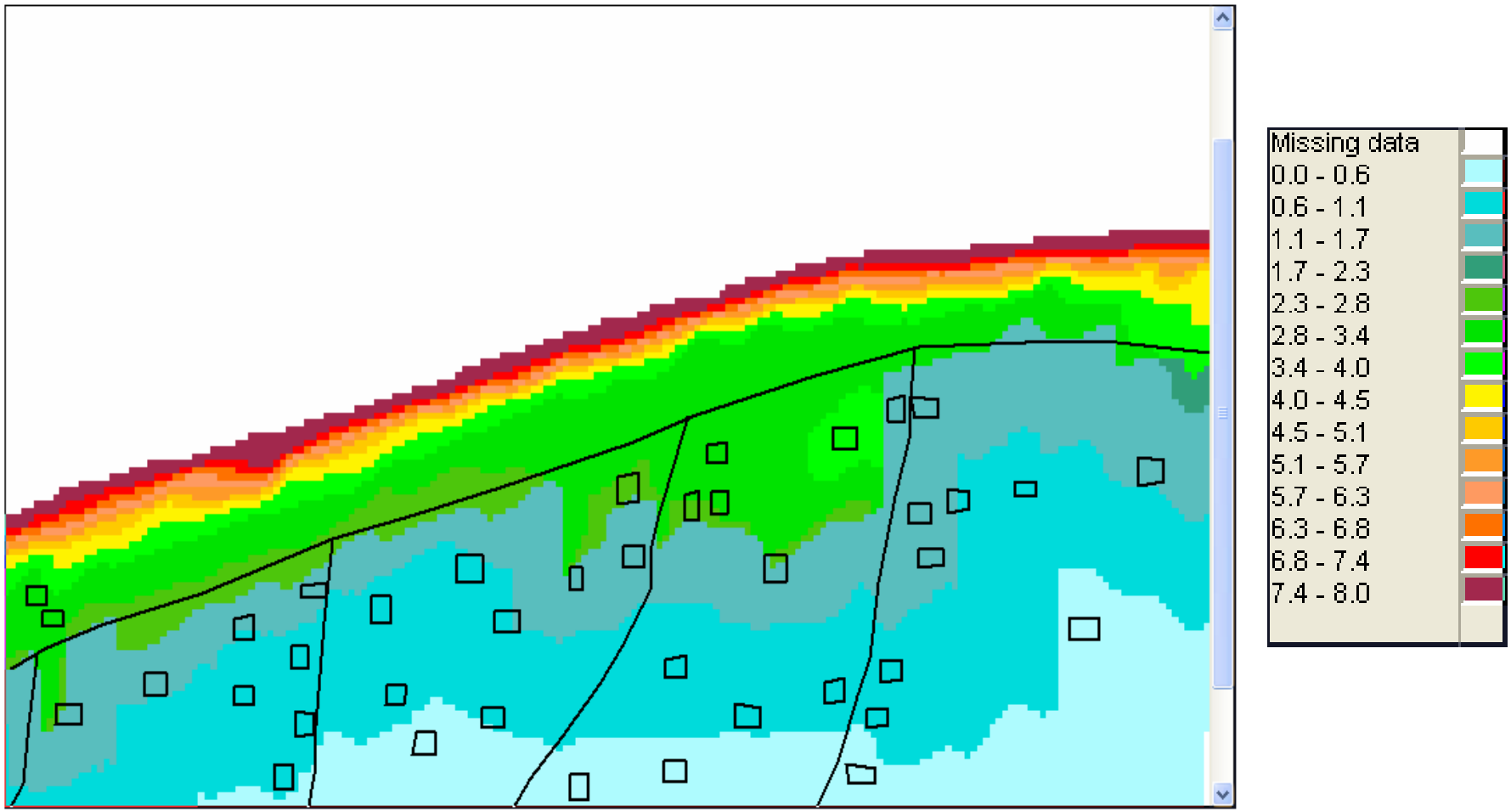




coastal flooding impact model



Inundation model (depth of flooding) –Niart village 2050 (A1B mid)

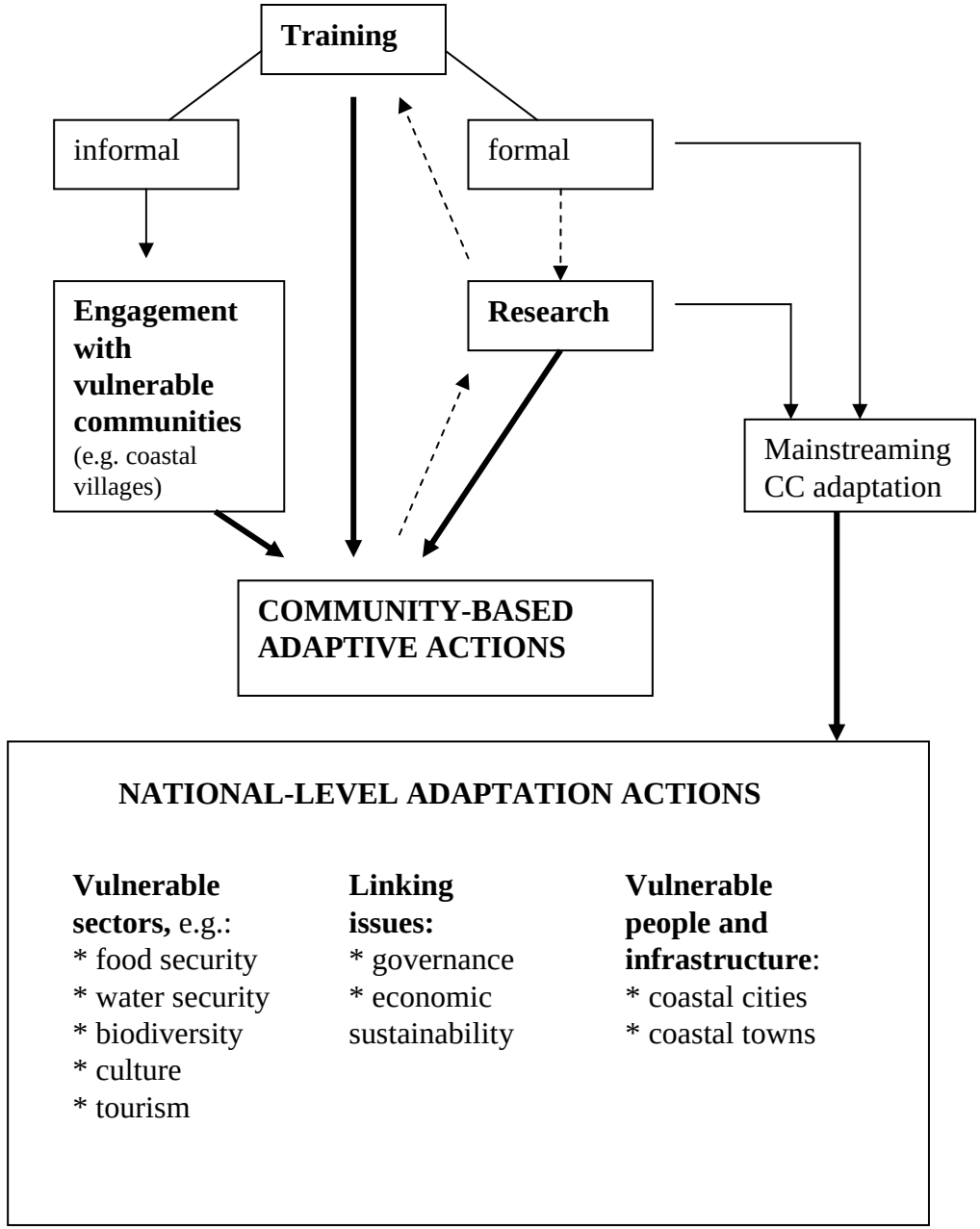


USP teaching on Climate Change

- Course on climate change impacts and adaptation (V&A) is now available online
- Aimed at officials, NGO workers, community leaders, etc
- Short courses on request
- Full postgraduate diploma in climate change to be offered from 2010 (with scholarships from AusAID)
- Will include V&A plus courses on climate science, EIA, renewable energy, biodiversity, development studies, etc.

Students modelling CC impacts

- EU ‘Global Climate Change Alliance’
- (Pacific component, 8m Euro)
- From mid-2011
- USP to lead



Questions?

Annual mean temperature (1990)