



# How our climate has changed – Introduction

Compiled by Brian Sadler, IOCI

**Climate Note 1/05 (August)** in a series outlining observed climate changes or variations over recent decades in south-west Western Australia.

## Introduction

Climate is a key determinant of south-west WA's environmental character, settlement, lifestyle, economy and infrastructure.

A multitude of: common-place lifestyle decisions; year-to-year decisions of business and resource management operations; and strategic decisions about the future, are based on what we have come to expect of regional climate behaviour.

We are aware that global climate has fluctuated widely over the Earth's history and in the shorter history of human evolution (Figure 1). However, from around the time of settled agriculture, some 10,000 years ago, human societies have enjoyed relative comfort and climatic stability in an inter-glacial period.

In recent decades however, significant changes to global climate (Figure 2) have been observed, with links to global warming. These changes continue to develop in directions consistent with human induced changes in composition of the atmosphere. At more than 375 parts per million, CO<sub>2</sub> concentrations are now well above levels believed to have occurred at any time in the past 400,000 years.

Modern societies have developed on the assumption that climate characteristics are stable within the life of practical decisions. These past assumptions about climate are no longer adequate. They are not easy to replace, but there is no choice.

In our south-west region some aspects of climate change have been cause for serious concern, uncertainty, and a need for adaptive response.

There will always be elements of uncertainty in assigning cause and

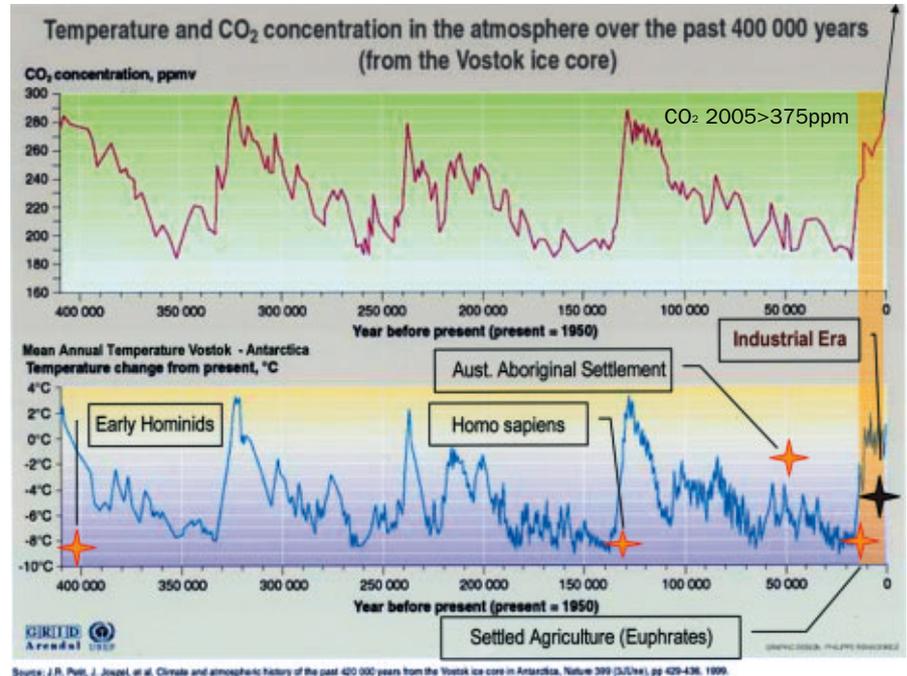


Figure 1: Climate has fluctuated widely over past millennia (pre-1950) and in the history of the human species.

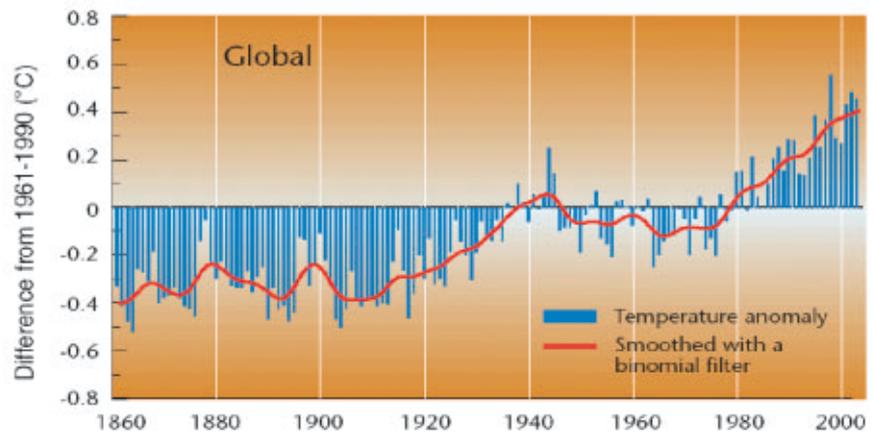


Figure 2: Recent observed changes in Global Mean Temperature (WMO).

in projecting future climate change. There is also the possibility that some components of observed change are influenced by natural multi-decadal variability. However, after seven years research of south-west climate, the Indian Ocean Climate Initiative Panel believes the enhanced greenhouse effect is a significant influence in observed regional climate change and notes

that the trends are broadly consistent with expectations for this effect.

This series of notes aims to help community understanding of the observed facts of established changes in south-west climate.

Climate change is a here and now issue.

## Changes described in these notes

Of the changes described in this series of notes the most fundamental have been the rise in atmospheric and marine temperatures, globally and regionally, over the last half century.

Associated (at least in part) with the warming, global and regional changes to circulation of the Earth's atmosphere have been observed since the 1970s.

For south-west WA, IOCI research has linked these latter changes to the most serious regional change experienced so far – a sudden step decrease in rainfall which occurred in the mid-1970s.

Sea level has risen in association with warming, melting of land-based ice and changes in terrestrial water storage. Changes to ocean circulation are coupled with regional climate change.

Deriving from these fundamental changes there have been changes to other aspects of regional hydro-climate including: river flow; groundwater; salinity; and estuarine conditions.

The Climate Notes published at August 2005 are listed on the right.

## The role of IOCI

The Indian Ocean Climate Initiative (IOCI) was formed by the WA Government to help establish and maintain regional understanding of climate variability and change in south-western Australia.

The initiative aims to provide decision-making with the up-to-date science needed for climate adaptation.

IOCI undertakes this role through: strategic research on regional climate; and interpretation of national and international climate science into terms helpful for decision-making.

IOCI is user-driven by a panel of partners who link it to stakeholders in a range of sectors. IOCI also looks for wider partnerships and collaboration in building the knowledge base, and in communication of that knowledge.

## Notes in the series on climate changes in south-west WA

Numbers, titles, authors

**Note 1** How our climate has changed - Introduction  
(Brian Sadler, IOCI)

**Note 2** How our temperatures have changed  
(John Cramb, BoM Perth)

**Note 3** How our sea temperature has changed  
(Ming Feng, Gary Meyers, John Church, CSIRO)

**Note 4** How our winter atmospheric circulation has changed  
(Ian Smith, CSIRO; Pandora Hope, BMRC)

**Note 5** How our rainfall has changed - The south-west  
(Pandora Hope, BMRC; Ian Foster, DoAg.)

**Note 6** How our extreme rainfalls have changed  
(John Ruprecht, DoE; Yun Li and Eddy Campbell, CSIRO; Pandora Hope, BMRC)

**Note 7** How our river flows have changed  
(Mark Pearcey, DoE; Colin Terry, Water Corp)

**Note 8** How our groundwater has changed  
(Philip Commander, DoE; Ed Hauck, DoE)

**Note 9** How our regional sea level has changed  
(Charitha Pattiaratchi and Matthew Eliot, CWR/UWA)

**Note 10** Variability in the Leeuwin Current  
(Charitha Pattiaratchi, CWR/UWA)

**Note 11** How our salinity has changed  
(Don McFarlane, CSIRO; John Ruprecht, DoE)

See also IOCI Stage 2 Bulletin 6: IOCI reports key findings of recent research into south-western climate

**Copies of the above notes on south-west climate change are available for downloading from [www.ioci.org.au/publications](http://www.ioci.org.au/publications). Further notes in this series are under consideration and, as produced, will be published on the IOCI website.**

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## Acknowledgements

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