



NODE 2 OVERVIEW

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CSIRO





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WAMSI Node 2

Climate processes, predictability & impacts in a warming Indian Ocean

Wealth from Oceans Flagship

Ming Feng

Presented by Chaojiao Sun

9 February, 2010



National Research
FLAGSHIPS
Wealth from Oceans



Objectives of WAMSI Node 2

Science: To understand and predict large-scale variation and change of ocean climate, and its impact on the continental shelf

Management: To inform decision making in WA agencies that have to address vulnerability to climate variation and change

Node Leader – Ming Feng (CSIRO)

Three Nested Projects

*2.1 Dynamics and predictability of the **Indo-Pacific Ocean** as a global condition on marine climate impacts in WA*

Project leader: Harry Hendon (BOM)

*2.2 Dynamics and Impacts of the **Leeuwin Current** on the marine environment of WA*

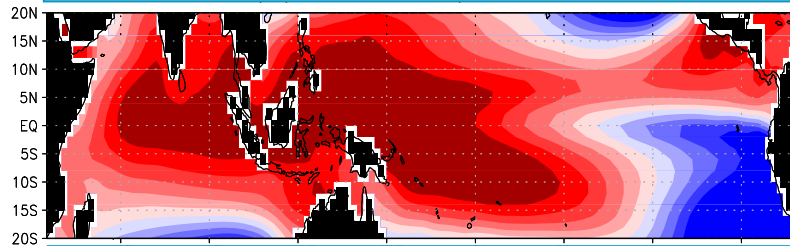
Project leader: Ming Feng (CSIRO)

*2.3 Oceanic conditions at **Ningaloo Reef** – analysis of downscaling ocean climate into the Ningaloo Reef Tract*

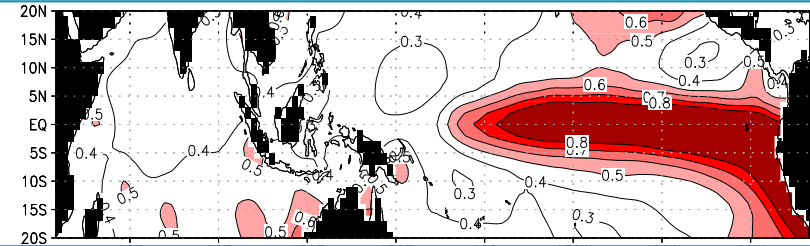
Project leader: Richard Brinkman (AIMS)

Progress in Project 2.1: improving prediction of the WA Marine Environment

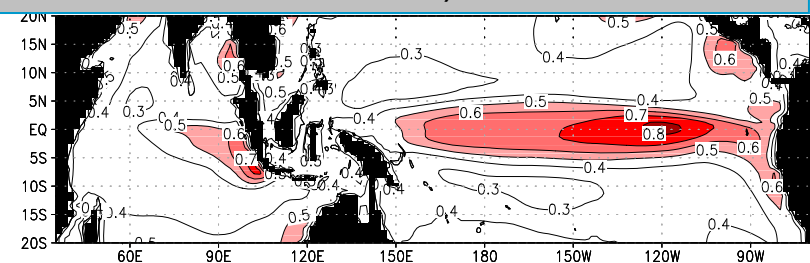
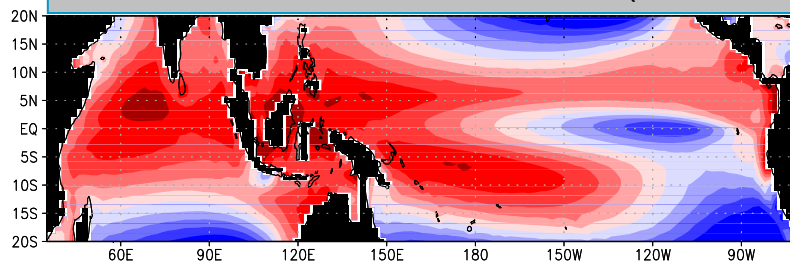
Observed SST



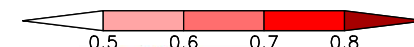
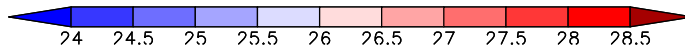
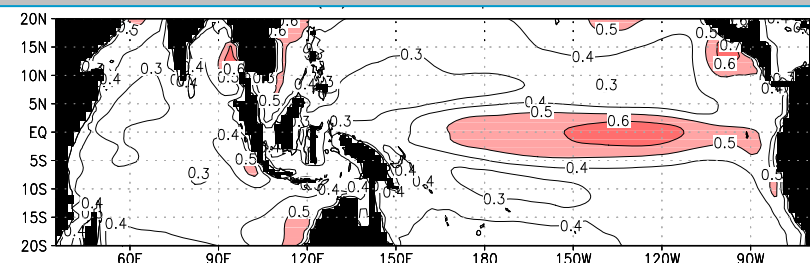
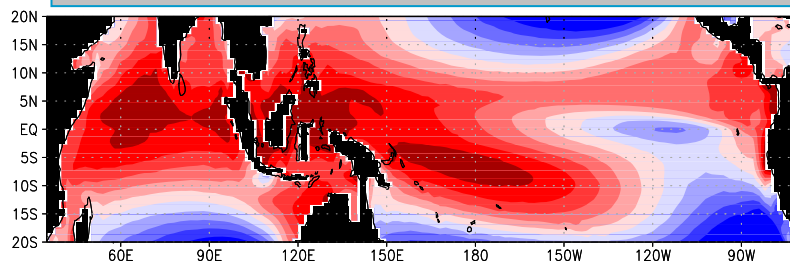
Observed SST standard deviation



Model SST (wind stress without surface currents)



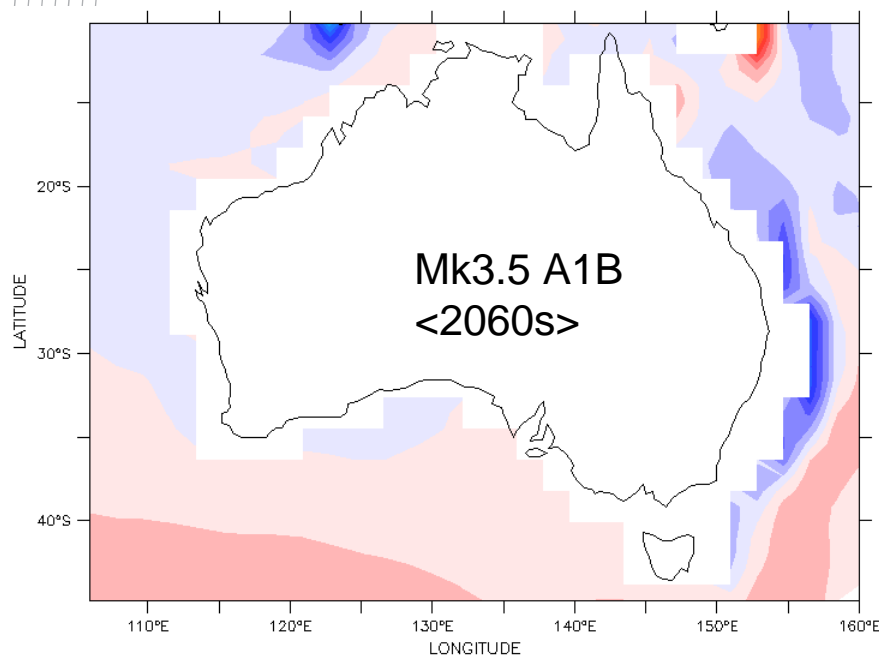
Model SST (wind stress with surface currents)



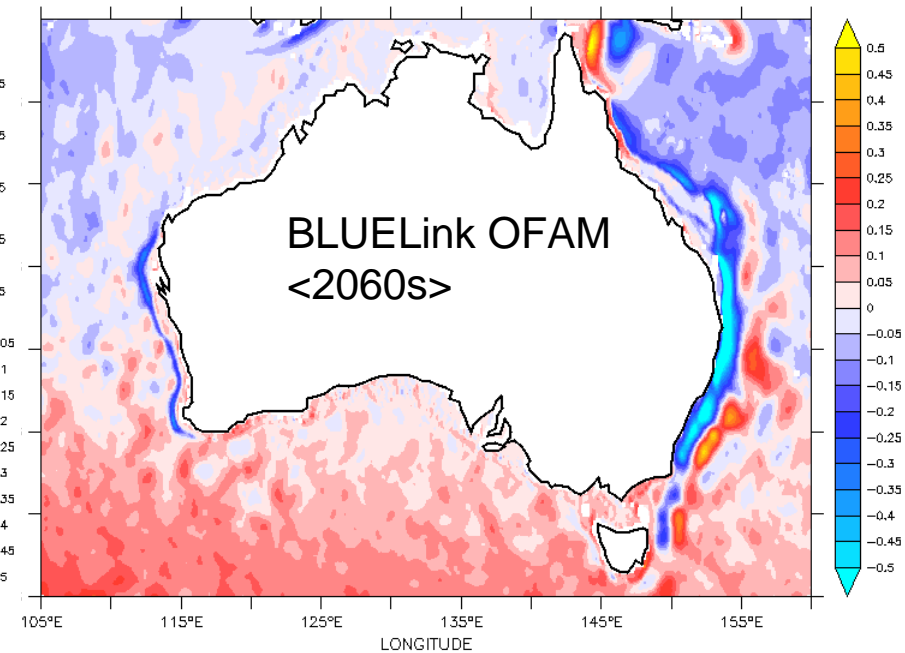
(Zhao et al. 2010, *Clim. Dyn.*, *in press*)

Progress in Project 2.2: the Leeuwin Current in climate change scenarios

- Available information: IPCC climate model projections (no observations)
- To resolve ocean boundary currents on the shelf: Need high resolution models

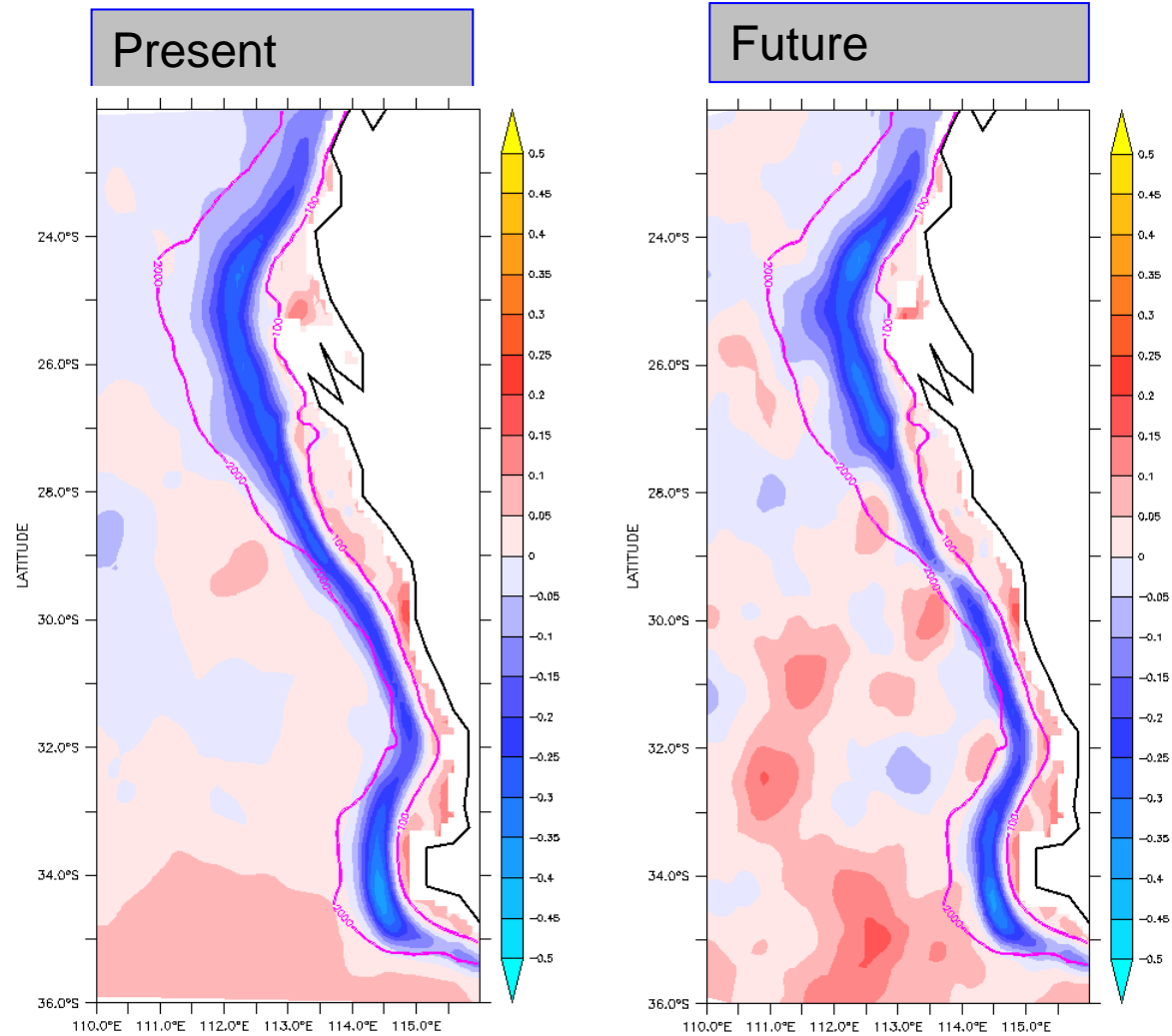


Ocean surface V from CSIRO Mk3.5 A1B (time mean in 2060s)

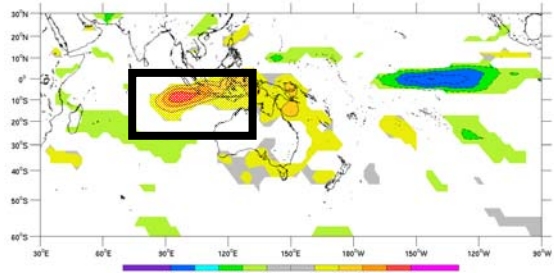


Ocean surface V from the OFAM (2060s time mean)

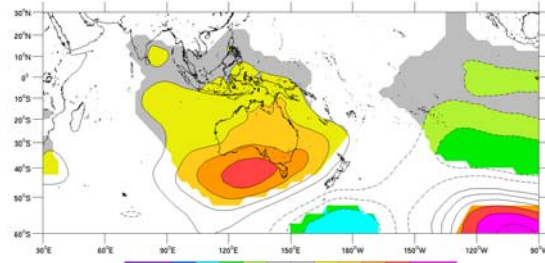
The Leeuwin Current in the present and future: a weakening in the future?



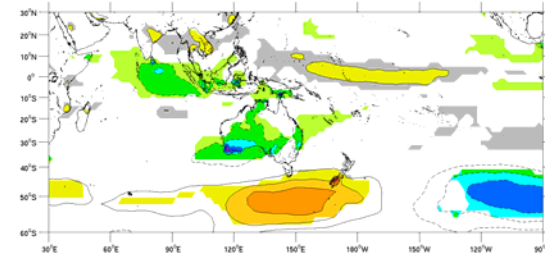
Progress in Project 2.2: Atmospheric pathways of influence in the Indian Ocean and W.A. environment



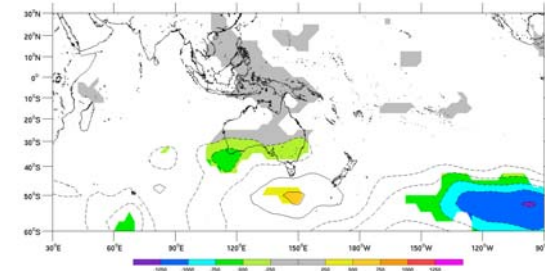
Positive IOD



Positive sea level pressure

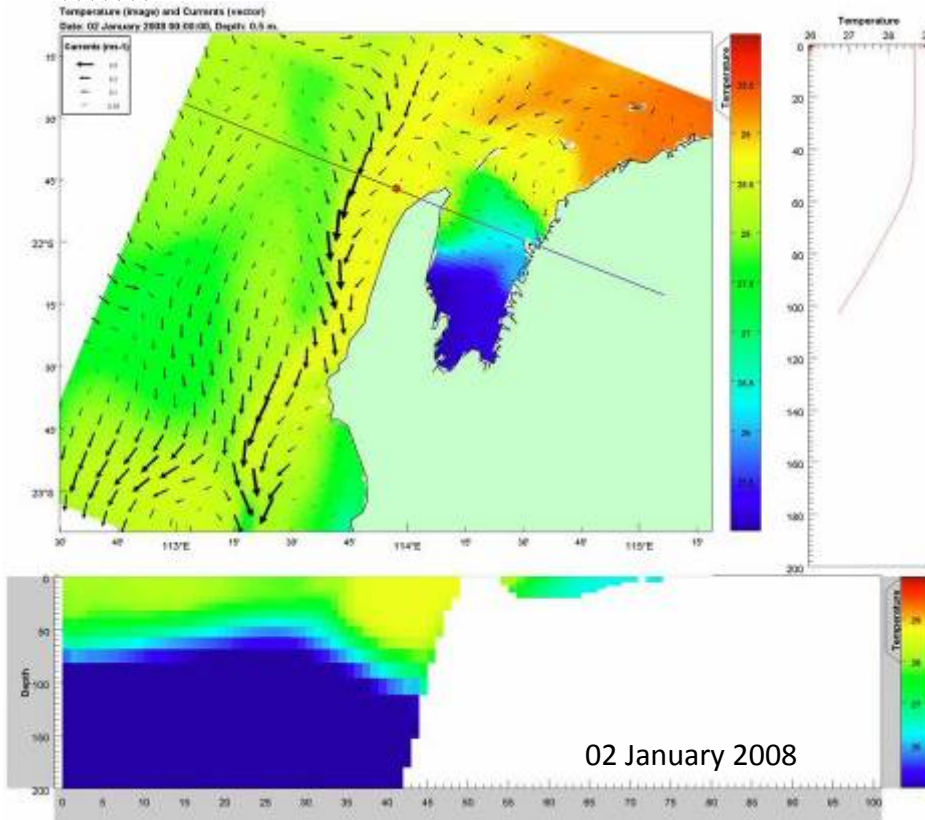


Easterly wind over SW

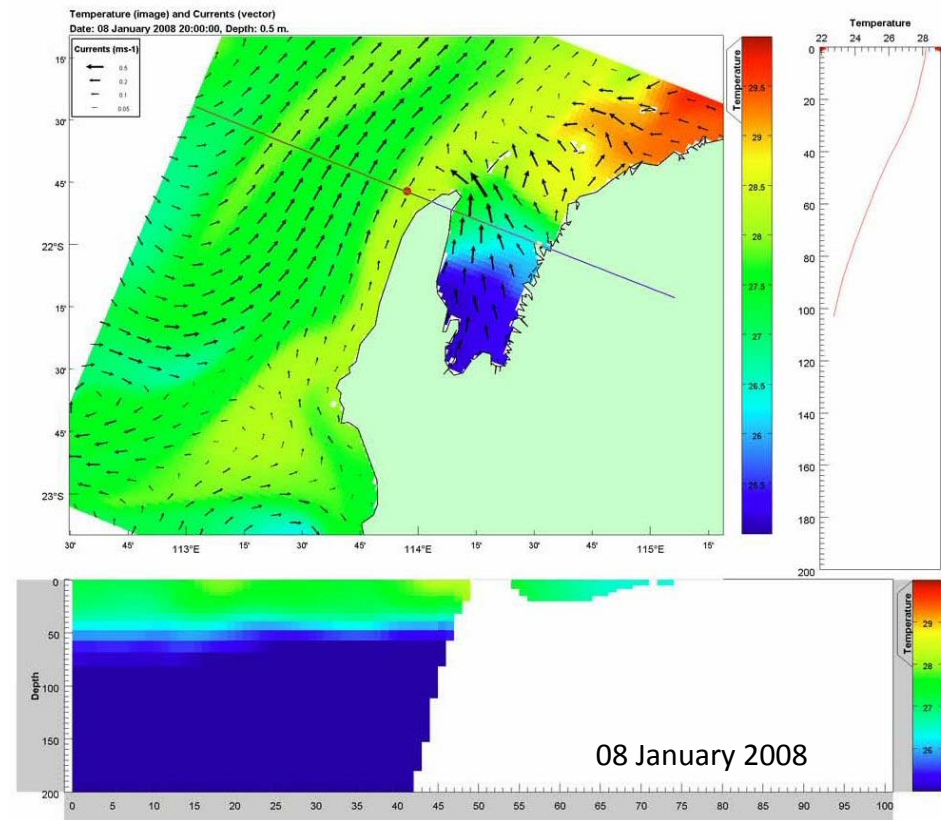


Decreased storminess

Progress in Project 2.3: a hydrodynamic model of the Ningaloo Reef Tract



Strong southward flowing Leeuwin current deepens thermocline adjacent to reef.



Reversal of coastal current due to offshore eddy field relaxes thermocline by ~50m adjacent to reef.

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Thank you

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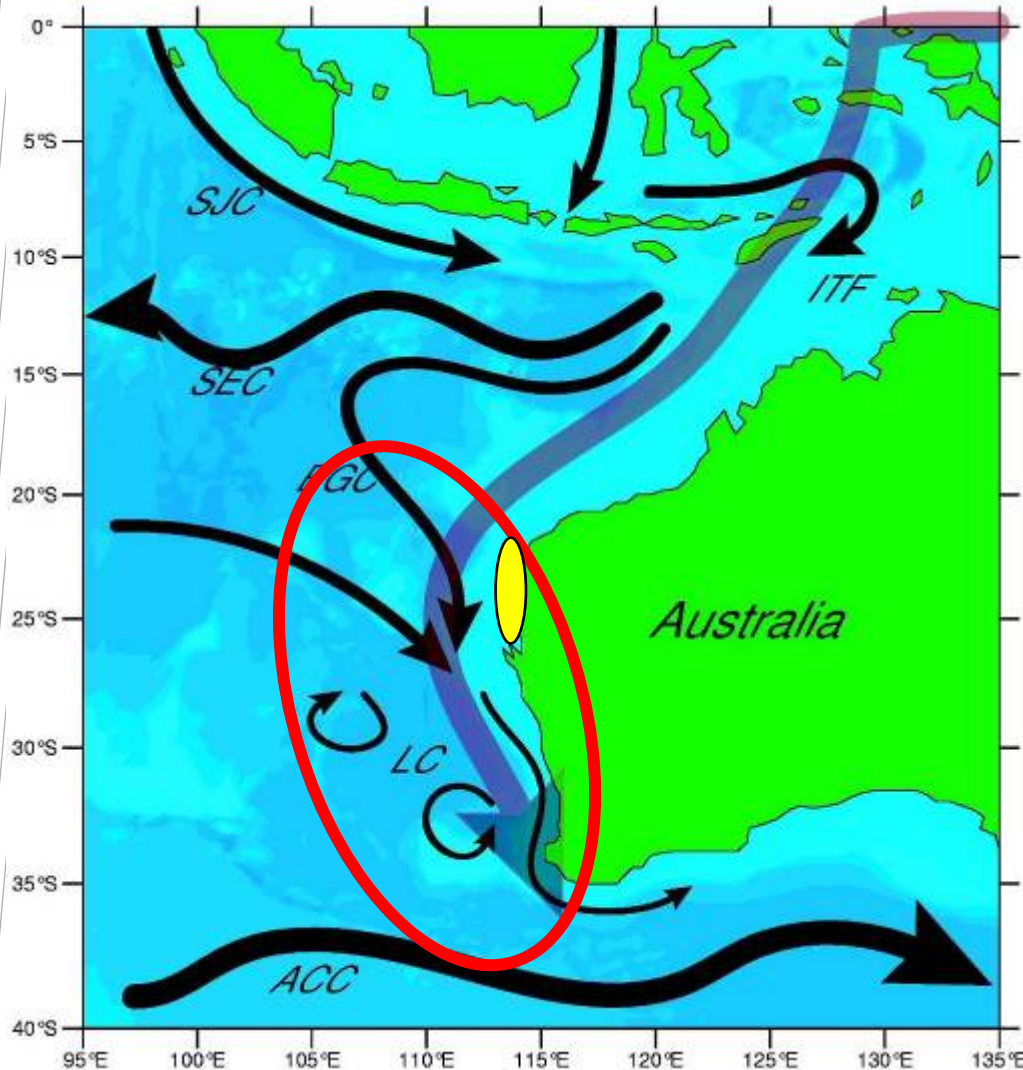
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Overall Goals of Node 2 and Collaborations



- Understand dynamics of variability & change
 - Basin-circulation (2.1)
 - Leeuwin current (2.2)
 - Ningaloo Reef (2.3)
- Dynamical downscaling
 - Nested models
 - 1000's to 10's to 1km(2.2 and 2.3)
- Assess impact of climate change on marine environment
(Cross-Node: Node 1, 3, 4)