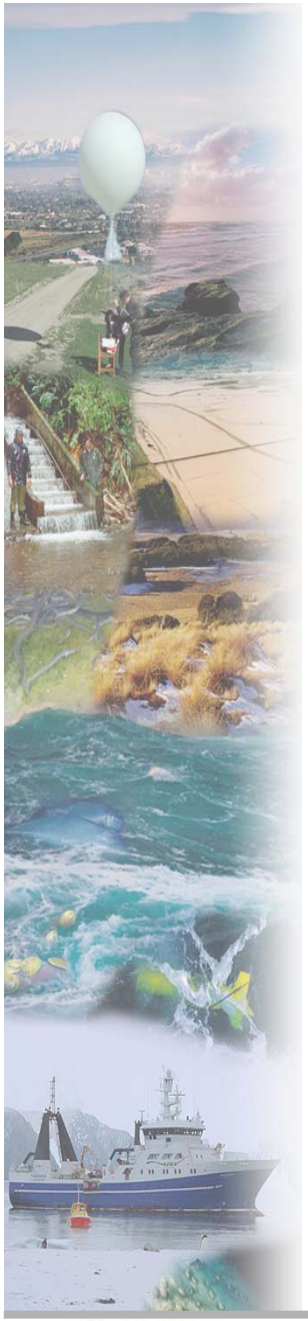
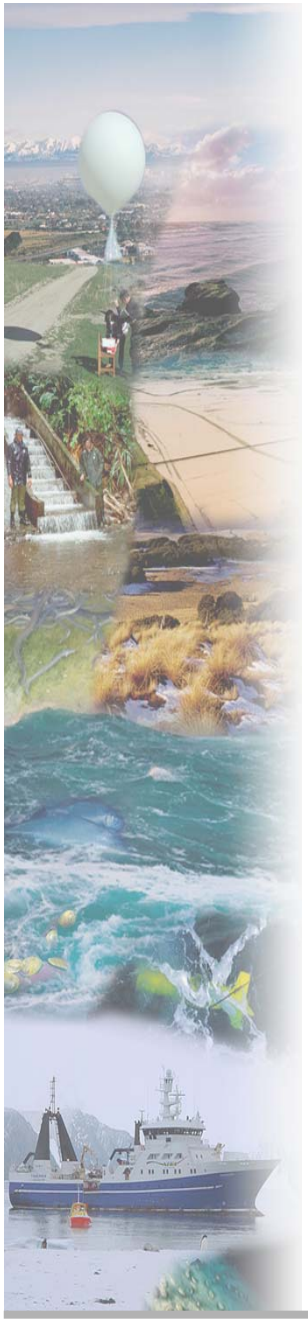


Climate prediction and applications in New Zealand – an update

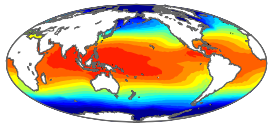
James Renwick
and NCC staff
NIWA

www.niwa.co.nz/ncc/



Outline

- Seasonal forecasts: current status
  - SPCZ
- Predictability and new statistical models
  - Zheng & Frederiksen
- Possibilities for collaboration
- Summary



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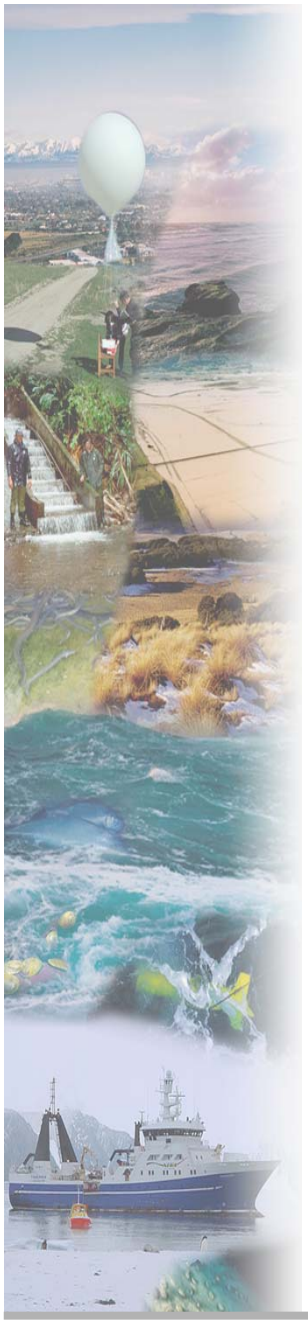
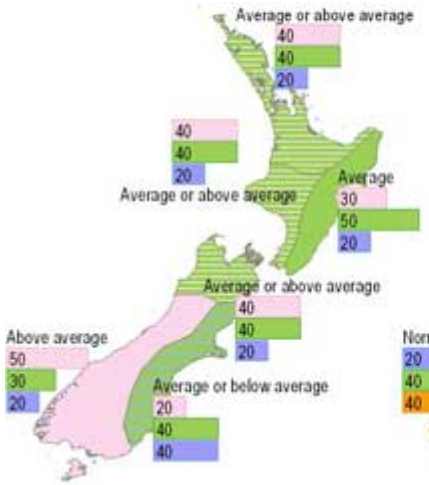


Seasonal forecasts: NZ

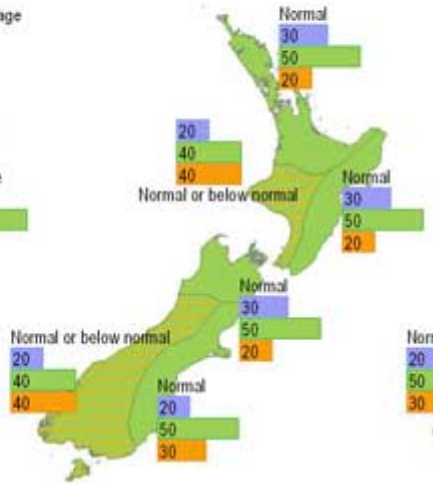
Outlook for August to October 2008

Taihoro Nukurangi

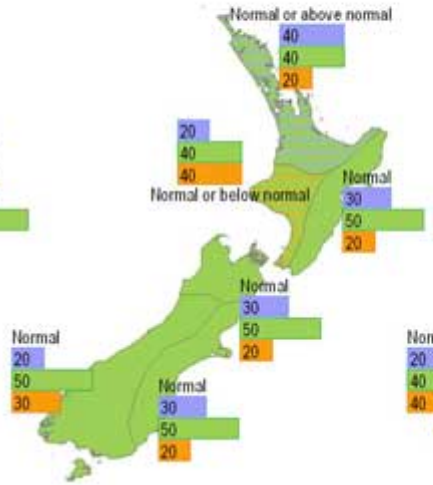
Mean air temperature



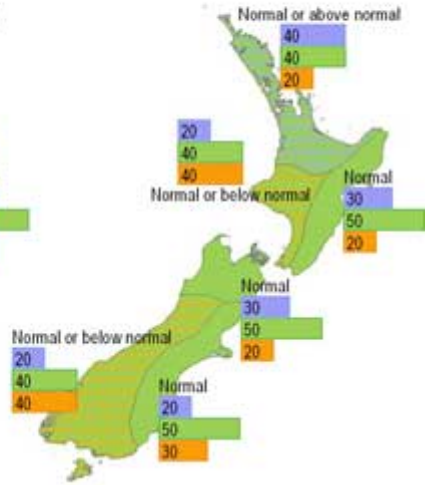
Rainfall



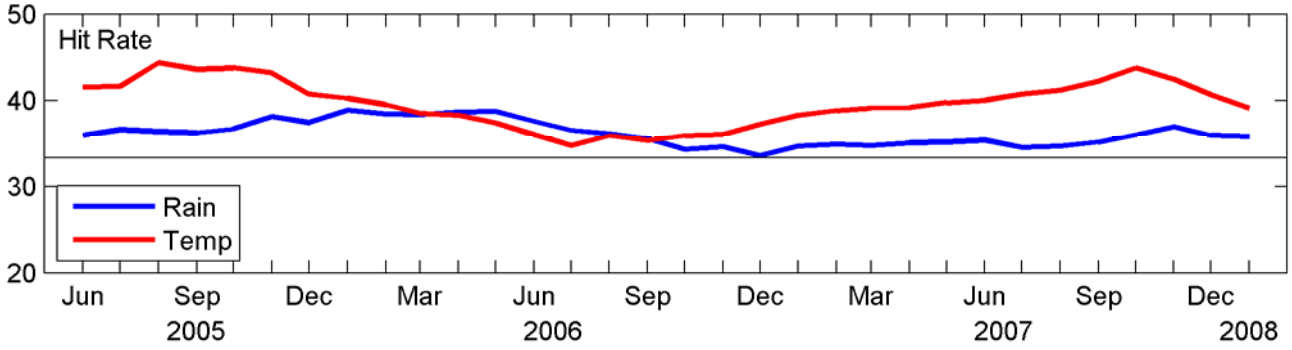
Available soil moisture

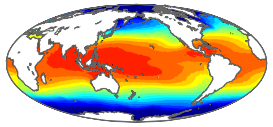


River flows



NZ Consensus seasonal, 11 month window





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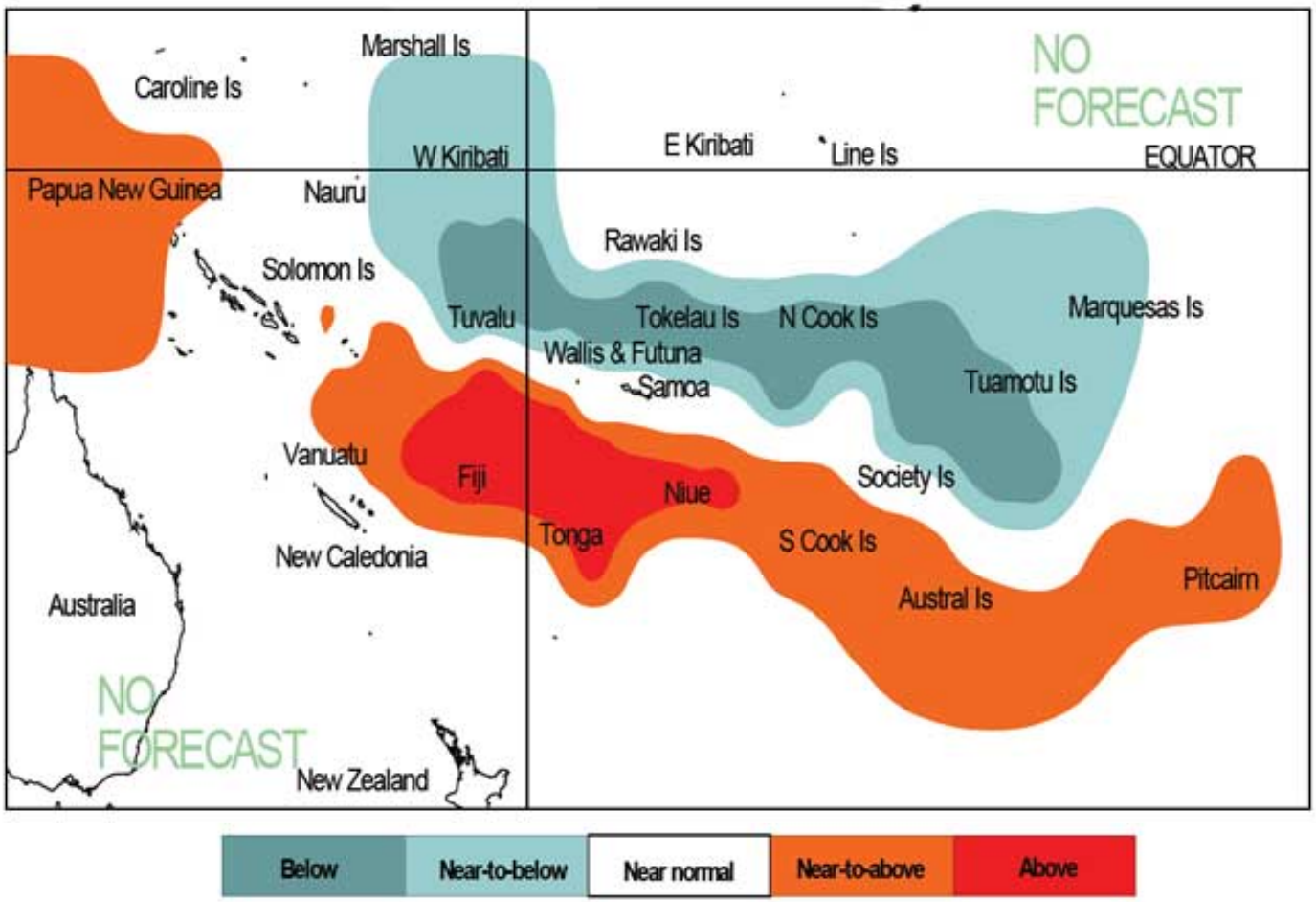
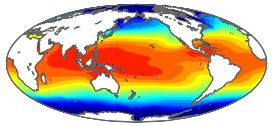
Seasonal forecasts: SW Pacific





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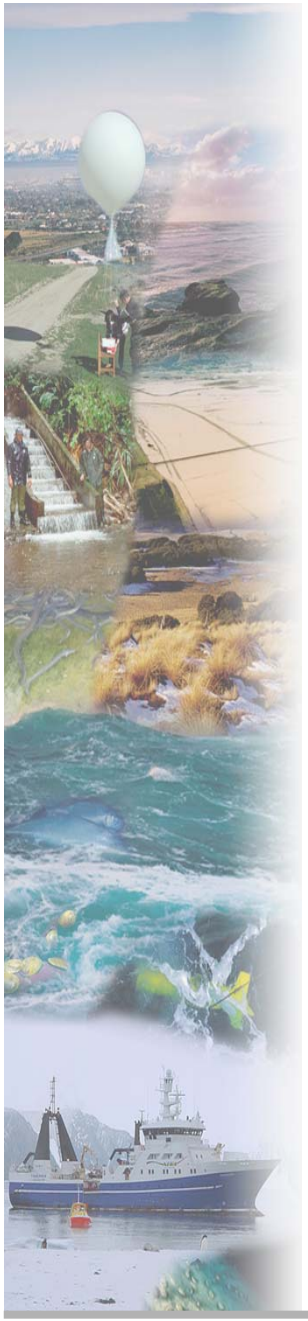
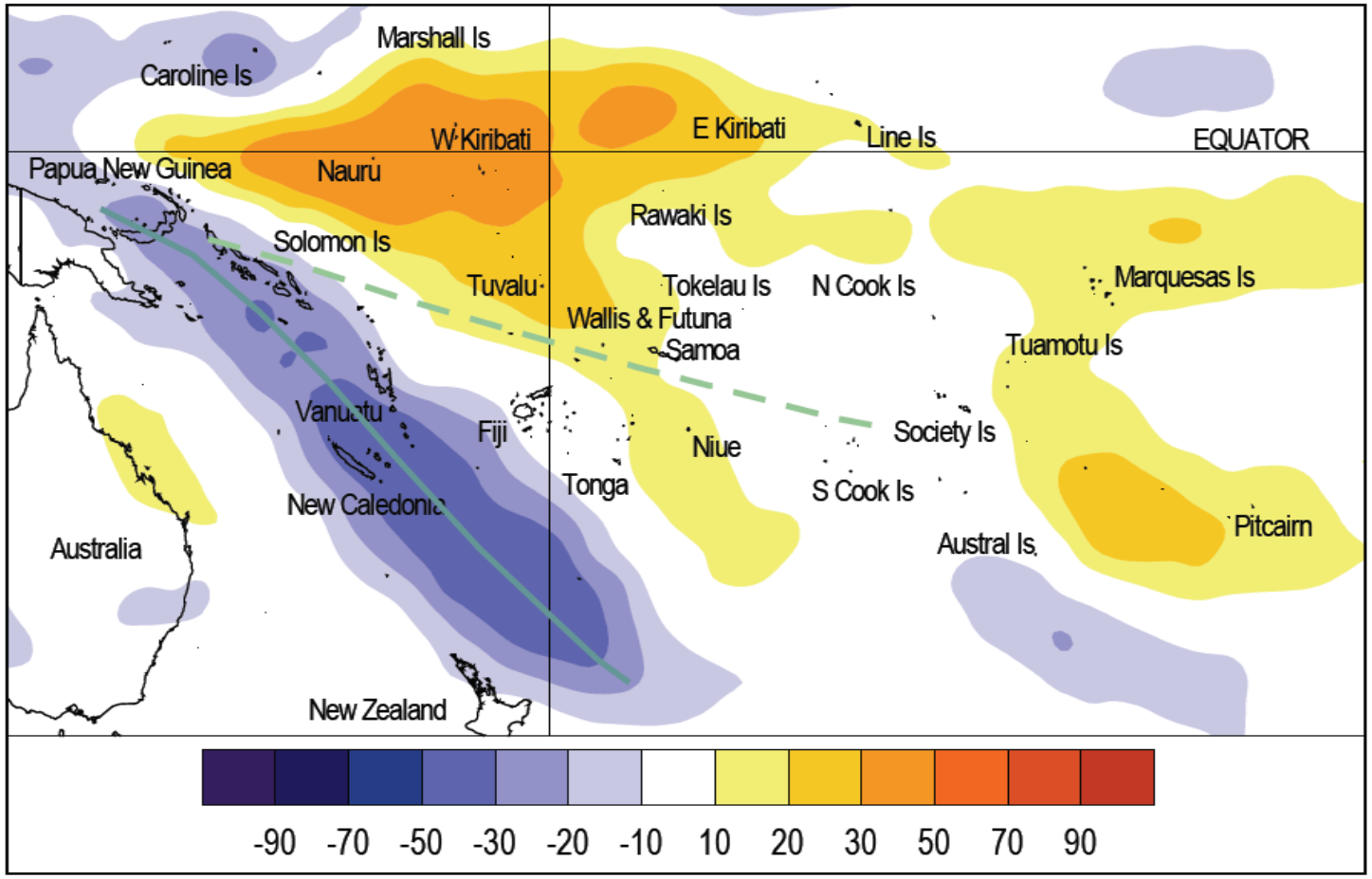
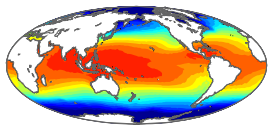


SPCZ: April 2008





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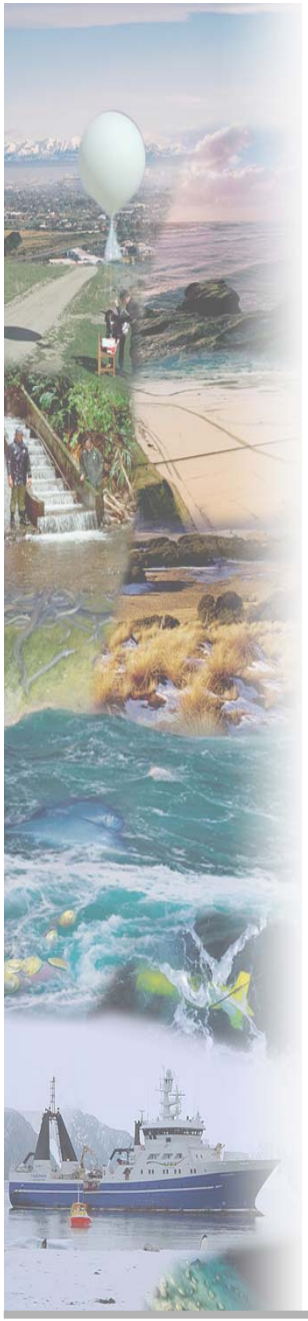
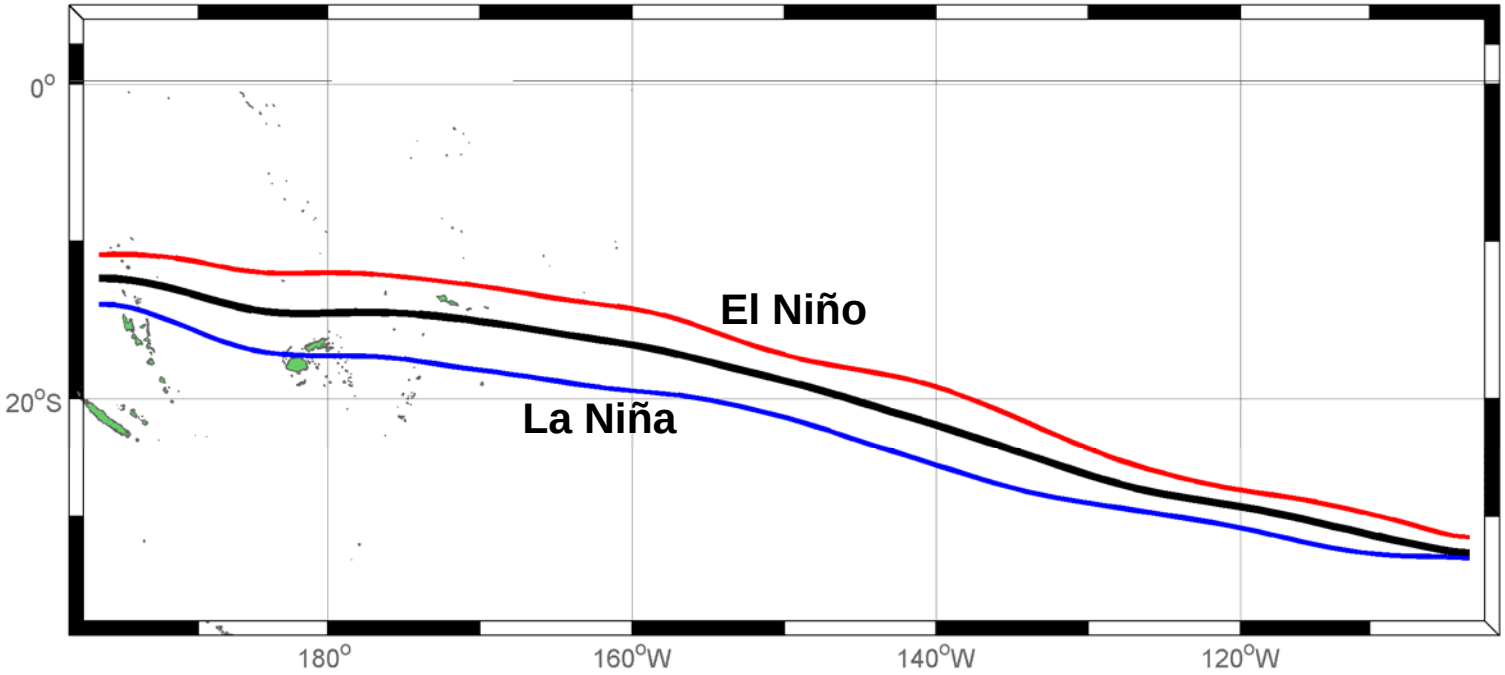
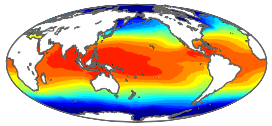


SPCZ and ENSO



- Much variability accounted for by ENSO
  - El Niño: northeast
  - La Niña: southwest



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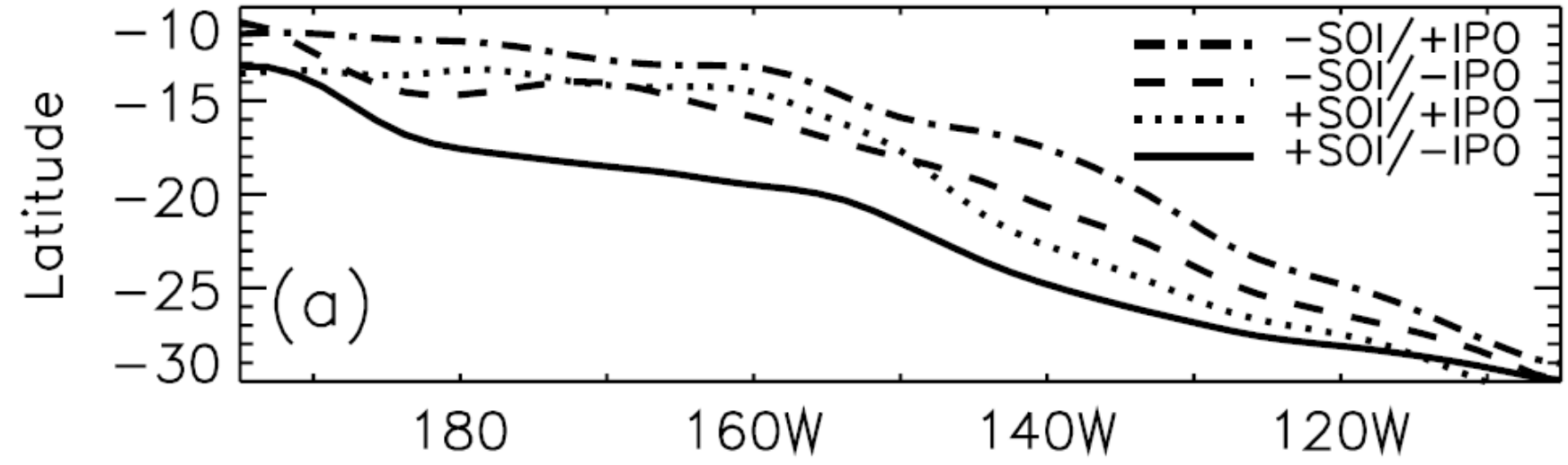
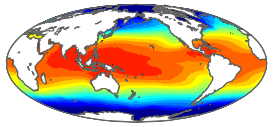
IPO & SPCZ



- Most SW when La Niña & negative IPO
- Most NE when El Niño & positive IPO



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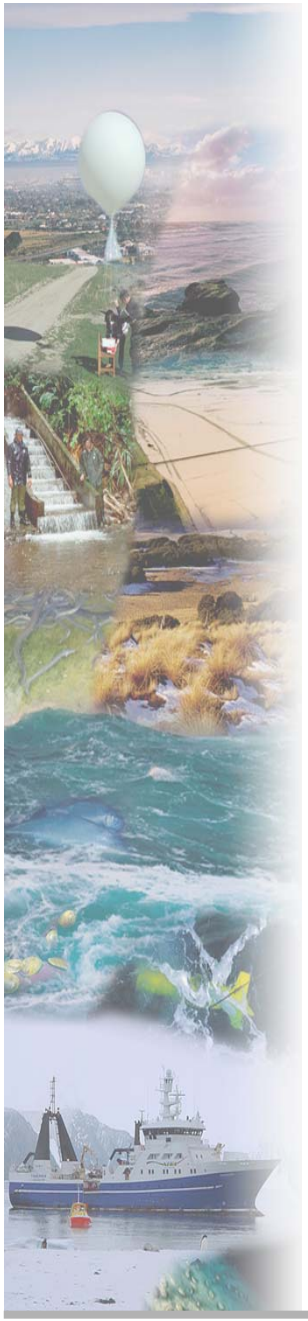
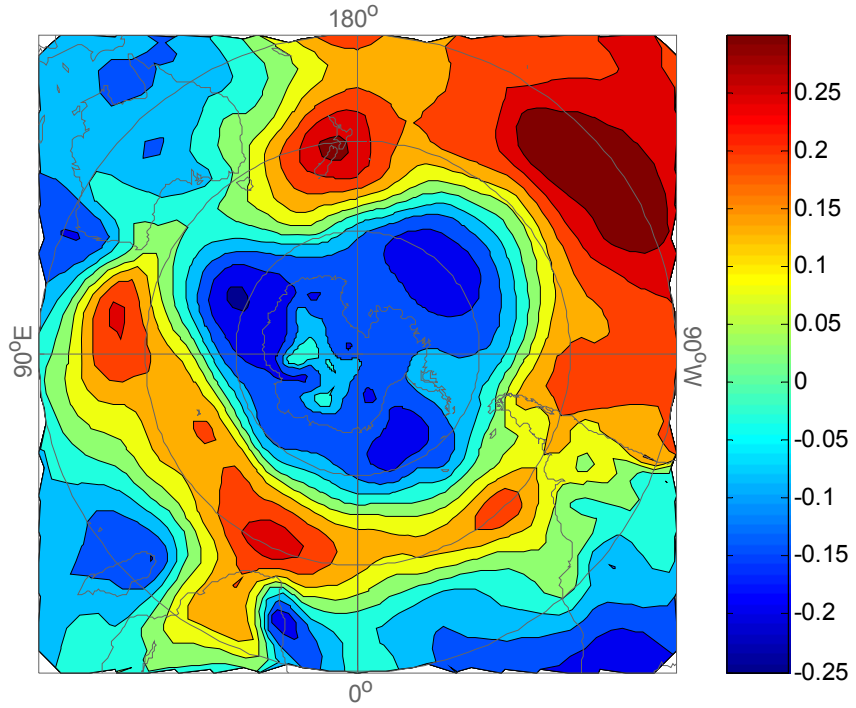
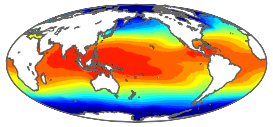


SPCZ – Southern Annular Mode



- SPI correlation map with 500hPa height
  - After linear removal of ENSO effect (SOI regressed out)
- SPCZ linked to the SAM & southern oceans?



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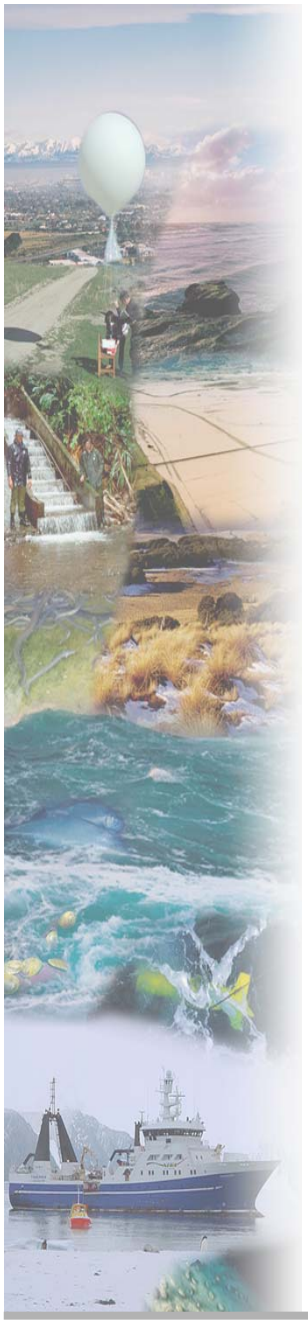
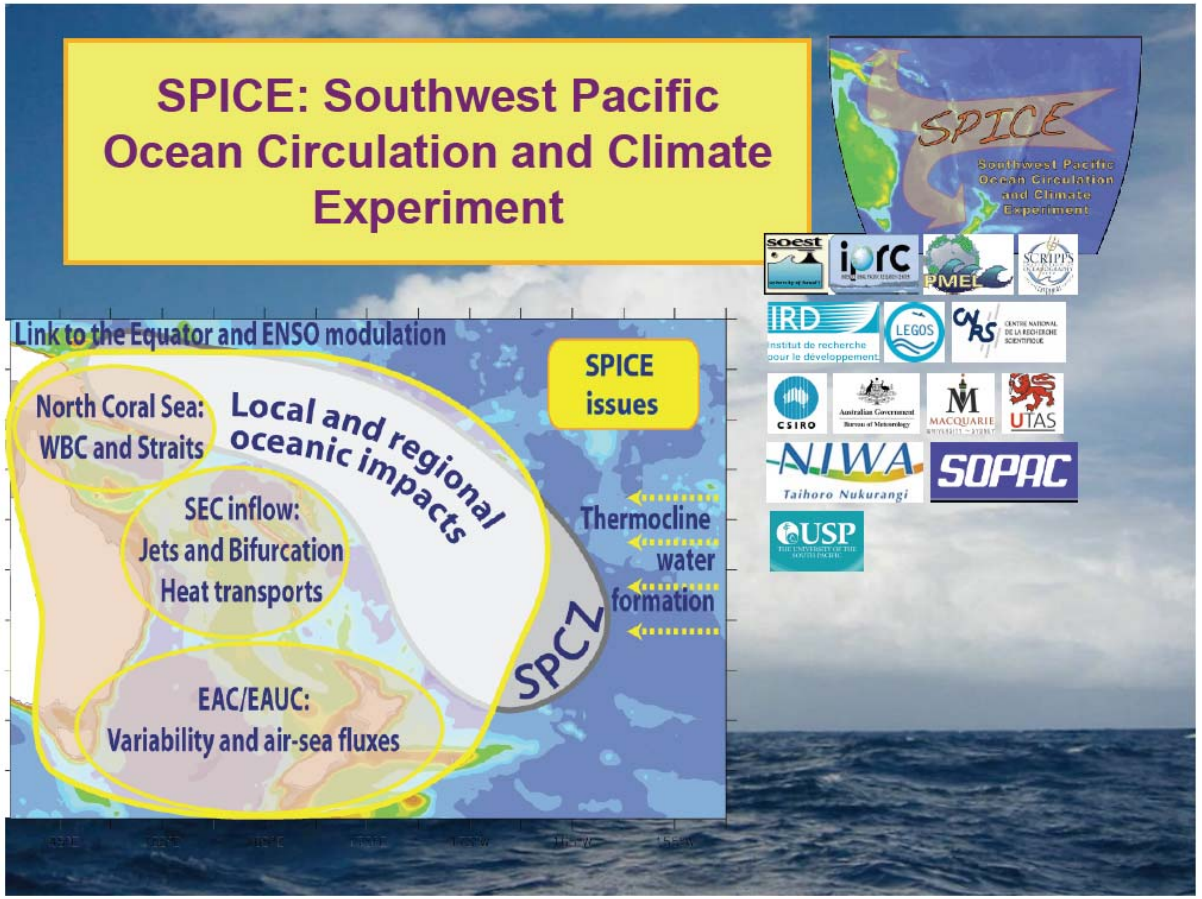
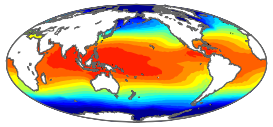




- Better understand teleconnections
- Proxy data – historical variability



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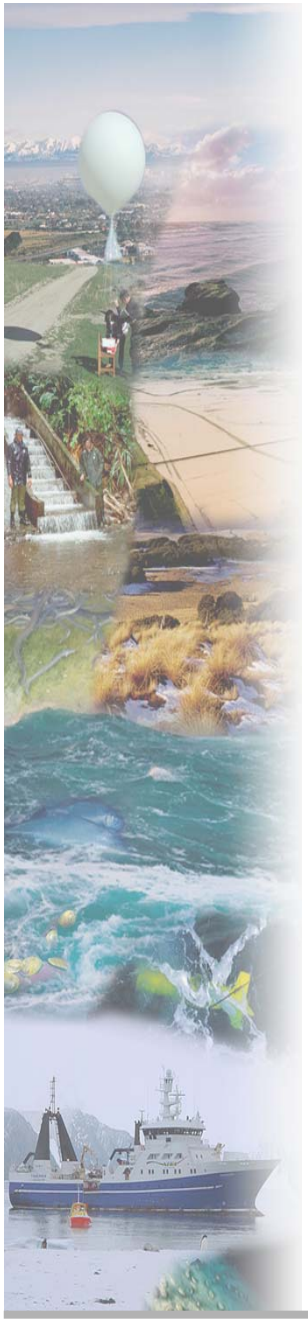
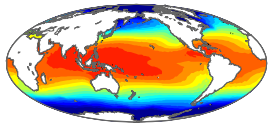


Predictability

- Slow modes: Zheng & Frederiksen
  - potentially predictable EOFs
- Statistical prediction of slow mode amplitudes
  - Regression against SST
  - Compare with GCM
  - Optimal combination of both



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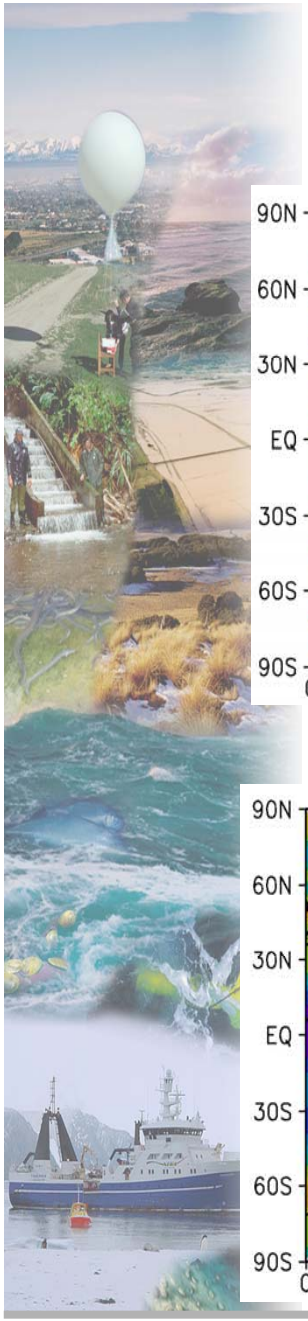
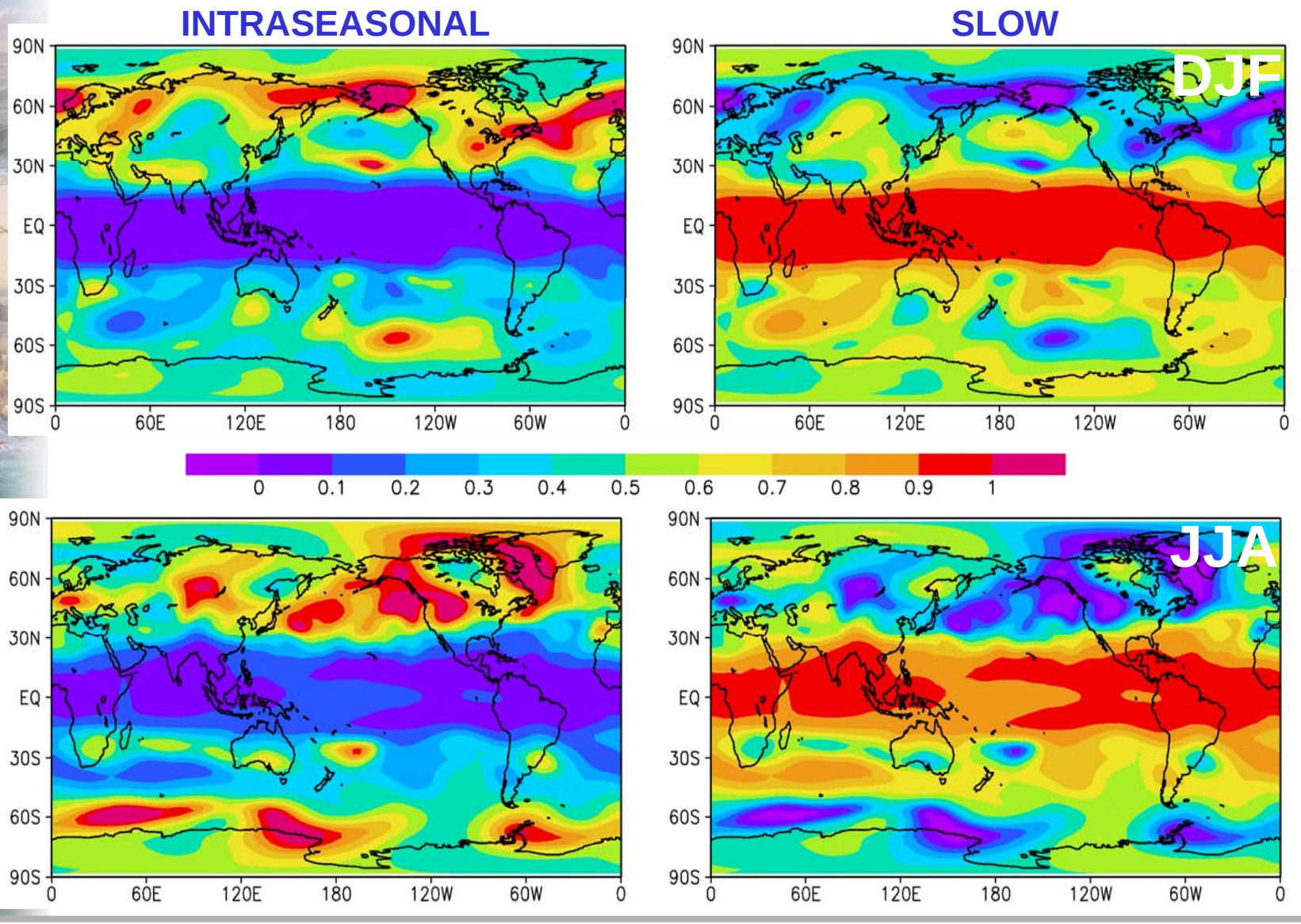
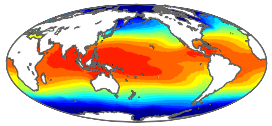
NCEP 200hPa ht: Fraction of Variance







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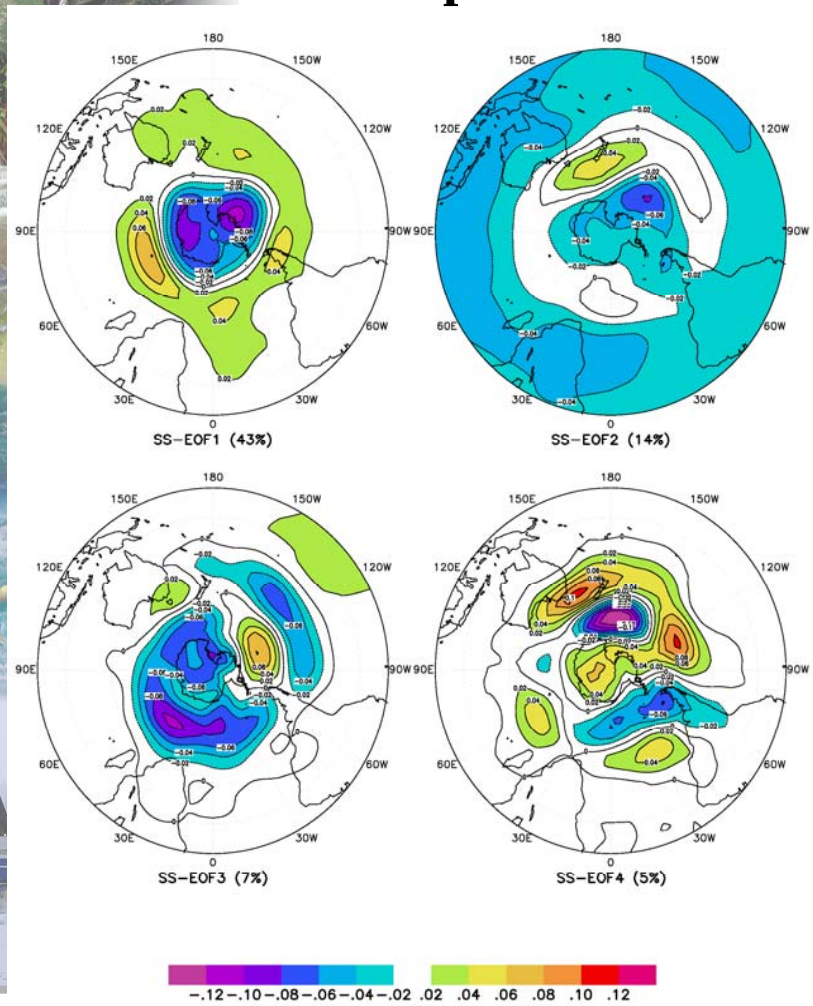
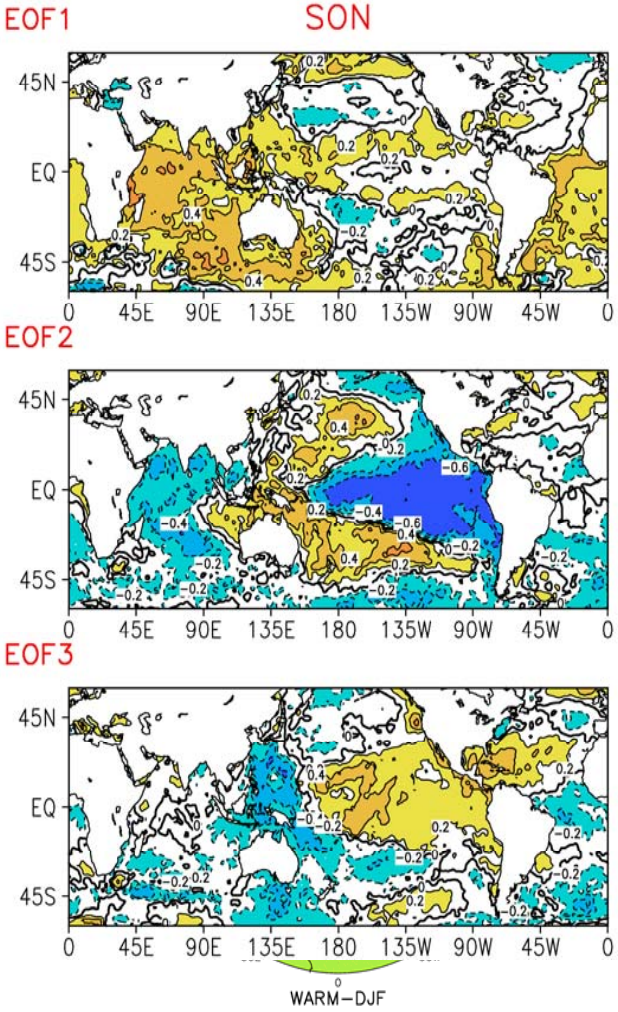
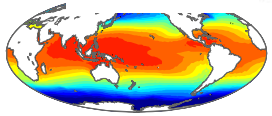
SH DJF 500hPa ht

Slow Component







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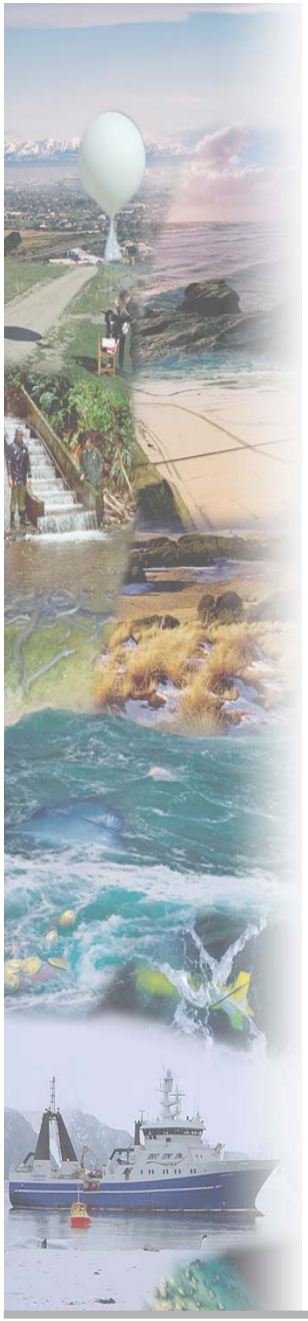
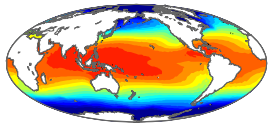


DJF Prediction in training period 1953-1992

Predictand	
DJF.pc1	Trend +Nov. SAM index
DJF.pc2	-SON NINO3 SST
DJF.pc3	-Nov. Coral Sea SST (150E-180, 15-30S)



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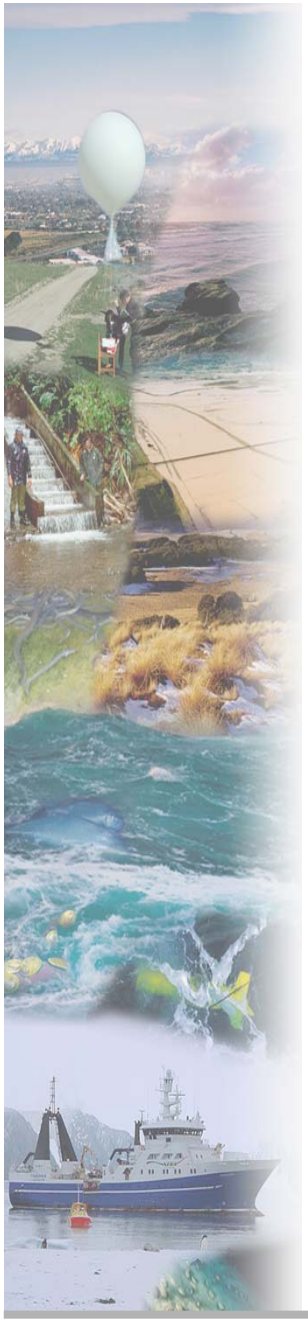
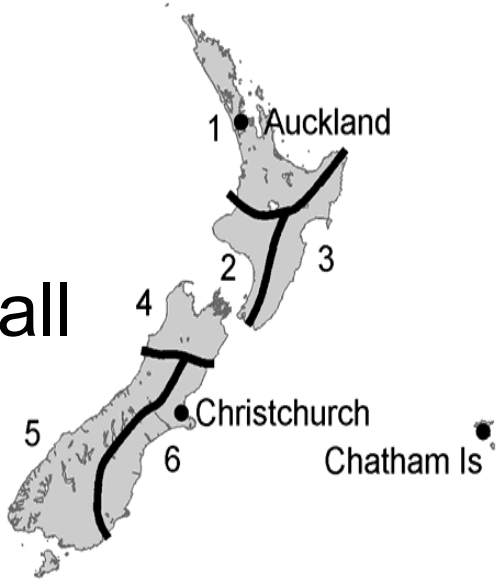
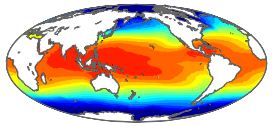


New Zealand regional rainfall

- NCEP reanalysis monthly-mean H500
  - Training:1953-1992
  - Verification: 1993-2000
- HadISST
- Monthly mean 6-regional rainfall anomalies (%)
- SVD of “slow” covariability





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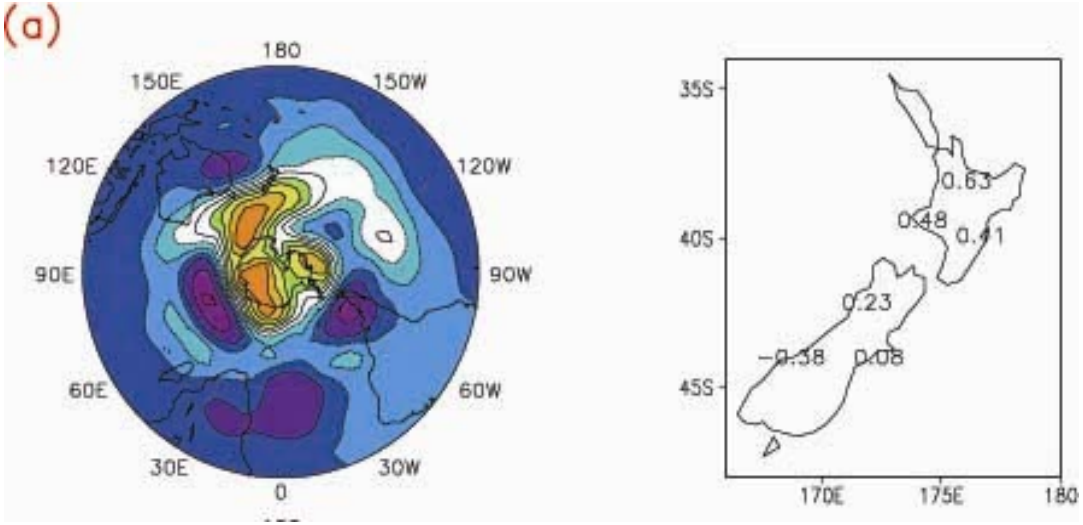
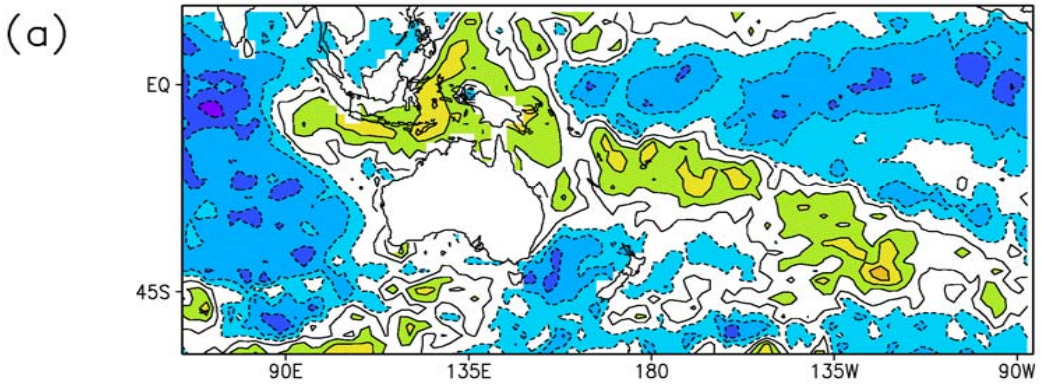
DJF slow component 1

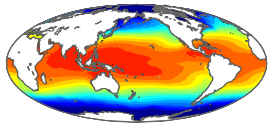


Skill: 20%

Wet North Island
and dry West South Island



Correlation between DJF.pc1 and SON.SST



DJF.pc1: -SON NINO3 SST, -Nov. NZ SST

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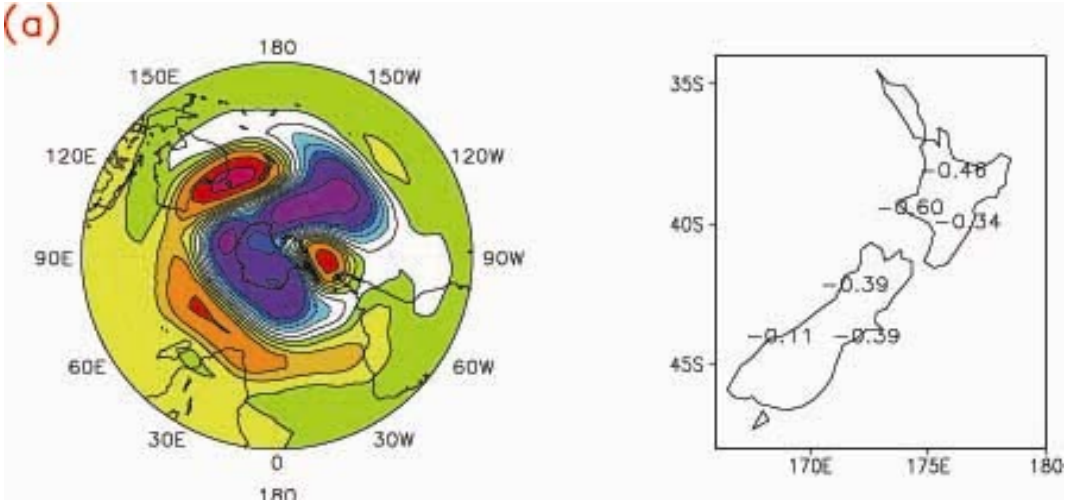
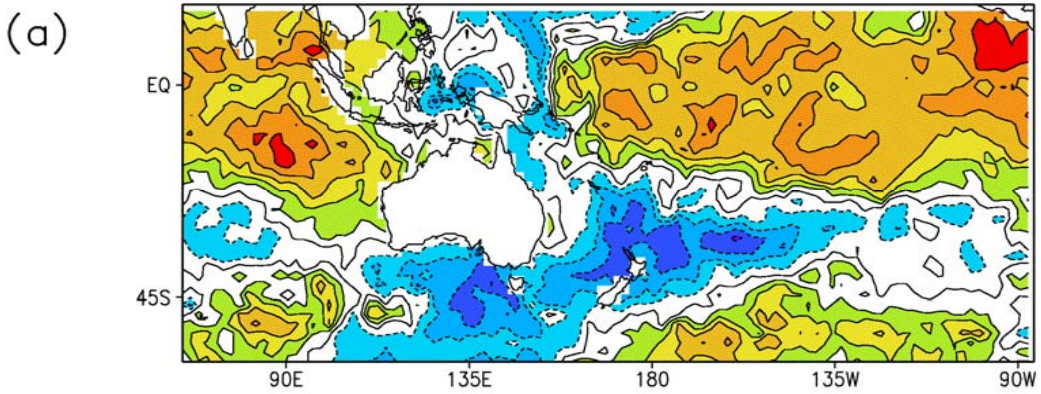
JJA slow component 1

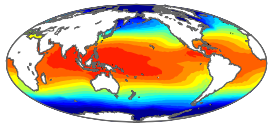


Skill: 17%

Dry



Correlation between JJA.pc1 and MAM.SST



JJA.pc1: May NINO3 SST

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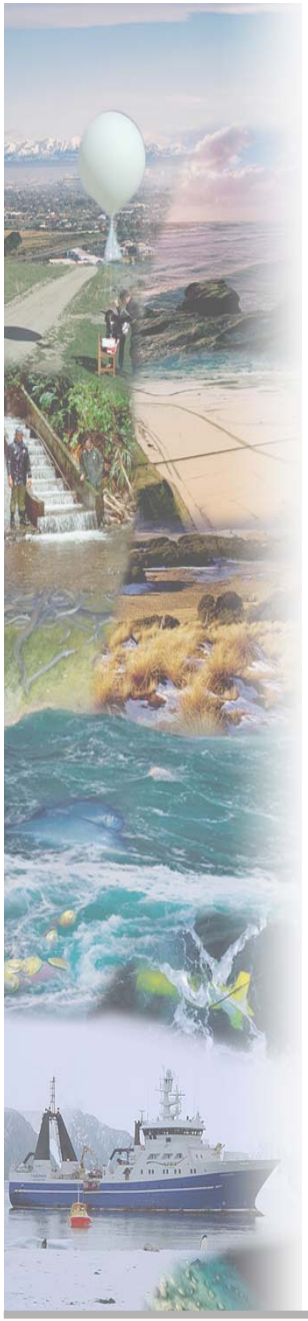
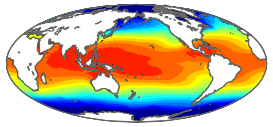


Collaborative opportunities

- Regional downscaling for climate change
  - Linking to hydrological models, river flows, snow storage, glacier mass
    - U. Chile Santiago visit, October 2007
- Indigenous knowledge
  - Māori knowledge of local climate & climate change
    - Integrate with Western science
  - Some parallels with South America?



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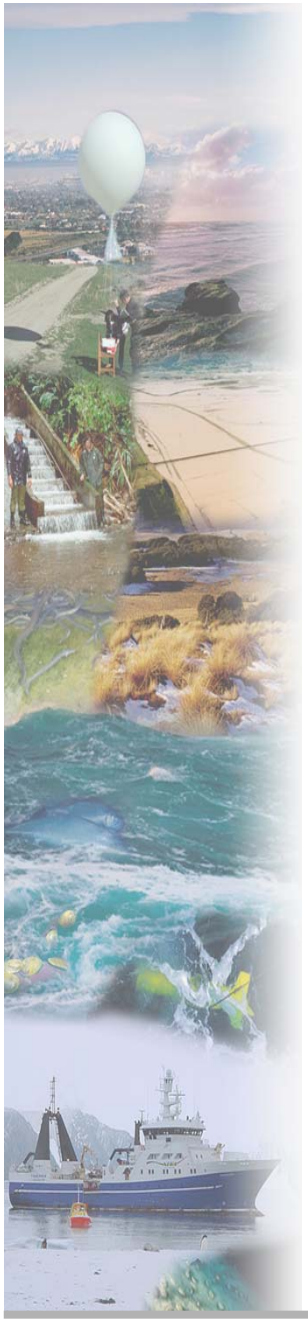
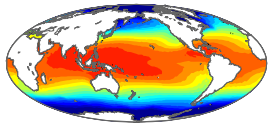


Summary

- Operational forecast skill enhanced during last La Niña
  - Still a need for objective combination of guidance
- New studies of SPCZ variability and effects
  - SPICE, paleoclimate elements
- Predictability studies
  - Identify forced variability
  - Useful for statistical forecasting
- Collaboration possibilities on the above, and
  - Regional climate modelling and linked modelling
  - Indigenous climate knowledge



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