WORLD METEOROLOGICAL ORGANIZATION

REGIONAL SEMINAR ON CLIMATE SERVICES
IN REGIONAL ASSOCIATION V (SOUTH-WEST PACIFIC)
Honiara, Solomon Islands, 1-4 November 2011

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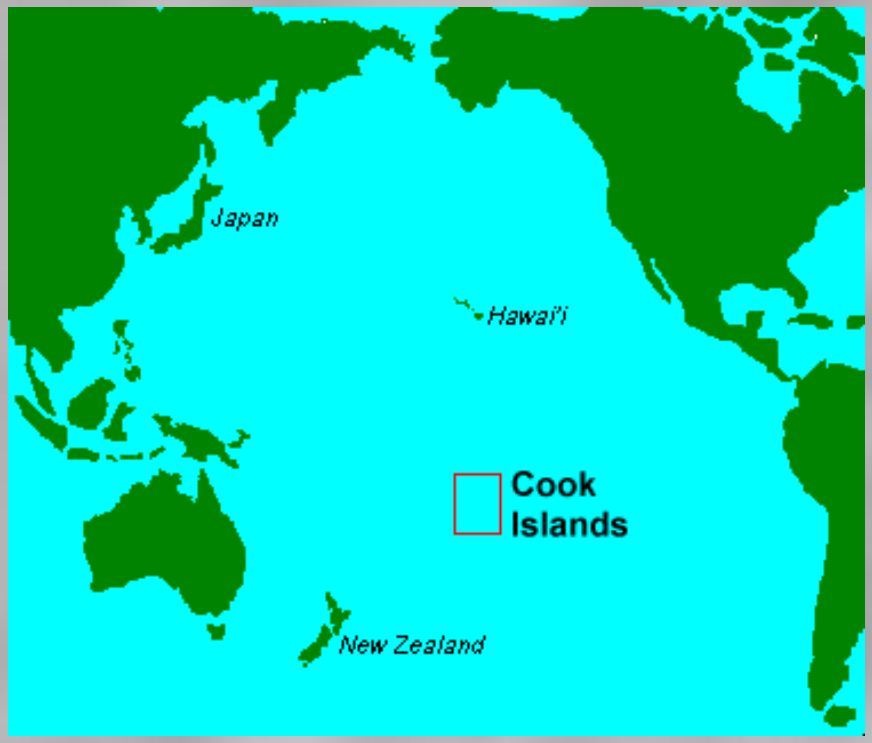
Director

Cook Islands Meteorological Service

Overview

- Current Climate
- Long Term Trends
- Extreme Events
- Major Users
- Current Capacities
- Climate Data, Monitoring and Prediction
- Challenges
- Conclusions

Where is the Cook Islands

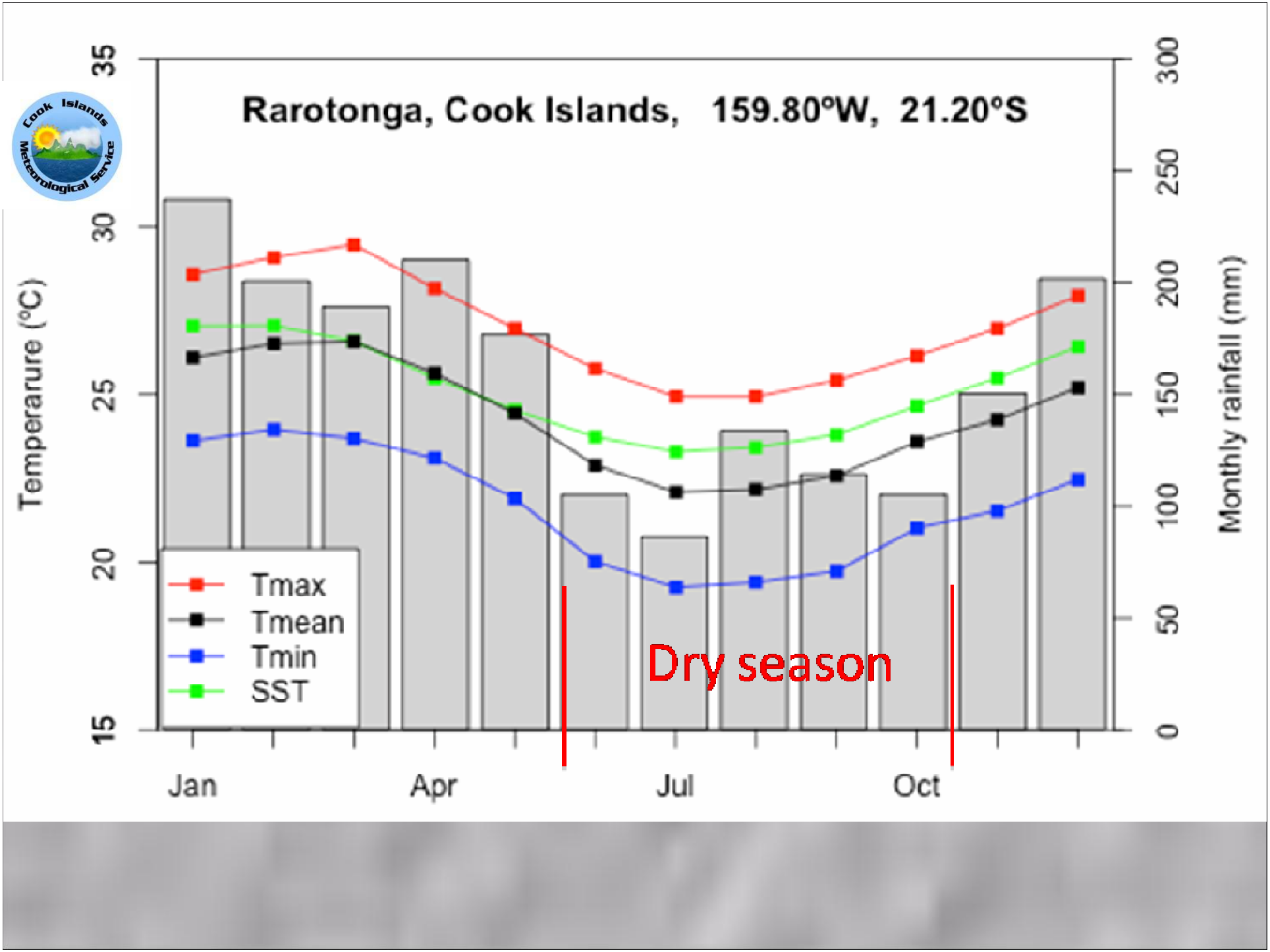


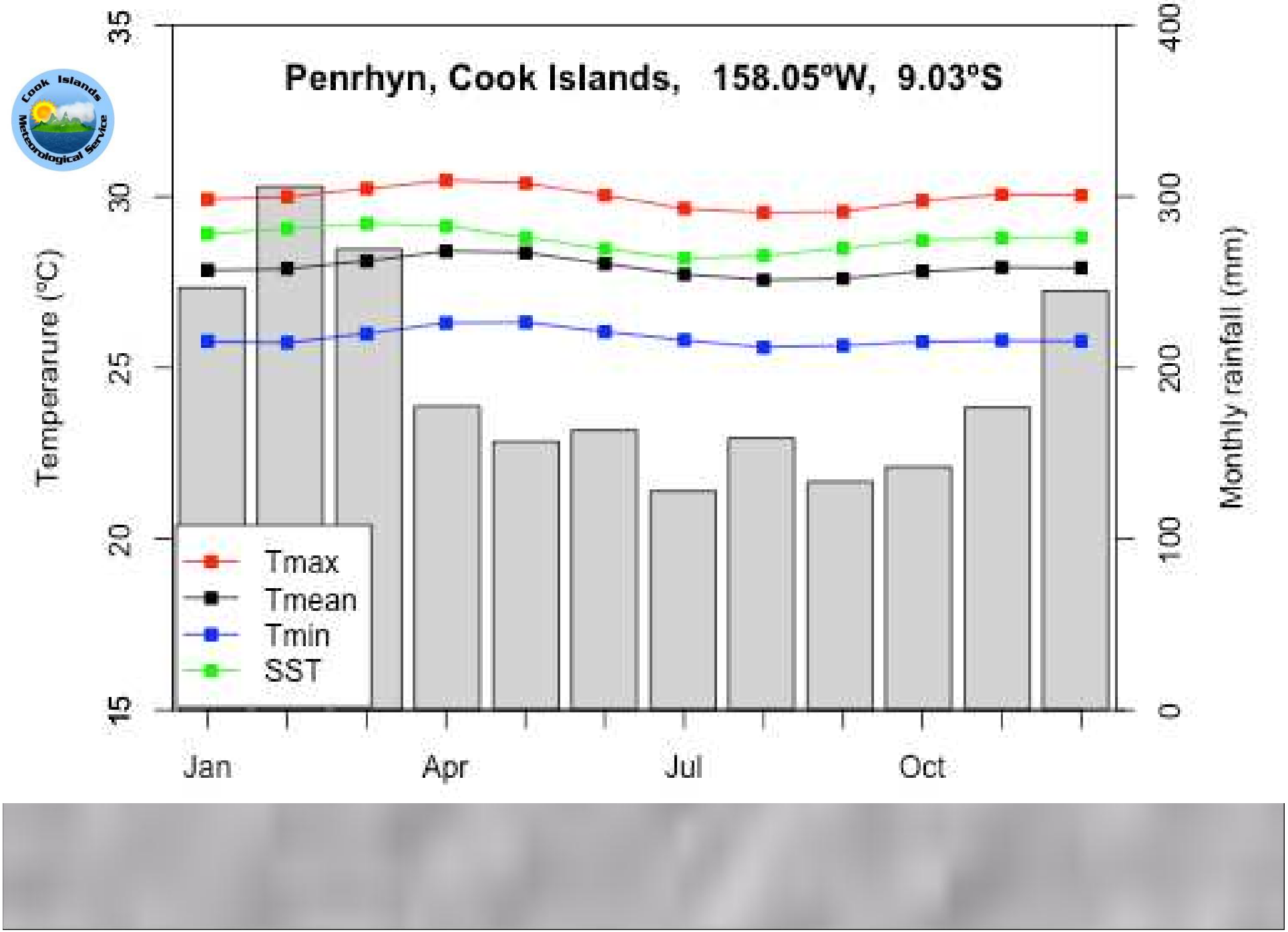
Climatological Setting

- - Main seasons; Climatology of rainfall and surface air temperature
- - Interannual variability; Long-term trends
- - Teleconnections (e.g., ENSO impacts)
- - Climate extremes/hazardous events
- - Major user sectors

Current Climate

- In the Northern Cooks Islands temperatures are fairly constant throughout the year, while in the Southern Cook Islands there is a difference of around 4°C between the warmer and cooler months.
- The wet season in the Cook Islands is from late November to April or May but is longer in the Southern Cook Islands.
- Year-to-year rainfall variations are high in both the Northern and Southern Cook Islands, and much of this is due to the El Niño–Southern Oscillation, particularly in the wet season.
- Warming trends are evident in both annual and seasonal maximum and minimum temperatures, across the Cook Islands since 1950.
- Rainfall trends differ between the Northern and the Southern Cook Islands. The negative trends in annual and wet season rainfall at Rarotonga are weakly statistically significant whereas at Penrhyn the positive trend in annual rainfall is moderately statistically significant.
- The sea-level rise measured by satellite altimeters since 1993, is about 4 mm yr^{-1},
- On average the Cook Islands experience 1.1 tropical cyclones per season, with most occurring between November and April. The interannual variability in the number of tropical cyclones in the vicinity of Rarotonga is large making it difficult to confidently identify any long-term trends in frequency.


Rarotonga, Cook Islands, 159.80°W, 21.20°S
Temperarure (°C)
Monthly rainfall (mm)
35
30
25
20
15
300
250
200
150
100
50
0
Tmax
Tmean
Tmin
SST
Dry season
Jan
Apr
Jul
Oct


Penrhyn, Cook Islands, 158.05°W, 9.03°S
Temperarure (°C)
Monthly rainfall (mm)
35
30
25
20
15
400
300
200
100
0
Jan
Apr
Jul
Oct
Tmax
Tmean
Tmin
SST

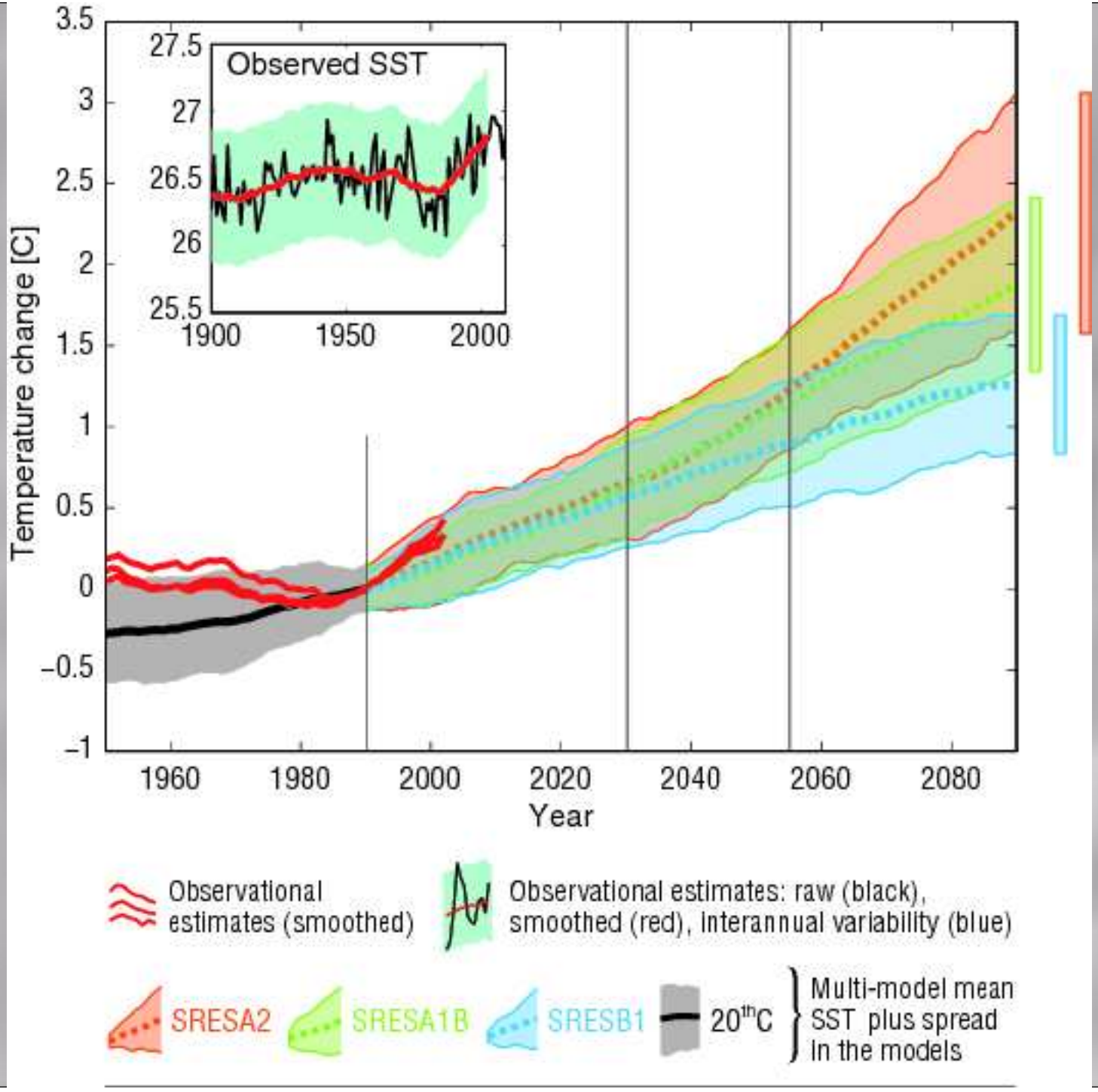

Observed SST
27.5
27
26.5
26
25.5
1900
1950
2000
Temperature change [C]
3.5
3
2.5
2
1.5
1
0.5
0
−0.5
−1
1960
1980
2000
2020
2040
2060
2080
Year
Observational estimates (smoothed)
Observational estimates: raw (black), smoothed (red), interannual variability (blue)
SRESA2
SRESA1B
SRESB1
20thC
Multi-model mean SST plus spread in the models

Figure 2.8: Historical climate (from 1950 onwards) and simulated historical and future climate for annual mean sea surface temperature over the region surrounding the southern Cook Islands, for the CMIP3 models. Shading represents approximately 95% of the range of model projections (twice the inter-model standard deviation), while the solid lines represent the smoothed (20-year running average) multi-model mean temperature. Projections are calculated relative to the 1980–1999 period (which is why there is a decline in the inter-model standard deviation around 1990). This highlights the fact that near-term projections are relatively independent of both model and emission scenario (although they are significantly affected by natural variability). Observational estimates in the main figure (red lines) are derived from the HadSST2, ERSST and Kaplan Extended SST V2 datasets (Volume 1, Section 2.2.2). Annual average (black) and 20-year running average (red) HadSST2 data is also shown inset. Projections for the northern Cook Islands closely resemble those for the south and are therefore not shown.

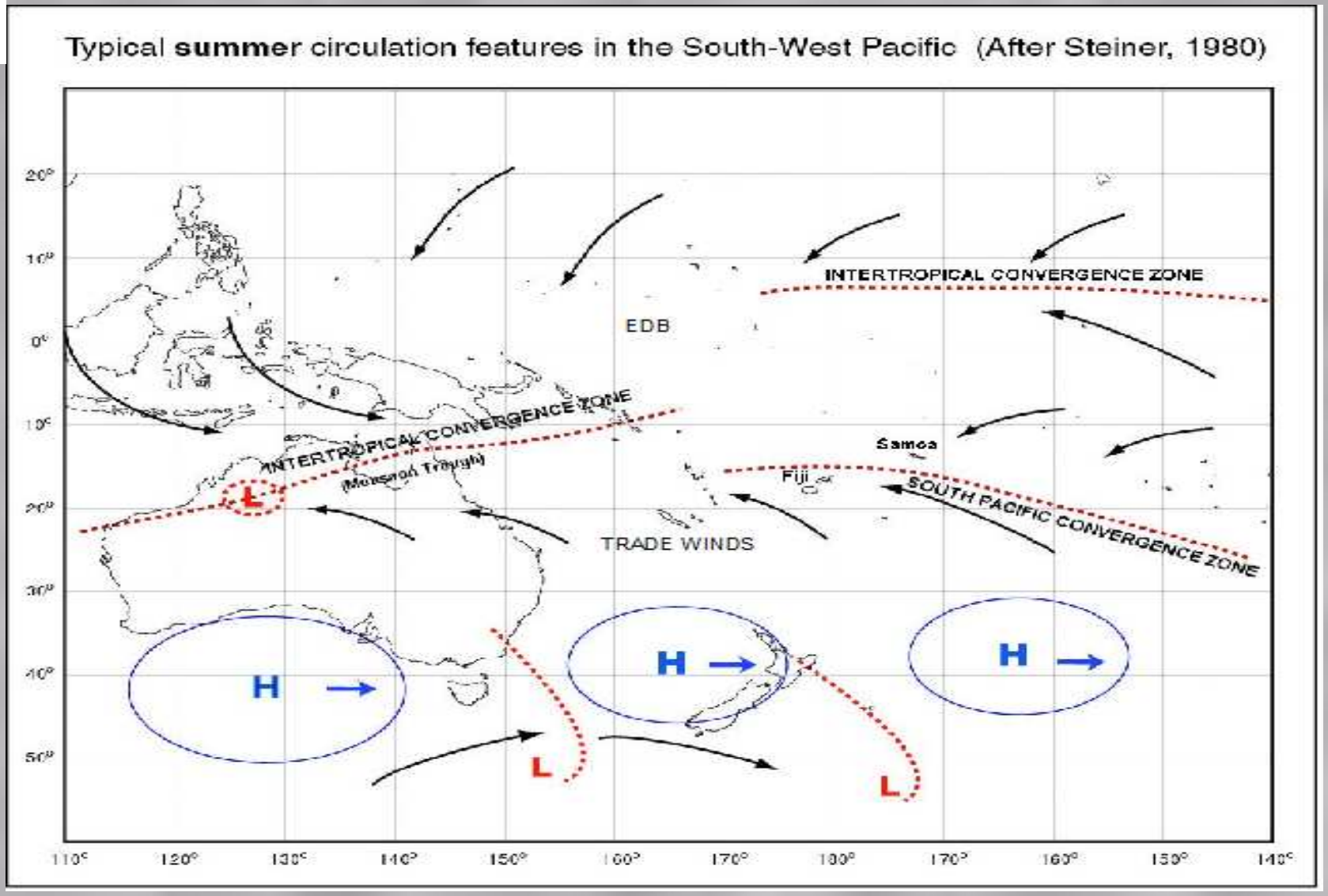


Figure 4: Summer circulation features in the South-West Pacific (Source: Steiner, 1980). Location of Trade winds and EDB are shown.

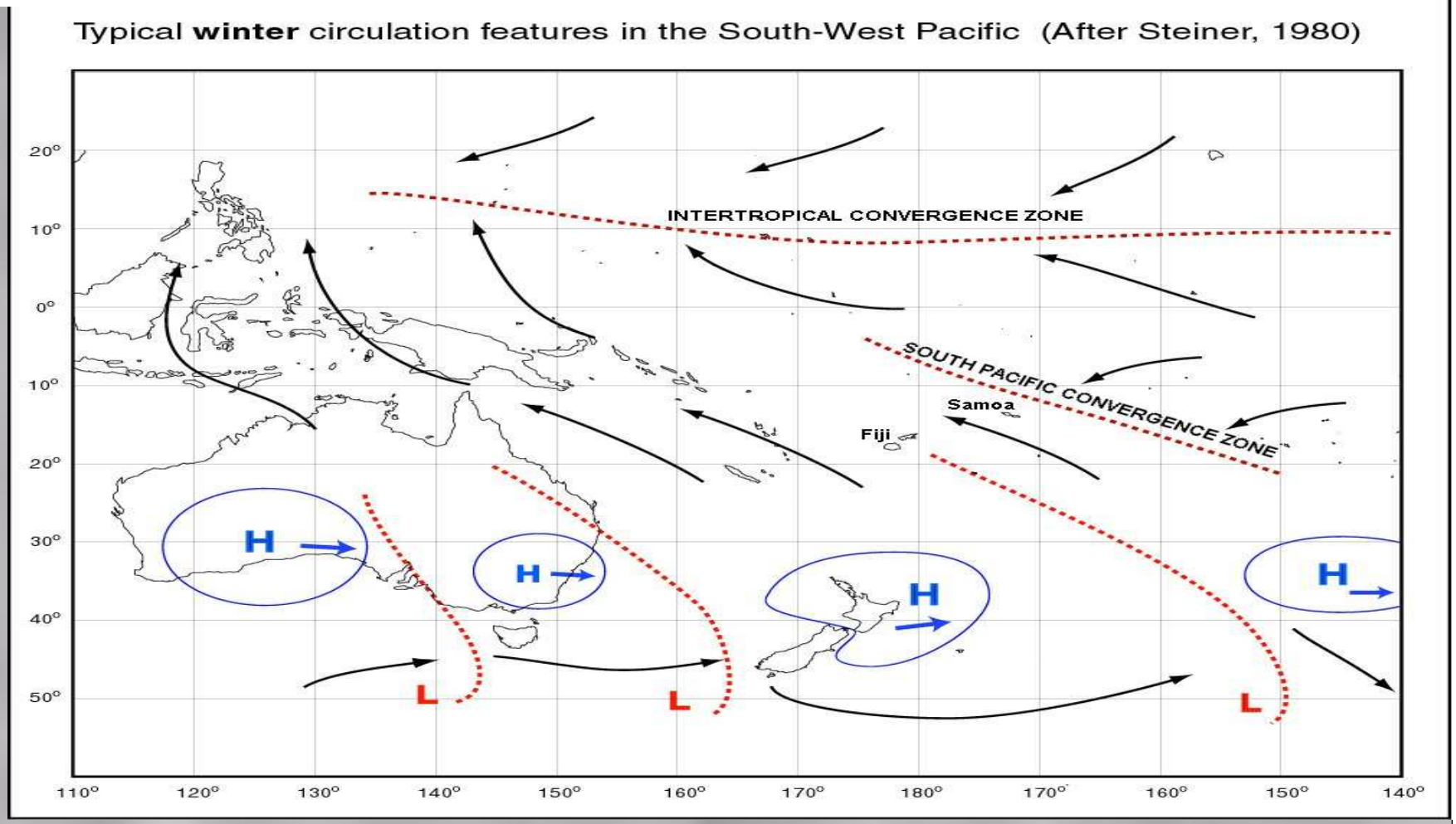
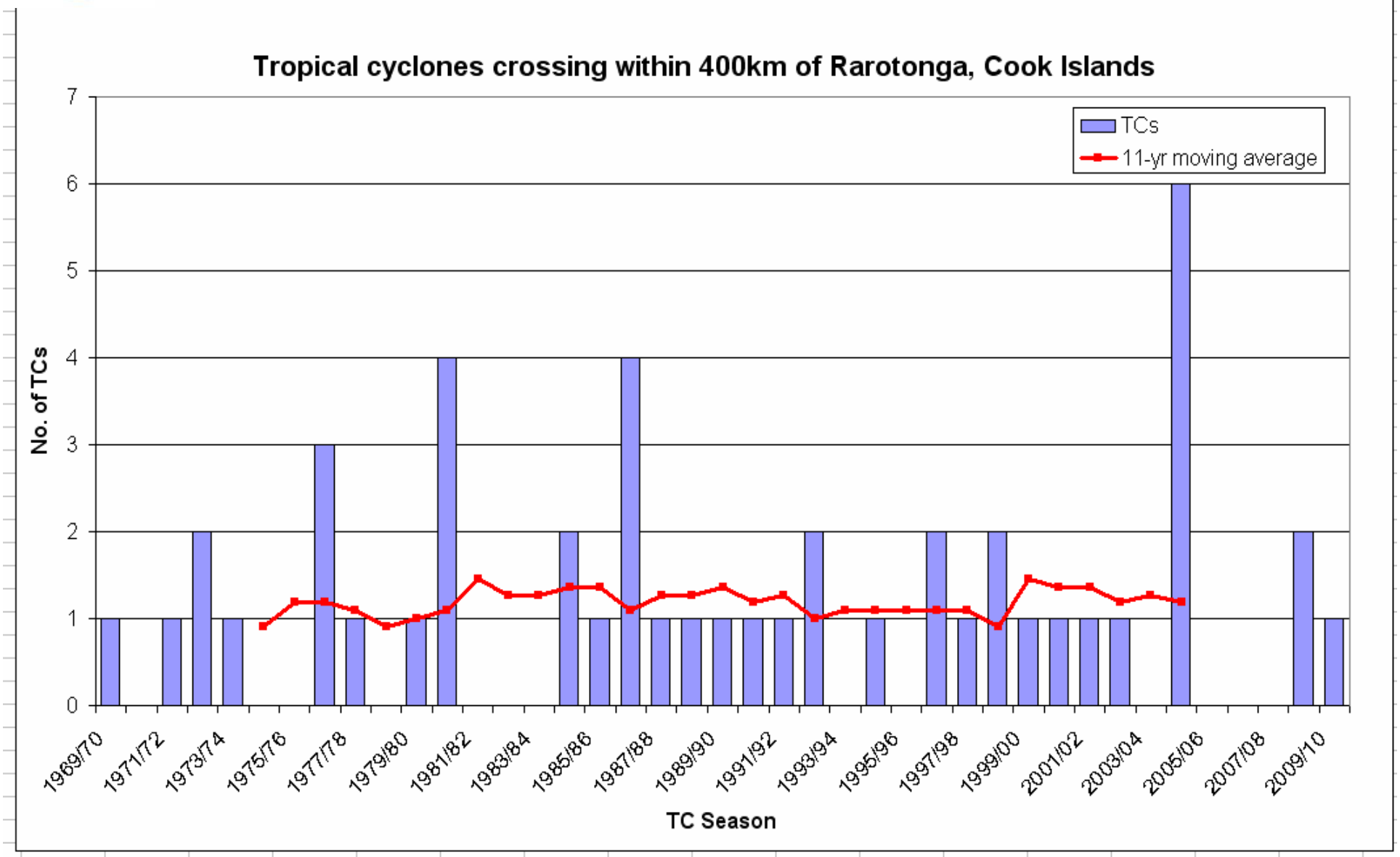


Figure 5: Winter circulation features in the South-West Pacific (Source: Steiner, 1980).


Tropical cyclones crossing within 400km of Rarotonga, Cook Islands
TCs
11-yr moving average
No. of TCs
0
1
2
3
4
5
6
7
1969/70
1971/72
1973/74
1975/76
1977/78
1979/80
1981/82
1983/84
1985/86
1987/88
1989/90
1991/92
1993/94
1995/96
1997/98
1999/00
2001/02
2003/04
2005/06
2007/08
2009/10
TC Season

Major Users

- Farmers
- Fishermen
- Aquaculture
- Community Based Organizations
- Government Departments
- Developers
- Private Sector

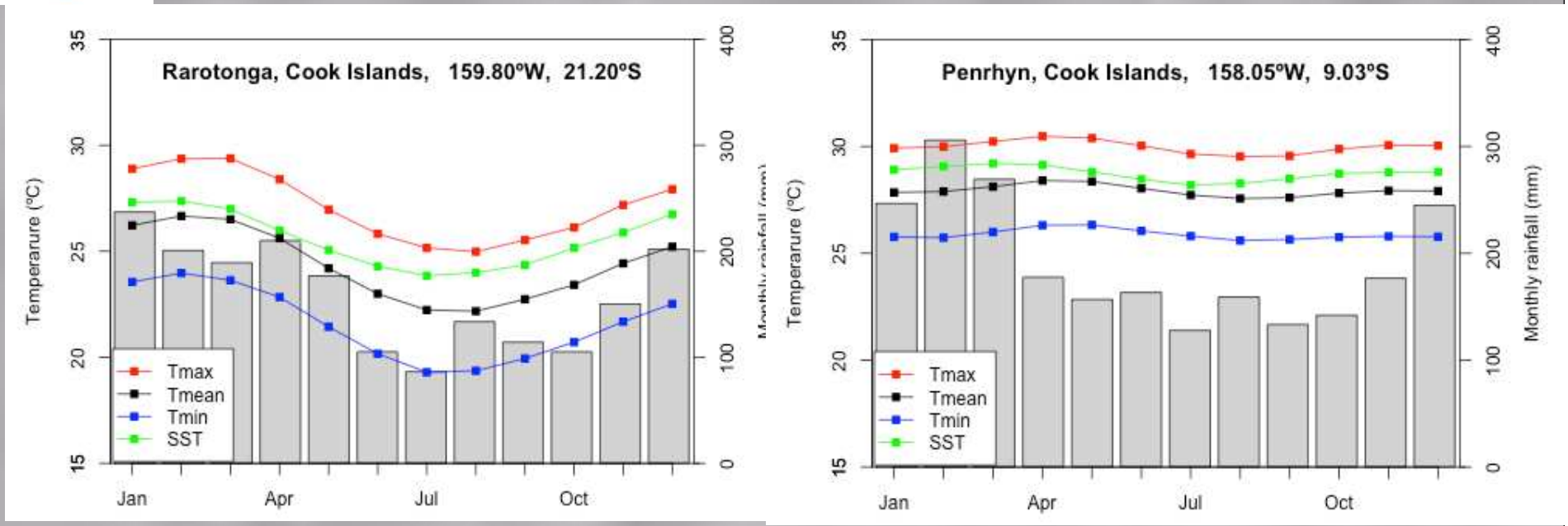


Figure 2.2: Mean annual cycle of rainfall (grey bars) and maximum (Tmax), minimum (Tmin), mean (Tmean) and sea surface temperatures (SST) at Rarotonga (left) and at Penrhyn (right).

Current Capacities for Climate Services

- - Observational network
- - Infrastructure and technical expertise
- - Human resources
- - Major strengths and challenges

OBSERVATIONAL NETWORK FOR THE COOK ISLANDS


Cook Islands
Meteorological Service

Current Status of Climate Services

- - Climate data (management, access, dissemination)
- - Climate monitoring
- - Climate prediction
- - Dissemination of climate information
- - Use of regional/global products
- - Climate research activities
- - Impacts of climate variability and change on the various socio-economic sectors
- - Perspectives on the Global Framework for Climate Services GFCS)
- - NMHS challenges/requirements to deliver climate services

Climate Data

(Management, Access and Dissemination)

- Recorded on pre-formated paper forms
- Digitized in certain and compatible way
- Quality Controlled by a Quality Manager
- Backed up in two different areas
- Access is given on a network and availabe to all staff
- Disseminated to stakeholders on a regular basis

Climate Monitoring

- 7 stations in the network
- Accessed synoptically and daily
- Communications via broaband
- Manual stations also report for comparison
- Schools encouraged to participate in the monitoring process

Climate Prediction

- Island Climate Update
- SCOPIC
- CLIDE

Challenges

- Government commitment
- Infrastructure
- Demand from stakeholders
- Skills and Capacities
- Incentives
- Career Paths

Conclusions

- Tools are provided for climate services
- Adaptation of tools to be familiar
- Observations Systems ought to be maintained
- Back-up systems to be in place
- Humans resources is important
- Collaboration with stakeholders
- Training should be part and parcel of the core functions of the service provider