NATIONAL CLIMATE CENTRE

New Zealand Meteorological Service

South Pacific Climate Monitor

January 1992

A summary of the month's climate in the South Pacific Islands region, with comments on climatic anomalies and outlooks for the coming months, prepared for planners and managers in agriculture, water resources and development

Editor: Reid Basher
Technical Services: Stuart Burgess

Summary

Rainfalls in the South Pacific Islands were very anomalous in January, continuing the pattern of December. In eastern Kiribati and northern French Polynesia rainfalls were up to four times higher than average, while from Queensland across through southern New Caledonia, southern Tonga and southeastern French Polynesia rainfalls were only 10% - 50% of average. Tropical cyclone 'Betsy' passed over southeastern Solomon Islands, and Vanuatu on the 9th, causing considerable damage, and near New Caledonia on the 10th. Its rainfall provided some relief from the otherwise dry conditions of these areas.

January's unusual rainfall patterns are part of the El Nino - Southern Oscillation (ENSO) event that has become well established in the Pacific and is in its mature stage. Other climatic and oceanic conditions are also affected. Sea surface temperatures were 2°C higher than average in many parts of the eastern equatorial Pacific. The equatorial easterly winds were weaker than average and turned westerly in some areas west of the dateline. The region of equatorial convection shifted well to the east of the dateline (causing the higher rainfalls in eastern Kiribati.) Sea level pressures patterns were anomalous and the Southern Oscillation Index (SOI), which is a principal indicator of ENSO episodes, reached a very negative value of -2.8. The most recent ENSO events occurred in 1982/83 and 1986/87.

The patterns of behaviour associated with ENSO events will take their course over the next few months. We can expect continued anomalous rainfall patterns, with higher than average rainfall in the north and northeast and lower than average rainfall in the south and southwest. New Caledonia, Fiji, and Tonga appear likely to become increasingly affected by drought. The risk of tropical cyclones in eastern areas, including Samoa, Tokelau, Cook Islands, and French Polynesia, is higher than usual during ENSO events (but note that other areas also face normal risk and we are in the height of the cyclone season.) Along the Equator, sea surface temperatures will remain higher than usual in eastern areas and the easterlies will remain weak.

Prepared with the cooperation of the national meteorological agencies of the South Pacific, and with the assistance of the National Climate Centre of the Australian Bureau of Meteorology.

Monitor published on 20/2/92

Bureau of Meteorology

Noticeboard

Rationale for the *Monitor*

Welcome to the *South Pacific Climate Monitor*. This is the first issue of what we hope will become a regular monthly publication. The Monitor aims to provide an up-to-date overview of the region's climate for the month, and guidance on what to expect in the coming months. The prime focus will be on rainfall. It is primarily targeted at policymakers, resource managers and researchers concerned with the South Pacific. It will assist individual countries to better understand the natural variation of their climates, and to better respond to climatic impacts when they occur.

Ordinarily, the *Noticeboard* section will contain news and views such as special climatic events (e.g. tropical cyclones, droughts), brief notes on climate change issues, advice from or to climate observers, *Monitor* administration matters, etc. This month the announcement and description of the *Monitor* takes up most of the *Noticeboard*.

Climate Prediction

Climate science is not good enough to allow reliable predictions for a month or more ahead. Usually, the only guide we have is the historical average climate for the month concerned, and this is what often will be used in the *Monitor*. However, we do know that rainfall in the Pacific is affected by the El Nino - Southern Oscillation (ENSO) phenomenon, so this can also offer useful guidance, specially at times like now when an ENSO episode is underway. We are currently exploring the statistics of this relationship in the hope of obtaining improvements in rainfall prediction in the future.

Regional Collaboration

The *Monitor* is only possible because of the dedicated cooperation of climate observers and meteorological services throughout the region in accurately recording and promptly forwarding their data. The exchange of data is organised under the umbrella of the World Meteorological Organisation's Global Climate Observing System. The *Monitor* also depends on meteorological analyses and advice from the Climate Analysis Center of the US National Weather Service. Its development has been assisted by the Australian Bureau of Meteorology, which has considerable experience with similar bulletins in Australia. Please note that advice on the climate of an island group can generally be obtained directly from the local meteorological service.

Development stage

The *Monitor* is a new initiative, and this is the first issue. There is a great deal of development work still to be done and in the meantime it will remain in a trial stage, with only limited circulation. It will be progressively improved as a result of better data input, scientific research development, and user feedback. Please feel free to let us know how well the *Monitor* meets your needs.

The *Monitor's* research development until 30 June 1992 is funded by the New Zealand Foundation for Research Science and Technology. Thereafter, alternative sources of support will be needed to maintain its routine production.

January News and Views

Tropical cyclone Betsy: Tropical cyclone Betsy, was the fourth cyclone in the region this season, following Tia in November, and Val and Wasa in December. Betsy originated west of Tuvalu at about 9°S, 172°E on the 5th and intensified as it moved south on the 7th. It caused some damage in the southeastern Solomon Islands, and later, on the 9th, resulted in substantial damage to crops, schools and other buildings and inundation of low lying islands in northern Vanuatu. On the 10th it passed to the north of New Caledonia (damage unknown.)

ENSO episode underway: Abnormalities in Pacific winds, rainfall and oceanic conditions show that the current ENSO event is well established. ENSO events are primarily a phenomenon of the Pacific Ocean region but they do have some effects beyond. Similar events occurred in 1982/83 and 1986/87. Further details of what is happening and on what to expect are given in *The Month's Climate* and *Climate Outlook* overpage.

The Month's Climate

January's atmospheric circulation, oceanic anomalies and rainfall patterns were consistent with those found during the mature phase of a ENSO event. Sea surface temperatures rose sharply along the Peruvian coast, and were 2°C higher than average in many parts of the eastern equatorial Pacific. Along the Equator the weakening of the easterly winds (to westerlies in some areas west of the dateline) was the greatest since the 1982/83 warm episode. The region of enhanced convection shifted well to the east of the dateline (this caused significantly higher rainfalls than usual in Eastern Kiribati.) Air temperatures were above average by about 0.5 - 1 °C in northern French Polynesia, northern Cook Islands and Queensland, and about 0.5°C lower than average around the dateline from Kiribati to Tonga. Mean sea level pressures were up to 2.5 hPa above average in the western South Pacific (e.g. over the Solomon Islands) and up to 2.2 hPa below average in the east over the Cook and Society Islands. The Southern Oscillation Index (SOI), a principal indicator of ENSO, reached a very negative value of -2.8 (see note on SOI definition on last page.)

These conditions continued the pattern of well below average rainfall in the south and southwest parts of our region of the Pacific, and well above average rainfall in the north-east. The rainfall data are listed in the *Rainfall Table* and their percentage deviations from average are mapped in the *Rainfall Anomaly Map*. Rainfall was less than half average for January throughout large areas from Queensland to Fiji and Tonga and across to the Austral Islands (in the south of French Polynesia.) It was below 20% of average along much of the Queensland coast, in southern Tonga and the Austral Is. January was the fourth consecutive month with rainfalls in the 1st quintile (lowest year in five) over southern Tonga. Only 9 mm (4% of average and lowest since records began in 1947) was recorded in January at Ha'apai, southern Tonga. This followed a December total of only 20 mm. Honiara in the Solomon Is reported rainfall at 30% of average.

In contrast, rainfall in the north-east was much higher than usual. It was four times average in eastern Kiribati (623 mm at Fanning Island; 2nd highest since records began in 1950) and was two to three times average in the Marquesas Islands. December rainfalls in these areas of the Pacific were also very high.

Western areas were affected by tropical cyclone Betsy from the 5th to the 12th of January. Betsy originated west of Tuvalu at about 9°S, 172°E on the 5th, and intensified as it moved south on the 7th. It moved across southeastern Solomon Islands and on the 9th it headed south-west, passing over Vanuatu. On the 10th it passed to the north of New Caledonia. For a time, Betsy posed a threat to Queensland as it continued west, but from the 12th it steered south-east and gradually dissipated. The cyclone contributed additional rainfalls along its path and hence would have provided some relief from the otherwise very dry conditions affecting Vanuatu and New Caledonia. The *Rainfall Anomaly Map* appears to confirm this.

Climate Outlook

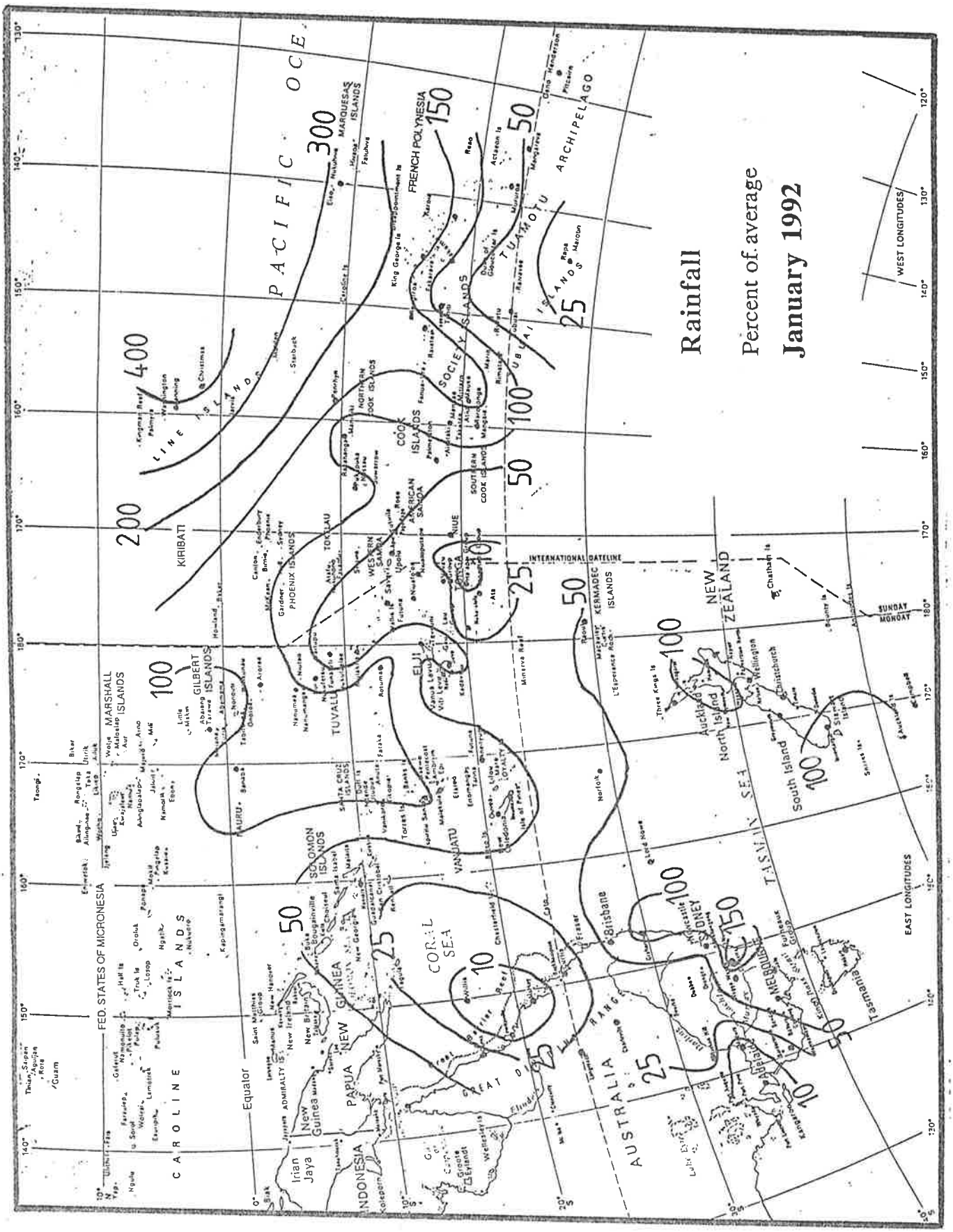
The evidence from past ENSO events and from computer models of ENSO suggests that the sea surface temperature anomaly is now at its peak. It is expected to persist for a couple of months and thereafter slowly decline over a further three to four months. This view is also supported by the recent increases in monsoonal activity over northern Australia and rainfalls in drought affected eastern Australia. We expect that the other anomalies now present throughout the tropical Pacific, including rainfall anomalies, will only slowly change over the next month or two.

In general, we expect higher than average cloudiness and rainfall in the northeast of our region and lower than average rainfalls in the south and southeast. Parts of New Caledonia, Fiji, and Tonga appear likely to become increasingly affected by drought. Of course there will be exceptions for individual islands, and there is always the chance of additional rainfall from tropical cyclones. The anomalous patterns will be superimposed on the usual pattern of wet season rainfalls for the next two to three months. On average, over most of our region, rainfalls decrease from April with the approach of the dry season.

During ENSO events such as we are experiencing, the risk of tropical cyclones is higher than usual in the eastern areas including Samoa, Tokelau, Cook Islands and French Polynesia (but note that other areas also face normal risk and we are in the height of the cyclone season.) Sea surface temperatures in the east around the Equator are expected to remain higher than usual. The changed patterns in the winds are likely to continue. The decline in the equatorial easterly winds are likely to result in the development of lower mean sea levels in the western equatorial region over the next few months.

This outlook applies to the next couple of months. An updated outlook will be prepared and presented in the February *Monitor*.

Rainfall Anomaly Map



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Published on 20/2/92

Rainfall Table

Please note that *average* rainfalls are not good predictions of actual monthly rainfalls. The *Climate Outlook* and the *Rainfall Anomaly Map* can be used to assess whether the rainfall might be higher or lower than average, specially when the period under consideration is affected by the ENSO phenomenon. Further technical explanation is given at the end of the table.

Station Details			January Rainfall			Average Rainfall for		
Territory and station	Station number	Start year	Total rainfall	% of average	Quintile	Feb	Mar	Apr
Cook Islands								
Aitutaki	91830	1930	319	131	-	239	227	215
Mauke	91840	1958	324	169	-	185	161	149
Palmerston	91826	1958	149	57	-	234	223	198
Penrhyn	91800	1937	354	169	—4–	190	179	149
Pukapuka	91811	1930	441	114	-	290	229	164
Rakahanga	91804	1941	250	73	-	245	194	162
Rarotonga Airport	91843	1930	334	127	—4–	199	255	202
Fiji								
Nadi Airport	91680	1942	97	31	1——	307	355	175
Nausori Airport	91683	1955	237	72	–2——	331	403	366
Ono-i-lau	91699	1943	21	10	1——	200	257	205
Rotuma	91650	1947	424	122	—4–	347	387	264
Udu Point	91652	1946	190	57	–2——	333	347	285
French Polynesia								
Atuona	91925	-	261	297	——5	92	106	97
Bora Bora	91930	-	429	170	——5	224	159	131
Hereheretue	91945	-	161	-		-	-	-
Hao	91944	-	106	-	–2——	-	-	-
Mururoa	91952	-	87	-	–2——	-	-	-
Rapa	91958	-	43	14	1——	219	257	254
Rikitea	91948	-	125	48	–2——	194	174	155
Tahiti-Faaa	91938	-	246	58	—3—	240	122	92
Takaroa	91943	-	420	152	——5	140	120	143
Tubuai	91954	-	47	-	1——	-	-	-
Kiribati								
Arorae	91629	1950	286	123	-	139	114	148
Banaba	91533	1953	360	133	-	225	171	143
Beru	91623	1947	171	83	-	127	101	99
Christmas	91490	1951	281	401	-	68	86	166
Fanning	91487	1950	623	397	1——	160	223	307
Tarawa	91610	1946	206	68	—3—	227	234	192
New Caledonia								
Koumac	91577	-	134	94	—3—	133	136	69
Noumea	91592	-	66	56	–2——	94	175	124
Niue								
Alofi	91822	1905	106	40	1——	259	318	201

Continued ...

Rainfall Table continued.

Station Details			January Rainfall			Average Rainfall for		
Territory and station	Station number	Start year	Total rainfall	% of average	Quintile	Feb	Mar	Apr
Solomon Islands								
Aata	91517	-	43	-	1——	-	-	-
Honiara	91520	1974	86	30	1——	283	273	159
Tonga								
Fua'amotu	91792	1979	33	21	–2––	184	176	150
Ha'apai	91784	1947	9	4	Rec low	197	303	191
Niuafoo'u	91772	1971	85	30	–2––	230	253	262
Niuatoputapu	91776	1947	83	30	1——	246	295	251
Vava'u	91780	1947	84	30	1——	260	364	227
Tuvalu								
Funafuti Airport	91643	1941	281	69	–2––	350	314	248
Nanumea	91631	1947	464	129	-	249	292	249
Nui Island	91636	1947	326	84	-	335	351	218
Niulakita	91648	1947	164	42	–2––	337	359	250
Vanuatu								
Aneityum	91568	1981	161	56	–2––	320	330	156
Bauerfield	91557	1985	-	-	-	-	-	-
Pekoa	91554	1981	291	105	–2––	269	227	234
Wallis & Futuna								
Wallis Island	91753	-	-	-	-	-	-	-
Western Samoa								
Apia	91762	1890	200	49	1——	319	376	237
Other								
Lord Howe	94995	1886	77	69	–2––	111	128	156
Norfolk	94996	1890	26	29	–2––	101	105	130
Raoul	93997	1937	61	51	––4–	144	143	122

Explanation: (a) Data are as received and may be subject to change with later quality control.
(b) The quintile number helps show how the month's rainfall ranks against previous years' rainfalls for the month. Unusually *low* rainfalls will fall in quintile 1 (shown as 1——). On average, one year in five will fall into this quintile. Similarly, unusually *high* rainfalls fall in quintile 5 (shown as ——5), and on average, one year in five will fall into this quintile. The same is true of the other quintiles.
(c) If the rainfall is a record for the station we enter "Rec low", or "Rec high".
(d) The more historical data a station has, as indicated by its start year, the more reliable the percentages and quintiles are and the more significant a record is.

SOI definition: The Southern Oscillation Index is a measure of the pressure difference between Tahiti and Darwin and is a principal indicator of ENSO episodes. Different institutions calculate it by slightly different methods, e.g. by using different periods of historical base data, and so their values can differ. We use the Troup method with a base period of 1941-1980.