Number 108, September 2009

The Island Climate Update

August's climate

- The South Pacific Convergence Zone (SPCZ) was weakly coherent this past month, and contracted toward northern Papua New Guinea.
- Suppressed convection in the central part of the Southwest Pacific near Tokelau.
- Mostly well below normal rainfall for many parts of New Caledonia.

El Niño/Southern Oscillation (ENSO), seasonal rainfall, and sea surface temperature forecasts

- El Niño conditions exist in the equatorial Pacific. Many dynamical climate models project the continuation of El Niño through 2009 and into 2010.
- Below normal rainfall is forecast for the Marquesas. Near or below normal rainfall is forecast for the Northern Cook Islands, Papua New Guinea, New Caledonia, Fiji, Tonga, and Tokelau.
- Above normal rainfall is expected for Western Kiribati and the Solomon Islands. Near or above normal rainfall is forecast for Eastern Kiribati.
- Above normal SSTs are forecast for Eastern Kiribati. Normal or above normal SSTs are forecast for the Northern Cook Islands, Marquesas, the Tuamotu Archipelago, Western Kiribati, the Solomon Islands, and Papua New Guinea. Near normal SSTs are expected elsewhere in the southwest Pacific.

Collaborators

Pacific Islands National Meteorological Services

Australian Bureau of Meteorology

Meteo France

NOAA National Weather Service

NOAA Climate Prediction Centre (CPC)

International Research Institute for Climate and Society

European Centre for Medium Range Weather Forecasts

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Climate developments in August 2009

Enhanced South Pacific Convergence Zone (SPCZ) anomalies were largely absent from the region last month. Localised pockets of enhanced rainfall occurred in the North Tasman Sea and near Pitcairn Island. The Solomon Islands and Western Kiribati also had enhanced rainfall during August, while northeastern Australia was very dry. Suppressed convection existed southeast of Western Kiribati last month near Tuvalu, Tokelau, and the Northern Cook Islands. The regional circulation in August was characterised by more frequent low pressure south of Fiji, a deep low pressure anomaly south of the Australian Bight, and higher than normal pressure to the east of New Zealand. This pattern resulted in more frequent easterly and southeasterly anomalies across the southwest Pacific, particularly in the northern Tuamotu Archipelago region and the Marquesas. Southerlies were more frequent near New Caledonia.

High rainfall was recorded in the Solomon Islands, some locations in Papua New Guinea, the northern half of Vanuatu, and in Western Kiribati during August. For Western Kiribati this is the third month in a row with considerable rainfall, for the western island group, with Butaritari receiving 263mm (172% of normal). Except for Kiritimati Island in Eastern Kiribati, most stations along the Equator in Kiribati received well above normal rainfall. In Fiji, near normal to below normal rainfall occurred for 60% of stations that reported. Similarly, Samoa had average to below average rainfall for the month, while most stations in New Caledonia and the southern half of Vanuatu received well below normal rainfall in August.

Island Group	Location	Rainfall (mm)	% of avg	Comments
Australia	Townsville	0	0	Tie for record low
Norfolk Island	North Tasman	36	29	Record low
Vanuatu	Sola	438	194	Highest monthly total in the region
Papua New Guniea	Port Moresby	98	350	Very high
Solomon Islands	Munda	352	134	High

Soil moisture in August 2009

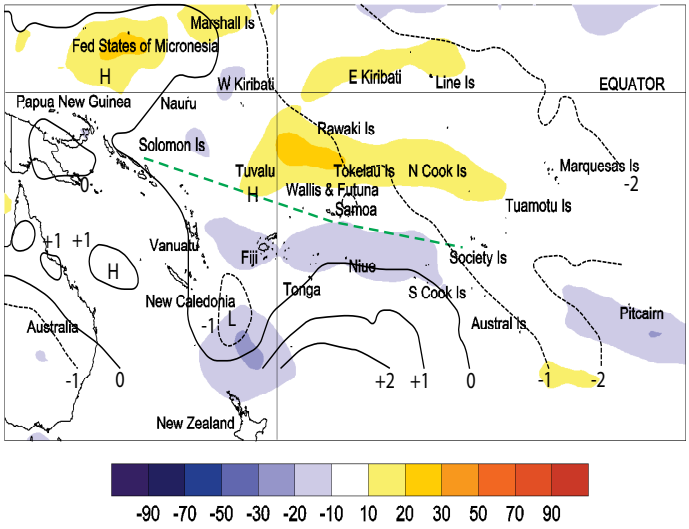
Estimates of soil moisture shown in the map (right) are based on monthly rainfall for one station in each country. Currently there are not many sites in the water balance model, but more stations will be included in the future.

The information displayed is based on a simple water balance technique to determine soil moisture levels. Addition of moisture to the available water already in the soil comes from rainfall, with losses via evapotranspiration. Monthly rainfall and evapotranspiration are used to determine the soil moisture level and its changes. These soil moisture calculations were made at the end of the month, and for practical purposes, generalisations were made about the available water capacity of the soils at each site.

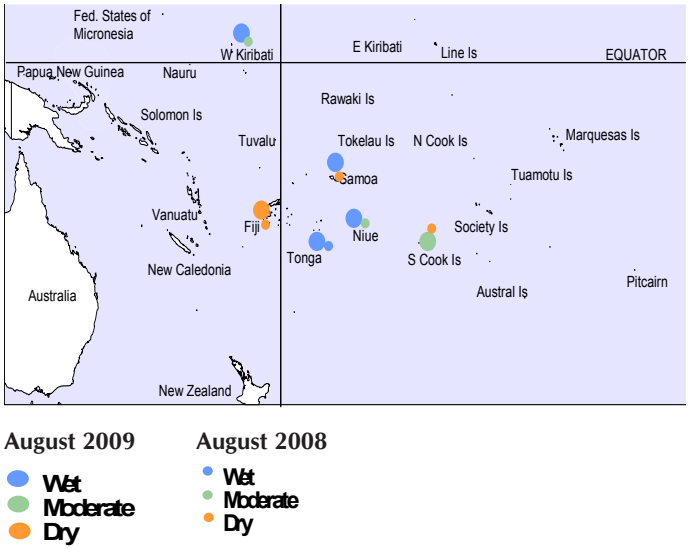
Hanan (Niue), Apia (Samoa), Tarawa (Western Kiribati) and Fua'amotu (Tonga) project moist soil moisture conditions. Raratonga (Southern Cook Islands) project moderate soil moisture, while Nadi (Fiji) is dry at this time.

In August dry conditions occurred over the northern and southern portions of French Polynesia. Significant rainfall anomalies (40 – 70% of normal) was recoreded in the Marquesas and in the Austral Islands, respectively. Gambier was the only region that received above normal rainfall during the month.

Warmer than normal conditions occurred as a whole across French Polynesia during August, with +0.6°C to +1.4°C above normal temperatures recorded. A new monthly mean temperature was also recorded for August at Tahiti. Maximum and minimum temperatures were also near or above normal for many other locations across the south Pacific. In New Zealand, it was the warmest August since records began 155 years ago.



Outgoing Long-wave Radiation (OLR) anomalies, in Wm^2 are represented by hatched areas. High radiation levels (yellow) are typically associated with clearer skies and lower rainfall, while cloudy conditions lower the OLR (blue) and typically result in higher rainfall. The August 2009 position of the South Pacific Convergence Zone (SPCZ) could not be determined by OLR anomalies. Based on TRMM analysis, it was less coherent compared to previous months. The average position of the SPCZ is identified by the dashed green line, which is based on mean January rainfall for the South Pacific. Mean sea level (MSL) pressure anomalies (in hPa) are shown as solid and dashed black lines.



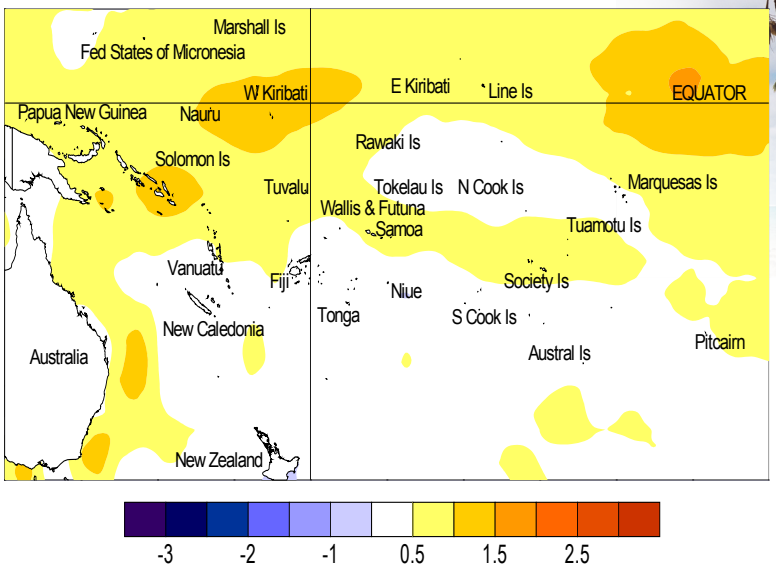
Estimated soil moisture conditions at the end of August 2009, using monthly rainfall data. Soil moisture projections for individual Pacific Island countries are dependent on data availability at the time of publication.

El Niño/Southern Oscillation (ENSO)

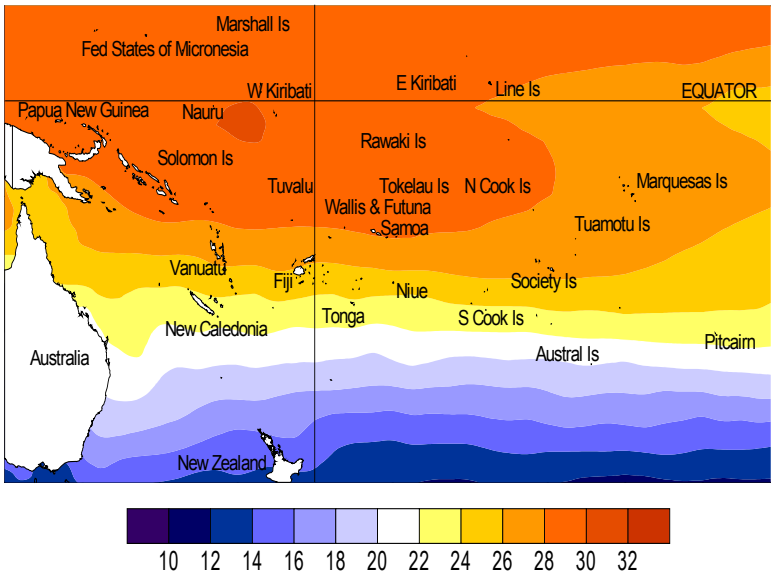
During August, equatorial Pacific Ocean continued to be in an El Niño state, but the atmosphere displayed only weak El Niño conditions. Sea surface temperatures were above normal across the equatorial Pacific, but did not intensify further from their July values. NINO 3 & 4 anomalies were +1.2°C and +0.8°C in August (little change from +1.3°C and +0.8°C respectively in July), with the 3-month means for JJA being +1.2°C and +0.7°C). Subsurface oceanic heat content remained substantially above average, but weakened in the east since the beginning of August. Sub-surface regions above +1°C contracted from the western equatorial Pacific into two centres – the anomaly centre near 110°W has weakened by about 1°C, and a new centre over +2°C has developed just east of the Dateline at 100m depth.

The atmospheric circulation still is not well coupled with the ocean: in August the SOI returned to negative values (-0.7 for the month, versus +0.2 for July) with a weak negative three-month mean (-0.3). Westerly wind anomalies persisted through August west of the Dateline, weakened from July, and showed eastward movement past the Dateline. The OLR anomalies were mostly near normal along the equator. The TRMM ENSO precipitation index is only weakly positive at +0.15 (+1 or more is indicative of a moderate El Niño). The MJO has been weak since late June. Although another event developed in the near-equatorial central Indian Ocean in mid–August, the MJO is fairly weak at present.

The global climate model ensemble assessed by NIWA show that dynamical models are signaling warm (El Niño) conditions through the end of the year. Several statistical models have now also picked up on the existing El Niño conditions. All the dynamical models that provide extended forecasts through to autumn 2010 show El Niño persisting to the end of this period, but there is a general tendency for Niño 3.4 SST anomalies to weaken from the peak over austral summer. The August NCEP ENSO discussion suggests some further strengthening of currently weak El Niño conditions and persistence through the austral summer period. The August ENSO update from IRI indicates a probability of near 80% for El Niño persisting through to the end of 2009, with chances of the event continuing into austral autumn reduced to below 50%.



Sea surface temperature anomalies (ºC) for August 2009



Mean sea surface temperatures (ºC) for August 2009

Forecast validation: June to August 2009

A region of suppressed convection was forecast for the southwest Pacific encompassing Tokelau, Tuvalu, the Northern Cook Islands, and the Marquesas, and below average rainfall was expected for those areas. Near normal rainfall was forecast for Pitcairn Island and the Tuamotu Archipelago. Enhanced convection was expected around Papua New Guinea, the Solomon Islands, Western Kiribati, Vanuatu, Niue, Tonga, the Southern Cook Islands, and the Austral Islands, and average or above average rainfall was anticipated for June through August. No clear precipitation guidance was offered for Fiji, New Caledonia, Eastern Kiribati, Samoa, the Society Islands, or Wallis & Futuna.

The June – August 2009 forecast validation was calculated for 12 island groups (two countries did not report rainfall values; six were forecast as climatology and were unscorable). The global island group 'hit' rate was 84%, 24% higher than average for June forecasts, and 23% higher than the average for all months combined.

Rainfall was overprojected for Tonga, and the northern part of the Tuamotu Archipelago, while it was underprojected for Tuvalu.

Tropical Pacific rainfall – August 2009

Territory and station station name	August 2009 rainfall total (mm)	August 2009 percent of average
Australia		
Cairns Airport	8	29
Townsville Airport	0	0
Brisbane Airport	4	9
Sydney Airport	6	8
Cook Islands		
Penrhyn	N/A	N/A
Aitutaki	N/A	N/A
Rarotonga Airport	113	104
Fiji		
Rotuma Island	154	74
Udu Point	79	93
Nadi Airport	56	86
Nausori	90	61
French Polynesia		
Hiva Hoa, Atuona	55	39
Bora Bora	58	109
Tahiti – Faa'a	56	114
Tuamotu, Takaroa	62	100
Gambier, Rikitea	222	134
Tubuai	106	78
Rapa	157	65
Kiribati		
Tarawa	247	161
Kanton	143	151
New Zealand		
Kaitaia	96	63
Whangarei Airport	94	68
Auckland Airport	72	67
New Caledonia		
Ile Art, Belep	16	30
Koumac	13	39
Ouloup	15	19
Ouanaham	56	78
Poindimie	26	25
La Roche	60	74
La Tontouta	25	48
Noumea	33	51
Moue	113	127
Niue		
Hanan Airport	128	106
Liku	N/A	N/A

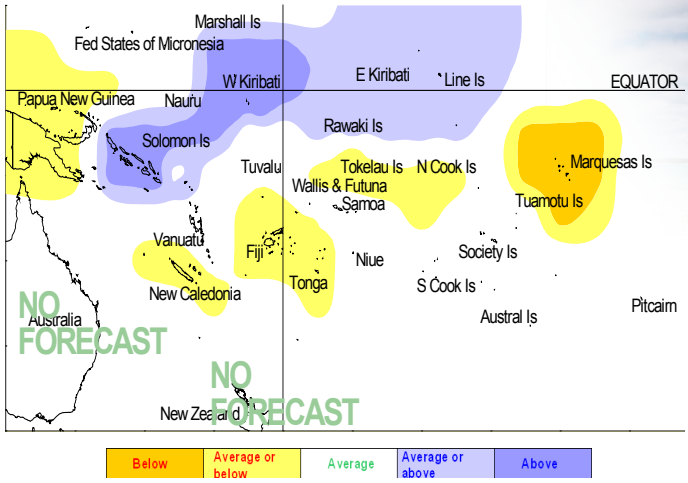
Territory and station station name	August 2009 rainfall total (mm)	August 2009 percent of average
North Tasman		
Lord Howe Island	78	55
Norfolk Island	36	29
Raoul Island	135	105
Samoa		
Faleolo Airport	131	N/A
Apia	133	120
Nafanua	142	115
Afiamalu	187	103
Alafua	100	161
Solomon Islands		
Taro	258	80
Munda	352	134
Auki	82	40
Honiara	97	110
Henderson	89	93
Kira Kira	N/A	N/A
Santa Cruz, Lata	326	97
Tonga		
Niuafo'ou	98	84
Mata'aho Airport	46	47
Lupepau'u	61	69
Salote Airport	57	57
Nuku'alofa	81	69
Fua'amotu Airport	105	85
Tuvalu		
Nanumea	125	54
Nui Island	286	129
Funafuti	163	70
Nuilakita	236	119
Vanuatu		
Sola	438	194
Pekoa	350	473
Lamap	64	108
Port Vila	N/A	N/A
Tanna/Whitegrass	45	N/A
Aneityum	47	14
Papua New Guinea		
Port Moresby	98	350
Wewak	244	145
Kavieng	246	134

Rainfall totalling 200% or more is considered well above average. Totals of 40% or less are normally well below average. Highlighted values are new records.

Data are published as received and may be subject to change after undergoing quality control checks. N/A denotes data unavailability at the time of publishing, and * denotes synoptic values.

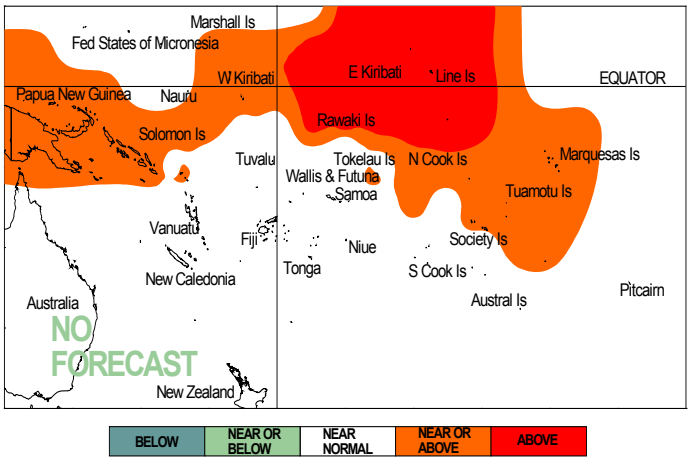
Tropical rainfall and SST outlook: September to November 2009

During September – November 2009, a region of suppressed convection is likely in the southwest Pacific encompassing Tokelau, the Northern Cook Islands, Tonga, Fiji, New Caledonia, and Papua New Guinea. Near to below average rainfall is expected for those areas. Below average rainfall is forecast for the Marquesas.Near normal rainfall is forecast for Niue, Southern Cook Islands, Wallis & Futuna, the Austral Islands and Pitcairn Island. Enhanced convection is likely along the Equator extending from Western to Eastern Kiribati, and also near the Solomon Islands. These regions are expected to receive near or above normal rainfall, with Western Kiribati and the Solomon Islands forecast to receive above normal rainfall. No clear precipitation guidance is offered for Vanuatu, Tuamotu Archipelago, Samoa, and the Society Islands.



Rainfall outlook map for September to November 2009

The global models are continuing to show elevated temperatures in the near equatorial Pacific sea surface for the northwest corner of the Southwest Pacific. Some SST anomalies a have strengthened in the projections from past months.Above average sea surface temperatures are forecast for Eastern Kiribati. A region of near or above average sea surface temperatures is forecast around Papua New Guinea, the Solomon Islands, Western Kiribati, the Northern Cook Islands, the Marquesas and the Tuamotu archipelago. Near normal SSTs are forecast for the remainder of the southwest Pacific.



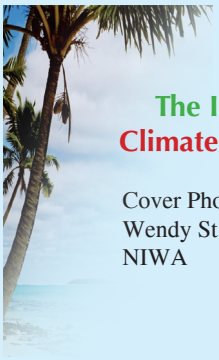
SST outlook map for September to November 2009

The confidence in the multi-model ensemble forecast skill for this seasonal rainfall outlook is moderate to moderately high. In the past, the average region-wide hit rate for rainfall forecasts issued in September is 67%, 6% higher than the long-term average for all months combined. The SST forecast confidence is mostly high, but the greatest uncertainty is localised around the Marquesas and Eastern Kiribati.

NOTE: Rainfall and sea surface termperature estimates for Pacific Islands for the next three months are given in the tables below. The tercile probabilities (e.g., 20:30:50) are derived from the averages of several global climate models. They correspond to the odds of the observed rainfall or sea surface temperatures being in the lowest one third of the distribution, the middle one third, or the highest one third of the distribution. For the long term average, it is equally likely (33% chance) that conditions in any of the three terciles will occur. *If conditions are climatology, we expect an equal chance of the rainfall being in any tercile.

Island Group	Rainfall Outlook	Outlook confidence
Kiribati (Western)	20:30:50 (Above)	Moderate-High
Solomon Islands	20:30:50 (Above)	Moderate
Kiribati (Eastern)	25:35:40 (Near or Above)	Moderate-High
Austral Islands	30:40:30 (Near normal)	Moderate
Cook Islands (Southern)	30:40:30 (Near normal)	Moderate-High
Niue	30:40:30 (Near normal)	High
Pitcairn Island	30:40:30 (Near normal)	Moderate
Wallis & Futuna	30:40:30 (Near normal)	Moderate
Tuvalu	30:35:35 (Climatology)	Moderate
Samoa	35:35:30 (Climatology)	Moderate
Society Islands	35:35:30 (Climatology)	Moderate
Tuamotu Islands	35:35:30 (Climatology)	Moderate
Vanuatu	35:35:30 (Climatology)	Moderate
Tonga	35:40:25 (Near or Below)	High
Cook Islands (Northern)	40:35:25 (Near or Below)	Moderate-High
Fiji	40:35:25 (Near or Below)	Moderate-High
New Caledonia	40:35:25 (Near or Below)	High
Papua New Guinea	40:35:25 (Near or Below)	Moderate-High
Tokelau	40:35:25 (Near or Below)	Moderate-High
Marquesas	45:35:20 (Below)	Moderate

Island Group	SST Outlook	Outlook confidence
Kiribati (Eastern)	20:30:50 (Above)	Moderate
Cook Islands (Northern)	25:35:40 (Near or Above)	Moderate-High
Kiribati (Western)	25:35:40 (Near or Above)	High
Marquesas	25:35:40 (Near or Above)	High
Papua New Guinea	25:40:35 (Near or Above)	Moderate-High
Solomon Islands	25:40:35 (Near or Above)	Moderate-High
Tuamotu Islands	25:40:35 (Near or Above)	High
Austral Islands	30:40:30 (Near normal)	High
Cook Islands (Southern)	30:40:30 (Near normal)	Moderate
Fiji	30:40:30 (Near normal)	High
New Caledonia	30:40:30 (Near normal)	High
Niue	30:40:30 (Near normal)	High
Pitcairn Island	30:40:30 (Near normal)	High
Samoa	30:40:30 (Near normal)	High
Society Islands	30:40:30 (Near normal)	High
Tokelau	30:40:30 (Near normal)	High
Tonga	30:40:30 (Near normal)	High
Tuvalu	30:40:30 (Near normal)	High
Vanuatu	30:40:30 (Near normal)	High
Wallis & Futuna	30:40:30 (Near normal)	High



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This summary is prepared as soon as possible following the end of the month, once the data and information are received from the Pacific Island National Meteorological Services (NMHS). Delays in data collection and communication occasionally arise. While every effort is made to verify observational data, NIWA does not guarantee the accuracy and reliability of the analysis and forecast information presented, and accepts no liability for any losses incurred through the use of this bulletin and its content.

Requests for Pacific Island climate data should be directed to the Meteorological Services concerned.

Sources of South Pacific rainfall data
This bulletin is a multi-national project, with important collaboration from the following Meteorological Services: **American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Kiribati, New Caledonia, New Zealand, Niue, Papua New Guinea, Pitcairn Island, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna.**

Web links to ICU partners:

South Pacific Meteorological Services:

Cook Islands
http://www.cookislands.pacificweather.org/

Fiji
http://www.met.gov.fj

Kiribati
http://pi-gcos.org/index.php (follow link to PI Met Services then Kiribati Met Service)

New Zealand
http://www.metservice.co.nz/

Niue
http://pi-gcos.org/index.php (follow link to to PI Met Services then Niue Met Service)

Papua New Guinea
http://pi-gcos.org/index.php (follow link to to PI Met Services then Papua New Guinea Met Service)

Samoa
http://www.mnre.gov.ws/meteorology/

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http://www.met.gov.sb/

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http://www.met.gov.to/

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The UK Met Office
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European Centre for Medium-term Weather Forecasts
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