Chapter 3 –
Weather

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Don Anderson Weather Broadcast Schedule as of December 2008
Radio Schedule November 2, 2008
Don Anderson
My ham call N6HG
My Private Coast Station, SUMMER PASSAGE RADIO WPXU557
My Valiant 47 "SUMMER PASSAGE" WBX8756
Oxnard, CA
(805) 983-3267

Time UTC	Freq kHz		
1415*	8122		**Amigo Net**. My Forecast, Ensenada to Socorro Island and Sea of Cortez to Puerto Vallarta to Acapulco
1430	3968	LSB	**Sonrisa Net.** I monitor for weather reports and any emergency traffic
1545	7294	LSB	**Chubasco Net.** I monitor for any emergency traffic.
1615	7233.5	LSB	**Baja California Maritime Service Net**. My forecast San Diego to Acapulco including Sea of Cortez. Weekdays only. I am backup for AA6TP if needed on weekends.

1630	12359	I monitor 12C for weather questions usually 500 to 2500 miles from my station.
1645*	16534	I monitor 16C for weather questions from vessels in North Atlantic and North and South Pacific, out to 7000 mi from my station. 18840, 22165 and 25115 are alternate frequencies, especially for vessels beyond 4000 miles.
0045	12359	I monitor 12C for weather questions from vessels out to 2500 mi from my station.
0100*	16534	I monitor 16C for weather questions from vessels North and South Pacific, out to 7000 mi from my station. 18840, 22165 and 25115 are alternate frequencies, especially for vessels beyond 4000 miles.
0200	6516	**Southbound Net.** Brief summary on 6D of any significant weather since Amigo net. During summer months the skip on 6D at this time shortens so I sometimes shift to 8122 or 12C for answering any weather questions from Mexico.

*If nothing heard after 15 minutes I close down.
On Fridays early I have a men's breakfast /bible study meeting so no watch until afternoon.
On Sundays I close down for the rest of the day after my morning 16C watch.

Mexican Ports to The Marquesas

Dr. Donald J. Anderson; Updated February 2009

TRANSITING THE INTERTROPICAL CONVERGENCE ZONE

The Intertropical Convergence Zone

The Intertropical Convergence Zone, usually referred to as the ITCZ, is a band of disturbed unsettled weather surrounding the earth a few degrees north of the equator where the northeast and southeast trade winds converge and where the sea surface temperatures reach their maximum values. It is characterized by cells of moderate to strong convection interspersed with areas of

flat calm (the doldrums). The convection cells appear as tall cumulonimbus clouds reaching heights well above 20,000 feet. At the surface beneath these cells there is frequent torrential rain with thunder and lightning. Conditions are often squally with winds from any direction. The squalls rarely exceed 35 knots.

Unlike the bad weather associated with frontal systems at higher latitudes where they travel from west to east at about 20 knots or more, those in the ITCZ seem to form and dissipate in place, in other words they are stationary systems. Furthermore they can form and disappear over very short periods of time, sometimes less than 24 hours. Seas usually are moderate to small but confused since they can come from any direction or several directions at once.

The ITCZ migrates north and south following the sun, lagging it by about two months. The north-south width of the disturbed area varies from none at all to as much as 300 miles wide. The north-south seasonal boundary migration is usually between about 01N and 14N with the northern extreme occurring during August and the southern extreme during February.

During the winter and spring months, when the ITCZ is closest to the equator, cyclonic storms can not form in the ITCZ because there is negligible coriollis force close to the equator. However, small area low level cyclonic circulations (LLCC's) up to about 120 miles in diameter with winds to 35 knots do occasionally form with very heavy rain and of course confused seas. These have the characteristics of miniature tropical disturbances. They travel east to west at 10 to 20 knots embedded in the southern boundary of the northeast trades. The strongest winds will be found in their northwest quadrant where they enhance the trades.

During the late summer months, when the ITCZ is at its maximum north migration, it experiences a larger coriollis force (actually a conservation of momentum effect rather than a force). This physical situation is an essential component of cyclogenesis leading to tropical storms and hurricanes. It is the principal reason why the highest frequency and the greatest intensities for hurricanes occur during the months of August and September.

Another tropical weather phenomenon affecting conditions along the ITCZ is the tropical wave. This is a whole subject unto itself so suffice it to say here that if one is prudent and makes passage from Mexico to the Marquesas between mid-March through the end of April, one does not have to worry about them. However, later in the season they could really spoil you day.

Should you be unfortunate enough to be making this passage late in the season then here is the stuff to watch for.

Each year on average, we experience about 60 tropical waves moving east to west. They begin their journey along the coast of West Africa and march west at 10 to 15 knots eventually dissipating near the date line. They are north-south troughs lying between about 05N and 18N, about 800 to 1200 miles long. Width is about 300 miles at the surface. They occur mid-May through the end of November so that means a wave passes about every three to four days. Most pass relatively unnoticed to the cruising sailor. Others cause a significant clockwise wind shift as they pass and some have torrential rain on the back side. A small number, about 16 in all, interact with disturbed areas in the ITCZ such that they become part of a significant tropical cyclone development, i.e. cyclogenesis. In the Northeast Pacific, all tropical storms and hurricanes have at least one tropical wave as a component of their cyclogenesis. Only about half of the tropical cyclones on the Atlantic side have such a component, why I don't know.

Frequently in the transition zone between the stable northeast and southeast trades there is an area of southerly winds of 5 to 20 knots over a north-south distance of up to 100 miles. Northerly winds in the transition zone are very rare.

Sometimes there is sufficient separation between the convection cells that one might find a smooth transition between the northeast and southeast trades with the winds never dropping below 15 knots. If one is fortunate enough to find this condition while transiting the ITCZ, it is more likely to be blind luck than astute strategic planning. The convection cells simply form, dissipate and reform in a seemingly random fashion over periods of less than 48 hours which is far too brief a period for a slow moving vessel to effectively steer a course that will assure her of a smooth transit of the ITCZ.

The location of the actual convection is rarely right over the convergence zone. Strictly speaking, the convergence is a zone of wind convergence and the convection cells usually lie on the north side of the convergence zone with their southern boundaries close to the convergence line.

This annual migration is illustrated by the climates of those islands lying in the tropics versus those situated close to the equator.

Isla del Cocos (5-30N 87-00W) and the Palmyra Atoll (5-55N 162-05W) are both situated at about 06ºN. Although they are 4500 miles apart, they both are within the ITCZ for most of the year which is the reason they have average annual rainfalls of about 280 and 180 inches a year respectively. This accounts for the large tropical rain forests on both islands. Isla del Cocos is the more humid of the two because it is situated in the far Eastern Pacific where winds are mostly light while the Palmyra Atoll is in the Central Pacific where the trade winds are well established and consistent.

The Galapagos Archipelago (00-30N 90-40W) straddles the equator and Christmas Island (01-55N 157-25W) is only 115 miles north of the equator. Although they are 4000 miles apart, their annual rainfall is similar; about 20 and 35 inches respectively. Annual rainfall in the Galapagos is fairly consistent whereas on Christmas Island it goes through wide swings between moderate rainfall to periods of drought lasting 18 months or more. Part of the reason is the tendency of the ITCZ to thin out as it progresses west toward the Central Pacific. During a strong El Niño episode, when sea surface temperatures can be two to four degrees Celsius above normal, the trade winds are weaker and the annual rainfall in the Galapagos and Easter Island can exceed five times the average amount.

As already mentioned, the recommended period for passages from Mexican ports to the Marquesas is about the middle of March through April. During this period, the ITCZ usually lies between about 03N and 07N.

The north-south width of the convection cells tends to decrease towards the west, especially west of about 125W.

Figures 1 and 2 are color-coded infrared satellite images. Note the thinning out of the ITCZ as one moves west. Of even greater significance is the change in the ITCZ over a very short period of time.

These images were taken only thirteen days apart. With that in mind, note the significant shift towards the south and the essential disappearance of any convection west of 130W on March 9. This does not mean the ITCZ is moving south in a predictable manner. It simply illustrates dramatically the large variations that can take place over very short periods of time. The distribution of convection could easily return to something like what existed thirteen days earlier. Such is the meandering variability of the convergence zone.

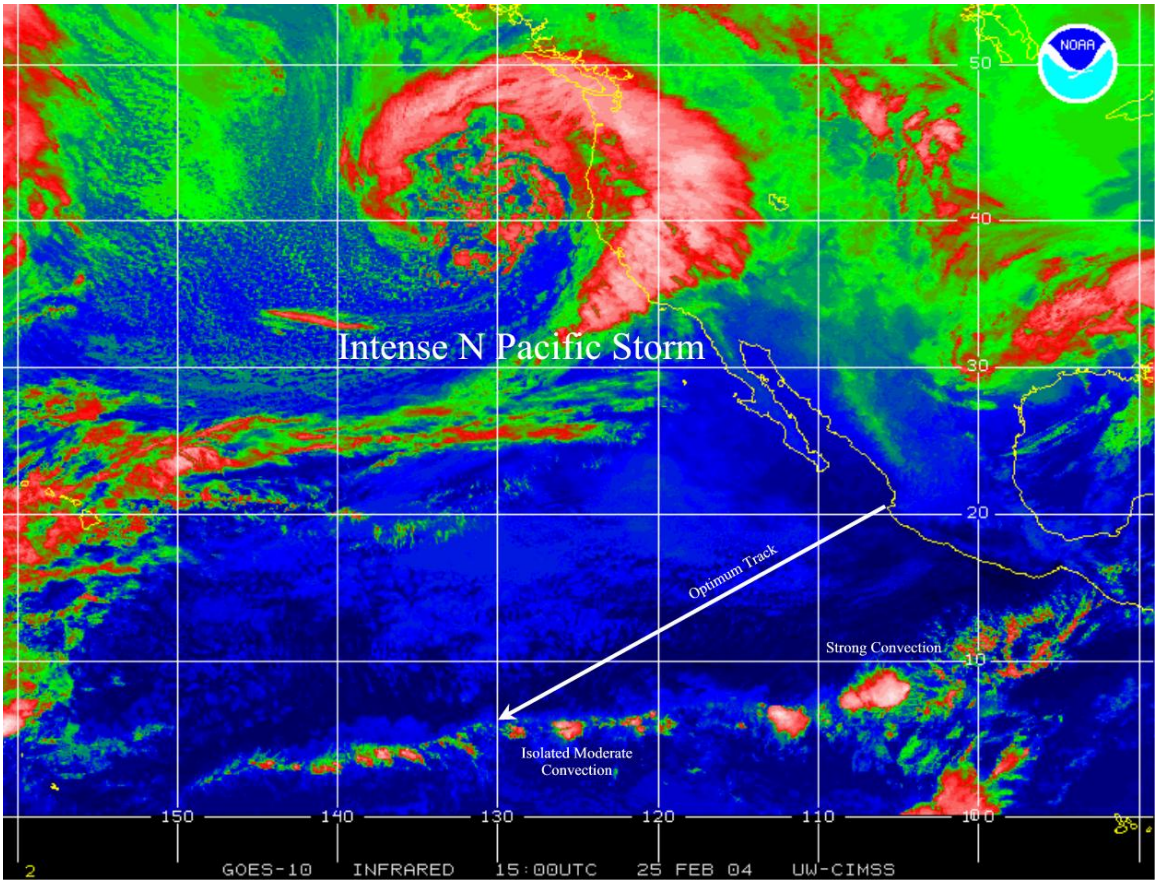


Figure 1

Infrared Satellite Image for February 25, 2004

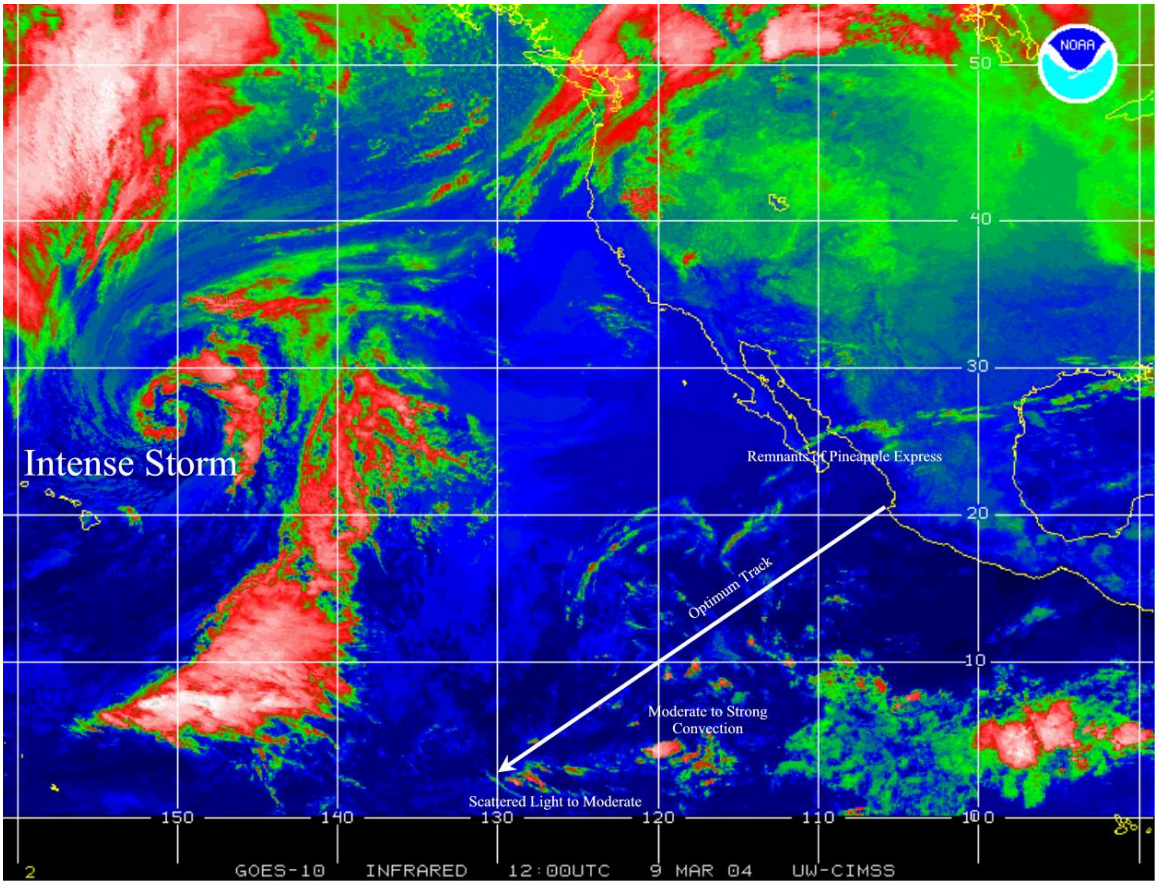


Figure 2

Infrared Satellite Image for March 9, 2004

The location of the ITCZ is given every six hours in the NWS High Seas Forecasts. The format is a sequence of lat/lon coordinates with comments on where along the ITCZ there is moderate or strong convection. This is useful information but one should not expect it to be current. The reason is that the convection cells can develop as strong thunderstorms and then be completely dissipated over a period of less than 24 hours. Unlike thunderstorms at higher latitudes, where they move from west to east at about 20 knots, those in the ITCZ tend to remain stationary. On the other hand, the latitude or line of the ITCZ, wiggles or meanders like the Gulf Stream. For a given longitude, the north-south position of the ITCZ can vary as much as 120 miles in a 24-hour period. What all this means is that by the time a vessel receives the ITCZ data, conditions have probably changed significantly. A slow moving vessel can not expect to find a hole in the convection chain based on information received via INMARSAT-C or USCG HF-voice weather forecasts. One might be able to improve one's chances if one has the capability to receive (real time) the low altitude polar orbiting NOAA weather satellite infrared encoded images directly as they pass over one's location. Aboard "*SUMMER PASSAGE*" we use the OCENS software and receiver.

Forecasting the day-to-day meanderings of the ITCZ is for me at any rate impossible. It's rather like trying to predict which way the rabbit is going to go when I chase him across the meadow. I know he probably will stay somewhere ahead of me, but when and where will he zig or zag? The only charts I'm aware of in the public domain that come reasonably close to forecasting the ITCZ are the streamline charts generated by the USN's NOGAPS model. But even then, one has to weight or bias them each day based on QuikSCAT scatterometer surface wind data. Computed wind vectors from scatterometer measurements are remarkably accurate. However, one has to be careful not to put too much faith in the data on the edges of the swaths or in the vicinity of very heavy precipitation.

So how does a slow moving vessel make something useful out of ITCZ data? Well, if one plots the coordinates every 24 hours, beginning several days in advance, and if one uses the same piece of paper or electronic chart, then one will have a band that shows the most probable width and location of the ITCZ. To illustrate this exercise I have plotted the daily coordinates given for the ITCZ over an eight-day period. Figure 3 shows these plots. Note the wider swings at the eastern end versus the smaller swings at the western end. Also note that during this brief period of time, the north-south swings range from about 175 to 475 miles. This illustrates my point that a slow-moving vessel can not expect to exploit the ITCZ to advantage. The rate of changes in the ITCZ far exceed the rate of progress of a slow-moving vessel.

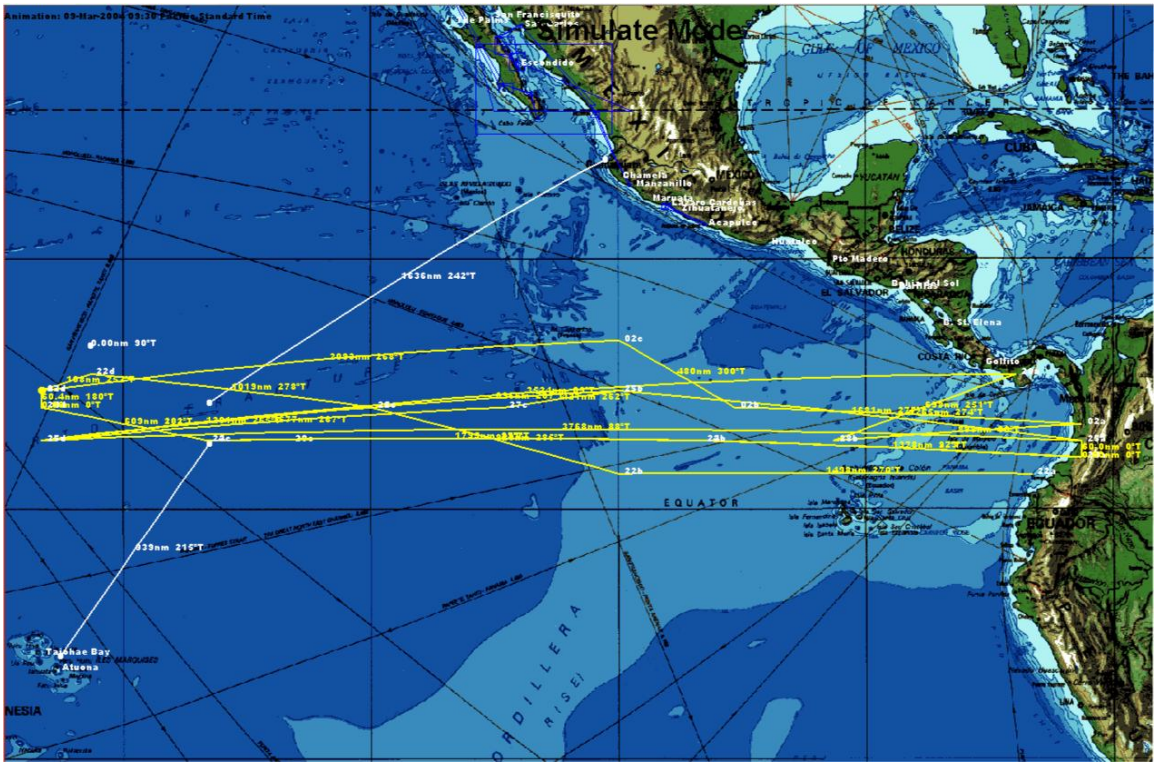


Figure 3
Plots of Daily ITCZ Coordinates Over An Eight-Day Period
February 22 through March 2, 2004

The Optimum Intermediate Waypoint

Obviously, based on the above illustrations, there is no precise optimum intermediate waypoint. All one can say is that at this time of year it is most likely to be somewhere between 03N and 07N at about 130W.

Generally one needs to remain north of the ITCZ for as long as possible. This means one makes most of one's westing in the northeast trades. Another reason to elect this strategy is that at this time of year the northeast trades tend to be stronger than the southeast trades. A third reason is that one is more likely to find spaces between the convection cells the further one is to the west. However, it usually is not worth sailing further than about 132W before diving south; the extra distance isn't worth it.

There is a fourth reason that has to do with the doldrums. During the recommended season, there is a good probability that the further west one goes, the more likely one will find a sharp transition between the northeast and southeast trades. Cutting the corner before the recommended waypoint, i.e. diving south, increases the probability of encountering large areas of calm. If you leave late in the season, say in June, this becomes even more probable. The reason is that the low-pressure systems forming a few hundred miles off Southern Mexico during hurricane season have the effect of markedly reducing the strength of the winds in the far southeastern corner of the trade wind belt.

A fifth reason for making most of your westing in the northeast trades as well as not leaving it too late to depart, is that as hurricane season approaches, the southeast trades in the far Eastern Pacific steadily veer, becoming southwest winds. Not only would these winds be head winds, the severity of the ITCZ weather increases as the winds shift from a convergence situation to one of shear.

On reaching the ITCZ most vessels power or motor sail due south so as to cut the ITCZ at right angles in order to transit in the shortest possible time. Once one is finally in steady southeast trades one sets course directly for the Marquesas. Sometimes the southeast trades are actually east winds.

Sailing this dogleg course is about 100 miles longer than the direct great circle or rhumb line route. That's less than three percent more than the shortest route.

While this strategy minimizes the amount of time one may be exposed to the ITCZ, one should still expect squalls at any time along the route, especially after clearing the Revillagigedos Archipelago. After all, this entire 3000-mile passage is made in the tropics.

South Pacific Pilot Charts

The US government has produced pilot charts for the South Pacific that show for each of the 12 calendar months the average conditions expected, with both text and color graphic representation of the winds, pressures, temperatures and cyclone probabilities. There is also an El Nino chart.

The 26 pages are best printed on 8 ½ x 17 legal size paper in color. The document is not printed in this manual, but is on the Puddle Jump CD as an appendix.

List of Worldwide HF Weatherfax Stations as of 5/06

This document is self-explanatory. The Hawaii and Pt Reyes CA station data are included in the printed document below. are. The document is not printed in this manual, as it is 124 pages but is on the Puddle Jump CD as an appendix.

Weather Forecast Services For South Pacific Noonsite 1/06

From: Bob McDavitt, Weather Ambassador mcdavitt@metservice.com

The main area I watch is from French Polynesia to the Australian East coast (but I can do Galapagos to Marquesas if you ask). I do not offer routing information (waypoints and so forth) but I do offer Weathergrams and 5-day forecasts --

Weathergrams: I occasionally (usually on a Sunday) send my weather ideas for sailing around the South Pacific as email messages, which I call weathergrams. Use these to plan when to start your voyages. You can log yourself on (and off) these (and/or yacht reports) from http://www.pangolin.co.nz/yotreps/list_manager.php

MetService High Seas Forecasts are sent in English by ZLM on HF 6224 and 12356 at 0303Z, 0903Z, 1503Z and 2103Z and on 8297 and 16531 30 minutes later. Full details are in the Nautical Almanac or at http://www.hydro.linz.govt.nz/msi/met/sched-broadcasts.pdf

MetService maps are sent by Radio Fax on ZKLF on SSB 3247.4, 5807, 9459, 13550.5 or 16340.1, Sked sent between 2300 and 2359Z and is at http://www.metservice.co.nz/services/radiofax_schedule.asp

All the above is free in the public domain.

Other weather forecast information by email : From www.buoyweather.com for $10 you can get 100 messages, triggered by your own email, each giving a voyage forecast. Then there is pangolin@xtra.co.nz - send an email with the word HELP in the message and it will auto reply all its services. Sailmail and seamail also offer various weather packages.

Voyage forecasts (and weather watch/updates): When I'm available I can send you a weather forecast covering the next 5-days, by email or by fax (if sent by fax you get the weather maps). Forecast includes target pressures (my specialty). Cost is $NZ50 per forecast + any communication expenses, and $10 per 5 minutes for any extra weather updates. Let me know your Boat type and name and likely departure date, speed and destination (and credit card info) a few days before you intend to sail. You can split the credit card details over two emails or phone/fax to: Bob McDavitt, MetService Weather Ambassador, PO Box 68429, Newton, Auckland, New Zealand, mcdavitt@metservice.com Phone (+64 9) 377 4831 Fax (+64 9) 3075993

Voice forecasts on HF

WWVH in Hawaii

gives storm warnings for the entire Pacific at 48 minutes past each hour on 5000, 10000 and 15000 kHz

Mahina Radio

forecasts for French Polynesia on 8803 kHz at 2100Z (also on VHF channels 26 and 27). Warnings at 0640Z and 1800Z.

Suva Radio

forecasts for tropical SW Pacific on 4372.9 and 6746.8 kHz at 0033, 0433, 0803, 1203, 2003Z

Taupo Maritime Radio (New Zealand)

forecasts fort subtropical SW Pacific on 6224, 8297, 12356, 16531 kHz at 0903 and 2103Z

Weather fax

Wellington Met office transmission schedule on 9459 kHz at 2315Z, 13550.5 kHz at 2330, 16340.1 kHz at 2345. Maps cover South Pacific from Australia to Tahiti. Details of all services on www.metservice.co.nz

www.nws.noaa.gov

Landlubber's forecast:
"City, St" or zip code

Search by city or zip code. Press enter or select the go button to submit request

Go

City, St

NWS Home
Parent Office
Marine and Coastal Weather Services Branch

Items of Interest
Marine Forecasts

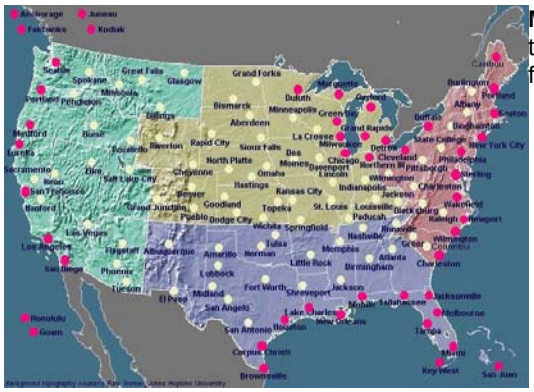
Observations
Dissemination
Publications
Links
FAQ
Contacts
Feedback

Vote

Be Prepared!

FIRSTGOV.gov
The U.S. Government's Official Web Portal

National Weather Service Marine Forecasts



Marine Forecast Offices and Centers provide links to their products as well as additional regionally focused information. Click on map for links.

Items of Interest to Mariners

- Read about NWS involvement in "The Perfect Storm".
- **Recent and Upcoming Changes to Marine Forecasts and Services**
- USCG seeks comments on proposed changes to NAVTEX broadcasts (pg 51)
- Marine Weather in the News, More, More , More , More , More
- For copies of old forecasts, please see our FAQ
- We appreciate feedback

Marine Text Forecasts and Products

- Marine Text Forecasts and Products Listing
- Most Popular Marine Text Forecasts (low speed connection friendly)
- Marine Text Forecasts by Zone - Text Interface (now with NWR SAME codes) new
- **Coastal** Marine Text Forecasts by Zone - Graphic Interface
- **Offshore** Marine Text Forecasts by Zone - Graphic Interface
- **High Seas** Marine Text Forecasts by Area - Graphic Interface
- Forecasts for NOAA Marine Sanctuaries
- More...

Graphic Marine Forecasts and Products

- Radiofax Charts
- Weather Charts
- U.S. Weather Maps
- Model Guidance from the Ocean Modeling Branch
- NDFD Graphical Forecasts (Experimental) new
- News - Gridded and Vector Data
- More...

Observations

- Buoy, C-MAN, Ship, and Drifting Buoy Observations
- PORTS®
- Coastal Water Temperature Guide
- Gulf Stream and Sea Surface Temperatures
- NEXRAD Doppler RADAR
- GOES Satellite Imagery and Products
- Ocean Surface Winds and Other Data Derived from Satellites new
- Tides and Water Levels (some stations also have meteorological sensors)

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WEATHER WEB SITES

And Other Useful Sources

Don Anderson N6HG

February 20, 2004

GRIB Files
Five-day forecasts: wind vectors
Send the following:
To: query@saildocs.com
grib:10N,35N,090W,160W|1,1|12,24,48,72,96,120,144,168,192|
or to receive files daily at about 1200Z send:
sub grib:10N,35N,090W,160W|1,1|12,24,48,72,96,120,144,168,192 days=30

Pacific Seafarers Net
http://pacsea.net/index.html
Tracking Cruising Yachts in the Pacific.
Daily at 0325Z on 14313.0 KHz
Posted to website (http://www.bitwrangler.com/yotreps/) each evening after roll call with positions, track, weather and chart.
Good source of on-site weather conditions.

High Seas Forecasts East Pacific. NWS Washington DC.
Equator to 60N East of 160W.
Excellent plain text forecast for the big picture out to 36 hours.
Text updated every 6 hours beginning 0500Z.
Available free to all vessels equipped with INMARSAT-C receivers.
http://weather.noaa.gov/cgi-bin/fmtbltn.pl?file=forecasts/marine/high_seas/north_pacific.txt&title=High+Seas+Forecasts%3CBR%3EEast+Pacific

Fleet Numerical Meteorology and Oceanography Center (FNMOC)
US Navy, Monterey, California. (831) 656-4875
Most extensive global weather charts with prognoses out to 6 days.
Home Page: https://www.fnmoc.navy.mil/public/wxmap/
Best wind vector forecast for Baja outside and on down to Colombia including Gulf of Mexico.
Not much detail for Sea of Cortez.
Click on "(COAMPS) Central America" for numerical model surface wind vector analysis and prognoses out to 48 hours in 6-hour increments.
Click on "Global Models (NOGAPS) and then on "Tropical EASTPAC" for surface streamlines out to 144 hours in 12-hour increments. Covers 40N to 30S and 080W to 160E. Good for best guess long range forecast for Baja outside, Gulf of Tehuantepec, windy areas of Central America such as Gulf of Papagayo and G of Panama.
Best big picture for routes to Hawaii and French Polynesia.

California Waters from 60 NM TO 250 NM Offshore.
Point Conception to Guadalupe Island.
Plain text for today, tonight and tomorrow.

Reliable for passages offshore Baja.
http://weather.noaa.gov/cgi-bin/fmtbltn.pl?file=forecasts/marine/offshore/pz/pzz085.txt

High Seas Forecast South Pacific NWS Honolulu
Equator to 25S, between 120W and 160E
Excellent plain text forecast for the big picture out to 36 hours.
http://weather.noaa.gov/cgi-bin/fmtbltn.pl?file=forecasts/marine/high_seas/south_hawaii.txt

Eastern Pacific Wind/Seas Analysis. Tropical Prediction Center/TAFB Miami FL.
34N to 20S between 075W and 140W
Updated every 12 hours. Good reliable wind vector data for long offshore passages:
Hawaii to Marquesas
Mexico to Hawaii
Mexico to Marquesas
Banderas Bay offshore to Panama and South to Galapagos.
Not very good for coastal conditions.
Poor and unreliable coverage for Sea of Cortez. Often 24 hours late for gale warnings in the Gulf of Tehuantepec.
Best source of wind data for Marquesas bound vessels equipped only with WEFAX. Available as WEFAX from USCG Station NMC, Point Reyes.
Frequencies, USB: 4344.1 8680.1 12728.1 17149.3
Times UTC: 1510 2419

http://weather.noaa.gov/pub/fax/PJBA00.TIF
http://weather.noaa.gov/pub/fax/PJBA01.TIF

24-Hour Wind/Wave Forecast
Northeast Pacific, Alaska to Cabo San Lucas
Valid 0000Z.
http://weather.noaa.gov/pub/fax/PWBE98.TIF
Valid 1200Z.
http://weather.noaa.gov/pub/fax/PWBE99.TIF

48-Hour Wind/Wave Forecast.
Northeast Pacific, Alaska to Cabo San Lucas
Valid 0000Z.
http://weather.noaa.gov/pub/fax/PJBI98.TIF
Valid 1200Z.
http://weather.noaa.gov/pub/fax/PJBI99.TIF

Pacific Surface Analysis.
Isobars, wind vectors and fronts; northeast Pacific.
18N to 65N and 118W to 173W
Valid 0000Z.
http://weather.noaa.gov/pub/fax/PYBA01.TIF
Valid 0600Z.
http://weather.noaa.gov/pub/fax/PYBA03.TIF
Valid 1200Z.
http://weather.noaa.gov/pub/fax/PYBA05.TIF

Valid 1800Z.
http://weather.noaa.gov/pub/fax/PYBA07.TIF

24-Hour Surface Forecast.
Northeast Pacific, isobars and fronts. No wind vectors.
Valid 0000Z.
http://weather.noaa.gov/pub/fax/PPBE00.TIF
Valid 1200Z.
http://weather.noaa.gov/pub/fax/PPBE01.TIF

48-Hour Surface Analysis.
Isobars, wind vectors and fronts; entire north Pacific.
22N to 65N and 118W to 138E
Valid 0000Z.
http://weather.noaa.gov/pub/fax/PWBI98.TIF
Valid 1200Z.
http://weather.noaa.gov/pub/fax/PWBI99.TIF

96-Hour Surface Forecast.
Isobars, wind vectors and fronts; entire north Pacific.
22N to 65N and 118W to 138E
Valid 0000Z.
http://weather.noaa.gov/pub/fax/PWBM99.TIF

Naval Pacific Meteorological and Oceanographic Center/Joint Typhoon Warning Center.
USN Honolulu. Charts, Satellite Images and Text.
The best graphical predictions for tropical cyclones throughout the world.
Excellent charts and text out to 144 hours updated every 6 hours only when there is a significant cyclonic disturbance.
http://www.npmoc.navy.mil/

National Hurricane Center/Tropical Prediction Center

Located on the campus of Florida International University, Miami FL.
Tracks active and potentially active tropical systems.
Most up to date source of analyses and predictions in text form with satellite imagery.
Areas covered:
Atlantic Ocean, Caribbean Sea, Gulf of Mexico and Eastern Pacific out to 140ºW.
http://www.nhc.noaa.gov/index.html

Central Pacific Hurricane Center

NWS, Honolulu, Hawaii.
Analysis and forecasts for all tropical cyclones in Central Pacific, 140W to the International Dateline.
http://205.156.54.206/pr/hnl/cphc/pages/cphc.shtml

University of Hawaii. Department of Meteorology

http://lumahai.soest.hawaii.edu/cgi-bin/uhmetintro.cgi
Educational and research site so intermittent, especially when the surf is up.
However, when their products are current, they are the best color-coded global GOES satellite infrared images available for the Pacific. Good views of the Pineapple Express.
When reliable they provide frequent updates, sometimes hourly.
GOES-10 Hawaii to U.S. Mainland.
http://lumahai.soest.hawaii.edu/cgi-bin/satview.cgi?sat=g10&satregion=hus&channel=ui4&anim=no&size=large
Especially useful for tracking the ITCZ west of 115W, fronts, thunderstorm activity (significant convection) and cyclonic storms (hurricanes etc.).
Click on "Sea Level Pressure and Wind Overlays" to see excellent surface analysis of N. Pacific high with wind vectors. Shows why one should think twice about taking "Clipper Route" from Mexican ports to Northern California.
GOES-10 Pacific West of 105W
http://lumahai.soest.hawaii.edu/cgi-bin/satview.cgi?sat=gmsg10&satregion=pac&channel=mi8&anim=no&size=large
Especially useful for tracking the secondary ITCZ south of the equator, west of 105W.
Also good for tracking tropical cyclones in western Pacific

INTELLICAST North Pacific High Resolution Satellite Image.
http://www.intellicast.com/Local/USNationalWide.asp?loc=usa&seg=Sail&prodgrp=SatelliteImagery&product=PacificHIRES&prodnav=none&pid=none
Infrared encoded Northeast Pacific image. Chamela Mexico to Alaska and out to 170W updated every 30 minutes.
Good but poor resolution in color encoding. However, it's very reliable.

National Meteorological Service of México City (SMN).
http://smn.cna.gob.mx/productos/mm5/htm/pag7772.htm
SMN in collaboration with Pennsylvania State University and National Center for Atmospheric Research, Boulder CO. Uses the Numerical Forecast MM5 model.
Wind vectors for entire west coast of Mexico, including Sea of Cortez and Gulf of Mexico out to 72 hrs. Updated daily at approximately 0430Z. Fairly good out to 48 hours, less so for 72 hrs.
Overall not as good as FNMOC wind vector prognoses.

http://smn.cna.gob.mx/satelite/sat.html
GOES-8 IR Satellite Image, color-coded. Complete coverage for US, Mexico to Ecuador and the Caribbean. Updated every 30 minutes.
Click on "Loop" to view excellent animation of cloud movement for recent 3-hour period.
Useful for estimating rate of movement or dissipation of Pineapple Express and other cloud formations across entire area. By observing the turbulence in the center of high attitude low temperature cloud formations one can assess the degree of convection and hence the strength of TSTM intensity.
Also black and white image of Mexico only, with Gulf of Mexico. Good for Baja Peninsular, Sea of Cortez down to Gulf of Tehuantepec. Updated every three hours.

Eastern East Pacific GOES-8 Satellite Infrared Image, Ch. 4
NOAA color-coded image updated hourly.
Good for tracking cyclonic disturbances and TSTM's Baja to Panama.
Good images of Pineapple Express when it is crossing the Baja or Mainland Mexico.

30N to Equator, 080W to 110W and Baja-Sea of Cortez.
http://www.ssd.noaa.gov/PS/TROP/EPACIR4.html

East Central Pacific GOES-10 Satellite Image
NOAA color-coded image updated hourly.
Good for Pt. Conception to Cabo San Lucas, including Sea of Cortez.
Also useful for tracking fronts, storms, tropical disturbances and the Pineapple Express.
Equator to 36N, 110W to 160W.
http://www.ssd.noaa.gov/PS/TROP/CPACIR4.html

U of Wisconsin, East Pacific color coded GOES-10 Satellite image.
Beautiful color images updated every two to four hours. Another educational and research institution and hence occasional outages. Moderately reliable.
http://cimss.ssec.wisc.edu/tropic/real-time/eastpac/images/xxirg9n.GIF

National Pacific Meteorology and Oceanography Center, San Diego (USN)
http://www.npmoc-sd.navy.mil/
San Diego Local Weather
Eastern Pacific and Central America
Links to other USN sites. Many other products available from this page.

National Center for Atmospheric Research, Boulder Colorado.
NCAR Index Page for Real-Time Weather
http://www.rap.ucar.edu/weather/
NCAR Surface Analysis, US to 20N
Only a fair indicator of present conditions for high wind areas such as Ceralvo Channel, Cabo Corrientes and the outside of the Baja. Frequently in error compared to on-site reports.
http://www.rap.ucar.edu/weather/surface/us_mslp.gif
NCAR 12hr Surface Winds, US to 20N
Fairly good prognosis chart, unfortunately only goes out to 12 hours and cuts off at Cabo Corrientes.
http://www.rap.ucar.edu/weather/model/ruc12hr_sfc_mslp.gif
NCAR Surface Winds, US to 20N
Five frames, Analysis, 03, 06, 09, and 12-hour forecasts.
http://www.rap.ucar.edu/weather/model/displayMod.php?var=ruc_sfc_mslp&hours=hr00hr01hr02hr03hr06hr09hr12

National Research Laboratory (NRL), Monterey (USN).
http://www.nrlmry.navy.mil/sat_products.html
Spectacular satellite images for Atlantic and Pacific Oceans. Updated frequently.

Marine Observing Systems Team.
High resolution ocean surface winds derived from the SeaWinds Scatterometer.
Processed by NOAA/NESDIS from near real-time data from NASA/JPL's SeaWinds Scatterometer aboard the QuikSCAT polar orbiting satellite.
Global wind vectors. Updated frequently, sometimes hourly.
Excellent for Gulf of Tehuantepec and Central America.
Click on chart area of interest for spectacular fine grid wind vector resolution.

By far the best source of reliable accurate data for checking validity of analyses and prognoses for ocean wind vectors from numerical models, 080N to 080S.
When the Multidimensional Histogram (MUDH) rain flag is being used, the black vectors are a good indication of the location and degree of severity of the ITCZ.
http://manati.wwb.noaa.gov/quikscat/

NOAA National Data Buoy Center
Hourly weather from coastal and offshore weather buoys and coast stations.
Excellent for verifying forecasts.

Northwest USA and Canada
http://www.ndbc.noaa.gov/Maps/Northwest.shtml
Southwest USA
http://www.ndbc.noaa.gov/Maps/Southwest.shtml
Hawaiian Islands
http://www.ndbc.noaa.gov/Maps/Hawaii.shtml

Oceanweather Inc.
http://www.oceanweather.com/
Marine forecasts/hindcasts Research at the air-sea interface.
Wind vectors from on-site reports from ships, weather buoys and coast stations.
Global coverage updated every 6 hours. Excellent reliable data except that occasionally a ship's report will be a significant error (e.g. N at 60 kts when isobaric charts would suggest S at 6 kts). Therefore need to check against your own wind estimate from isobaric spacing and direction (4 MB spacing in degrees of latitude divided into 50).
Good data for checking validity of analyses and prognoses from numerical models.
Click on bottom right corner to select a region from a world chart.

Northeast Pacific, Equator-62N, 090W-170E
http://www.oceanweather.com/data/NPAC-Eastern/marineM00.gif

Northwest US Coastal, 40-52N, 116-140W
http://www.oceanweather.com/data/NW-US/marineM00.gif

Southwest US Coastal, 30-42N, 116-134W
http://www.oceanweather.com/data/SW-US/marineM00.gif

South Pacific, Equator to 70S, 065W-160E
http://www.oceanweather.com/data/South-Pacific/marineM00.gif

South Atlantic, Equator to 70S, 040E-090W
http://www.oceanweather.com/data/South-Atlantic/marineM00.gif

Land-based Meteorological Stations.
These stations provide a good check on prognoses. They allow one to assess the diurnal thermal effects on coastal conditions. Often winds are much stronger and sometimes 180 degrees different from what one sees on marine weather charts. This is because the charts tend to average wind vectors over 12 or 24-hour periods over areas as great as 100,000 square miles

(blocks of 5 degrees of latitude on a side). Check the following NWS website for worldwide list of stations. http://www.nws.noaa.gov/tg/siteloc.shtml

Mexico, Hourly Reports

Mexicali 32-38N 117-00W 22m
http://weather.noaa.gov/weather/current/MMML.html

Loreto 26-01N 111-21W 15m
Fairly good read on Southern Sea of Cortez on Baja side.
http://weather.noaa.gov/weather/current/MMLT.html

Guaymas 27-58N 110-56W 27m
Fairly good read on Central Sea of Cortez on mainland side.
http://weather.noaa.gov/weather/current/MMGM.html

Los Mochis 25-41N 109-05W 4m
Fairly good read on Southern Sea of Cortez on Mainland side.
http://weather.noaa.gov/weather/current/MMLM.html

La Paz 24-04N 110-22W
Fairly good read on winds in La Paz area.
http://weather.noaa.gov/weather/current/MMLP.html

San Jose Del Cabo 23-09N 109-42W
Use with caution. When wind speeds are high, they are usually high offshore. However the wind direction rarely agrees with that across the water.
http://weather.noaa.gov/weather/current/MMSD.html

Mazatlan 23-10N 106-16W
Winds tend to be much less than offshore, unless from the westerly quadrant when they seem to be a reliable indicator of coastwise conditions, especially afternoons.
http://weather.noaa.gov/weather/current/MMMZ.html

Puerto Vallarta 20-41N 105-15W
Rarely a good indicator of winds in Banderas Bay, especially La Cruz and Punta de Mita where afternoon winds are often strong from the west.
http://weather.noaa.gov/weather/current/MMPR.html

Manzanillo 19-09N 103-34W
Very reliable indicator of coastal daytime and early evening conditions in that area, especially the afternoon southwesterlies.
http://weather.noaa.gov/weather/current/MMZO.html

Ixtapa-Zihuatanejo 17-36N 101-28W
Very reliable indicator of coastal daytime and early evening conditions in that area, especially the afternoon southwesterlies.

During winter months, marine forecasts usually show light and variable winds 10 kts or less from Chamela to Puerto Huatulco. However, for this stretch of the mainland, land-based reports as well as those from anchored vessels, show light to calm winds night and early morning, and occasionally 10 to 15 kts off the land. By noon winds veer to the S to SW 5 to 10 kts, and by mid afternoon are frequently SW to WSW 10 to 15 kts, occasionally 20 to 25 kts.
http://weather.noaa.gov/weather/current/MMZH.html

Acapulco 16-46N 099-45W
http://weather.noaa.gov/weather/current/MMAA.html
A light wind area, especially during the winter months. Not a good indicator of winds 50 to 100 NM offshore. Reliable for afternoon southwesterly wind reports.

Puerto Escondido 15-52N 97-05W 88m
http://weather.noaa.gov/weather/current/MMPS.html
Good indicator of on coastal winds between Acapulco and Bahias de Huatulco.

Bahias De Huatulco 15-47N 096-16W
http://weather.noaa.gov/weather/current/MMBT.html
Located on the west end of the Gulf of Tehuantepec, but not a good indicator of conditions in the Gulf. Winds are usually from the southern semicircle less than 15 knots. Even when there are gale or storm conditions in the Tehuantepec.

Minatitlan 18-06N 094-35W
http://weather.noaa.gov/weather/current/MMMT.html
Located on the Bahia de Campeche on Atlantic side of the Tehuantepec.
A good indication of conditions in the Gulf of Tehuantepec.
If it's blowing 15+ from the northerly quadrant, then it's probably blowing a gale in the Tehuantepec. When it's blowing from the other quadrants, it's usually light and variable in the Tehuantepec.
(By far the best 2- and 5-day forecasts for the Gulf of Tehuantepec may be found in the USN FNMOC COAMPS and NOGAPS Tropical East Pacific Surface Streamlines and Wind Speeds graphics at file://localhost/PUBLIC

Meteorological Stations, Central America, Hourly Reports

San Jose, Guatemala 13-55N 090-49W 2m
Fair indication of conditions in Puerto Quetzal.
http://weather.noaa.gov/weather/current/MGSJ.html

Compala, El Salvador 13-26N 089-03W 25m
Fair indicator of conditions at Marina Barillas.
http://weather.noaa.gov/weather/current/MSLP.html

Chinandega, Nicaragua 12-38N 087-08W 60m
Good read on wind direction but coastal winds often stronger than reported.
http://weather.noaa.gov/weather/current/MNCH.html

Bluefields, Nicaragua 12-00N 086-46W 5m
Useless indicator of winds on the Pacific side.

http://weather.noaa.gov/weather/current/MNBL.html

Liberia, Costa Rica 10-37N 085-26W 80m
The best read on Gulf of Papagayo winds, but often coastal winds are stronger by as much as 15 kts with much stronger gusts.
http://weather.noaa.gov/weather/current/MRLB.html

Chacarita, Costa Rica 09-59N 084-47W 2m
Only 5 miles east of Puntarenas. Good reliable reports.
http://weather.noaa.gov/weather/current/MRCH.html

Tobias Bolanos International, Cost Rica 09-57N 084-09W 994m
Located 100 miles ESE of Gulf of Papagayo and 36 miles N of Punta Quepos.
A fairly good indicator of winds along the coast, especially if strong from E to NE.
http://weather.noaa.gov/weather/current/MRPV.html

Santiago, Panama 8-05N 080-57W 88m
Located on peninsular at west side of Gulf of Panama. Best indicator of the strong winds prevalent off Punta Mala. Daytime winds usually 5 to 10 kts greater than marine forecasts. Night and early morning winds usually calm or much less than marine forecasts.
http://weather.noaa.gov/weather/current/MPSA.html

Marcos A. Gelabert, Panama 08-59N 079-31W
Good indicator of Canal Zone weather
http://weather.noaa.gov/weather/current/MPMG.html

Tocumen, Panama 09-03N 79-22W 45m
http://weather.noaa.gov/weather/current/MPTO.html
Good indicator of Canal Zone weather

NWS CHARTS
Also broadcast as WEFAX charts by USCG stations.

Mexico Weather. USA Today. Chart
Moderately useful for showing thunderstorm areas but otherwise of no marine value.
http://www.usatoday.com/weather/basemaps/wmxp1.htm

Mexico Weather. USA Today. Selected Cities.
Designed for tourists. 4-day forecasts for wind, cloud cover and precipitation. Rarely accurate except during really bad weather.
http://www.usatoday.com/weather/basemaps/wmxt1.htm

High Seas Forecast, Offshore Peru NWS Washington DC.
S Pacific from the Equator to 18.5S E of 120W.
Galapagos and offshore Ecuador and Peru.
Plain text forecast out to 36 hours, updated every 6 hours beginning 0515Z.
Available free to all vessels equipped with INMARSAT-C receivers.

http://weather.noaa.gov/cgi-bin/fmtbltn.pl?file=forecasts/marine/high_seas/east_pacific_3.txt

Coastal and Offshore Forecast, Chile
Armada de Chile, Valparaiso Playa Ancha Radio CBV.
Coast of Chile to Antarctica and out to 130W.
Plain text forecast out to 36 hours, updated every 12 hours. In Spanish and English.
Available free to all vessels equipped with INMARSAT-C receivers.
Information available from cbvradio@directemar.cl
Twice daily position reports to mrccchile@directemar.cl

Global 5-Day Marine Forecasts

http://www.buoyweather.com/
Interesting virtual buoy data based on numerical models.

Armada de Chile
http://www.directemar.cl/
Copies of daily Analysis and Prognosis WEFAX charts.
Go to Servicios, Servicio de Comunicaciones Marítimos, Meteorolgia, Mapa Sinóptico.
Only source of such information for entire coast of Chile.

Dundee Satellite Receiving Station

Spectacular black and white geostationary satellite images of whole globe.
http://www.sat.dundee.ac.uk/auth.html

USCG HF VOICE BROADCASTS
Perfect Paul synthesized voice weather forecasts
http://www.nws.noaa.gov/om/marine/hfvoice.htm

WEFAX RECEPTION
Currently the simplest system for laptop/PC's is JVComm32.
All one needs is an HF receiver, the software and a laptop/PC equipped with a sound card. No external demodulator is necessary. The quality of the images is excellent. The software may be downloaded from the website of Eberhard Backeshoff, DK8JV.
http://www.jvcomm.de/

List of Worldwide HF Weatherfax Stations

Worldwide Marine Radio Facsimile Broadcast Schedules
List of stations, products, frequencies and schedules compiled by NOAA/NWS
Acrobat PDF file. http://www.nws.noaa.gov/om/marine/rfax.pdf

New Zealand

ZKLF Radio Facsimile Schedule

Schedule of HF WEFAX transmissions.
http://www.metservice.co.nz/services/radiofax_schedule.pdf

INMARSAT-C
NWS, Peru, Chile, Fiji, New Zealand and Australia Meteorological Offices broadcast free marine analyses and forecasts in English text form to vessels equipped with INMARSAT-C transceivers. Excellent information for entire Pacific, updated every six hours by some offices.
See: Trimble Product Guide: Galaxy Inmarsat-C/GPS Marine, for transceiver system details at:
http://www.trimble.com/galaxymarine.html

HF E-mail, WinLink and SailMail
The latest in low cost e-mail for offshore cruisers worldwide.
http://www.sailmail.com/
http://winlink.org/
Necessary to receive GRIP files. Software is free.

NOAA Polar Orbiting Weather Satellites
Presently the ultimate for real-time visible and color-coded infrared images.
Excellent images of fronts, storms and tropical cyclones. Images allow one to pinpoint severe convection cells.
Each satellite provides at least two passes per day and covers an area of about 1000 miles wide by 3000 miles N to S depending on altitude at time of transit over the receiver's location.
Requires a satellite receiver, gain antenna, decoder PC card and software.
Presently NOAA 12, 15 and 17 are operational
For current status of these satellites, see:
http://noaasis.noaa.gov/NOAASIS/ml/status.html
See: OCENS, SeaStation Mariner, Satellite Weather, for receiver system details.
http://www.ocens.com/

LONG RANGE FORECASTS

El Niño/Southern Oscillation (ENSO) Diagnostic Discussion
NOAA/NWS Climate Prediction Center
Camp Springs, MD
Updated around the middle of each month.
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/

The Tropical Meteorology Project
Atlantic hurricane prediction team headed by Professor William M. Gray
Department of Atmospheric Science Colorado State University
http://tropical.atmos.colostate.edu/forecasts/

TOOLS

Visual Passage Planner. Software by Digital Wave, 2002.

Presently the best tool for planning optimum tracks for long ocean passages.
User friendly for documenting and printing long passages.

Robert Gehrsitz
P.O. Box 326, Fort Monmouth, NJ 07703
(215) 493-7483 or (877) 783-8591
http://www.digwave.com/index.html
support@digwave.com
info@digwave.com
sales@digwave.com

Virtual Passage. Software by Virtual Passages, 2000.
More of a game than a tool, but interesting from the standpoint of learning what passage making is all about.

Virtual Passages
Richard T. McNider
P.O. Box 13024
Huntsville, AL 35803, (246) 882-9517 FAX 882-9517
http://www.virtualsail.com/
info@virtualsail.com

HISTORICAL RECORDS

National Hurricane Center/Tropical Prediction Center

Archives of Past Hurricane Seasons
http://www.nhc.noaa.gov/pastall.html
The National Hurricane Center's Tropical Cyclone Reports (formerly called Preliminary Reports) contain comprehensive information on each storm, including synoptic history, meteorological statistics, casualties and damages, and the post-analysis best track (six-hourly positions and intensities).

REFERENCE WORKS and TUTORIALS

Fundamentals of Physical Geography
http://www.geog.ouc.bc.ca/physgeog/home.html
Excellent glossary of meteorological terms.

Hurricanes, Typhoons, and Tropical Cyclones
by Christopher W. Landsea, NOAA / AOML, 4301 Rickenbacker Causeway
Miami, Florida 33149, chris.landsea@noaa.gov

http://www.aoml.noaa.gov/hrd/tcfaq/tcfaqHED.html
The Atlantic Oceanographic and Meteorological Laboratory (AOML) is one of the Oceanic and Atmospheric Research (OAR) Facilities of the National Oceanic and Atmospheric

Administration (NOAA). NOAA/AOML is a part of the US Department of Commerce (DOC) and is located in Miami, Florida. AOML's mission is to conduct basic and applied research in oceanography, tropical meteorology, atmospheric and oceanic chemistry, and acoustics. The research seeks to understand the physical characteristics and processes of the ocean and the atmosphere, both separately and as a coupled system.

TROPICAL WAVES

Tropical Waves by Michel Davison
Michel.Davison@noaa.gov
http://www.hpc.ncep.noaa.gov/international/training/tropicalwaves.old/
Home Page: http://www.hpc.ncep.noaa.gov/international/intl2.html
Excellent 29-frame Microsoft PowerPoint Presentation that may be downloaded.

Lin & Larry Pardey on Sailing in Reinforced Trades

As we were out sailing this weekend on our little racing yacht Thelma, we began discussing your letter. Seems there are some things we would consider before going on a passage such as this. In fact we had a long enough list to consider writing an article on the subject. For those going on beyond Australia, these conditions will definitely be met in the Indian Ocean between Cocos Keeling and Madagacar. We had an amazing run across that patch of water with winds rarely below 28, never above 35 and averaged 168 miles a day for 2900 miles - best days run, 192, best week, 175. But it definitely was wet on deck and keeping from getting the interior wet from our dripping foulies took some doing.

If we do the article in time I will pass on the rough draft. But just to start the ball rolling.
1. If we were delivering a boat like the ones you are describing, a 40 to 45 foot fine and skeg with roller furling headsails and a foil over the head stay, we would consider the following - as the head stay will be flopping around a lot and thus can suffer from metal fatigue (work hardening), if the wire and its fittings are less than five year old, inspect them extra carefully. If they are five to seven years old, consider replacing them. If they are seven to ten years old replace them before setting sail.

To stop the leeward shrouds from working lash shock cord around the shrouds and tension it.

2. Be sure there are ways to shorten your sails without heading into the wind, especially your mainsail. In these conditions you will need the mainsail up, but reefed. Reason, to steady out the boat and give a more comfortable ride. it pays to tighten in the sail when you are running downwind. We put the jib on a pole, then put one or two reefs in the mainsail and sheet the mainsail as for a beam reach to cut down rolling.
Feels real good.

3. Consider using your storm trysail in winds above 30 if you can't reef your mainsail downwind. I.e. if you have full length battons

4. Be sure your rudder has proper rudder stops. (If anyone in your group does not have good strong rudder stops we can send the drawings from the chapter

in our new edition of Storm tactics handbook called, how to avoid rudder problems- the book won't be out for another six weeks but I have e files.)

5. Check out your steering gear - the chain, the turning blocks etc. It will work hard.

6. Have a few extra easy to prepare meals lined up.
You'll find that after a few days, you will get used to the motion and be more interested in being in the galley.

7.Once we set sail, we stop listening to weather reports, weather gurus and just check in every day to WWV on 15000 shortwave (the time tick station) at 10 minutes after the hour to be sure there are no storms approaching your area. We then spend the time we save by being away from radios by checking the rig for chafe, getting lots or rest, reading some good books.

8. Buy a cheap but very lightweight set of foul weather gear - normal gear is too hot in the tropics and takes too long to dry off. This way you will be more willing to go out on deck and right to the forestay once on each watch to check for chafe, and potential gear problems.

8. Look forward to fast passages that could be the highlight of your sailing time.

Our experience with reinforced trades (we've enjoyed them several times, on our boats and during deliveries) is that they can blow consistently for two or three weeks at a time, but if you slow the boat down to a sedate six or seven knots, you will find most of your concerns are covered. We have sailed on double enders, wide transomed long keelers, fin and skeg types in these conditions and found steering and tracking depended on the individual boat, not a general configuration.

If anyone in your group has our DVD, storm tactics take a look at the last section for a discussion of what we mean about keeping the shrouds from work hardening. Also, our DVD Get Ready to Cross Oceans, has a section on the reinforced trade winds we encountered in the Indian Ocean, and might have an idea or two for your group.

USEFUL BOOKS

OCEAN PASSAGES FOR THE WORLD, Publication NP 136, Fourth Edition, Hydrographic Department, Ministry of Defense, Taunton, Somerset, England. Available from Agents for the Sale of Admiralty Charts. The classic authority since 1895.

WORLD CRUISING ROUTES, Third Edition, by Jimmy Cornell, 1995. International Marine, McGraw Hill, P.O.Box 547, Blacklick, OH 43004. 1-800-822-8158.

THE ATLANTIC CROSSING GUIDE, Third Edition, 1992, by Anne Hammick, Royal Cruising Club Pilotage Foundation. International Marine, P.O. Box 220, Camden, ME 04843.

Weather for the Mariner, Third Edition, 1983 by William J. Kotsch, Rear Admiral, U.S. Navy (Retired). Naval Institute Press, Annapolis, Maryland 21402. 1983.

MARINER'S WEATHER HANDBOOK, A Guide To Forecasting & Tactics, by Steve & Linda Dashew. Boewulf, Inc., 6140 East Finisterra Drive, Tucson, Arizona 85750, 1999.

HURRICANE WATCH, FORECASTING THE DEADLIEST STORMS ON EARTH by Dr. Bob Sheets and Jack Williams, Vintage Books, a Division of Random House, Inc., New York, September 2001.

Wind and Sailing Boats, The structure and behavior of the wind as it affects sailing craft, 1965 by Alan Watts, F.R.Met.S., Adlard Coles Limited, 36 Soho Square, London W1.

THE PROGRESS OF THE DEVELOPMENT OF THE LAW OF STORMS, AND OF THE VARIABLE WINDS, WITH THE APPLICATION OF THE SUBJECT TO NAVIGATION, by Lieut.-Colonel William Reid, C.B., F.R.S. (Of the Corps of Royal Engineers). John Weale, Publishers, London 1849.

USN Naval Meteorology and Oceanography Command Handbooks
file://localhost/nmosw/handbk.htm

Tropical Cyclone Forecasters' Reference Guide
Naval Research Laboratory, Monterey Marine Meteorology Division
http://www.nrlmry.navy.mil/~chu/

file://localhost/PSAPG.htm

Typhoon Havens Handbook for the Western Pacific and Indian Oceans
Sam Brand, Editor;Naval Research Laboratory, Monterey, CA
Meteorological Applications Development Branch;Marine Meteorology Division
October 1996;last Modified June 2001;actually addresses entire Pacific area.
Specific recommendations for Mazatlan and Puerto Vallarta

file://localhost/nmosw/thh_nc/0start.htm

PUGET SOUND AREA HEAVY WEATHER PORT GUIDE
Naval Research Laboratory, Monterey, CA 93943-5502
file://localhost/PSAPG/PSAPG.htm

National Weather Service Forecast Office - Norman, Oklahoma
Mostly US weather. Has good glossary and educational sections.
http://www.srh.noaa.gov/oun/index.shtml

THE EL NIÑO/LA NIÑA CYCLE: A TUTORIAL
Provided by NWS Climate Prediction Center
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensocycle/enso_cycle.html

Antarctic Weather
Rice University, a tutorial.
http://www.glacier.rice.edu/weather/3_introduction.html

Mountain Meteorology: Fundamentals and Applications
C. David Whiteman, Oxford University Press, New York, approx. 250pp. 1999
Atmospheric scientist at Battelle Pacific Northwest Labs, Richland, WA.

Center for Ocean-Atmospheric Prediction Studies Library
Florida State University;Tallahassee, FL 32306-2840
Homepage: http://www.coaps.fsu.edu/lib ;(850) 644-6931 / (850) 644-4841 (fax)

Weather Glossaries
http://www.cagenterprises.com/wx_glossary_a.html
http://www.weather.com/glossary/
http://www.geog.ubc.ca/courses/g102/Resources/G102Glossary.html

NOTES

For most of the charts from various meteorological offices around the world, wind speeds are averaged over 10 minute periods. Gusts may be up to 40% stronger than average speeds. Wave and swell heights refer to significant wave heights representing the average of the highest one third of waves. The likely maximum wave height can be up to twice the significant wave height.

Winds down canyons and off promontories and headlands often blow as much as twice the speeds forecast for the area.

Areas that are between two or more significantly different weather patterns can have dangerous mountainous confused seas that are not shown on the charts.

WEFAX
In order to determine optimum propagation times for HF WEFAX broadcasts use one of the readily available propagation software packages.
My favorite is available at http://elbert.its.bldrdoc.gov/pc_hf/hfwin32.html

New Zealand Weather & Routing 2/07

The MetService Mariners Met Pack is a book I have compiled to help introduce sailors to the weather patterns of the Southwest Pacific

Two ways to get the MetService Mariners Met Pack(South West Pacific) (also known as the Yacht Pack) 1. Order thru Boatbooks (Auckland, New Zealand) http://boatbooks. co.nz/weather. html 2. Order direct thru myself. Send me via reply email your VISA or Mastercard details and mailing address and I shall airmail you the latest edition for $NZ 29.95 plus postage (about $NZ 13 to USA and $NZ16 to Mexico).

Bob McDavitt MetService Weather Ambassador
mcdavitt@metservice .com Phone (649) 377 4831 Fax (649) 307 5993

Weather Advice from Chris Bone of Pacific Yacht Deliveries, New Zealand -

http://www.pacificyachtdeliveries.co.nz

Thanks to Bob McDavitt for helping me gain the knowledge to allow me to compile this page.

This page is intended to offer you some advice and links to useful websites to assist with you passages in the SW Pacific. I am sharing what I have learnt about the area from my time here as a yacht delivery skipper. I am NOT a weather forecaster, nor have I had much training, apart from courses I have attended as part of my various skipper's tickets. I am just sharing how I look for weather information, what suits how I work. My policy is always to avoid storms if I can possibly manage to. My reputation as a delivery skipper relies on me getting boats to their destinations in the best possible condition so I take great care to get the best weather reports that I can.

General discussion.

I have found that in general the weather forecasts in the area are quite good but there can be discrepancies between the 2 main computer models I.E. WW3 from NOAA and the European ECMWF model. There are very good charts available based on the WW3 model, which include wind directions and speeds so it's an easy model to use. I therefore tend to plan my passages on the WW3 model but I ALWAYS check the ECMWF model as well as it often picks up systems that WW3 has missed (2 cyclones in 2006!). When amongst the SW Pacific Islands I also look at the Fiji Met Office forecasts and I also use the 3-day New Zealand Met Office forecasts, which are very good. If in doubt I contact Bob McDavitt from the New Zealand Met Office and discuss the situation with him before departing.

Seasonal.

My initial passage plans are made using Visual Passage Planner. This is a digital version of all the data in Ocean Passages of the World. VPP gives me an idea of the overall feasibility of a passage and probable best course. I then use chart-plotting software to make a passage plan for quoting my deliveries.

Long range (>10 days).

There are 2 main indications of long-range prospects.

1. Is it an El Nino or a La Nina year?

General El Nino discussion websites are; El Nino description, El Nino discussion, NOAA-PMEL-TAO - What is an El Niño (ENSO) and Tropical Atmosphere Ocean (TAO) Project Home Page

An El Nino forecast is available here; El Nino Forecast and sea temperature charts are available here (central Pacific), here (SW Pacific)and here (SW Pacific)

2. What is the Madden Julian Oscillation (MJO) doing? I use the MJO in conjunction with Sea Surface temperature mainly during shoulder seasons to determine how bad the hurricane risk might be.

General Madden Julian information websites are CDC Experimental MJO Forecasts and The Madden-Julian oscillation

A 2 week MJO forecast is available here and here

Medium range (3-10 days).

We are spoilt for choice! The main websites I use are;

Weatheronline. Marine Weather Oceania 8 day forecasts including wind strength and direction from the ECMWF model (I think). A bit frustrating as some areas are completely missed!

Metvuw. Metvuw This is the site I go to first for deliveries in the SW Pacific as it's nicely organised and includes rain, wind strength and direction on the detailed charts. WW3 model.

Stormsurf has a nice animation for 7 days Stormsurf 7 day wind WW3

The ECMWF site that I use to compare with the WW3 model is EC model MSL baro + 850 hpa winds Note that the 850hPa winds are at around 5000 feet or 1500m up.

Bob McDavitt's weekly discussion forecasts are very useful and are available by subscription form Pangolin where one can also subscribe to the useful Fiji Fleet GRIBS

Passage plans.

If I want a full passage plan I obtain one from Bob McDavitt. Bob uses Expedition software. Expedition has been developed for racing, not cruising so it is important to give Bob the maximum wind strength (according to direction) that I am happy with.

Barometer notes.

I use the digital barometer on my hand held chart plotter or watch. Every trip I check the reading for accuracy before I depart. I want to watch trends but also know where I am in a system so a calibrated barometer is essential.

Reading Weather Fax Charts

From the Marine Prediction Center's Radiofax Users Guide

Surface Analyses Surface analyses are generated four times per day, at 0000Z, 0600Z, 1200Z, and 1800Z (Zulu, UTC, or Greenwich Mean Time) for each ocean. Analyses consist of isobaric pressure observations at four-millibar (mb) contour interval spacing, labeled every eight mb. Central pressure mb values of low and high-pressure systems are depicted in bold three or four digits, underlined, and placed adjacent to or under the "H" or "L." Surface analyses also consist of abbreviated, automated ship plots of wind direction (eight points on the compass rose), wind speed in knots, present reported weather, and cloud coverage. The product is issued in two parts, which overlap by some 10 degrees of longitude (between 165W and 175W in the Pacific Ocean, and between 50W and 60W in the Atlantic Ocean). Both parts will project the low or high-pressure systems' forecast position with an arrow to the 24-hour position. These will be labeled with an "X" for lows and a circle with an "X" in the middle for highs, with a bold two-digit mb central pressure value underlined under or adjacent to the 24-hour position label (e.g.,1050-mb high would be written as a 50 and a 960-mb low would have 60). Significant weather systems have labels depicting whether the system has gale or storm conditions as noted by ship and buoy observations, Special Sensor Microwave Imagery (SSM/I), satellite, or computer model guidance. If 24-hour forecast gale or storm conditions are expected, the appropriate area has the label "developing gale" or "developing storm." Used in conjunction with a 500-mb analysis, a 24-hour forecast position of synoptic scale weather systems will aid in determining a weather system's motion and intensity trends.

The hand-drawn surface analyses depict isobars, surface winds, frontal systems (occluded, stationary, cold, and warm), low and high-pressure center positions, and central pressure. The 24-hour track history and 24-hour forecast position of each synoptic scale system's position and central pressure are displayed on all 48-hour surface forecasts. Systems having or expected to have synoptic scale gale or storm conditions are labeled in bold capital letters. Similarly, systems expected to develop gale or storm conditions in 24 hours have labels of developing gale or developing storm. Surface low-pressure falls of 24 mb or greater during a 24-hour period are denoted in large capital letters as RAPIDLY INTENSIFYING. For tropical cyclones, the alphanumeric description of the analyses or forecast time are displayed in bold capital letters adjacent to the tropical cyclone's position with the appropriate cyclone symbol in the following manner:

Standard abbreviations:

DSIPT - DISSIPATE
STNRY - STATIONARY
WKNG - WEAKENING
RPDLY - RAPIDLY
FRMG - FORMING
MOVG - MOVING
INLD - INLAND
DVLPG - DEVELOPING
COMB - COMBINED
DCRS - DECREASE
INCRS - INCREASE
INTSFY - INTENSIFY
Q-STNRY - QUASI-STNRY

TYPHOON or HURRICANE or TROPICAL STORM "NAME"
LATITUDE ___ LONGITUDE ___
MAX WINDS___ KT G (GUST) ___KT
MOV DIR ___ (DEGREES) __KT

24-Hour Surface Forecast Surface forecast charts feature low and high-pressure center positions with bold three and four-digit central pressure values underlined under or adjacent to the L or H. An arrow displays direction of movement, with the system's speed shown in knots depicted adjacent to the head of the arrow. Significant systems have labels denoting whether the system is expected to have GALE or STORM conditions. If 24-hour forecast gale or storm conditions are expected, the appropriate area has the label DEVELOPING GALE or DEVELOPING STORM. Also displayed on this surface forecast chart are frontal systems (occluded, warm, and cold) and when appropriate, associated areas of fog, signifying areas of potentially restricted to visibility. Isobars are depicted in increments of four mb, except for deep systems which are depicted in eight-mb increments. The 1000-mb contour will be dashed to separate four-mb from eight-mb contour spacing.

48-Hour Surface Forecasts These surface forecast products are generated twice each day at 0000Z and 1200Z for each ocean. Products show surface isobars every four mb with labeling of two digits in increments of eight mb. Central pressure millibar values of synoptic scale lows and highs in bold three or four digits are underlined adjacent to or under the L or H. The 24-hour forecast position and future 72-hour forecast position of lows and highs have vector arrows with an X for low centers and a circle with an X inside by the head for high centers. An underlined bold two-digit mb central pressure value will be placed under or adjacent to the 24/72-hour position label (e.g., 1050-mb high would be written as a 50 and a 960-mb low would have 60). The 48-hour surface forecast depicts wind speeds in knots (wind barbs in increments of five or 10 knots), and frontal systems (occluded, warm, and cold). Significant systems have labels depicting whether the system is expected to have gale or storm conditions. If 72-hour forecast gale or storm conditions are expected, the appropriate area has the label DEVELOPING GALE or DEVELOPING STORM.

24-Hour Wind/Wave Forecasts This forecast product depicts 24-hour forecasts of wind, in increments of five knots, and significant wave heights, in isopleths of combined sea and swell in three-foot intervals. During appropriate weather conditions such as Gulf Stream "North Wall" episodes, substantially higher wind/wave height values are highlighted. Arrows will point to a superimposed hatched area. Wave-height values are depicted by solid contours in increments of three feet. Superstructure icing, displayed by a half moon with one or two lines crossing through the center, will depend on the forecast for light or heavy accumulation of ice.

Sea State Analysis Sea State Analyses are issued once a day per ocean at the time of the greatest number of ship observations (1200Z in the Atlantic and 0000Z in the Pacific) and analyze ship's synoptic reports for sea state in meters. The sea state analysis has solid one-meter contour intervals along with primary swell direction arrows. Where appropriate, maximum and minimum combined wave-height values (approximately 1/3 the height of the wind wave added to the height of the swell wave) are centrally depicted and underlined with the abbreviation of MAX or MIN under, or adjacent to, the values. The primary swell direction arrows are based on actual ship observation reports. During winter cold months, ice edges are displayed as a bold jagged line. Sea state analyses highlight where the most significant combined sea and swell wave heights prevail and when viewed with surface analyses, provide a complete picture of surface weather conditions.

48-Hour Sea State Forecast These forecasts are generated twice daily, at 0000Z and 1200Z, and are based on significant wave forecast model runs. Combined sea heights are depicted in solid contours of one-meter increments with a maximum or minimum combined sea state value underlined with the abbreviation of

MAX or MIN, adjacent to the values. Ice edge is displayed as a bold jagged line during winter months. These forecasts provide a complete picture of surface conditions when used in conjunction with the 48-hour surface forecasts. Our tropical cyclone symbol forecast position will be depicted on all surface analyses. Both 24-hour and 72-hour tropical cyclone positions will appear on the 48-hour surface forecasts. Mariners are strongly advised to rely on the latest warnings from the Tropical Prediction Center's (TPC) National Hurricane Center (NHC) which covers the Atlantic and Eastern Pacific Oceans east of 140W; the Central Pacific Hurricane Warning Center (PHNL) covering the Eastern and Central Pacific Ocean west of 140W to the international dateline (180); and the Joint Typhoon Warning Center (JTWC), covering the Western Pacific west of 180.

Tropical Eastern Pacific Analysis Streamline analyses covering the tropical East Pacific Ocean are issued twice daily for 1200Z and 1800Z. Coverage is from 30N to 20S and between 78W and 155W. Bold streamlines with arrows indicate prevailing general wind direction with actual or derived wind reports from ships and satellite. This chart includes all pertinent synoptic features (lows, highs, fronts, troughs) along with their direction and speed of motion. All tropical systems have internationally recognized symbols: a circle with a dot inside represents a tropical disturbance, a circle with an X inside represents a tropical depression, an open circle with two spiraling arms indicates a tropical storm, a closed circle with two spiraling arms denotes a hurricane. All tropical cyclones analyzed have the latest TPC advisory, location, intensity, and the direction and speed of motion.

Two types of surface wind data (barb format) are plotted on this analysis: ship reports, denoted by a circle at the end of the barb, and boundary layer winds from the latest numerical model run. Boundary layer winds are included to supplement the sparse data in the region. All regions of significant showers/thunderstorms on the Tropical Eastern Pacific Analysis are delineated by scalloped lines and labeled by coverage (SCT - scattered, ISOLD - isolated) and intensity (MOD - moderate, STG - strong). This analysis includes all appropriate synoptic features, i.e., lows, highs, fronts, and troughs. All tropical waves and tropical cyclones are displayed with the name and latest TPC advisory position of each tropical cyclone. This information is followed by a six digit tropical cyclone code with general system information.

Regional Products—General information Regional surface graphic charts cover both coastal and high-seas areas. There are two products—the first encompasses the western Atlantic Ocean west of 50W and north of 30N, which includes the US east coast, and the central Florida coast. The second covers the eastern North Pacific Ocean, from the Baja peninsula, south to Cabo San Lucas, and north to the Gulf of Alaska, which includes Prince William Sound as far west as 150W. Regional products consist of 24-hour surface forecasts and wind/wave forecasts and are issued twice daily per ocean for 0000Z and 1200Z.

These short-range forecast products depict synoptic and mesoscale features of surface low and high-pressure systems, isobars with frontal features, areas of reduced visibility, wind speeds, and significant wave height as generated by the synoptic and mesoscale weather systems within 1,000 miles of the coasts. The wind speeds are derived from Special Sensor Microwave Imagery (SSM/I) received from a US satellite from oceanic areas. This state-of-the art data input represents a significant enhancement in analyzing wind conditions in the marine environment. SSM/I is especially important in areas sparse in data, where ship and buoy reports are not available. SSM/I aids short-range prediction in the 24-hour forecast by enabling marine meteorologists to compare initial data from forecast model outputs and make necessary adjustments to near-term forecast solutions.

500 MB Upper Air Charts The 500-mb charts are produced from a computer model of the atmosphere. These products are automated, unmodified computer outputs that depict height contours above the earth's surface (geopotential heights) at 60-meter intervals. Wind speeds of 30 knots and greater are shown with wind barb increments of five or 10 knots. Embedded within the 500-mb height field are short wave troughs, generally 50 degrees or less in longitude. These are drawn on the charts as bold dashed lines. These short-wave troughs

assist the mariner in locating surface low-pressure systems or developing lows on frontal waves. The 500-mb winds approximate the speed of surface extra-tropical lows (often about 1/3 to 1/2 of the 500-mb wind speed) and surface wind force (approximately 50 percent), particularly in colder SW quadrants. The 5640-meter height contour is highlighted since this height contour is widely used by mariners for general surface storm track direction and the southern extent of Beaufort Force 7 (28 to 33 knot) or greater surface winds in the winter, and Force 6 (22 to 27 knot) winds in summer. Analyses are generated twice a day at 0000Z and 1200Z, and depict synoptic scale flow patterns, location, and amplitude of long and short waves. Synoptic scale features can be compared with previous analyses to determine the movement and trends of the upper air pattern. They can be used in conjunction with the surface analyses, sea state analyses, and meteorological satellite imagery, which are valid at the same synoptic time.

12-Hour 500-mb Forecasts These products can be used to compare changes in flow patterns from the latest 500-mb analyses to follow the progression of short waves. A 500-mb 48-hour forecast should be used in conjunction with surface and sea state 48-hour forecast products, and comparison of previous 48-hour 500-mb forecasts with the most current 500-mb analysis can establish confidence in subsequent forecasts.

Weather Fax Schedules

HONOLULU, HAWAII
Effective 6/06

CALL SIGN FREQUENCIES TIMES EMISSION POWER
KVM70 9982.5 kHz 0519-1556 F3C 4 KW
11090 kHz CONTINUOUS F3C 4 KW
16135 kHz 1719-0356 F3C 4 KW

TIME CONTENTS OF TRANSMISSION RPM/IOC VALID MAP
TIME AREA
0519/1719 TEST PATTERN 120/576
0524/1724 SIGNIFICANT CLOUD FEATURES 120/576 03/15 D
0535/1735 CYCLONE DANGER AREA 120/576 03/15 E
0555/1755 STREAMLINE ANALYSIS 120/576 00/12 B
0615/1815 SURFACE ANALYSIS 120/570 00/12 C
0635/1835 EAST PACIFIC GOES IR SATELLITE IMAGE 120/576 06/18 G
0649/1849 SW PACIFIC GOES IR SATELLITE IMAGE 120/576 06/18 H
0701/1901 24HR SURFACE FORECAST 120/576 00/12 A
0714/1914 48HR SURFACE FORECAST 120/576 00/12 A
0727/1927 72HR SURFACE FORECAST 120/576 00/12 A
0740/1940 WIND/WAVE ANALYSIS 120/576 00/12 B
0753/1953 24HR WIND/WAVE FORECAST 120/576 00/12 B
0806/2006 24HR WIND/WAVE FORECAST 120/576 00/12 4
0816/2016 48HR SURFACE FORECAST 120/576 00/12 1
0826/2026 48HR WIND/WAVE FORECAST 120/576 00/12 1
0836/2036 48/96HR WAVE PERIOD,SWELL DIRECTION 120/576 00/12 1
0846/2046 rebroadcast/ 96HR SURFACE FORECAST 120/576 1200 1
0856/2056 rebroadcast/ 96HR WIND/WAVE FORECAST 120/576 1200 1
0906/2106 PACIFIC GOES IR SATELLITE IMAGE 120/576 06/18 5
0917/2117 SURFACE ANALYSIS (PART 1 NE PACIFIC) 120/576 06/18 2
0930/2130 SURFACE ANALYSIS (PART 2 NW PACIFIC) 120/576 06/18 3
0943/2143 TROPICAL GOES IR SATELLITE IMAGE 120/576 06/18 Y
0954/2154 TROPICAL SURFACE ANALYSIS 120/576 06/18 Z
1008/2208 24HR TROPICAL WIND/WAVE FORECAST 120/576 06/18 Z
1042/2242 CYCLONE DANGER AREA 120/570 09/21 E
1102/2302 48HR WIND/WAVE FORECAST 120/576 00/12 B
1115/2315 72HR WIND/WAVE FORECAST 120/576 00/12 B
1128/2328 SEA SURFACE TEMPS 120/576 LATEST F
1141/2341 rebroadcast 24HR WIND/WAVE FORECASTS 120/576 00/12 B
1154/2354 STREAMLINE ANALYSIS 120/576 06/18 B
1214/0014 SURFACE ANALYSIS 120/576 06/18 C
1234/0034 EAST PACIFIC GOES IR SATELLITE IMAGE 120/576 12/00 G
1248/0048 SW PACIFIC GOES IR SATELLITE IMAGE 120/576 12/00 H
1300/0100 SCHEDULE PART I 120/576
1320/0120 SCHEDULE PART II 120/576
1340/0140 SYMBOLS OR PRODUCT NOTICE BULLETIN 120/576
1400/0200 24HR TROPICAL SURFACE FORECAST 120/576 12/00 Z
1410/0210 48HR TROPICAL SURFACE FORECAST 120/576 12/00 Z
1420/0220 72HR TROPICAL SURFACE FORECAST 120/576 12/00 Z
1430/0230 48/72HR TROPICAL WAVE PERIOD,SWELL DIR 120/576 12/00 Z
1440/0240 TROPICAL SEA STATE ANALYSIS 120/576 12/00 Z
1450/0250 24HR TROPICAL WIND/WAVE FORECAST 120/576 12/00 Z
1500/0300 48HR TROPICAL WIND/WAVE FORECAST 120/576 12/00 Z
1510/0310 72HR TROPICAL WIND/WAVE FORECAST 120/576 12/00 Z

1520/0320 rebroadcast/SEA STATE ANALYSIS 120/576 0000 1
1530/0330 SURFACE ANALYSIS(PART 1 NE PAC) 120/576 12/00 2
1543/0343 SURFACE ANALYSIS(PART 2 NW PAC) 120/576 12/00 3
1556/0356 TROPICAL SURFACE ANALYSIS 120/576 12/00 Z
MAP AREAS:
A. 30S - 50N, 110W - 130E B. 30S - 30N, 110W - 130E Honolulu Forecast Office
C. EQ - 50N, 110W - 130E D. 30S - 50N, 110W - 160E Honolulu Forecast Office
E. EQ - 40N, 80W - 170E F. EQ - 55N, 110W - 160E Honolulu Forecast Office
G. 05S - 55N, 110W - 155E H. 40S - 05N, 130W - 165E Honolulu Forecast Office
1. 20N - 70N, 115W - 135E 2. 20N - 70N, 115W - 175W Ocean Prediction Center
3. 20N - 70N, 175W - 135E 4. 18N - 62N, EAST OF 157W Ocean Prediction Center
5. 05N - 55N, EAST OF 180W Ocean Prediction Center
Y. 05N - 32N, EAST OF 130W Z. 20S - 30N, EAST OF 145W Tropical Prediction Center

HONOLULU, HAWAII

STREAMLINES ARE LINES OF CONSTANT WIND DIRECTION.
WIND SPEEDS ARE GIVEN BY WIND BARBS INDEPENDENT OF STREAMLINES.
THE SIGNIFICANT CLOUD FEATURES CHARTS DEPICT CLOUD FEATURES BASED UPON
IMAGES FROM THE VARIOUS GEOSTATIONARY AND POLAR ORBITING SATELLITES OVER THE PACIFIC.
ABBREVIATIONS ON THESE CHARTS INCLUDE: AC - ALTOCUMULUS;
AS - ALTOSTRATUS; BKN - BROKEN; CB - CUMULONIMBUS; CC - CIRROCUMULUS;
CI - CIRRUS; CS - CIRROSTRATUS; CU - CUMULUS; FEW - FEW; ISOL - ISOLATED;
LYRS - LAYERS; NS - NIMBOSTRATUS; OVC - OVERCAST; SC - STRATO-CUMULUS;
SCT - SCATTERED; TCU - TOWERING CUMULUS; TSTM – THUNDERSTORM
RADIOFAX FREQUENCIES ARE ASSIGNED FREQUENCIES. TO CONVERT TO CARRIER
FREQUENCIES, SUBTRACT 1.9 KHZ FROM THE ASSIGNED FREQUENCIES.

PT. REYES, CALIFORNIA
Effective 5/06

CALL SIGN FREQUENCIES TIMES EMISSION POWER

NMC 4346 kHz NIGHT F3C 4 KW
8682 kHz CONTINUOUS F3C 4 KW
12786 kHz CONTINUOUS F3C 4 KW
17151.2 kHz CONTINUOUS F3C 4 KW
22527 kHz DAY F3C 4 KW

TIME CONTENTS OF TRANSMISSION RPM/IOC VALID MAP
TIME AREA

0140/1400 TEST PATTERN 120/576
0143/1403 NE PACIFIC GOES IR SATELLITE IMAGE 120/576 00/12 6
0154/1414 PACIFIC GOES IR SATELLITE IMAGE 120/576 00/12 5
0205/1425 TROPICAL SEA STATE ANALYSIS 120/576 00/12 4
0215/1435 TROPICAL 24HR WIND/WAVE FORECAST 120/576 00/12 4
0225/------ TROPICAL 48HR WIND/WAVE FORECAST 120/576 0000 4
0235/------ TROPICAL 72HR WIND/WAVE FORECAST 120/576 0000 4
0245/1445 500MB ANALYSIS 120/576 00/12 1
0255/1455 SEA STATE ANALYSIS, WIND/WAVE ANALYSIS 120/576 00/12 1/8#
0305/1505 PRELIM SURFACE ANALYSIS(PART 1 NE PAC) 120/576 00/12 2
0318/1518 PRELIM SURFACE ANALYSIS(PART 2 NW PAC) 120/576 00/12 3
0331/1531 FINAL SURFACE ANALYSIS(PART 1 NE PAC) 120/576 00/12 2
0344/1544 FINAL SURFACE ANALYSIS(PART 2 NW PAC) 120/576 00/12 3
0357/1557 CYCLONE DANGER AREA* or HIGH WIND/WAVES 120/576 03/15 10
0408/1608 TROPICAL SURFACE ANALYSIS 120/576 00/12 4
0655/1840 TEST PATTERN
0657/------ 2033Z REBROADCAST (96HR 500MB) 120/576 1200 1
0707/------ 2043Z REBROADCAST (96HR SURFACE) 120/576 1200 1
0717/------ 2053Z REBROADCAST (96HR WIND/WAVE) 120/576 1200 1
0727/------ 2103Z REBROADCAST (96HR WAVE PERIOD) 120/576 1200 1
------/1842 SST ANALYSIS 120/576 LATEST 9
------/1852 SST ANALYSIS 120/576 LATEST 6
0737/1902 TROPICAL GOES IR SATELLITE IMAGE 120/576 06/18 7
0748/1913 WIND/WAVE ANALYSIS 120/576 06/18 8#
0758/1923 24HR 500MB FORECAST 120/576 00/12 1
0808/1933 24HR SURFACE FORECAST 120/576 00/12 8#
0818/1943 24HR WIND/WAVE FORECAST 120/576 00/12 8#
0828/1953 48HR 500MB FORECAST 120/576 00/12 1
0838/2003 48HR SURFACE FORECAST 120/576 00/12 1
0848/2013 48HR WIND/WAVE FORECAST 120/576 00/12 1
0858/2023 48HR WAVE PERIOD/SWELL DIRECTION 120/576 00/12 1
------/2033 96HR 500MB FORECAST 120/576 1200 1
------/2043 96HR SURFACE FORECAST 120/576 1200 1
------/2053 96HR WIND/WAVE FORECAST 120/576 1200 1
------/2103 96HR WAVE PERIOD/SWELL DIRECTION 120/576 1200 1
0908/2113 PACIFIC GOES IR SATELLITE IMAGE 120/576 06/18 5
0919/2124 SURFACE ANALYSIS (PART 1 NE PACIFIC) 120/576 06/18 2
0932/2137 SURFACE ANALYSIS (PART 2 NW PACIFIC) 120/576 06/18 3
0945/2150 TROPICAL SURFACE ANALYSIS 120/576 06/18 4
0959/2204 TROPICAL 24HR WIND/WAVE FORECAST 120/576 06/18 4
1009/2214 CYCLONE DANGER AREA* or HIGH WIND/WAVES 120/576 09/21 10
1120/2320 TEST PATTERN 120/576
1124/2324 BROADCAST SCHEDULE (PART 1) 120/576
1135/2335 BROADCAST SCHEDULE (PART 2) 120/576
1146/------ REQUEST FOR COMMENTS 120/576
1157/------ PRODUCT NOTICE BULLETIN 120/576

1208------ TROPICAL 48HR WIND/WAVE FORECAST 120/576 1200 4
1218/------ TROPICAL 72HR WIND/WAVE FORECAST 120/576 1200 4
1228/2346 TROPICAL 48HR WAVE PERIOD/SWELL DIR 120/576 12/00 4
------/2356 TROPICAL 72HR WAVE PERIOD/SWELL DIR 120/576 0000 4
* Tropical Cyclone Danger Area chart replaced by High Wind/Wave Warning chart
Dec 01 - May 14

Effective May 16, 2006 at 1900 UTC, map area 8 will change from a polar
stereographic to a Mercator projection as follows:
MAP AREAS: 1. 20N - 70N, 115W - 135E 2. 20N - 70N, 115W - 175W
3. 20N - 70N, 175W - 135E 4. 20S - 30N, EAST OF 145W
5. 05N - 55N, EAST OF 180W 6. 23N - 60N, EAST OF 150W
7. 05N - 32N, EAST OF 130W 8. 18N - 62N, EAST OF 157W
9. 40N - 53N, EAST OF 136W 10. 0N - 40N, 80W - 180W
NOTES: 1. CARRIER FREQUENCY IS 1.9 kHz BELOW THE ASSIGNED FREQUENCY

CHARLEVILLE, AUSTRALIA

CALL SIGNS FREQUENCIES TIMES EMISSION POWER

VMC 2628 kHz 0900-1900 F3C 1 KW
VMC 5100 kHz CONTINUOUS F3C 1 KW
VMC 11030 kHz CONTINUOUS F3C 1 KW
VMC 13920 kHz CONTINUOUS F3C 1 KW
VMC 20469 kHz 1900-0900 F3C 1 KW

CHARLEVILLE & WILUNA, AUSTRALIA

TIME CONTENTS OF TRANSMISSION RPM/IOC VALID MAP
TIME AREA

------/2315 Casey Eastern and Western High Seas (H+48) 120/576 1200
1130/------- Asian Sea Surface Temp Anal (Weekly) 120/576 LATEST E
------/2330 Australian MSLP Prog (H+36) 120/576 0000 AUST
------/2345 Indian Ocean MSLP Prog (H+48) 120/576 1200 IO
1145/------- VMC/VMW Information Notice 120/576

NOTES:
1. ALL WEEKLY OCEANOGRAPHIC PRODUCTS, SUCH AS SEA SURFACE TEMPERATURE CHARTS, WHICH WERE BROADCAST ONLY ONE DAY A WEEK, ARE NOW BROADCAST EVERY DAY. HOWEVER, NOTE THE CHARTS ARE ONLY UPDATED ONCE A WEEK, BUT BROADCAST EVERY DAY UNTIL A NEW CHART IS AVAILABLE TO REPLACE THE OLD CHART.
MAP AREAS: A: 30N - 35S, 120E – 180, B: 30N - 35S, 070E - 130E, C: 30N - 35S, 070E - 180
D: 43S 110E, 34S 155E, 34N 142E, 29N 096E, E: 23N - 23S, 100E - 170E, H: 25N - 25S, 080E - 180
AUST: LAMBERT 10S 090E, 50S 080E, 10S 170E, 50S 180
SEAUST- MERCATOR 31S - 40S, 148E - 156E
SWAUST MERCATOR 25S - 37S, 110E - 120E
RSW - MERCATOR 0S - 50S, 100E - 180
IO - POLAR 10S - 90S, EQ - 090E - 180
SWP - POLAR 20S - 90S, 150E - 180 - 90W
SH - POLAR 10S - 90S, ALL LONGITUDES
(Schedule Effective ??????)
(INFORMATION DATED 2004) http://www.bom.gov.au/nmoc/rad_sch/

WILUNA, AUSTRALIA

CALL SIGN FREQUENCIES TIMES EMISSION POWER
VMW 5755 kHz 1100-2100 F3C 1 KW
VMW 7535 kHz CONTINUOUS F3C 1 KW
VMW 10555 kHz CONTINUOUS F3C 1 KW
VMW 15615 kHz CONTINUOUS F3C 1 KW
VMW 18060 kHz 2100-1100 F3C 1 KW
TIME CONTENTS OF TRANSMISSION RPM/IOC VALID MAP
TIME AREA
------/1200 Australian MSLP Prog (H+36) 120/576 1200 AUST
0015/1215 VMC/VMW Schedule Page 1 of 2 120/576
0030/1230 VMC/VMW Schedule Page 2 of 2 120/576
0045/------- VMC/VMW Information Notice 120/576
0100/------- IPS Recommended Frequencies for VMC (Charleville)) 120/576
0130/------- IPS RECOMMENDED FREQUENCIES FOR VMW 120/576
------/1245 Indian Ocean MSLP Prog (H+36) 120/576 1200 IO
------/1300 Australian Sigwx Prog Valid 120/576 0600 RSW
------/1315 South Pacific Ocean Total Waves (H+48) 120/576 0000 SWP
------/1330 Indian Ocean Total Waves (H+48) 120/576 0000 IO
------/1345 Pacific Ocean Sea Surface Temps (Weekly) 120/576 LATEST SWP
------/1400 Indian Ocean Sea Surface Temps (Weekly) 120/576 LATEST IO
0200/------- Australian MSLP Prog (H+24) 120/576 0000 AUST
0215/------- Australian Sigwx Prog 120/576 1800 RSW
0230/------- Asian Current Warnings Summary 120/576 LATEST H
------/1415 Casey Eastern and Western High Seas (H+48) 120/576 0000
0245/1430 Australian MSLP Anal (Manual) 120/576 00/12 AUST
------/1445 Asian Current Warnings 120/576 LATEST H
0300/1500 Australian 500 hPa Anal 120/576 00/12 AUST
0315/------ Voice Broadcast Information for VMW (Wiluna) 120/576
------/1515 Australian MSLP Prog (H+36) 120/576 1200 AUST
0330/1530 Asian Sigwx Prog Valid 120/576 12/00 D
0400/1600 Australian 500 hPa (H+24) Prog 120/576 00/12 AUST
0430/------ Australian MSLP 4-day forecast, Days 1 and 2 120/576
0445----- Australian MSLP 4-day forecast, Days 3 and 4 120/576
------/1630 IPS Recommended Frequencies for VMC (Charleville) 120/576
------/1700 IPS Recommended Frequencies for VMW (Wiluna) 120/576
0600/1800 Asian (Part A) Gradient Level Wind Anal (Manual) 120/576 00/12 A
0623/1823 Asian (Part B) Gradient Level Wind Anal (Manual) 120/576 00/12 B
0645/------- Asian MSLP Anal (Manual) 120/576 0000 C
0715/1900 Australian Sigwx Prog 120/576 00/12 RSW
0730/1915 Indian Ocean MSLP Anal (Manual) 120/576 00/12 IO
0745/1930 Australian Wind Waves Ht(m) Prog 120/576 00/12 AUST
0800/1945 Australian Swell Waves Ht(m) Prog (H+24) 120/576 00/12 AUST
0815/------- Asian Current Warnings Summary 120/576 LATEST H
0830/------- South Pacific Ocean MSLP Anal 120/576 0000 SWP
0845/------- Australian MSLP Anal (Manual) 120/576 0600 AUST
------/2000 South Pacific Ocean MSLP Anal (Manual) 120/576 1200 SWP
------/2015 Casey Eastern and Western High Seas (H+24) 120/576 1200
------/2030 Australian MSLP Anal (Manual) 120/576 1800 AUST
------/2045 Asian Current Warnings Summary 120/576 LATEST H
0903/2100 Asian 200 hPa Streamline Anal 120/576 00/12 C
0923/2120 Asian 500 hPa Streamline Anal 120.576 00/12 C

0941/2140 Asian 700 hPa Streamline Anal 120/576 00/12 C
1000/2200 Asian Sigwx Prog 120/576 18/06 D
1015/------ Casey Eastern and Western High Seas (H+24) 120/576 0000
------/2215 Casey Eastern and Western High Seas (H+36) 120/576 1200
1030/2230 S.H. 500 hPa Prog (H+48) 120/576 00/12 SH
1045/2245 S.H. MSLP Prog (H+48) 120/576 00/12 SH
1100/------ Casey Eastern and Western High Seas (H+36) 120/576 0000
1115/2300 S.H. 500 hPa Anal 120/576 00/12 SH

WELLINGTON, NEW ZEALAND

CALL SIGN FREQUENCIES TIMES EMISSION POWER

ZKLF 3247.4 kHz 0945-1700 F3C 5 KW
5807 kHz CONTINUOUS F3C 5 KW
9459 kHz CONTINUOUS F3C 5 KW
13550.5 kHz CONTINUOUS F3C 5 KW
16340.1 kHz 2145-0500 F3C 5 KW
Single transmitter used. Times below reflect broadcast times at 5807 kHz
Add 15 minutes for 9459 kHz, 30 minutes for 13550.5 kHz and 45 minutes for 3247.4 and 16340.1 kHz

TIME CONTENTS OF TRANSMISSION RPM/IOC VALID MAP
TIME AREA

0000/1200 SOUTHWEST PACIFIC 30HR SURFACE PROG (MSL) 120/576 00/12 SWP
0100/1300 SOUTHWEST PACIFIC 48HR SURFACE PROG (MSL) 120/576 00/12 SWP
0200/1400 SOUTHWEST PACIFIC 72HR SURFACE PROG (MSL) 120/576 00/12 SWP
0300/1600 TASMAN-NEW ZEALAND MSL ANALYSIS 120/576 00/12 TNZ
0400/1600 SOUTHWEST PACIFIC MSL ANALYSIS 120/576 00/12 SWP
0900/2100 TASMAN-NEW ZEALAND MSL ANALYSIS 120/576 06/18 TNZ
1000/2200 SOUTHWEST PACIFIC MSL ANALYSIS 120/576 06/18 SWP
1100/2300 TRANSMISSION SCHEDULE

MAP AREAS: TNZ - TASMAN SEA - NEW ZEALAND
SWP - SOUTHWEST PACIFIC
(INFORMATION DATED MAY 2002) http://www.metservice.co.nz/default/index.php?pkey=191620&ckey=229167

ern Hemisphere, winds ahead of the front will be southwest and shift into the vest with frontal passage.

front The leading edge of a relatively warmer surface air mass that separates two distinctly different air masses. The gradients of temperature and moisture aximized in the frontal zone. Ahead of a typical warm front in the Northern sphere, winds are from the southeast, and behind the front, winds will shift to uthwest.

nary front A front that has not moved appreciably from its previously ed position.

ded front The union of two fronts formed as a cold front overtakes a warm or quasi-stationary front refers to a cold-front occlusion. When a warm front kes a cold front or quasi-stationary front, the process is termed a warm-front ion. These processes lead to the dissipation of the front in which there is no nt in temperature and moisture.

olysis The weakening or dissipation of a front occurs when two adjacent air s lose contrasting properties, such as density and temperature. It is the ite of frontogenesis.

ogenesis The formation of a front occurs when two adjacent air masses with nt densities and temperatures meet and strengthen the discontinuity en the air masses. It occurs most frequently over continental land areas, is the eastern United States, when the air mass moves out over the ocean. It opposite of frontolysis.

An elongated area of relatively high pressure that is typically associated with cyclonic wind shift.

h, or Trof An elongated area of relatively low pressure that is typically ated with a cyclonic wind shift.

w- and high-pressure systems
d miscellaneous key terms

ressure with a number such as 99 means 999 millibars (mb), and with 03 means 1,003 igh pressure with a number such as 25 means 1,025 mb.

ropical low A low-pressure center that refers to a migratory frontal cyclone of middle and latitudes. Tropical cyclones occasionally evolve into extratropical lows losing tropical characteristics and become associated with frontal discontinuity.

ressure An area of low pressure identified with counterclockwise circulation in the Northemisphere and clockwise in the Southern Hemisphere. Also defined as a cyclone.

ressure An area of higher pressure identified with a clockwise circulation in the Northern Hemisphere and a counterclockwise tion in the Southern Hemisphere. Also defined as an anticyclone.

This term may be used in lieu of a forecast track position of a high- or low-pressure center when the center is expected to form pecific time. For example, a surface analysis may depict a 24-hour position of a new low-pressure center with an X at the 24-osition, followed by the term New; the date and time in UTC indicate the low is expected to form by 24 hours.

ly intensifying Indicates an expected rapid intensification of a cyclone with surface pressure xpected to drop by at least 24 mb within 24 hours.

l A sudden wind increase characterized by a duration of minutes and followed by a sudden ase in winds.

Over the marine environment, the term fog refers to visibility greater than or equal to 0.5 d less than three nautical miles. Fog is the visible aggregate of minute water droplets nded in the atmosphere near the surface.

speed and direction Arrows point in the direction wind is g and "feathers" indicate force in 5-, 10- and 50-knot ents.