

Appendices to the Final Preliminary Report

Volume 3 Appendices 14 -15

Prepared by the Transport Accident Investigation Commission
for
The Royal Commission of Inquiry into the Sinking of the
MV Princess Ashika

15 February 2010



Weather conditions near 20° 24' South 174° 56' West
at about 1100 UTC 5 August 2009

Introduction

This report has been prepared at the request of Doug Monks, Marine Accident Investigator of Transport Accident Investigation Corporation. Mr Monks is investigating the sinking of MV Princess Ashika north of Tongatapu on 5 August 2009.

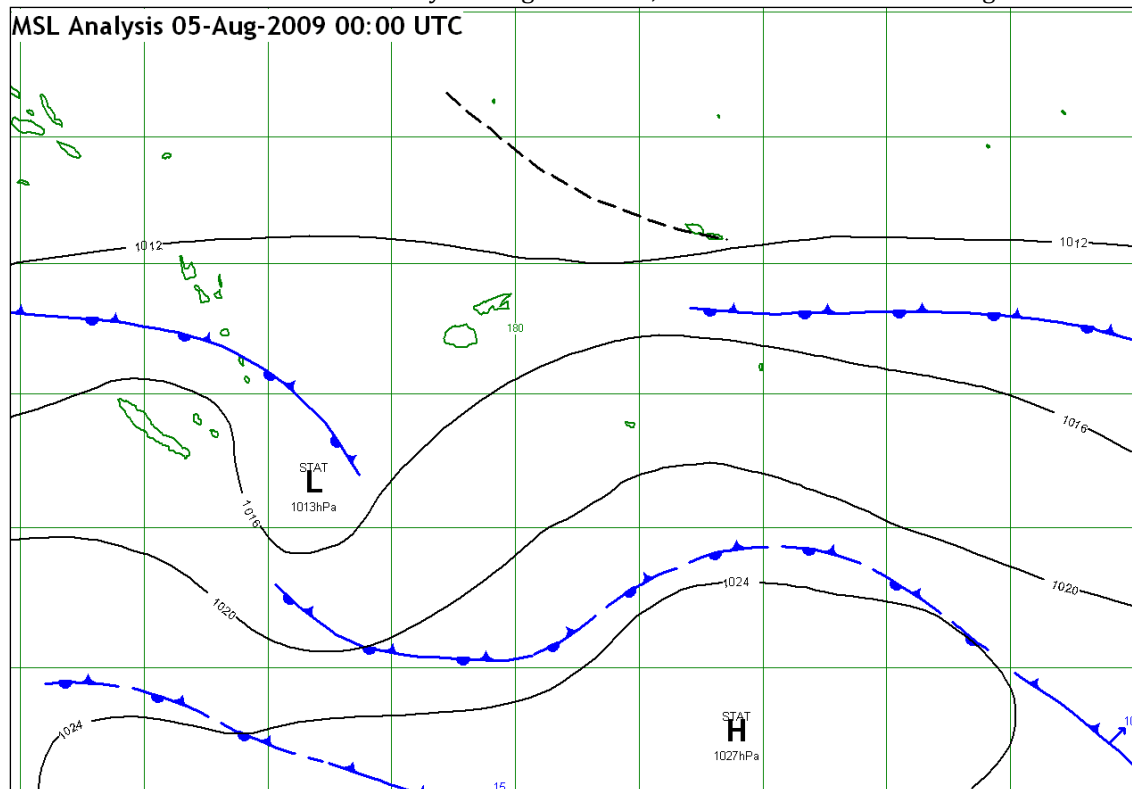
This report contains

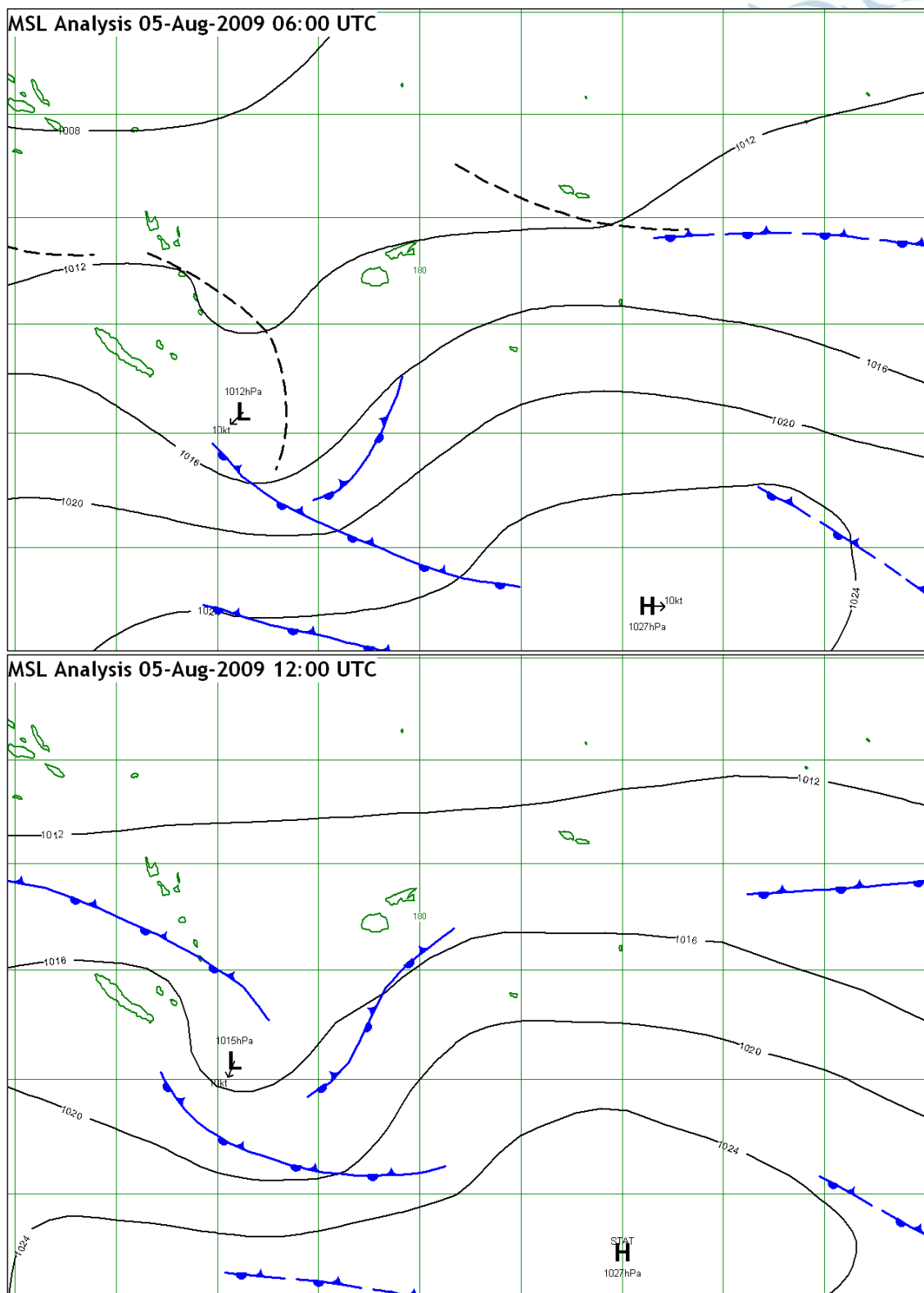
- 1) a description of the meteorological situation, and available forecasts,
- 2) an assessment of wind, weather, sea and swell conditions in the 6 to 12 hours leading up to the incident, supported by remote sensed wind data and modeled wave data.

Meteorological Situation

An anticyclone to the south of Tonga extended a ridge of high pressure to the east and west. Against the equatorial trough of low pressure, this ridge maintained the general east-southeast Trade Wind regime over the tropical southwest Pacific Ocean. A weak ridge of high pressure extended from the anticyclone east-northeastwards over Tonga, and this resulted stronger than usual winds from southeast (rather than east-southeast).

The following three charts are parts of the MetService MSL analyses selected to cover the tropical southwest Pacific Ocean in the vicinity of Tonga for 0000, 0600 and 1200 UTC on 5 August 2009.





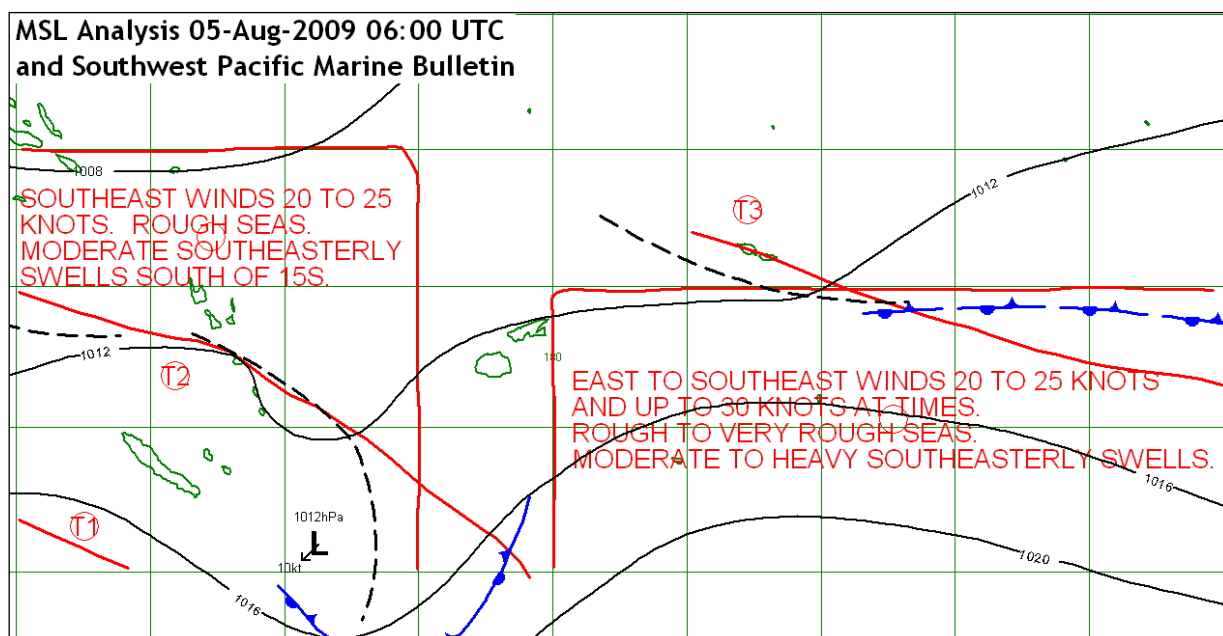
In these charts, Tongatapu is depicted as the single small island approximately in the centre of the chart area.

Forecasts

The Marine Weather Bulletin for Islands Area is prepared by Fiji Meteorological Service (FMS) twice each day and these are broadcast on the INMARSAT C Broadcast service at 0930 and 2130 UTC.

MARINE WEATHER BULLETIN FOR ISLANDS AREA EQUATOR TO 25S BETWEEN 160E AND 120W.
 EQUATOR to 25S between 160E and 120W issued by Fiji Meteorological Service
 Aug 050800 UTC.
 PART 1 : WARNINGNIL.
 PARTS 2 AND 3 : SYNOPSIS AND FORECAST VALID UNTIL Aug 060600 UTC.
 TROUGH T1 23S 160E 25S 164E SLOW MOVING. POOR VISIBILITY IN RAIN AND A FEW
 SQUALLY THUNDERSTORMS WITHIN 180 MILES OF T1.
 TROUGH T2 15S 160E 17S 167E 20S 173E 25S 178E SLOW MOVING. POOR VISIBILITY
 IN RAIN AND A FEW THUNDERSTORMS WITHIN 200 MILES OF T2.
 TROUGH T3 13S 175W 17S 163W 20S 146W 25S 133W SLOW MOVING. POOR VISIBILITY
 IN RAIN AND A FEW SQUALLY THUNDERSTORMS WITHIN 180 MILES OF T3 IN AREAS EAST
 OF 145W. ELSEWHERE, POOR VISIBILITY IN SOME SHOWERS AND FEW THUNDERSTORMS
 WITHIN 120 MILES OF T3.
 OVER BROAD AREA SOUTH OF 10S AND WEST OF 175E, EXPECT SOUTHEAST WINDS 20 TO
 25 KNOTS. ROUGH SEAS. MODERATE SOUTHEASTERLY SWELLS SOUTH OF 15S.
 OVER BROAD AREA SOUTH OF 15S AND EAST OF 180, EAST TO SOUTHEAST WINDS 20 TO
 25 KNOTS AND UP TO 30 KNOTS AT TIMES. ROUGH TO VERY ROUGH SEAS.
 MODERATE TO HEAVY SOUTHEASTERLY SWELLS.

Marine Weather Bulletin for Islands Area broadcast at 0930 UTC 5 August 2009



Plot of the content of the Marine Weather Bulletin for Islands Area (prepared by FMS) in the vicinity of Tonga using the MetService analysis for 0600 UTC 5 August 2009 as a back ground.

Tonga Meteorological Service issues weather forecasts for Tonga and for the sea areas in the vicinity of Tonga. These forecasts are issued at 4:00am, 11:00am and 6:30pm each day. The forecasts issued on 4 and 5 August 2009 and other information are included in the report of the Director of Meteorology which is titled "Weather Forecasts and Conditions during the Sinking of the Princess Ashika (Call Sign A3C12) 05th August 2009" dated 18 August 2009. The Marine Weather Forecast for Tonga issued at 11:00am and 6:30pm on 5 August 2009 valid to midday the next day both say, "East to southeast winds 15/20 knots gusting to 25 knots over most coastal waters. Moderate to rough seas with a moderate southeast swell."

Wind observations from Fua'amotu and Ha'apai

Fua'amotu Airport is located in the southeast of Tongatapu and is about 3 km inland. The meteorological station at Ha'apai is at 19° 48' South 174° 21' West. MV Princess Ashika sank about 50 km north of Tongatapu and 50 km southwest of Ha'apai.

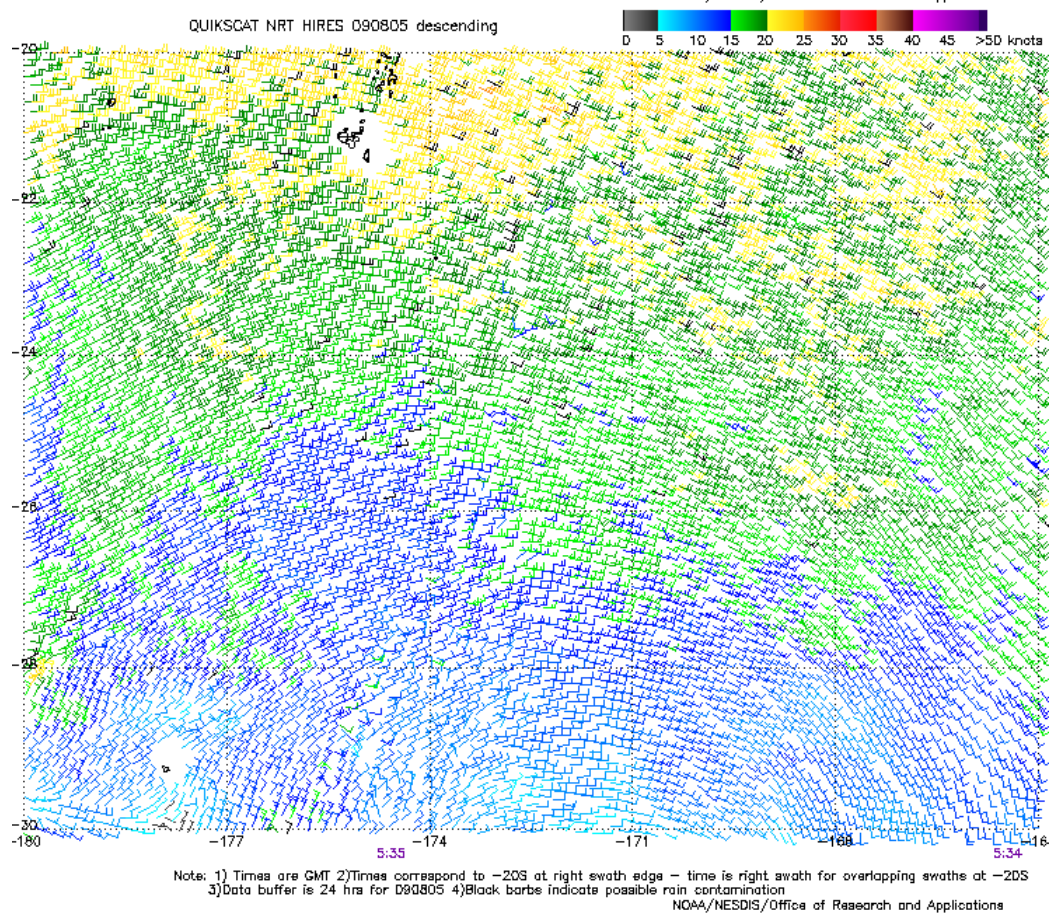
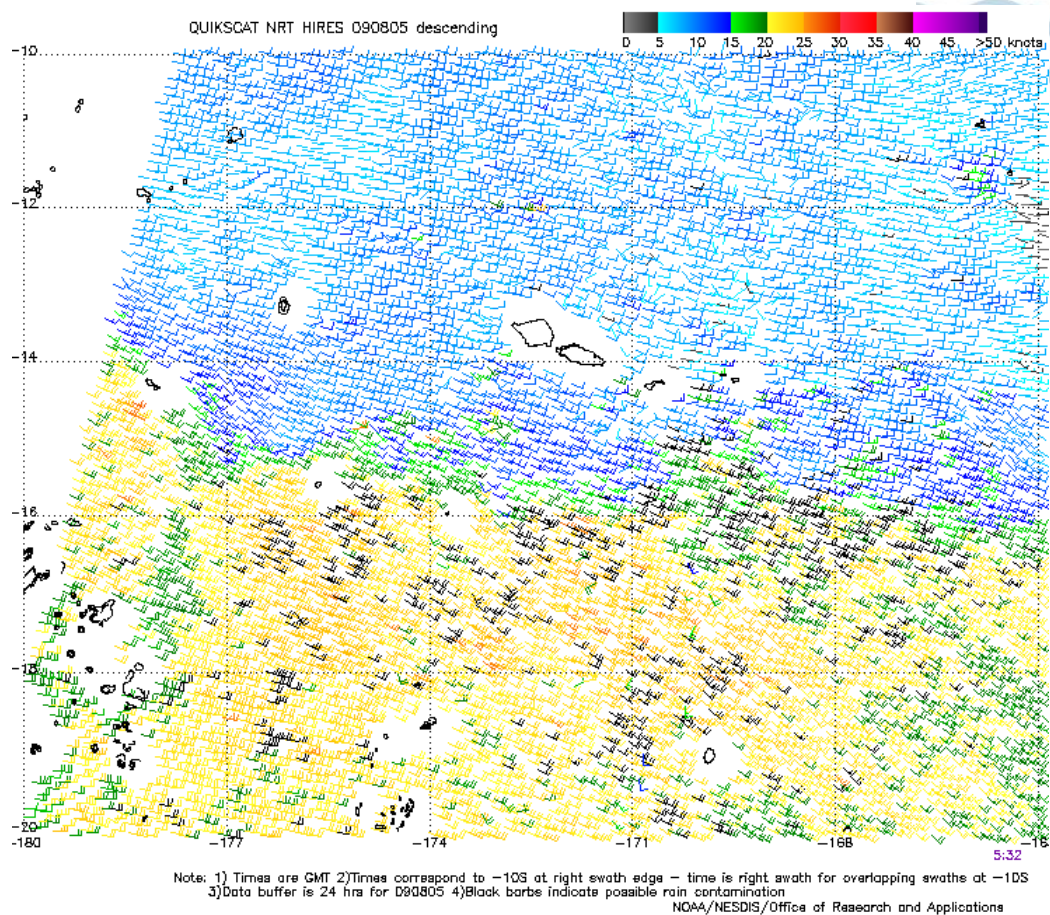
The meteorological observations at these stations are listed in full in the report of the Director of Meteorology. Briefly, in the 12 hours up to 1100 UTC 5 Aug 2009, at Fua'amotu the wind recorded was from slightly south of due east at 8 to 9 knots during the night and about 12 knots during the day. Due to friction over the land the open ocean wind speed has been somewhat reduced. That there is a diurnal change in wind speed also suggests that the wind recorded at Fua'amotu has been influenced by moving a short distance over a land surface. At Ha'apai, in the 12 hours up to 1100 UTC 5 Aug 2009, the wind direction was recorded as close to due east at about 20 knots. This station is close to the sea and the wind recorded there is probably representative of the open ocean wind speed.

Remote sensed and modeled data

QuikScat

"QuikScat" is a satellite based system for estimating wind speed and direction over the open oceans. The satellite is sun-synchronous polar orbiting which means that it passes overhead any place on the Earth at the same local time, twice every day. The resulting data is made publicly available on NOAA's Marine Observing Systems web site at <http://manati.orbit.nesdis.noaa.gov/hires/>.

The data is presented in the form of 10 by 15 degree tiles containing latitude and longitude lines and coast line, and coloured symbols to represent wind speed and direction.



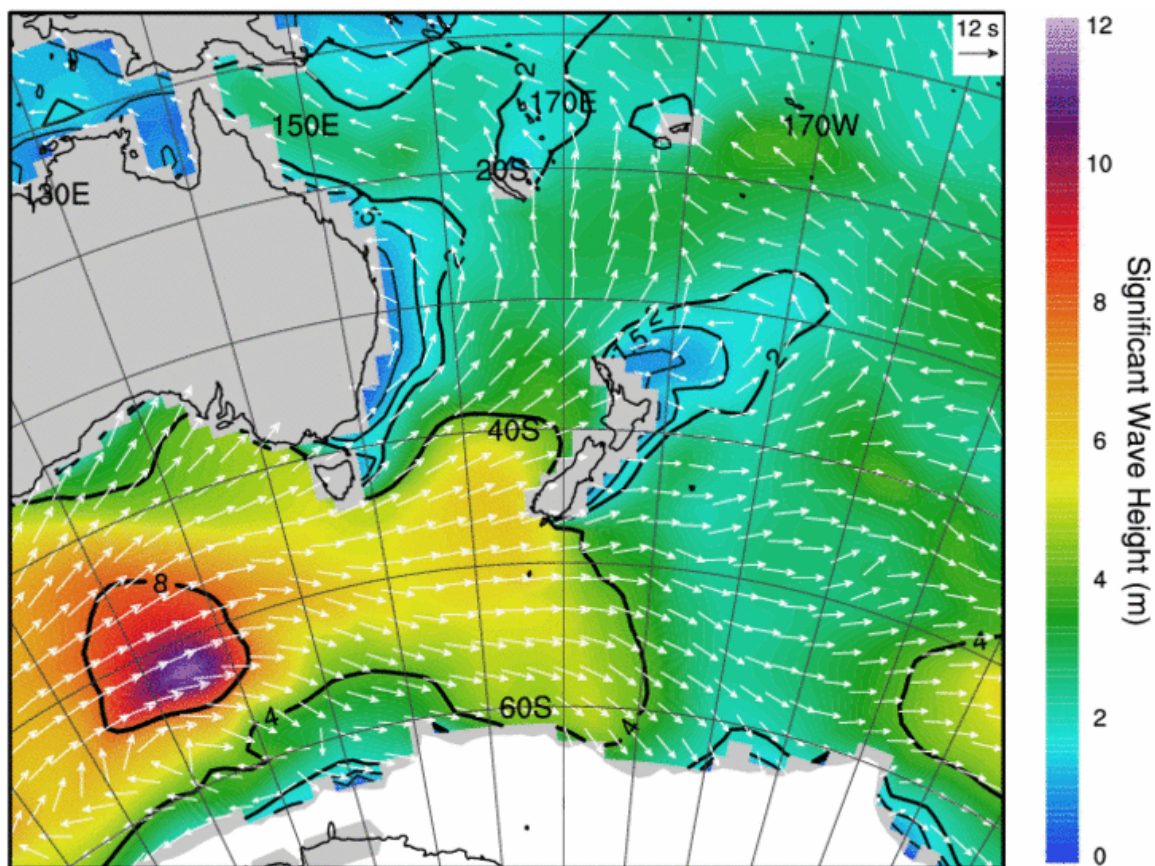
QuickScat data for the satellite pass overhead at approximately 05:32 UTC 5-Aug-2009.

In this plot of estimated wind speed and direction at 0532 UTC 05 Aug 2009, near 20° 24' South 174° 56' West, the wind direction is slightly south of due east and the wind speed is shown as 20 knots. In previous scans of this system (see Appendix), the wind speed at 1827 UTC 4 Aug 2009 near 20° 24' South 174° 56' West was 20 to 25 knots from slightly south of due east.

Numerical Weather Prediction – Wave Modeling

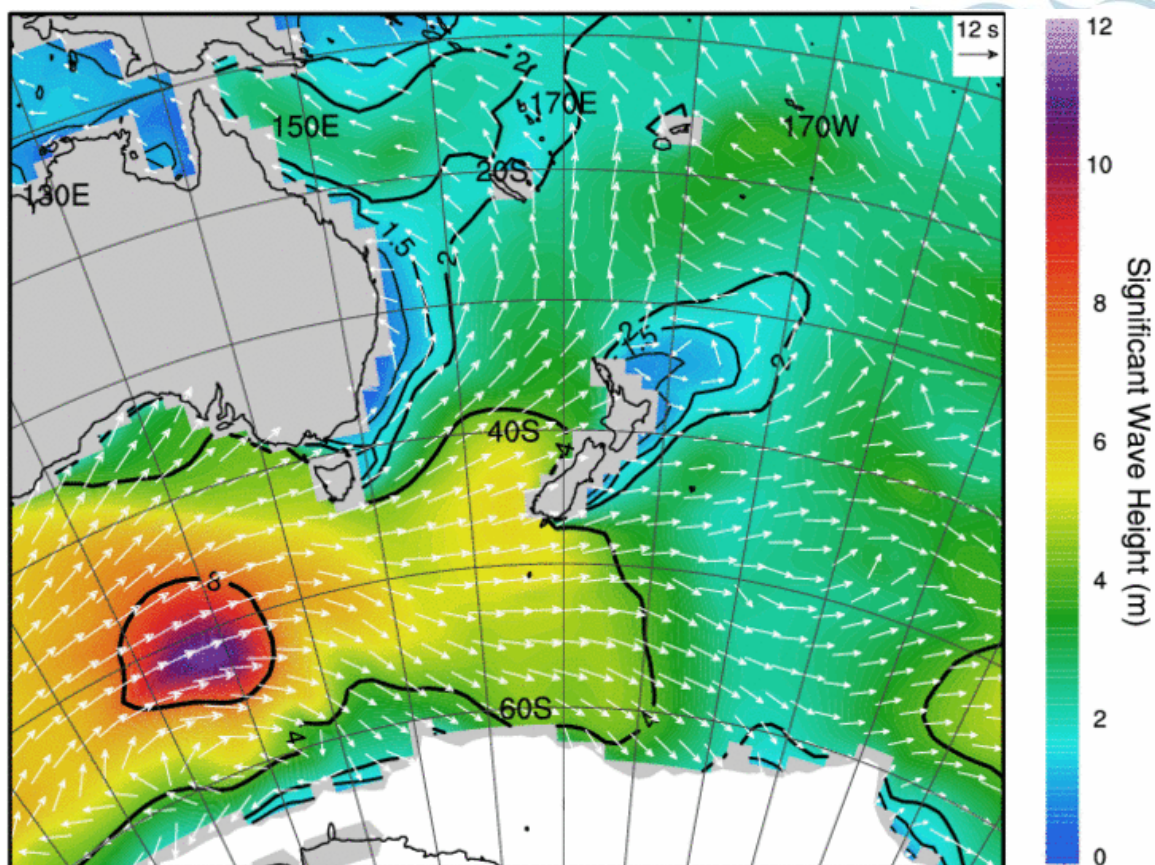
The National Institute of Water and Atmospheric Research (NIWA) runs a global wave model twice each day to produce an analysis and predictions out to 6 days ahead.

The analysed significant combined wave field over the southwest Pacific Ocean at 0000 UTC 5 August 2009, and the following prognoses at 0600 and 1200 UTC are shown. In these charts significant wave height is contoured at 4 metre intervals and shaded with a colour scale. The arrows indicate wave direction and the length of the arrows indicate the wave period. (Scale length for 12 seconds is in the top right corner).



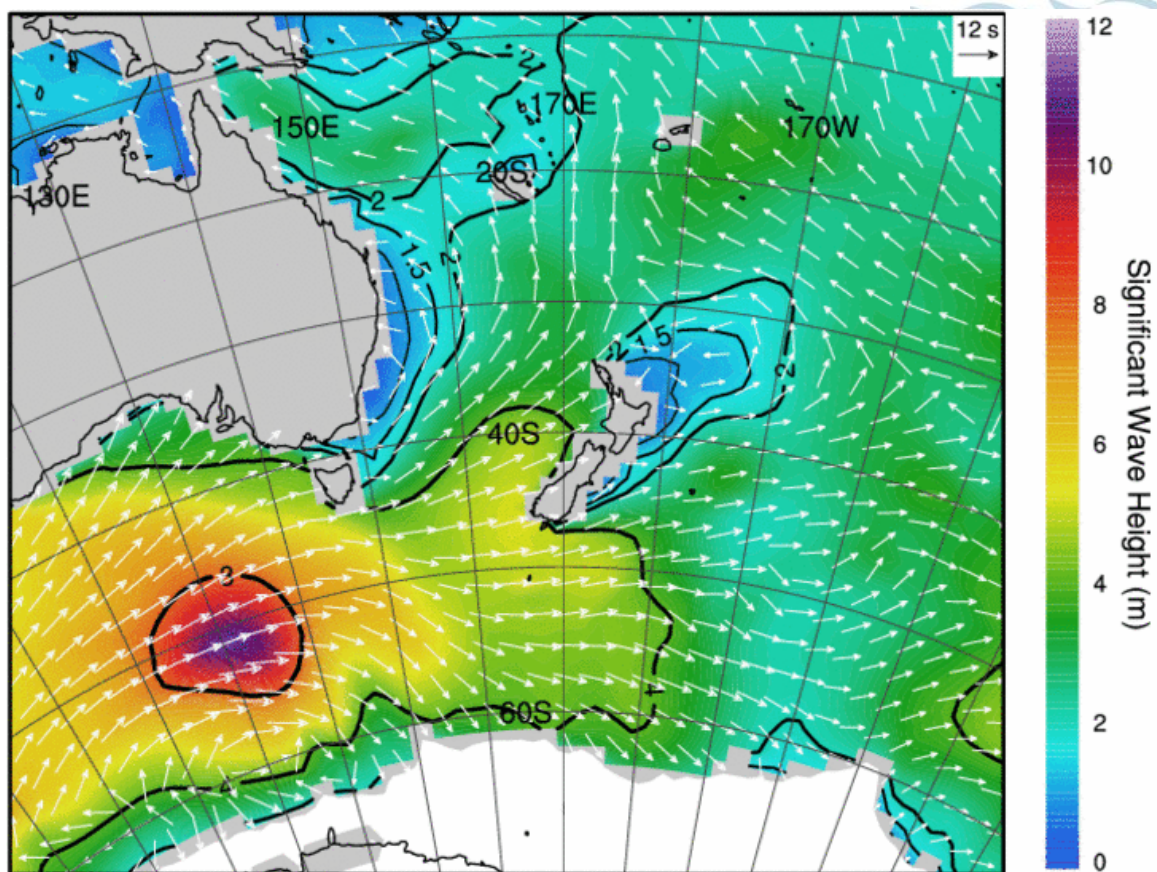
Significant combined waves at 0000 UTC 5 August 2009.

Careful examination of this image resulted in an estimation of significant combined wave height of about 3.5 metres from east-northeast near 20° 24' South 174° 56' West. There is a local maximum of combined wave height of about 4 metres near 17° South 173° West.



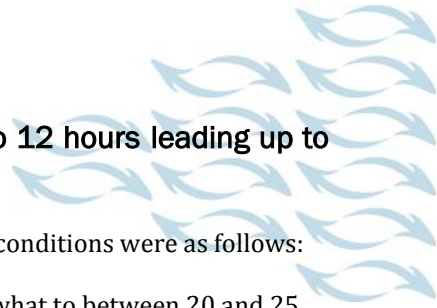
Significant combined waves at 0600 UTC 5 August 2009.

Careful examination of this image resulted in an estimation of significant combined wave height of about 3.3 metres from east-northeast near 20° 24' South 174° 56' West. There is a local maximum of combined wave height of about 3.6 metres near 17° South 175° West.



Significant combined waves at 1200 UTC 5 August 2009.

Careful examination of this image resulted in an estimation of significant combined wave height of about 3.2 metres from east-northeast near 20° 24' South 174° 56' West. There is a local maximum of combined wave height of about 3.6 metres near 17° South 176° West.



Assessment of wind, weather, sea and swell conditions in the 6 to 12 hours leading up to 1100 UTC 5 August 2009

In the vicinity of 20° 24' South 174° 56' West the wind, weather, sea and swell conditions were as follows:

Weather: No precipitation or other meteorological obscuration. Good visibility.

Wind: About 25 knots in the late afternoon and early evening, and eased somewhat to between 20 and 25 knots later in the evening; blowing from the east or up to 20° south of east.

Sea state and swell: Almost all waves were travelling from east-southeast and it would be very difficult to differentiate between wind driven waves (sea) and waves that had travelled from a generation area further away (swell). The combined¹ (sea and swell) significant wave height in the late afternoon and early evening was about 3.5 metres. Later in the evening, the combined significant wave height had probably eased a little to about 3.3 metres.

Given sufficient time and a long fetch, a 20 to 25 knot wind can develop a sea with significant waves of 3.5 metres. Therefore it is likely that the waves were wind driven sea waves rather than swell waves.

Ocean depth and wave height

My understanding of ocean wave behaviour is that wave height is not significantly affected until the depth is much, much less than the deep water wave length which is typically 100 to 150 metres for waves with a period of 8 to 10 seconds. However, the wave length will noticeably shorten over the shallower water, and the sea state may appear to be relatively higher.

¹ Significant wave height is the average height of the highest 1/3 of the waves present.

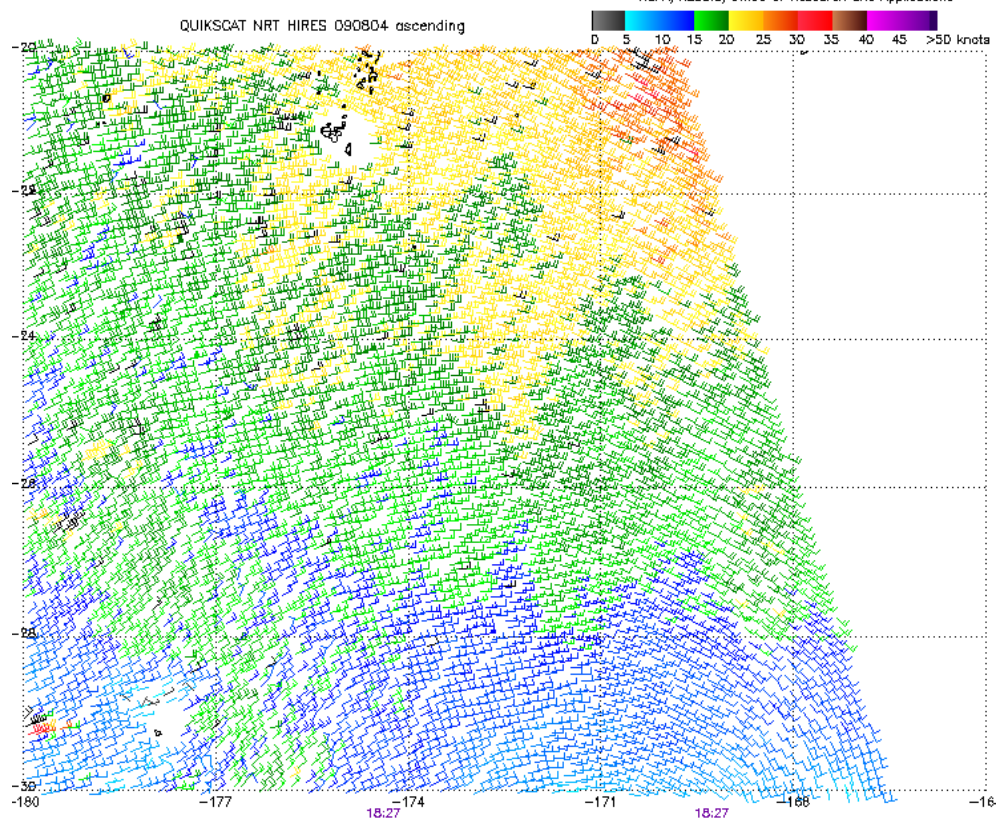
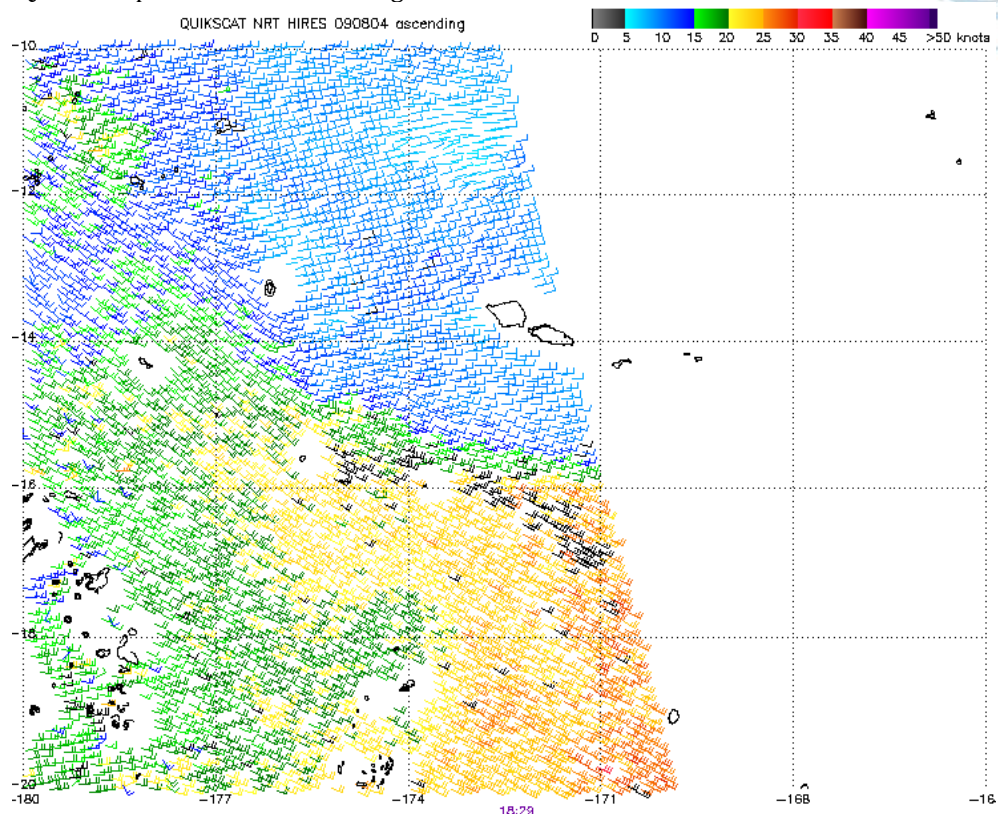


The above meteorological information has been retrieved from our records. To the best of my knowledge, the information is correct.

For and on behalf of Meteorological Service of New Zealand Ltd

Ross Marsden
Consultant Meteorologist
15 July 2010

“QuikScat” pass at 1828 UTC 4 Aug 2009.





TONGA METEOROLOGICAL SERVICE
MINISTRY OF TRANSPORT
 P. O. Box 845, Fua'amotu Airport, Tongatapu, TONGA

2.1(d) METEOROLOGICAL REPORT OF
 THE DIRECTOR OF METEOROLOGY
 ON THE SINKING OF THE
 MV PRINCESS ASHIKA.

Weather Forecasts and Conditions during the

Sinking of the "PRINCESS ASHIKA" (Call Sign A3C12)

05th August 2009

(report by Director of Meteorology)

COPY

1. Weather Forecasts

1.1 Weather Forecasts issued on 4 August 2009

WEATHER FORECAST ISSUED FROM NWFC FUA'AMOTU AT 3:00AM
 TUESDAY 04 AUGUST 2009.

SITUATION

A RIDGE OF HIGH PRESSURE EXTENDS ON TO TONGA FROM THE
 SOUTHEAST DIRECTING A MODERATE TO FRESH EAST TO SOUTH-
 EAST WIND FLOW OVER THE GROUP.

FORECAST TO MIDNIGHT TONITE FOR TONGA:

MOSTLY FINE APART FROM A FEW BRIEF SHOWERS. MODERATE
 EAST TO SOUTHEAST WIND FLOW FRESH AT TIMES ABOUT TONGA-
 TAPU, 'EUA, HA'APAI AND VAVA'U.

OUTLOOK FOR WEDNESDAY:

A FEW SHOWERS ABOUT THE NIUAS AND VAVA'U. MOSTLY FINE
 ELSEWHERE. A MODERATE TO FRESH EAST TO SOUTHEAST WIND
 FLOW CONTINUES.

MARINE WEATHER FORECAST FOR TONGA

FORECAST TO MIDNIGHT TONITE FOR TONGA COASTAL WATERS:

EAST TO SOUTHEAST WINDS 15/20KTS UP TO 25KTS AT TIMES
 OVER MOST COASTAL WATERS. MODERATE TO ROUGH SEAS WITH
 A MODERATE SOUTHEAST SWELL.

OUTLOOK FOR WEDNESDAY:

EAST TO SOUTHEAST WINDS 15/20KTS UP TO 25KTS AT TIMES
 OVER MOST COASTAL WATERS.

TIDES

LOW TIDE 1245PM
 HIGH TIDE 0700PM

MEAN SEA LEVEL PRESSURE RECORDED AT FUA'AMOTU AT 3:00AM
 WAS 1016.6MB

/ML/OF/TT/=



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'Eua
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18/8/09.
 Q.F.



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WEATHER FORECAST ISSUED FROM NWFC FUA'AMOTU AT 10:30AM
TUESDAY 04 AUGUST 2009.

SITUATION

A WEAK TROUGH LIES SLOW MOVING ABOUT THE NIUAS. MEANWHILE
AN EAST TO SOUTHEAST WINDFLOW PREVAILS OVER THE KINGDOM.

FORECAST TO MIDNIGHT TOMORROW FOR TONGA:

MOSTLY FINE APART FROM A FEW BRIEF SHOWERS ESPECIALLY
THE NIUAS. MODERATE EAST TO SOUTHEAST WINDS FRESH AT
TIMES. COOL AT NIGHT.

OUTLOOK FOR THURSDAY:

A FEW SHOWERS ABOUT THE NIUAS AND VAVA'U. MOSTLY FINE
ELSEWHERE. A MODERATE TO FRESH EASTERLY WIND FLOW.

MARINE WEATHER FORECAST FOR TONGA

FORECAST TO MIDNIGHT TOMORROW FOR TONGA COASTAL WATERS
EAST TO SOUTHEAST WINDS 15/20 KNOTS UP TO 25KTS AT TIMES
OVER MOST COASTAL WATERS. MODERATE TO ROUGH SEAS WITH A
MODERATE SOUTHEAST SWELL.

OUTLOOK FOR THURSDAY:

EASTERLY WINDS 15/20KTS.

TIDES

LOW TIDE 12:45PM
HIGH TIDE 07:00PM

MEAN SEA LEVEL PRESSURE RECORDED AT FUA'AMOTU AT 10:30AM
WAS 1019.4MB

/OT=



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WEATHER FORECAST ISSUED FROM NWFC FUA'AMOTU AT 6:00PM
 TUESDAY 04 AUGUST 2009.

SITUATION

A WEAK TROUGH LIES SLOW MOVING TO THE NORTH OF THE NIUAS.
 MEANWHILE AN EAST TO SOUTHEAST WINDFLOW PREVAILS OVER
 THE KINGDOM.

FORECAST TO MIDNIGHT TOMORROW FOR TONGA:

MOSTLY FINE APART FROM A FEW BRIEF SHOWERS ESPECIALLY
 THE NIUAS. MODERATE EAST TO SOUTHEAST WINDS FRESH AT
 TIMES. COOL AT NIGHT.

OUTLOOK FOR THURSDAY:

A FEW SHOWERS ABOUT THE NIUAS AND VAVA'U. MOSTLY FINE
 ELSEWHERE. A MODERATE TO FRESH EASTERLY WIND FLOW.

MARINE WEATHER FORECAST FOR TONGA

FORECAST TO MIDNIGHT TOMORROW FOR TONGA COASTAL WATERS:

EAST TO SOUTHEAST WINDS 15/20 KNOTS UP TO 25KNOTS AT
 TIMES OVER MOST COASTAL WATERS. MODERATE TO ROUGH SEAS
 WITH A MODERATE SOUTHEAST SWELL.

OUTLOOK FOR THURSDAY:

EASTERLY WINDS 15/20KTS.

TIDES

HIGH TIDE 07:00PM
 LOW TIDE 12:46AM

MEAN SEA LEVEL PRESSURE RECORDED AT FUA'AMOTU AT 6:00PM
 WAS 1017.4MB

OT/=



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'Eua
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1.2 Weather Forecasts issued on 5 August 2009

WEATHER FORECAST ISSUED FROM NWFC FUA'AMOTU AT 4:00AM
WEDNESDAY 05 AUGUST 2009.

SITUATION

A WEAK TROUGH LIES SLOW MOVING TO THE NORTH OF THE NIUAS.
MEANWHILE AN EAST TO SOUTHEAST WINDFLOW PREVAILS OVER THE
KINGDOM.

FORECAST TO MIDNIGHT TONITE FOR TONGA:

MOSTLY FINE APART FROM A FEW BRIEF SHOWERS ESPECIALLY THE
NIUAS. MODERATE EAST TO SOUTHEAST WINDS FRESH AT TIMES. COOL
AT NIGHT.

OUTLOOK FOR THURSDAY:

A FEW SHOWERS ABOUT THE NIUAS AND VAVA'U. MOSTLY FINE ELSE
WHERE. A MODERATE TO FRESH EASTERLY WIND FLOW.

MARINE WEATHER FORECAST FOR TONGA:

FORECAST TO MIDNIGHT TONITE FOR TONGA COASTAL WATERS:

EAST TO SOUTHEAST WINDS 15/20 KNOTS UP TO 25 KNOTS AT TIMES
OVER MOST COASTAL WATERS. MODERATE TO ROUGH SEAS WITH A
MODERATE SOUTHEAST SWELL.

OUTLOOK FOR THURSDAY:

EASTERLY WINDS 15/20 KTS.

TIDES

HIGH TIDE 06:55AM
LOW TIDE 01:25PM

MEAN SEA LEVEL PRESSURE RECORDED AT FUA'AMOTU AT 4:00AM
WAS 1018.3MB

SV/=



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WEATHER FORECAST ISSUED FROM NWFC FUA'AMOTU AT 11:00AM
WEDNESDAY 05 AUGUST 2009.

SITUATION

A WEAK TROUGH LIES SLOW MOVING TO THE NORTH OF THE NIUAS.
MEANWHILE AN EAST TO SOUTHEAST WINDFLOW PREVAILS OVER
THE KINGDOM.

FORECAST TO MIDNIGHT TOMORROW FOR TONGA:

MOSTLY FINE APART FROM A FEW BRIEF SHOWERS ABOUT VAVA'U
AND THE NIUAS. MODERATE EAST TO SOUTHEAST WINDS FRESH AT
TIMES.

OUTLOOK FOR FRIDAY:

A FEW SHOWERS ABOUT THE NIUAS AND VAVA'U. MOSTLY FINE
ELSEWHERE. A MODERATE TO FRESH EAST TO NORTHEAST WINDS.

MARINE WEATHER FORECAST FOR TONGA:

FORECAST TO MIDNIGHT TOMORROW FOR TONGA COASTAL WATERS:

EAST TO SOUTHEAST WINDS 15/20 KNOTS GUSTING TO 25 KNOTS
OVER MOST COASTAL WATERS. MODERATE TO ROUGH SEAS WITH A
MODERATE SOUTHEAST SWELL.

OUTLOOK FOR FRIDAY:

EAST TO NORTHEAST WINDS 15/20KTS.

TIDES

LOW TIDE 01:25PM
HIGH TIDE 07:40PM

MEAN SEA LEVEL PRESSURE RECORDED AT FUA'AMOTU AT 11:00AM
WAS 1020.5MB

NH/=



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WEATHER FORECAST ISSUED FROM NWFC FUA'AMOTU AT 06:30PM
 WEDNESDAY 05 AUGUST 2009.

SITUATION

A WEAK TROUGH LIES SLOW MOVING OVER THE NIUAS. MEANWHILE
 AN EAST TO SOUTHEAST WINDFLOW COVERS THE GROUP.

FORECAST TO MIDNIGHT TOMORROW FOR TONGA:

CLOUDY PERIODS WITH A FEW BRIEF SHOWERS ABOUT THE NIUAS.
 ELSEWHERE FINE APART FROM A FEW CLOUDY PERIODS. MODERATE
 EAST TO SOUTHEAST WINDS FRESH AT TIMES.

OUTLOOK FOR FRIDAY:

A FEW SHOWERS ABOUT THE NIUAS AND VAVA'U. MOSTLY FINE
 ELSEWHERE. A MODERATE TO FRESH EAST TO NORTHEAST WINDS.

MARINE WEATHER FORECAST FOR TONGA:

FORECAST TO MIDNIGHT TOMORROW FOR TONGA COASTAL WATERS:

EAST TO SOUTHEAST WINDS 15/20 KNOTS GUSTING TO 25 KNOTS
 OVER MOST COASTAL WATERS. MODERATE TO ROUGH SEAS WITH A
 MODERATE SOUTHEAST SWELL.

OUTLOOK FOR FRIDAY: EAST TO NORTHEAST WINDS 15/20KTS.

TIDES

HIGH TIDE 07:40PM
 LOW TIDE 01:30AM

MEAN SEA LEVEL PRESSURE RECORDED AT FUA'AMOTU AT 06:30PM
 WAS 1018.4MB

NH/=



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2. Weather Conditions Reports from Marine Vessels in Tonga Coastal Waters

05 August 2009

1. MFV KERRY ELLE (A3BH9) – 0720hrs

Position: 21°05'S 176°33'W
 Wind Direction: ESE
 Wind Speed: 15/20KTS
 Sea Swell: SE
 Sea Swell speed: 0.9KTS

2. MFV ALBACORE (A3CM4) – 0906hrs

Position: 21°28'S 174°59'W
 Wind Direction: East
 Wind Speed: 20/25KTS
 Sea Swell: East
 Sea Swell speed: 1KTS

3. MV VALO (A3BN3) – 0948hrs

Position: Abeam Mounu
 Wind Direction: East
 Wind Speed: 15/20KTS
 Sea Swell: East
 Sea Swell speed: 1.5KTS

4. MFV KERRY ELLE (A3BH9) – 1707hrs

Position: 20°48'S 176°34'W
 Wind Direction: East
 Wind Speed: 20/25KTS
 Sea Swell: SE
 Sea Swell speed: 0.5KTS



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2. Marine Weather Reports from Marine Vessels in Tonga Coastal Waters

06 August 2009

- 1. MV PULUPAKI (A3CJ3) – 1004hrs**
 Position: 20°04'S 174°18'W (abeam Tokulu)
 Wind Speed: 20KTS
- 2. MV IKALE (A3CQ4) – 1254hrs**
 Position: abeam Kolonga
 Wind Direction: ESE
 Wind Speed: 15/20KTS
 Sea Swell: 2M
- 3. MV PULUPAKI (A3CJ3) – 1004hrs**
 Position: abeam Luahoko in Ha'apai
 Wind Direction: ENE
 Wind Speed: 15/20KTS
 Sea Swell: 3-4M
- 4. MFV KERRY ELLE (A3BH9) – 1744hrs**
 Position: 20°46'S 176°04'W
 Wind Direction: SE
 Wind Speed: 20KTS
 Sea Swell: 3M
 Sea Swell Speed: 0.5KTS



Fua'amotu Airport (HQ)
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 HF: 3167, 3827 & 6381kHz

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 Fx: (676) 60815

Niutoputapu
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Niuafo'ou
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 Ph: (676) 28504



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3. Routine Hourly Aviation Weather Reports (METAR)

5 August 2009

Fua'amotu Meteorological Station (TBU)

METAR NTF 041200Z 10007KT 9999 FEW010 22/18 Q1019=
 METAR NTF 041300Z 11008KT 9999 FEW010 22/18 Q1018=
 METAR NTF 041400Z 10008KT 9999 FEW010 SCT140 22/18 Q1018=
 METAR NTF 041500Z 10008KT 9999 FEW010 SCT014 22/18 Q1018=
 METAR NTF 041600Z 10006KT 9999 FEW010 SCT014 22/18 Q1018=
 METAR NTF 041700Z 10009KT 9999 FEW010 21/18 Q1018=
 METAR NTF 041800Z 10008KT 9999 FEW010 21/17 Q1019=
 METAR NTF 041900Z 10009KT 9999 FEW010 22/17 Q1019=
 METAR NTF 042000Z 10011KT 9999 FEW010 22/17 Q1019=
 METAR NTF 042100Z 09011KT 9999 FEW010 24/17 Q1020=
 METAR NTF 042200Z 10014KT 9999 FEW010 25/18 Q1020=
 METAR NTF 042300Z 09011KT 9999 FEW010 25/19 Q1020=
 METAR NTF 050000Z 10013KT 9999 FEW012 25/18 Q1019=
 METAR NTF 050100Z 10011KT 9999 SCT014 25/20 Q1018=
 METAR NTF 050200Z 10012KT 9999 SCT014 25/19 Q1017=
 METAR NTF 050300Z 10011KT 9999 SCT014 25/19 Q1017=
 METAR NTF 050400Z 10009KT 9999 SCT014 24/19 Q1017=
 METAR NTF 050500Z 10008KT 9999 SCT014 23/18 Q1018=
 METAR NTF 050600Z 10010KT 9999 SCT014 22/17 Q1018=
 METAR NTF 050700Z 10007KT 9999 FEW010 21/18 Q1019=
 METAR NTF 050800Z 10009KT 9999 FEW011 22/18 Q1020=
 METAR NTF 050900Z 11007KT 9999 FEW011 22/18 Q1020=
 METAR NTF 051000Z 11009KT 9999 FEW011 SCT120 21/18 Q1020=
 METAR NTF 051100Z 11009KT 9999 FEW011 SCT120 21/18 Q1019=

Salote Pilolevu Meteorological Station (Ha'apai)

METAR NFTL 041700Z 09013KT 9999 SCT018TCU 22/19 Q1016=
 METAR NFTL 041800Z 09015KT 9999 SCT018TCU 23/20 Q1016=
 METAR NFTL 041900Z 09018KT 9999 BKN018TCU 23/19 Q1016=
 METAR NFTL 042000Z 09019KT 9999 SCT018TCU 25/18 Q1017=
 METAR NFTL 042100Z 10020KT 9999 BKN018 24/18 Q1018=
 METAR NFTL 042200Z 10020KT 9999 SCT020TCU 25/18 Q1018=
 METAR NFTL 042300Z 09019KT 9999 SCT020 25/18 Q1017=
 METAR NFTL 050000Z 08022KT 9999 FEW020 25/18 Q1017=
 METAR NFTL 050100Z 08021KT 9999 FEW020 25/18 Q1016=
 METAR NFTL 050200Z 08020KT 9999 SCT020 25/18 Q1015=
 METAR NFTL 050300Z 09020KT 9999 SCT010 BKN040 24/18 Q1015=
 METAR NFTL 050400Z 09019KT 9999 SCT020 24/18 Q1015=
 METAR NFTL 050500Z 08020KT 9999 BKN018TCU 23/19 Q1015=
 METAR NFTL 050600Z 08021KT 9999 SCT018 BKN040 23/18 Q1016=



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6 August 2009

Fua'amotu Meteorological Station (TBU)

METAR NTF 051200Z 11010KT 9999 FEW012 SCT120 21/17 Q1019=
 METAR NTF 051200Z 11010KT 9999 FEW012 SCT120 21/17 Q1019=
 METAR NTF 051300Z 11008KT 9999 FEW012 SCT120 21/19 Q1019=
 METAR NTF 051400Z 11006KT 9999 FEW013 21/17 Q1019=
 METAR NTF 051500Z 12005KT 9999 FEW013 21/18 Q1018=
 METAR NTF 051600Z 11005KT 9999 FEW013 21/18 Q1019=
 METAR NTF 051700Z 12006KT 9999 FEW014 21/18 Q1019=
 METAR NTF 051800Z 11006KT 9999 FEW015 21/19 Q1019=
 METAR NTF 051900Z 11007KT 9999 FEW012 BKN300 22/19 Q1019=
 METAR NTF 052000Z 10006KT 9999 SCT014 22/19 Q1019=
 METAR NTF 052100Z 09009KT 9999 SCT014 24/19 Q1020=
 METAR NTF 052200Z 10008KT 9999 SCT018 25/18 Q1019=
 METAR NTF 052300Z 10011KT 9999 SCT018 25/19 Q1019=
 METAR NTF 060000Z 11007KT 9999 SCT018 26/20 Q1019=
 METAR NTF 060100Z 11010KT 9999 SCT018 26/20 Q1017=
 METAR NTF 060200Z 11011KT 9999 BKN018 25/20 Q1017=
 METAR NTF 060300Z 12010KT 9999 BKN018 24/19 Q1016=
 METAR NTF 060400Z 12011KT 9999 SCT016 24/19 Q1017=
 METAR NTF 060500Z 12010KT 9999 BKN017 22/19 Q1017=
 METAR NTF 060600Z 12009KT 9999 BKN018 21/19 Q1017=
 METAR NTF 060700Z 12008KT 9999 BKN018 22/19 Q1018=
 METAR NTF 060800Z 11009KT 9999 SCT016 22/18 Q1018=
 METAR NTF 060900Z 11009KT 9999 SCT016 22/18 Q1018=
 METAR NTF 061000Z 11007KT 9999 SCT016 22/18 Q1018=
 METAR NTF 061100Z 11006KT 9999 SCT016 22/18 Q1018=

Salote Pilolevu Meteorological Station (Ha'apai)

METAR NTF 051200Z 09017KT 9999 FEW018 23/17 Q1017=
 METAR NTF 051200Z 09017KT 9999 FEW018 23/17 Q1017=
 METAR NTF 051800Z 09011KT 9999 SCT018 22/20 Q1017=
 METAR NTF 051900Z 09010KT 9999 FEW018 BKN040 22/18 Q1017=
 METAR NTF 052000Z 10012KT 9999 FEW018 BKN040 23/18 Q1018=
 METAR NTF 052100Z 10012KT 9999 FEW020 24/19 Q1018=
 METAR NTF 052200Z 10012KT 9999 FEW018 BKN040 25/20 Q1017=
 METAR NTF 052300Z 10012KT 9999 FEW018 BKN040 25/20 Q1017=
 METAR NTF 060000Z 09012KT 9999 FEW020 25/20 Q1016=
 METAR NTF 060100Z 10010KT 9999 SCT020 26/21 Q1015=
 METAR NTF 060200Z 09011KT 9999 BKN020 25/20 Q1015=
 METAR NTF 060300Z 11010KT 9999 BKN018 24/20 Q1014=
 METAR NTF 060400Z 11011KT 9999 SCT018 BKN040 24/20 Q1014=
 METAR NTF 060500Z 10010KT 9999 FEW018 BKN040 23/19 Q1014=
 METAR NTF 060600Z 10013KT 9999 SCT018 BKN040 23/19 Q1015=



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4. Routine SYNOPTIC Reports

5 August 2009

Fua'amotu Meteorological Station

Synoptic Observations - Tonga
 Fua'amotu Station
 0100hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
100/07	40km	Partly Cloudy	21.7	1019.0	Nil

Synoptic Observations - Tonga
 Fua'amotu Station
 0700hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
100/08	40km	Partly Cloudy	21.2	1019.1	Nil

Synoptic Observations - Tonga
 Fua'amotu Station
 1300hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
100/13	50km	Partly Cloudy	25.2	1019.2	Nil

Synoptic Observations - Tonga
 Fua'amotu Station
 1900hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
100/10	40km	Partly Cloudy	21.9	1018.5	Nil



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4. Routine SYNOPTIC Reports

5 August 2009

Salote Pilolevu Meteorological Station

Synoptic Observations - Tonga
 Ha'apai Station
 0100hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
100/15	40km	Cloudy	23.0	1015.8	Nil

Synoptic Observations - Tonga
 Ha'apai Station
 0700hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
090/15	40km	Partly Cloudy	22.8	1016.5	Nil

Synoptic Observations - Tonga
 Ha'apai Station
 1300hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
080/22	50km	Partly Cloudy	24.6	1017.0	Nil

Synoptic Observations - Tonga
 Ha'apai Station
 1900hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
080/21	40km	Cloudy	23.0	1016.3	Nil



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4. Routine SYNOPTIC Reports

6 August 2009

Fua'amotu Meteorological Station

Synoptic Observations - Tonga
 Fua'amotu Station
 0100hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
110/10	40km	Partly Cloudy	21.1	1019.9	Nil

Synoptic Observations - Tonga
 Fua'amotu Station
 0700hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
110/06	40km	Partly Cloudy	20.9	1019.4	Nil

Synoptic Observations - Tonga
 Fua'amotu Station
 1300hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
110/07	40km	Partly Cloudy	26.2	1019.1	Nil

Synoptic Observations - Tonga
 Fua'amotu Station
 1900hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
120/09	40km	Cloudy	20.6	1017.6	Nil



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4. Routine SYNOPTIC Reports

6 August 2009

Salote Pilolevu Meteorological Station

Synoptic Observations - Tonga
Ha'apai Station
0100hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
090/17	40km	Partly Cloudy	22.7	1017.2	Nil

Synoptic Observations - Tonga
Ha'apai Station
0700hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
090/11	40km	Partly Cloudy	22.3	1017.6	Nil

Synoptic Observations - Tonga
Ha'apai Station
1300hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
090/12	50km	Partly Cloudy	25.2	1016.2	Nil

Synoptic Observations - Tonga
Ha'apai Station
1900hrs

Wind [dir/kts]	Vis. [km]	Present Weather	Temp. [C]	Press. [hPa]	Rain [mm]
100/13	40km	Cloudy	23.0	1015.2	Nil



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