FIRST DRAFT OF PLANS FOR THE 1999 SYDNEY TO HOBART YACHT RACE

PRE-RACE METEOROLOGICAL TRAINING

The Bureau of Meteorology is to participate in the marine meteorological training provided by the CYCA to crews in the weeks that lead up to the race. The Bureau's contribution, by agreement with the CYCA, is to include appropriate coverage of:

- Weather at sea.
- Generation of sea waves.
- Ocean currents.
- Local weather effects.
- Terminology and definitions.
- The weather and sea wave prediction models developed by the Bureau of Meteorology.
- Safe Navigation – getting there and back safely.
  Weather safety hints:
  - The longer the range the less reliable are forecasts.
  - Always obtain the latest weather forecast before going to sea.
  - Know the local meteorological factors that influence sea conditions and where to reach shelter quickly.
  - While at sea; always check the latest routine forecast or Warning.
- ***Coastal Marine Radio Delivery System.***
  This system is operated by Telstra. Marine weather forecasts and Warnings are broadcast over VIS Sydney Radio for NSW Waters and VIM Melbourne Radio for Victorian and Tasmanian areas of responsibility.
- ***HF Radio Fax (AXM) transmitter.***
  The Australian Navy on behalf of the Bureau operates this facility.
- ***Recorded Telephone.***
  The Bureau provides telephone marine weather forecasts and coastal reports of weather and sea state via Telstra services.

	Telstra
New South Wales Coastal Waters	1900 926 101
Eastern Bass Strait	1900 969 933
Tasmanian Coastal Waters	1900 969 940

- ***Weather by Fax.***
  The Bureau uses a polling fax system and provides a menu of over 270 products, including the latest warnings and routine Coastal Waters Forecasts. Reports of Coastal Weather Observations s of the latest wind and sea conditions are also available.

	NATIONAL	NSW	TAS
Current Weather Map	1902 93 5210		
Marine Weather Warnings		1902 93 5071	1902 93 5049
Coastal Waters Forecast (Graphic)			1902 93 5246
Coastal Waters Forecast (Text and Observations).		1902 93 5220	1902 93 5240

A special Weather By Fax polling system, with a telephone number dedicated to the customised Sydney to Hobart Yacht Race Forecasts and relevant weather observations,

will be established. The telephone number will be advised at the time of the pre-race training.

- ***Satellite Communications.***
  Telstra transmits on their Satcom-C system via INMARSAT weather forecasts for the High Seas as well as Gale Force Wind Warnings and Storm Force Wind Warnings, free of charge to recipients. The identity code for downloading Ocean Wind Warnings is IDWOIXXX. The customised forecast for the Sydney to Hobart Yacht Race could also be broadcast via Satcom-C by prior arrangement with Telstra (one of the sponsors of the race).
- ***Internet.***
  A full range Bureau of Meteorology forecast and warning products is available on the World Wide Web. Included in the Web menu will be the Special Sydney to Hobart Yacht Race Forecasts. The Internet address is http://www.bom.gov.au.

PRE RACE BRIEFING

It may be useful to have a "dry run" of the briefing with selected skippers to ensure that the language, format and coverage are appropriate.

On Friday 24 December provide a Bureau of Meteorology presentation at the Formal Compulsory Race Briefing of skippers and navigators for the 55th Sydney to Hobart Yacht Race. About an hour should be allowed to cover briefly cover all items. Matters that will be presented in the overview include:

- Organisational aspects such as terminology used in weather forecasts and warnings.
- The frequency of issue of Special Yacht Race Forecasts has been increased from 2 to 4 each 24 hours.
- Format of routine special yacht race forecasts.
- Communications schedule of Special Yacht Race Forecasts from the Radio Relay Vessel to the yachts.
- Coastal Marine Radio Delivery System operated by Telstra (VIS and VIM).
- HF Radio Fax (AXM) transmitter operated by the Australian Navy on behalf of the Bureau.
- Satellite Communications. Telstra transmits via Satcom-C a complete range of safety information, including weather warnings, free of charge to recipients.
- Arrangements for the passing of messages of weather and wave height observations taken from 20 selected yachts.
- Role of the proposed "Weather Ship".
- General weather outlook for *the start of* the Sydney to Hobart Yacht Race which is to start 60 hours after the data cut off time, for model output that is currently available on the day before Christmas.
- The last competitors often arrive in Hobart about 7 days after the data cut-off time for numerical weather prediction output that is available during the day before Christmas. At this stage examples of some of the synoptic situations of previous notable Sydney to Hobart events may be more beneficial than a definitive forecast for up to a week ahead.

WEATHER PACKAGE DELIVERED BEFORE THE START

An up-to-date weather forecast package is to be distributed outside the Sailing Office at the CYCA from 9.00 a.m. on Boxing Day 26 December 1999. Additionally Bureau of Meteorology representatives will be available to discuss the prognosis. Dr. George Cresswell CSIRO Division of Marine Research, Hobart, will provide the latest cloud free NOAA satellite imagery of the East Australian Current, showing the position of the main current and eddies etc. It may be possible for CSIRO DMR to provide some advice on the optimum path to maximise assistance from eddies embedded in the East Australian Current, if there has been a recent cloud free image of the sea surface off the South Coast of NSW.

WIND WARNINGS

The Bureau of Meteorology will provide extra distribution of any Strong, Gale Force, or Storm Force Wind Warnings that affect the course of the Sydney to Hobart Yacht Race. The CYCA is requested to advise the BoM (no later than the beginning of December) the telecommunications addresses to be used.

The range of wind warnings that may be issued by the Bureau of Meteorology, depending on the meteorological situation, are:
Strong Wind (25-33 knots)
Gale Force Wind Warnings (34-47 knots)
Storm Force Wind Warnings (48 knots and greater).

SATELLITE COMMUNICATIONS

According to Mr Graham Temple, of Electrotech Marine, the costs of SATCOM-C equipment is about $5,500 (including tax). Mr Temple can be contacted on phone 9646 0555, or mobile 0419 013877).

Telstra purchased 20 INMARSAT-C terminals from Electrotech Marine two years ago, for the express purpose of installing them on yachts in the Sydney-Hobart. Telstra used the terminals for tracking the fleet, but of course they can also be used for sending weather reports, preferably in WMO code. Electrotech Marine was involved in fitting the equipment. The first year, the terminals were distributed amongst all classes, but last year, the Cruising Yacht Club requested that they be fitted to the larger boats, which would tend to lead the race. The contact for distribution of SATCOM-C terminals is:
Mr. Ewin Rankin, of Telstra.
Title: Events Manager.
Office: Level 9
242 Exhibition Street,
Melbourne.
Phone: 96328192
Mobile: 0418 347718

Very few yachts possess their own SATCOM equipment and tend to have rather primitive radio based communications systems. The cost of accessing a chart via 'weather by fax' through INMARSAT-C system is about $100 per chart. The cost of accessing a chart from

Bureau's WWW page, via an Internet connection through an INMARSAT-C system is about $10 per chart.

INMARSAT-C communication of any Warnings current for the course of the Sydney to Hobart yacht race will be provided to yachts carrying the required reception equipment.

OBSERVATIONS OF WEATHER AND SEA WAVES

Lodgement of Weathers by Sydney to Hobart Yachts

The yachts have the option of working either Sydney/VIS, Brisbane/VIB or Melbourne/VIM. The operator located at Brisbane controls Sydney. All stations are 24 hours operations. The preferred station would be Melbourne, although for the first 12 hours of the race, Sydney would be the recommended station. The three stations maintain a continuous listening watch on the following frequencies:

Sydney	2182, 4125 & 6215 kHz
Brisbane	2182, 4125, 6215, 8291 and 12290 & 16420 kHz (between the hours of 0700 to 1900 local time)
Melbourne	2182, 4125, 6215, 8291and 12290 & 16420 kHz (between the hours of 0700 to 1900 local time).

The yacht should call any one of the three Maritime Communications Stations (MCS) on any one of these frequencies. When responding the MCS will then indicate that both the yacht and MCS change to a working frequency which will be in the same band as that on which the initial call was made. The working frequencies are common to all MCS and are listed as follows:

Ship transmit	Ship receive
2201	2201 kHz
4134	4426
6206	6507
8176	8176
12365	12365

There are no listed working frequencies for 16420 kHz, it will be at the discretion of the MCS to nominate, however, it is unlikely that this frequency will be used to communicate. Both Melbourne and Brisbane still have telex equipment. Messages should be addressed " OBS METEO MELBOURNE" and be in the standard weather format code of 10 numeric per group. Matt O'Neill is Operations Manager, Radio Services, Telstra.

Robert Mobbs,
Telstra Radio Services Product
Specialist.
rmobbs@nentmho.telecom.com.au

Priority listing of initiatives for obtaining Ship observations

1. The Radio Relay Vessel "Young Endeavour".

The naval commander for the past couple of years was a Neil Galletly. The RAN could initiate training of their officers who will man the ship on the BBXX code. Regular (6-

hourly) weather and sea state reports are to be made by trained Observers (Navy or if necessary BoM personnel). Observations are encoded in the international code (World Meteorological Organization Ship Code). Communication is then in real time via INMARSAT-C to the National Meteorological Centre in Melbourne. These reports are then ingested into the high resolution Limited Area Prediction System (LAPS) for the Southeast Australia area, if received prior to cut-off time.

2. A proposed weather-observing vessel that departs from Eden

It is recommended that the CYCA should provide resources for another vessel that departs from the South Coast of NSW (say Eden late on Boxing Day). The proposal is that this "weather ship" will make its way ahead of the leading yachts to provide reliable measurements of wind speed and direction, atmospheric pressure and estimated average wave height. The Bureau of Meteorology would be keen to work with the CYCA on this initiative by providing a volunteer weather Observer and marine weather services Meteorologist. Three-hourly WMO coded Ship Observations would be sent via INMARSAT-C to the National Meteorological and Oceanographic Centre in Melbourne for ingestion into the high resolution weather forecasting model for the Southeast Australia area. As well, coding facilitates immediate automatic switching to operational meteorologists in Regional Forecast Centres in Sydney, Melbourne and Hobart. Direct ABC radio broadcasts by the Bureau of Meteorology representative/s may be organised from the weather ship while the race is in progress.

3. Selected yachts with INMARSAT-C equipment

The Bureau of Meteorology is prepared to recruit up to 20 yachts, representing all classes of competitors, to report weather conditions at 6-hourly intervals (6a.m., Noon, 6p.m. and Midnight). These observations need to be encoded and communicated via INMARSAT-C using SERVICE CODE 41 so that they are ingested in the high-resolution weather prediction model for Southeast Australia. Coding also facilitates automatic switching of observations to operational weather forecasters in Sydney, Melbourne and Hobart immediately prior to the 6-hourly issue time of Special Forecasts for the Sydney to Hobart Yacht Race. The Bureau is prepared to provide training in the making weather and sea wave observations, and coding them in a simplified code. The Bureau's Computer Message Switching System will automatically send the reports to Sydney, Melbourne and Hobart Forecasting Centres. The Bureau will provide training to the navigator or other designated crewmember in homeports during the weeks prior to departure to participate in the 1999 Sydney to Hobart Race.

4. *All ships in Southeastern Australian waters*

All ships operating in Australian waters are obliged to send AUSREPS to the AUSSAR centre in Canberra. AUSSAR might be able to give us a daily report of ships operating in/near the race area, and we could ask them individually to submit weathers to us whilst they are in its proximity. (Our operations staff would need special instructions on how to contact the ships if you thought this might be viable).

5. 'Spirit of Tasmania'

Operators could be asked if the Officer of the Watch would make three hourly meteorological observations from the Spirit between Boxing Day and New Years Day.

SPECIAL FORECASTS ISSUED FOR THE SYDNEY TO HOBART RACE

The Bureau of Meteorology will provide forecasts issued four times every 24 hours, commencing at 0200 a.m. on Sunday 26 December for the following sections of the course for the Sydney to Hobart Yacht Race. The components of the forecasts will be refined if necessary by the Shift Supervisor in the NSW Regional Forecast Centre, who is responsible for overall quality control including consistency between various forecast sections. The end product will then be issued from the NSW RFC to the CYCA and the Radio Relay Vessel (using the most effective communications channel provided by the CYCA).

A template to be mounted on AIFS such as the one given as ATTACHMENT 1 will be used for insertion by the responsible RFCs of relevant component parts (in NSW Sydney to 38°S, VIC 38°S to 40°S and TAS 40°S to Hobart). A graphical version of the forecast will be developed for dissemination via the www and telephone facsimile.

Statement regarding claims by Mr Paul Harrop in E-mails to the Bureau of Meteorology

Referring to Mr Harrop's E-mail of 22 June 1999 (Attachment 1):

Mr Harrop's "First Fact" :-" On the preceding nights (24th & 25th December, 1998) Hobart was hit by an intense storms that caused black-outs, flash flooding and immense lightning activity similar to equatorial areas."

My reply: while I was not in the state at the time weather reports, newspaper reports and anecdotal evidence suggest that the thunderstorms which Mr Harrop mentions were experienced in the south east of Tasmania on 24 December and statewide on 25 December last year. These storms seemed to be unusually persistent and active for this part of the world. There were blackouts and some flash flooding. The State Emergency Service regard the event as "all fairly insignificant" in its effects. Newspaper reports suggest that there were extensive black outs.

Mr Harrop's "Second Fact" :- " Five (5) cyclonic lows were seen to be off the Tasmania's East Coast in the Tasman Sea on SBS's Weather Watch program at approx. 9:00am on the morning of the 26th December, 1998." In a later E-mail (Attachment 2) Mr Harrop clarifies his remarks by saying " The weather Watch program indicates precipitation and has the intensities in different colours. The 5 lows we saw on the 26th December were all of the intensities of cyclones, which were also seen, in the Java / PNG area at the same time."

My reply: I have examined weather maps for around 9am 26 December 1998 and cannot identify the five lows of tropical cyclone strength which Mr Harrop says were off Tasmania's East Coast at about this time. Referring to the Bureau's Preliminary Report On Meteorological Aspects Of The 1998 Sydney To Hobart Yacht Race, Figure 5 in that report shows the carefully analysed mean sea level isobaric analysis for 9 am 26 December 1998, while Fig 27 in that report shows the Japanese Geostationary Meteorological Satellite image for about this time. A 992 hPa low was analysed some 600 nm northeast of Tasmania at this time with a 998hPa low centre analysed just north north west of Melbourne, a 996 hPa low analysed near Strahan on Tasmania's west coast and a 994 hPa low analysed about 200 nm south -southwest of Tasmania. The cloud signatures evident on the satellite image near Tasmania are related to the thunderstorm activity to which Mr Harrop referred earlier, and some of this cloud might give the impression of low pressure activity off East Tasmania's Coast. (See also the Bureau of Meteorology's preliminary report, (page14 where the cloud mass developing over south east Australia is linked to thunderstorm activity).

Mr Harrop's "Third Fact" :-" Sydney to Hobart yachts are battered by intense storm (classified cyclonic) near to Bass Strait."
and
Mr Harrop's "Fourth Fact" :- "The Bureau of Meteorology (BOM) did not issue warning's, of any significance amount, to prevent undue loss to property or life".

My reply: The Bureau of Meteorology issued a gale warning for NSW coastal waters south of Broken Bay soon after 9am on 26 December 1998. The Bureau issued its first storm warning for the area south of Merimbula shortly after 2pm on 26 December. This latter time was about 1 hour into the race and about 18 to 21 hours prior to storm force winds developing.

Mr Harrop's Question One :- " Was there any staff at the Hobart offices of The Bureau of Meteorology (BOM) on the 25th or 26th December, 1998 (known to be a holiday for public servants)?"

My reply: Yes. The Bureau of Meteorology in Hobart (and at each of its Regional Forecasting Centres in the other Australian capital cities) and in its central operations centre in Melbourne, maintains a twenty four hour, seven day a week, 365/366 day per year weather service. In particular, a non stop 24 hour per day forecast and warning service was maintained in Hobart, on the days mentioned in Mr Harrop's question.

Mr Harrop's Question Two :- " Did the Bureau of Meteorology (BOM) explain in any way the storm activity, which struck Hobart on the 24th & 25th December?"

My reply: The Bureau's Hobart office's forecasts issued at 5.30 am Christmas Eve 1998 included mention of the chance of thundery afternoon showers. The intensity of the predicted convection was fine tuned as the situation developed so that at 9.05 am on Christmas Day 1998 the Bureau issued a flash flood warning for localised parts of Tasmania due to expected scattered thunderstorms.

Attachment 3 is a brief summary of some of the meteorological aspects of this thunderstorm activity.

Mr Harrop's Question Three :-" Did The Bureau of Meteorology (BOM) main office or Hobart's office see or even acknowledge the lows off the Tasmania's East Coast? (If not why not?)"

And

Mr Harrop's Question Four :- " Could in anyway the five cyclonic lows which were seen off the Tasmanian East Coast be associated with the storm that struck the Sydney to Hobart yacht race? "

My reply: In addition to my comments on Mr Harrop's "second fact" above the following information is provided.

Figures 1A to 23A are three hourly infra-red images taken by the Japanese Geostationary Meteorological Satellite for the period approx 1.30 pm 24 December 1998 (0230 UTC 24 Dec) to approx 7.30am 27 December 1998 (2030UTC 26 Dec). Figures 1B to 23B are the mean sea level analyses corresponding to about the same time as the images (except that there are no analyses for approx 1.30am each day (1430UTC) since few manually read synpotic observations are taken at around this time).

These images are colour coded in a manner which the Bureau of Meteorology believes to be approximately the same as that which Mr Harrop would have seen on SBS. (It should be noted that we are unsure of the exact colour scheme used for the SBS images due to (i) SBS erasing the relevant tapes as a matter of routine; and (ii) Bureau of Meteorology equipment being replaced since that time due to obsolescence and Y2K matters.). The colour scheme use in these images is used to indicate the temperature of the top of the emitting surface (and not precipitation intensities as Mr Harrop suggests). The relationship of colour to temperature used in Figures 1A to 23 is given in Table 1:

Table 1

Colour	*Temperature (°C)*
Black	> +27
Blue	+27 : -05
Green	-06 : -26
Magenta	-27 : -62
Yellow	-63 : -83
White	< -83

The image which Mr Harrop viewed on SBS at about 9am 26 December 1998 would have probably been Fig 15A being for approximately 7.30am 26 December 1998, this being the most recently available image received by the Bureau's image feed system to SBS. It may be seen that much of the cloud near Tasmania has cloud top temperature in the range minus 27 to minus 62 degrees and is not particularly similar or different in colour to cloud elsewhere.

As mentioned, the image feed system used by the Bureau of Meteorology has changed since 1998. Figure 24 is an example of the scheme presently used. The colour scale on the left hand side of Figure 24 shows the colour - temperature relationship.

The difficulty with trying to match cloud top colour with the pressure pattern at mean sea level is well illustrated by noting that there is only one Tropical Cyclone shown in Figure 15A (Tropical Cyclone "Cathy") near 18 °S 97 °E. There are numerous cloud patches in this image which look like the colder cloud signature of Tropical Cylcone "Cathy". And yet there are no low level circulations (apart from "Cathy") anywhere near the strength of a tropical cyclone. Moreover, as noted earlier, there was an extra tropical low analysed near 31 °S 150 °E. Much of the cloud near the centre of this circulation is low level and difficult to see on the image. The more obvious cloud is middle to high level cloud located well south of this low. (Incidentally, this particular low had weakened considerably by 8am 27 December 1998 (See Figure 23B).

There is no evidence in the analysed pressure field nor in the satellite imagery of five cyclone strength lows off Tasmania's East Coast at 9am 26 December 1998.

It is also relevant to point out that the Bureau of Meteorology's computer model ***output*** which provided the guidance for the Bureau's gale and storm warnings which issued 18 to 21 hours in advance of the storm, had ***inputs*** which included the observations taken at 9am 26 December 1998. Any cause-effect that the thunderstorm activity identified by Mr Harrop had on the storm's evolution would most likely have been assimilated by the computer model.

Mr Harrop's Question Five :- " If someone sitting at home watching SBS's Weather Watch could see, and acknowledge, an intense storm front occurring off the East Coast of Tasmania, why couldn't the Bureau of Meteorology, with all it's billions of dollars state of the art satellite systems, give an advance warning of the pending danger?"

My reply: As mentioned earlier, the Bureau monitored the intense low and issued its first storm warning some 18 to 21 hours ahead of the race incident. The Bureau used its high

resolution computer model to assist in this service. The Bureau of Meteorology, does not own, nor with its modest resources, could it afford to own, any satellite systems, but the Bureau does access the satellite data provided by other countries.

Mr Harrop's Question Six :- " Why did the Bureau of Meteorology say in it's PRELIMINARY REPORT ON METEOROLOGICAL ASPECTS OF THE 1998 SYDNEY TO HOBART YACHT RACE report "Note that for the special yacht race forecasts, the Bureau of Meteorology's Hobart's office area of responsibility is the area from 38°S to Hobart."? (This is from the Victorian coastline all the way down to Hobart). Is this some sort of disclaimer for their head office?"

My reply: the responsibility for the Sydney-Hobart yacht race forecasts is currently shared between the Bureau of Meteorology's Sydney Regional Forecasting Centre (RFC) office, which concentrates on the race from Sydney Harbour to 38 degrees south, and its Hobart RFC office, which concentrates on the race from 38 south to Hobart. The reason for this is that staff in each office have expertise and experience for their own geographic area of focus, as well as having a more general knowledge of the meteorology of areas more distant from their own states. The two offices liaise with each other, and with the Victorian Regional Forecasting Centre, to ensure that the best possible forecast service is provided to the Sydney-Hobart yacht race.

(Steve Pendlebury),
Supervising Meteorologist,
Regional Forecasting Centre,
Hobart

24September 1999

ATTACHMENT 1 E-mail sent by Mr Paul Harrop to the Bureau of Meteorology 22 June 1999.

>Return-Path: <owner-webmar@meteorology.ho.bom.gov.au>
>Date: Tue, 22 Jun 1999 09:16:27 +1000
>From: Paul Harrop <pharrop@mail.smartchat.net.au>
>To: Clare Richards <C.Richards@bom.gov.au>
>Cc: webclim@bom.gov.au, webarch@bom.gov.au, webmar@bom.gov.au
>Subject: Re: Sydney to Hobart Yacht Race
>X-Mime-Autoconverted: from 8bit to quoted-printable by mailbom.ho.BoM.GOV.AU id XAA17787
>Sender: owner-webmar@meteorology.ho.bom.gov.au
>Reply-To: webmar@BoM.GOV.AU
>
>Clare,
>
>as I haven't heard back from the forecasters who were on duty at the time of the
>Sydney to Hobart Yacht Race, I have a few questions I would like answered:-
>
>First Fact :- On the preceding nights (24th & 25th December, 1998) Hobart was hit
>by an intense storms that caused black-outs, flash flooding and immense lightning
>activity similar to equatorial areas.
>
>Second Fact :- Five (5) cyclonic lows were seen to be off the Tasmania's East
>Coast in the Tasman Sea on SBS's Weather Watch program at approx. 9:00am on the
>morning of the 26th December, 1998.
>
>Third Fact :- Sydney to Hobart yachts are battered by intense storm (classified
>cyclonic) near to Bass Strait.
>
>Fourth Fact :- The Bureau of Meteorology (BOM) did not issue warning's, of any
>significance amount, to prevent undue loss to property or life.
>
>Question One :- Was there any staff at the Hobart offices of The Bureau of
>Meteorology (BOM) on the 25th or 26th December, 1998 (known to be a holiday for
>public servants)?
>
>Question Two :- Did the Bureau of Meteorology (BOM) explain in any way the storm
>activity, which struck Hobart on the 24th & 25th December?
>
>Question Three :- Did The Bureau of Meteorology (BOM) main office or Hobart's
>office see or even acknowledge the lows off the Tasmania's East Coast? (If not
>why not?)
>
>Question Four :- Could in anyway the five cyclonic lows which were seen off the
>Tasmanian East Coast be associated with the storm that struck the Sydney to
>Hobart yacht race? (obviously, YES)
>
>Question Five :- If someone sitting at home watching SBS's Weather Watch could

>see, and acknowledge, an intense storm front occurring off the East Coast of
>Tasmania, why couldn't the Bureau of Meteorology, with all it's billions of
>dollars state of the art satellite systems, give an advance warning of the
>pending danger?
>
>Question Six :- Why did the Bureau of Meteorology say in it's PRELIMINARY
REPORT
>ON METEOROLOGICAL ASPECTS OF THE 1998 SYDNEY TO HOBART YACHT RACE report
"Note
>that for the special yacht race forecasts, the Bureau of Meteorology's
Hobart's
>office area of responsibility is the area from 38°S to Hobart."? (This is
from
>the Victorian coastline all the way down to Hobart). Is this some sort of
>disclaimer for their head office?
>
> For me there are to many unanswered questions conserning the Bureau of
>Meteorology's duty and role in this tragic event.
>
>Paul Harrop
>

ATTACHMENT 2 E-mail sent by Mr Paul Harrop to the Bureau of Meteorology 25 June 1999.

Date: Fri, 25 Jun 1999 10:42:25 +1000
From: Paul Harrop <pharrop@mail.smartchat.net.au>
Reply-To: pharrop@smartchat.net.au
X-Mailer: Mozilla 4.05 [en]C-AAPTINET (Win95; I)
To: Steve Pendlebury <S.Pendlebury@bom.gov.au>
Subject: Re: Sydney to Hobart Yacht Race

Dear Mr. Pendlebury,

I find the remarks in your letter to me both arrogant and condescending, which, having worked for the government, doesn't surprise me in the least. Firstly, the images my wife and I both saw on SBS's Weather Watch program comes directly from the the Bureau of Meteorology, so might I suggest that you get a better knowledge of what your Department produce. The weather Watch program indicates precipitation and has the intensities in different colours. The 5 lows we saw on the 26th December were all of the intensities of cyclones, which were also seen, in the Java / PNG area at the same time.

What we saw on the 26th December is not in dispute here it's a statement of fact and your statement that "the lows to which your refer did not exist off Tasmania's East Coast at the time you mention" we find contemptuous and patronizing.

I also find your remarks "you obviously take a keen interest in the weather and I would be delighted if you were to visit the Bureau some time so that we could learn from your forecasting technique", sanctimonious and derisive.

I suggest, that in the future, you might have more respect for the general public and their views, which, even thought it might not agree with your astigmatic view of the world, might have genuine and useful information. It has been suggested to me that the information I have be passed on to the NSW State Coroner, this is fully what I intend to do.

Paul Harrop

Steve Pendlebury wrote:

> Dear Mr Harrop,
>
> Thank you for your recent E-mail to the Bureau of Meteorology which
> addresses certain aspects of the weather over or near Tasmania at around
> Christmas time last year. I can provide the following information on the
> points which you raise.
>
> Your "First Fact" :-" On the preceding nights (24th & 25th December, 1998)
> Hobart was hit by an intense storms that caused black-outs, flash flooding
> and immense lightning activity similar to equatorial areas."
>
> My reply: while I was not in the state at the time I am told that the
> thunderstorms which you mention were experienced in the south east of
> Tasmania on 24, 25 and 26 December last year. These storms seemed to be
> unusually persistent and active for this part of the world.
>
> Your "Second Fact" :- " Five (5) cyclonic lows were seen to be off the
> Tasmania's East Coast in the Tasman Sea on SBS's Weather Watch program at

> approx. 9:00am on the morning of the 26th December, 1998."
>
> My reply: I am not aware of the program to which you refer unless you mean
> the satellite image which SBS shows as a filler while not broadcasting
> regular programs. I have examined weather maps for around 9am 26 December
> 1998 and cannot identify the five lows which you say were off Tasmania's
> East coast. I note from your question six below that you have read the
> Bureau's Preliminary Report On Meteorological Aspects Of The 1998 Sydney To
> Hobart Yacht Race. Figure 5 in that report shows the carefully analysed
> mean sea level isobaric analysis for 9 am 26 December 1998 while Fig 27
> shows the Japanese Geostationary Meteorological Satellite image for about
> this time. A 992 hPa low was analysed some 600 nm northeast of Tasmania at
> this time with a 998hPa low centre analysed just north north west of
> Melbourne, a 996 hPa low analysed near Strahan on Tasmania's west coast and
> a 994 hPa low analysed about 200 nm south -southwest of Tasmania. If you
> are referring to the cloud signatures evident on the satellite image that
> SBS might have been showing at the time then the thunderstorm activity to
> which you referred earlier is quite evident and some of this cloud might
> give the impression of low pressure activity off East Tasmania's Coast.
>
> Your "Third Fact" :-" Sydney to Hobart yachts are battered by intense storm
> (classified cyclonic) near to Bass Strait."
> and
> Your "Fourth Fact" :- "The Bureau of Meteorology (BOM) did not issue
> warning's, of any significance amount, to prevent undue loss to property or
> life".
>
> My reply: The Bureau of Meteorology issued a gale warning for NSW coastal
> waters south of Broken Bay soon after 9am on 26 December 1998. The Bureau
> issued its first storm warning for the area south of Merimbula shortly
> after 2pm on 26 December. This latter time was about 1 hour into the race
> and about 18 to 21 hours prior to storm force winds developing. The Bureau
> of Meteorology's performance during the Sydney-Hobart Race will be
> investigated by the NSW Coroner in November this year.
>
> Your Question One :- " Was there any staff at the Hobart offices of The
> Bureau of Meteorology (BOM) on the 25th or 26th December, 1998 (known to be
> a holiday for public servants)?"
>
> My reply: the short answer is "yes". The Bureau of Meteorology in Hobart
> (and at each of its Regional Forecasting Centres in the other Australian
> capital cities) and in its central operations centre in Melbourne,
> maintains a twenty four hour, seven day a week, 365/366 day per year
> weather service. In particular, a non stop 24 hour per day forecast and
> warning service was maintained in Hobart, on the days mentioned in your
> question.
>
> Your Question Two :- " Did the Bureau of Meteorology (BOM) explain in any
> way the storm activity, which struck Hobart on the 24th & 25th December?"
>
> My reply: The Bureau's Hobart office's forecasts issued at 5.30 am
> Christmas eve 1998 included mention of the chance of thundery afternoon
> showers. The intensity of the predicted convection was fine tuned as the
> situation developed so that 9.05 am on Christmas Day the Bureau issued a
> flash flood warning for localised parts of Tasmania due to scattered
> thunderstorms.
>
> Your Question Three :-" Did The Bureau of Meteorology (BOM) main office or
> Hobart's office see or even acknowledge the lows off the Tasmania's East
> Coast? (If not why not?)"
>
> And

>
> Your Question Four (and your own answer) :- " Could in anyway the five
> cyclonic lows which were seen off the Tasmanian East Coast be associated
> with the storm that struck the Sydney to Hobart yacht race? (obviously, YES)"
>
> My reply: the lows to which your refer did not exist off Tasmania's East
> Coast at the time you mention. By about twelve hours after the time which
> you mention the Bureau had analysed a multi centred low pretty much centred
> over north eastern Tasmania. The Bureau monitored this low complex which
> was evolving into the storm which hit the yacht race fleet, and as
> mentioned above, issued warnings earlier in the day and continued to issue
> warnings during the race while conditions warranted the warnings. The
> trough of low pressure which was over western Tasmania at 9am on Boxing Day
> 1998 was overtaken by a cold front from the west. At first glance it seems
> likely to me that upper cold cyclonic air associated with the cold front
> interacted in some way with the trough and with the warm humid conditions
> associated with the north easterly flow circulating around the large high
> centred near New Zealand. And so to that extent the activity which you
> identified was probably part of the evolution of the storm which struck the
> fleet. However, I will be interested to see the Bureau's final report and
> any other scientific papers which may be published to learn, from careful
> post analysis, about the most likely mechanism acting in this storm.
>
> Your Question Five :- " If someone sitting at home watching SBS's Weather
> Watch could see, and acknowledge, an intense storm front occurring off the
> East Coast of Tasmania, why couldn't the Bureau of Meteorology, with all
> it's billions of dollars state of the art satellite systems, give an
> advance warning of the pending danger?"
>
> My reply: you obviously take a keen interest in the weather and I would be
> delighted if you were to visit the Bureau some time so that we could learn
> from your forecasting technique. As mentioned earlier, the Bureau monitored
> the intense low and issued its first storm warning some 18 to 21 hours
> ahead of the race incident. The Bureau used its high resolution computer
> model to assist in this service. The Bureau of Meteorology, does not own,
> nor with its modest resources, could it afford to own any satellite
> systems, but the Bureau does access the satellite data provided by other
> countries. Whether or not the Bureau could have provided a better forecast
> service for the Sydney to Hobart yacht race, will no doubt be examined by
> the NSW Coroner later this year. I believe that the Bureau is more than
> happy to have such an impartial umpire assess its performance and make
> recommendations for improvements, if any are needed.
>
> Your Question Six :- " Why did the Bureau of Meteorology say in it's
> PRELIMINARY REPORT ON METEOROLOGICAL ASPECTS OF THE 1998 SYDNEY TO HOBART
> YACHT RACE report "Note that for the special yacht race forecasts, the
> Bureau of Meteorology's Hobart's office area of responsibility is the area
> from 38°S to Hobart."? (This is from the Victorian coastline all the way
> down to Hobart). Is this some sort of disclaimer for their head office?"
>
> My reply: the responsibility for the Sydney-Hobart yacht race forecasts is
> currently shared by our Sydney office, which concentrates on the race from
> Sydney Harbour to 38 degrees south while the Hobart office staff
> concentrate on the race from 38 south to Hobart. The reason for this is
> that staff in each office have expertise and experience for their own
> geographic area of focus, as well as having a more general knowledge of the
> meteorology of areas more distant from their own states. The two offices
> liaise with each other, and with the Victorian Regional Forecasting Centre,
> to ensure that the best possible forecast service is provided to the
> Sydney-Hobart yacht race.
>
> In conclusion, the Bureau welcomes constructive ideas on how its weather

> services might be improved and I would be more than happy to show you over
> our Regional Forecasting Centre in Hobart at a mutually convenient time.
>
> Yours sincerely,
>
> Steve Pendlebury,
> Supervising Meteorologist,
> Weather Services,
> Hobart
>
> 24 June 1999
>
> ---
> Steve Pendlebury PHONE: 03 6221 2021 (+61 3 6221 2021)
> Supervising Meteorologist FAX : 03 6221 2080 (+61 3 6221 2080)
> Weather Services E-mail: S.Pendlebury@bom.gov.au
> Bureau of Meteorology POST: GPO Box 727G, HOBART,
> Tasmania/Antarctica Region AUSTRALIA, 7001
> LOCATION: 111 Macquarie St., HOBART, 7000
> ==========
>
>

ATTACHMENT 3 Summary by Mr Paul Fox-Hughes (Bureau of Meteorology) of the thunderstorm activity of 24 to 26 December 1998.

Fig A3-1 **Hobart Thunderstorm 24 December 1998. Courtesy Mrs K. Xepaps**

Brief Summary of Data on Thunderstorms 24-26 December 1998

An unusual period of thunderstorms occurred over Tasmania during the period 24 – 26 December 1998. In particular, Hobart experienced storms on these 3 consecutive days, a sequence of events which has not occurred since at least the start of 1944. The twenty four hour rainfall totals ending 9am on 25, 26 and 27 December 1999 are shown as Figures A3-2, A3-3, and A3-4 respectively.

A high pressure system moved to the east of the state on 23 December, remaining in the south Tasman Sea until the 26th. The high directed moist, warm air from the north Tasman Sea over Tasmania during that period. Several weak troughs and cold fronts crossed the state between the 24th and 26th, without displacing the airmass that was present. The instability resulting from the passage of these systems, combined with the low-level atmospheric conditions, permitted the widespread development of thunderstorms on those days.

Comparisons follow of weather parameters recorded during the period 24-26 December with climatological values.

Average December 3 pm temperature/dewpoint for Hobart: 18.0° /8.2°. Standard deviation for dec. dewpoint is 3.9, with 13° at the 84th percentile.

Recorded values were:

Day	Temp (°)	Dewpt (°)
23	23.7	7.3
24	22.3	13.5
25	20.2	13.4
26	21.1	16.3
27	15.7	15

Thunderstorm indices (see note at end) calculated from upper atmospheric soundings at Hobart Airport during the period are tabulated below:

Date/Time	Total-Totals	CAPE	Lifted Index
24 03Z	53	768	-3
24 12Z	50	0	2
25 00Z	55	520	-4
25 12Z	45	0	5
26 00Z	46	490	-1
26 12z	36	18	7

Average December Total-Totals value from the morning upper atmospheric sounding at Hobart Airport (for the period 1953-1991) is 38, with a standard deviation of 7.8. On only 3.6% of occasions was the Total-Totals value greater than or equal to 50.

Lifted Index values of between 0 and –2 are regarded as indicating the possible development of thunderstorms, while values between –2 and –4 are suggestive of possible severe thunderstorms.

CAPE values recorded between 24 – 26 December are considerably in excess of those normally recorded at Hobart, where CAPE rarely exceeds 100-200.

Paul Fox-Hughes
Severe Weather Section

***Note on thunderstorm indices*:**

Total totals index (TOTA):

TOTA = T850-T500 + Td850 -T500 where:

T850 is the air temperature at 850 hPA level;
Td850 is the dew point temperature at the 850 hPa level;
T500 is the air temperature at the 500 hPa level.

T850-T500 is a measure of the temperature decrease between 850 hPa and 500 hPA.
Td850-T500 is a measure of the moisture decrease (and indirectly of the low level moisture).

Accepted interpretation of the Total Totals Index is:

TOTA	*Convection*
44-45	Isolated to a few ordinary thunderstorms
46-49	Scattered ordinary thunderstorms
50-55	Scattered ordinary thunderstorms with isolated severe thunderstorms
>= 56	Numerous ordinary thunderstorms with scattered severe thunderstorms.

Lifted Index (LI)

LI is the difference at 500 hPa of the ambient air temperature and the temperature of a parcel of air had it been lifted moist adiabatically from low levels of the atmosphere.

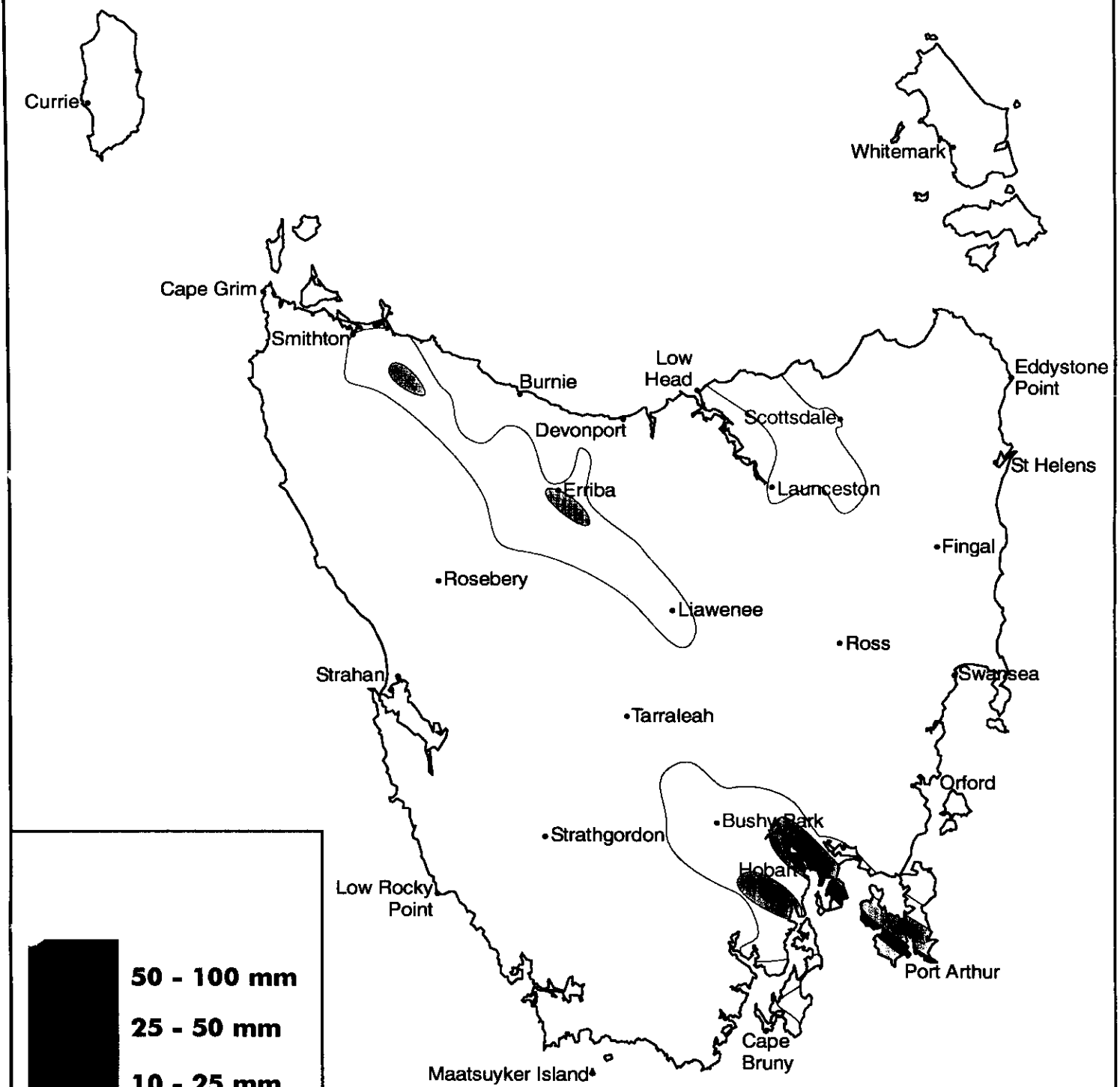
Accepted interpretation of the Lifted Index is:

LI	*Convection*
>+2	No showers or thunderstorms likely
0 to +2	Probable showers/isolated thunderstorms possible
-2 to 0	Possible thunderstorms
-4 to -2	Possible severe thunderstorms
<-4	Probable severe thunderstorms/possible tornadoes.

CAPE (Convective Available Potential Enrgy)

CAPE is the buoyant energy available to a parcel of air rising from the level of free convection to the equilibrium level.

Figure A3-2: Isohyetal analysis for the 24 hours ending 9am 25 December 1998



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Prepared on 24 September 1999

Every effort has been made to ensure the veracity of these data, but some errors may be present.

Figure A3-3: Isohyetal analysis for the 24 hours ending 9am 26 December 1998

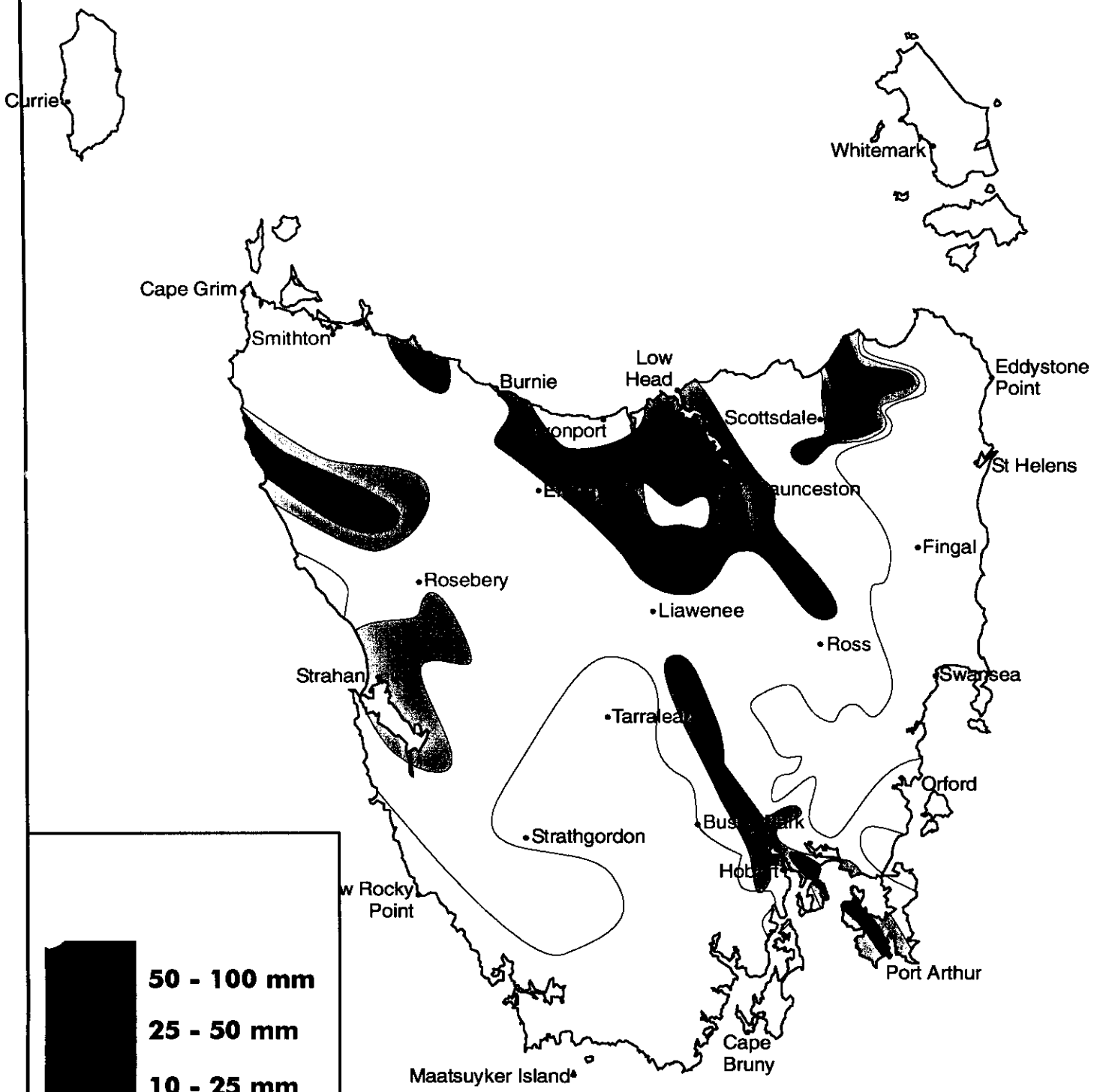

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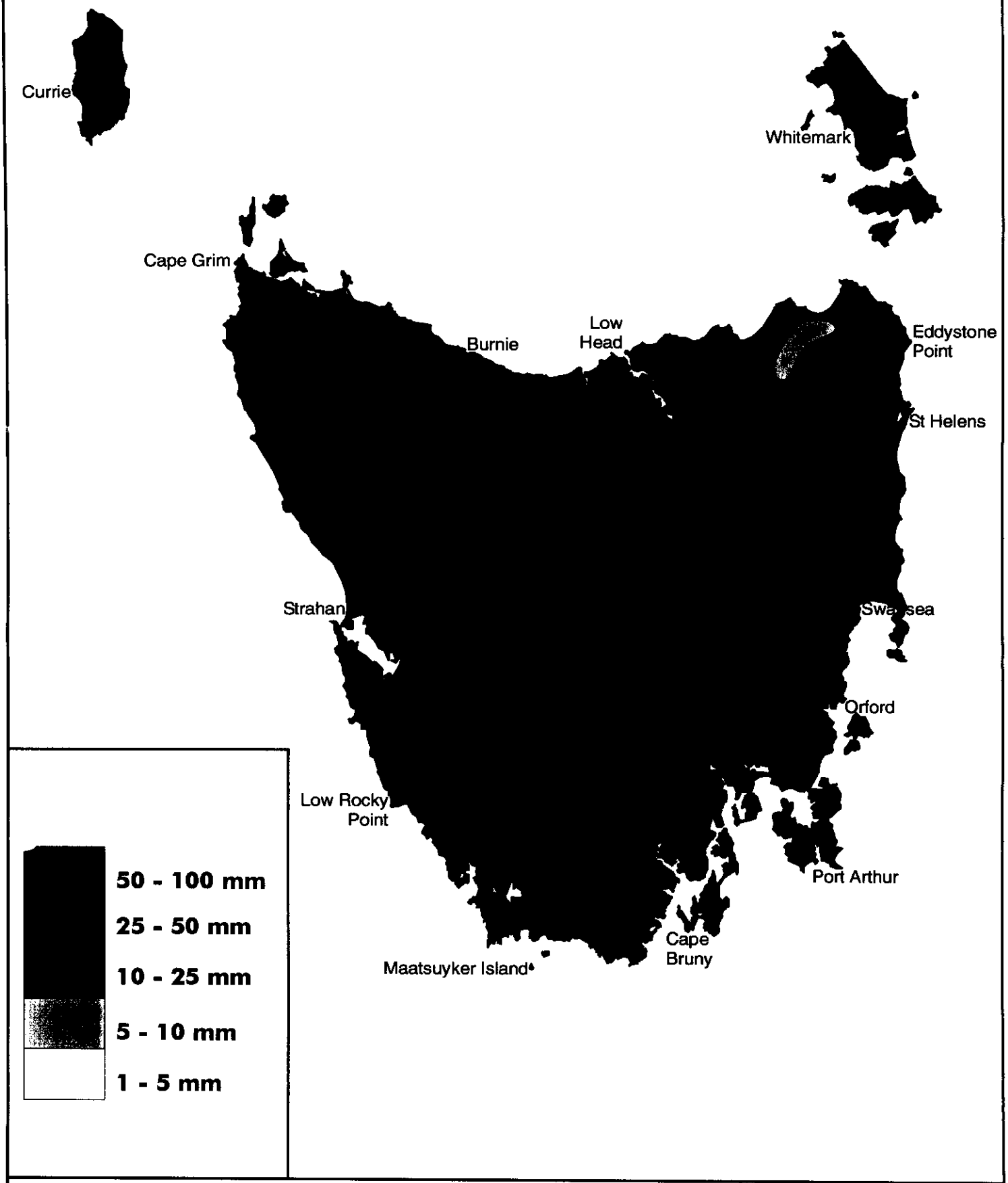
Figure A3-4: Isohyetal analysis for the 24 hours ending 9am 27 December 1998



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Every effort has been made to ensure the veracity of these data, but some errors may be present.

Figure 1B
Mean sea level analysis nominally for 2pm 24 Dec 1998 (many observations would have been taken at noon).

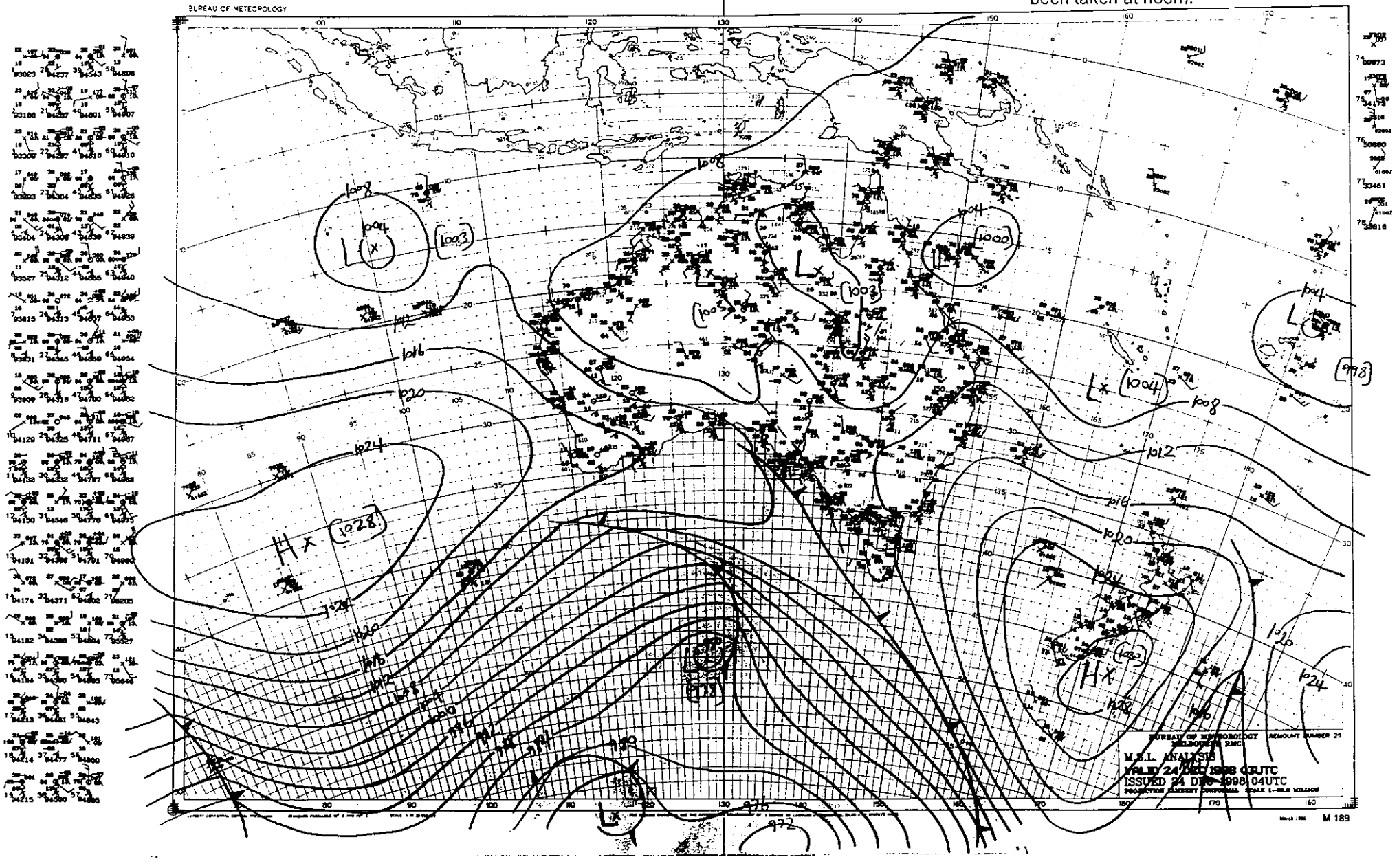

Figure 2B
Mean sea level analysis nominally
For 5pm 24 Dec 1998
(many observations would have
been taken at 3pm).

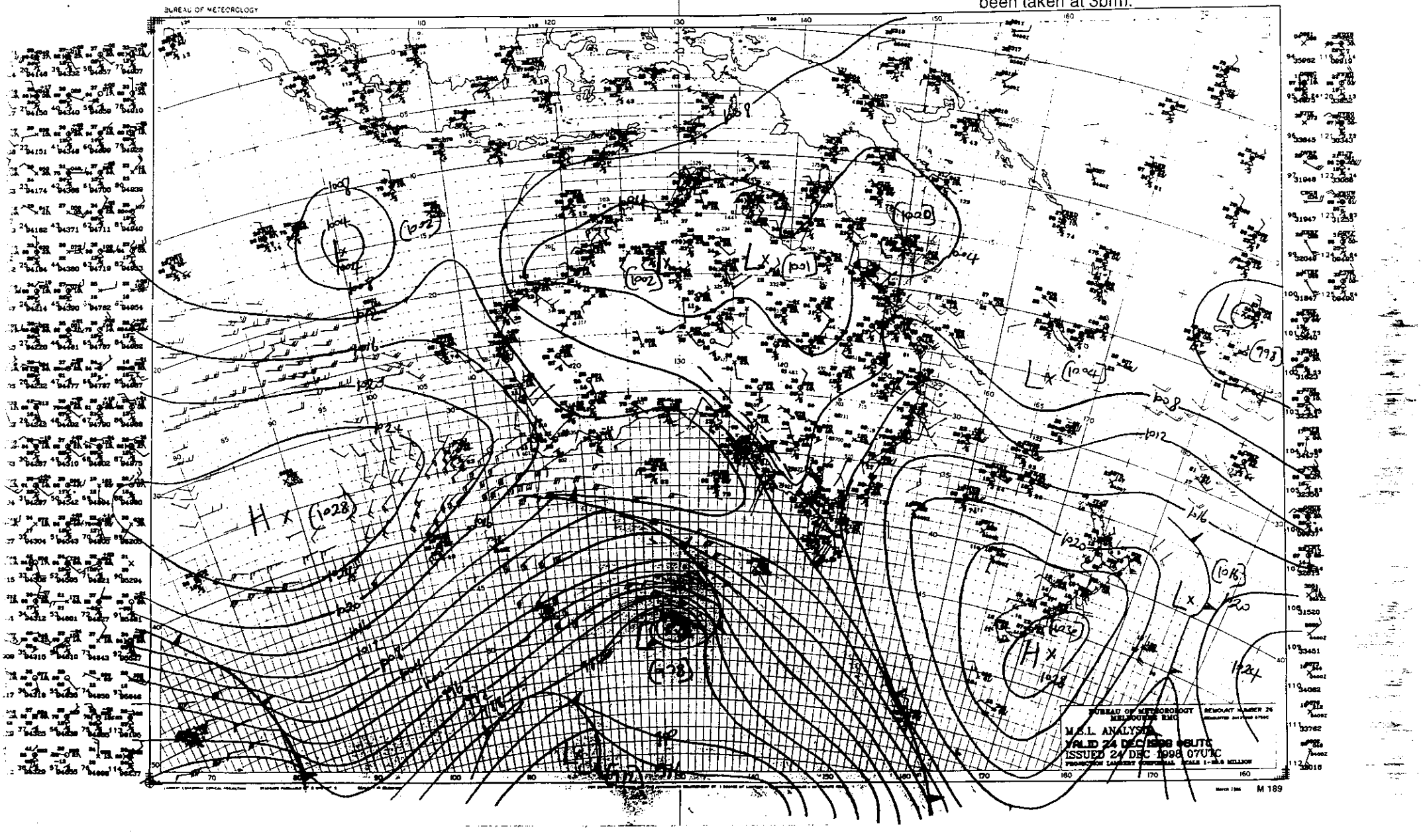

Figure 3B
Mean sea level analysis nominally
For 8pm 24 Dec 1998
(many observations would have
been taken at 6pm).

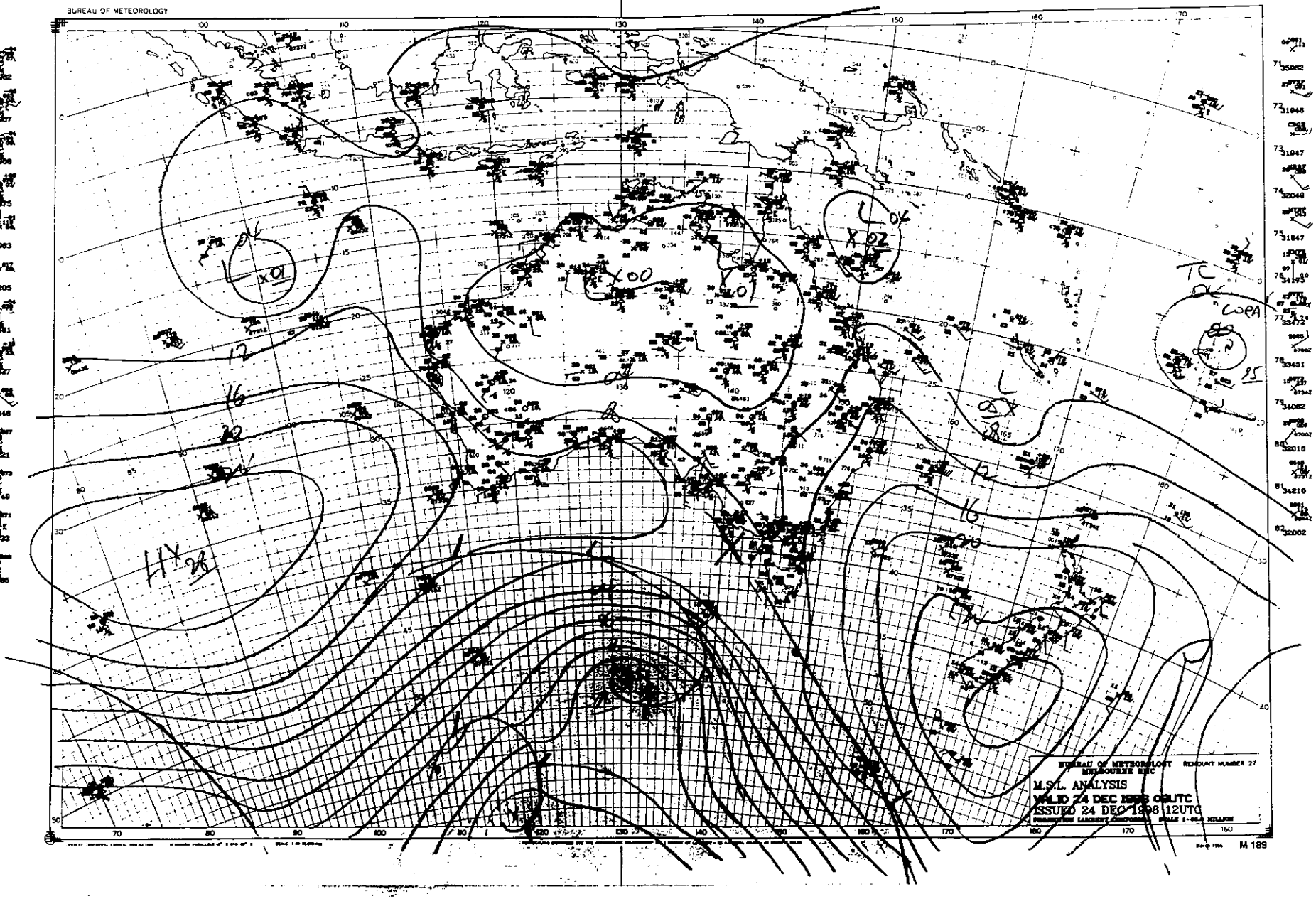

Figure 4B
Mean sea level analysis nominally
For 11pm 24 Dec 1998
(many observations would have
been taken at 6am).

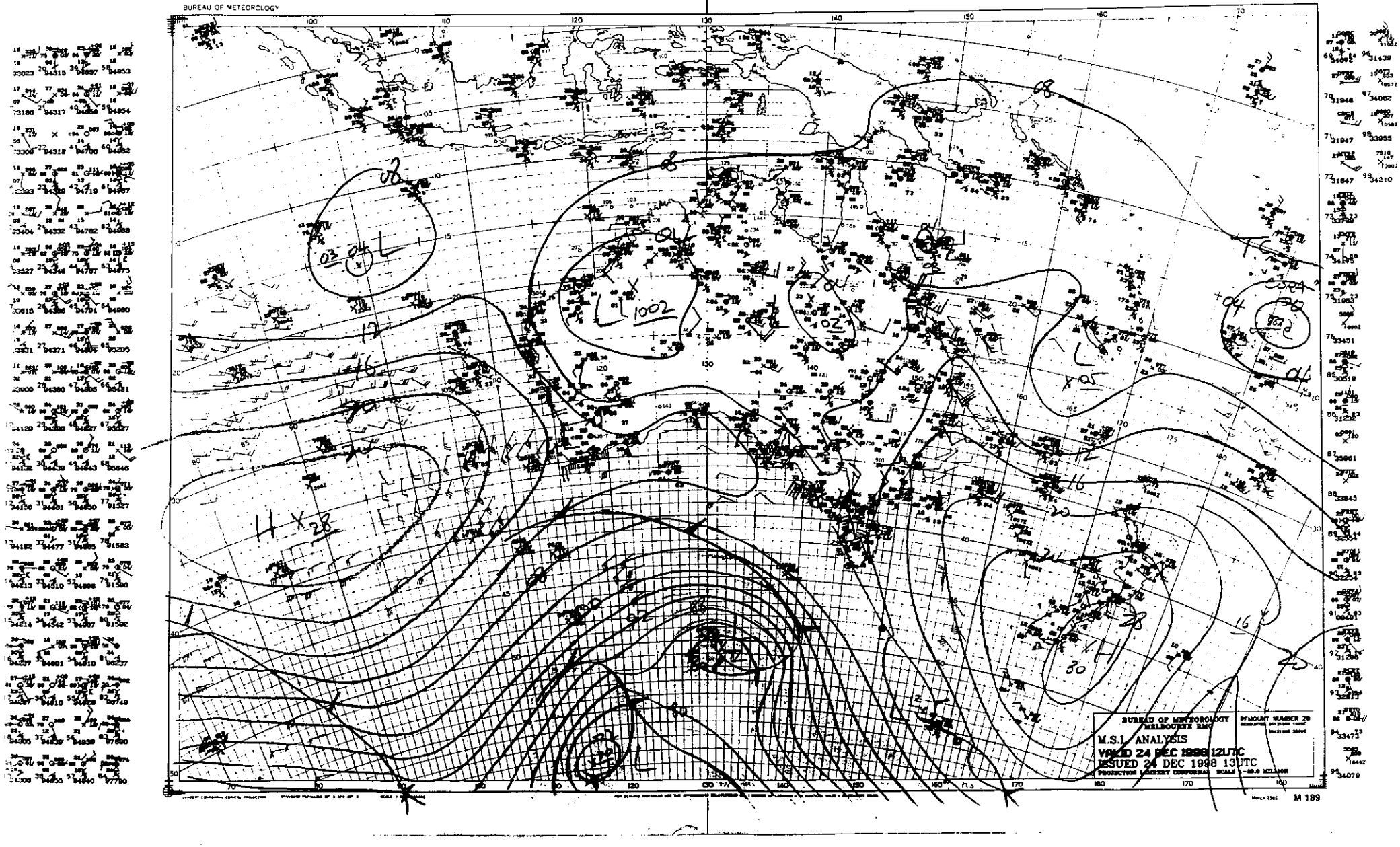

Figure 5B

No analysis available as there are few observations taken at midnight.

Figure 6B

Mean sea level analysis nominally
For 5am 25 Dec 1998
(many observations would have
been taken at 3am).

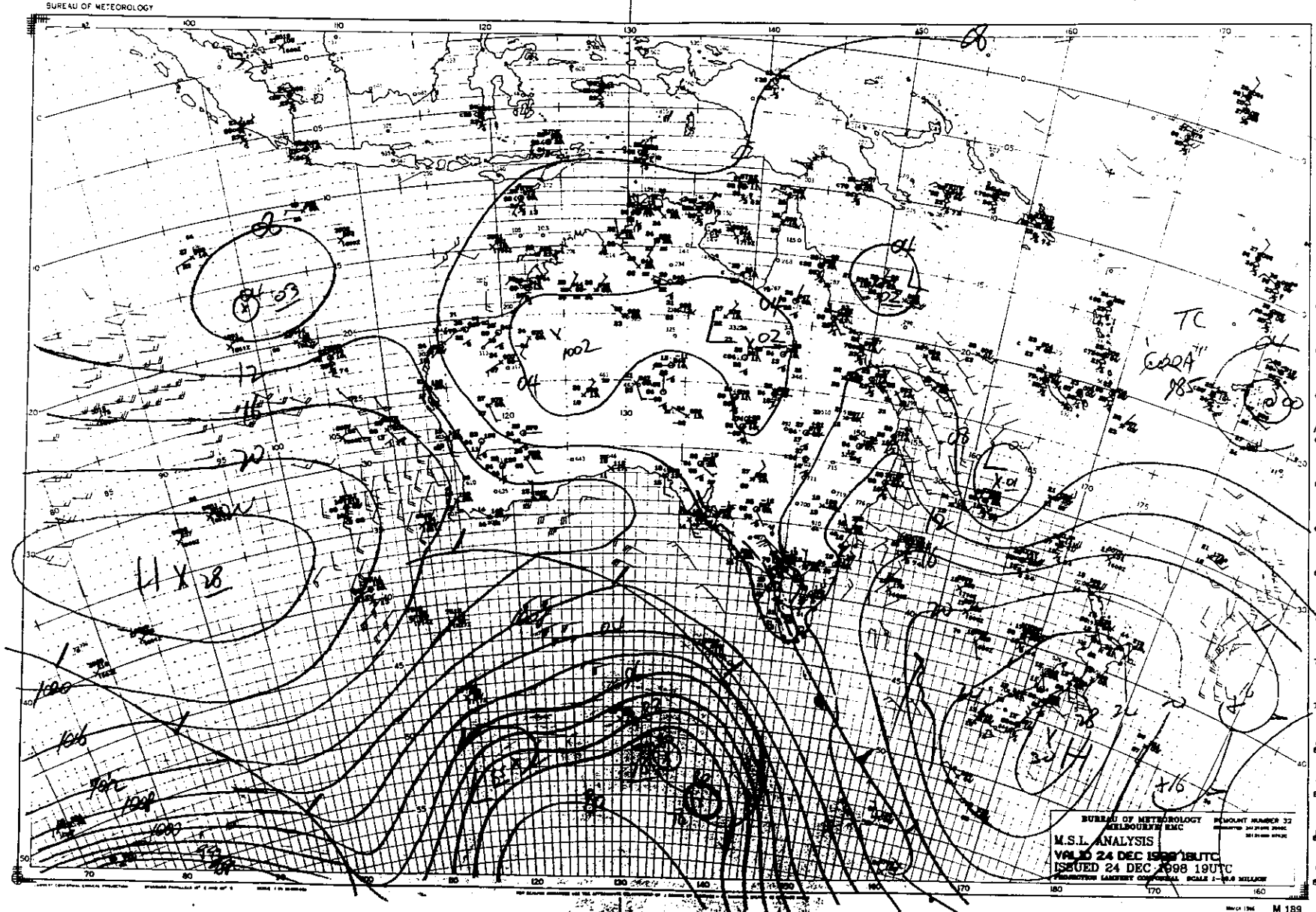

Figure 7B

Mean sea level analysis nominally
For 8am 25 Dec 1998
(many observations would have
been taken at 6am).

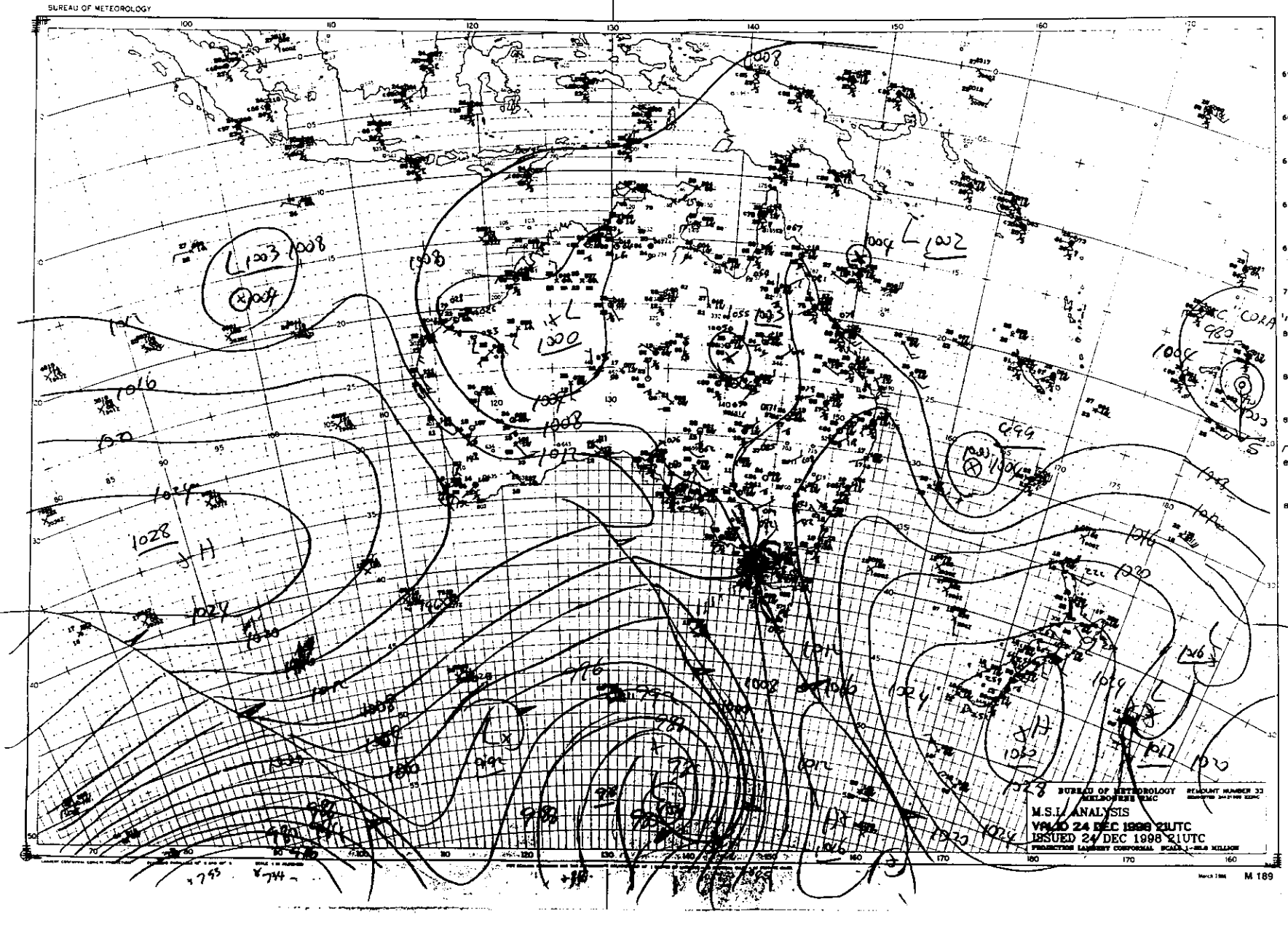

Figure 8B
Mean sea level analysis nominally
For 11am 25 Dec 1998
(many observations would have
been taken at 9am).

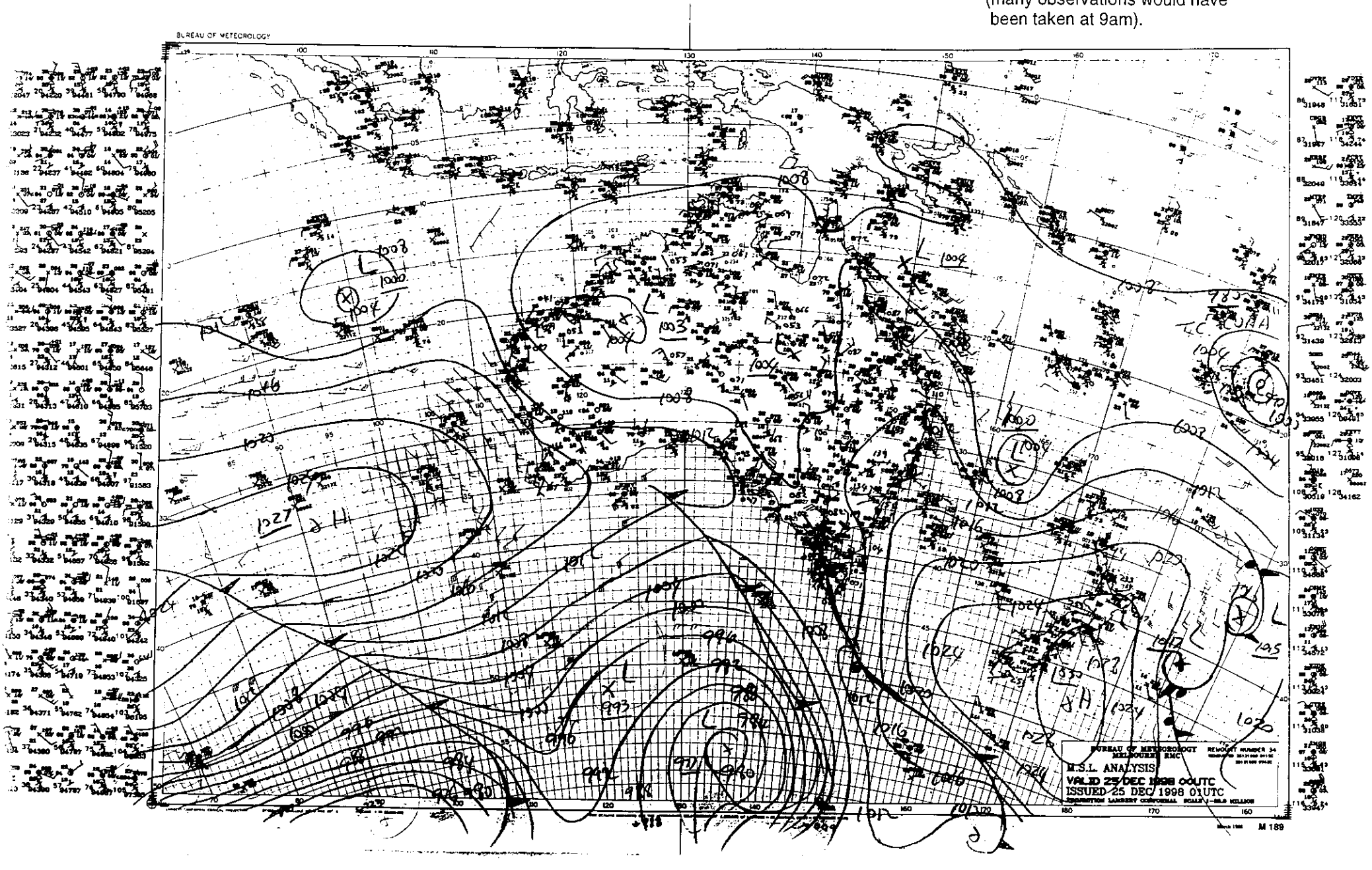

Figure 9B
Mean sea level analysis nominally
For 2pm 25 Dec 1998
(many observations would have
been taken at noon).

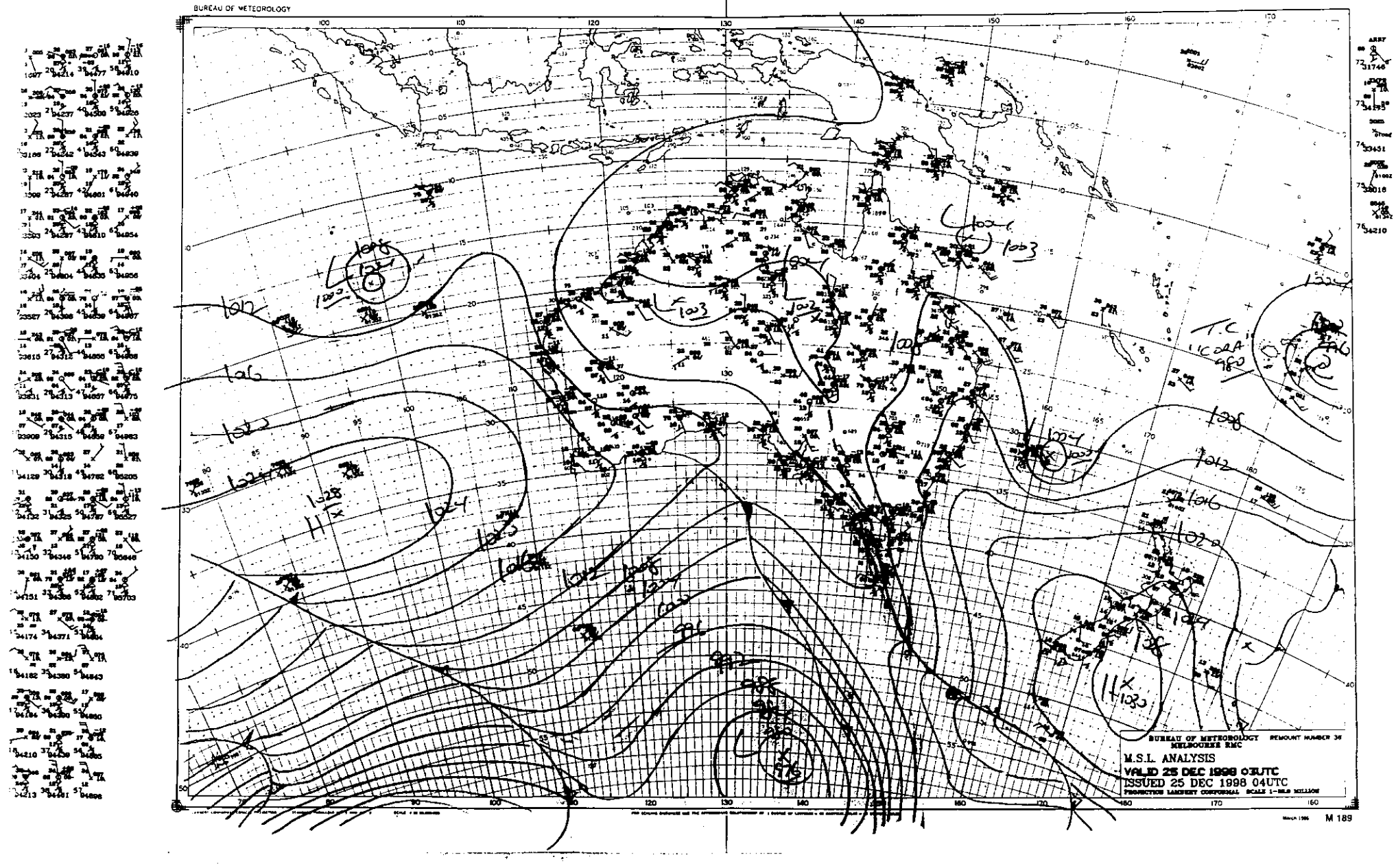

Figure 10B

Mean sea level analysis nominally
For 5pm 25 Dec 1998
(many observations would have
been taken at 3pm).

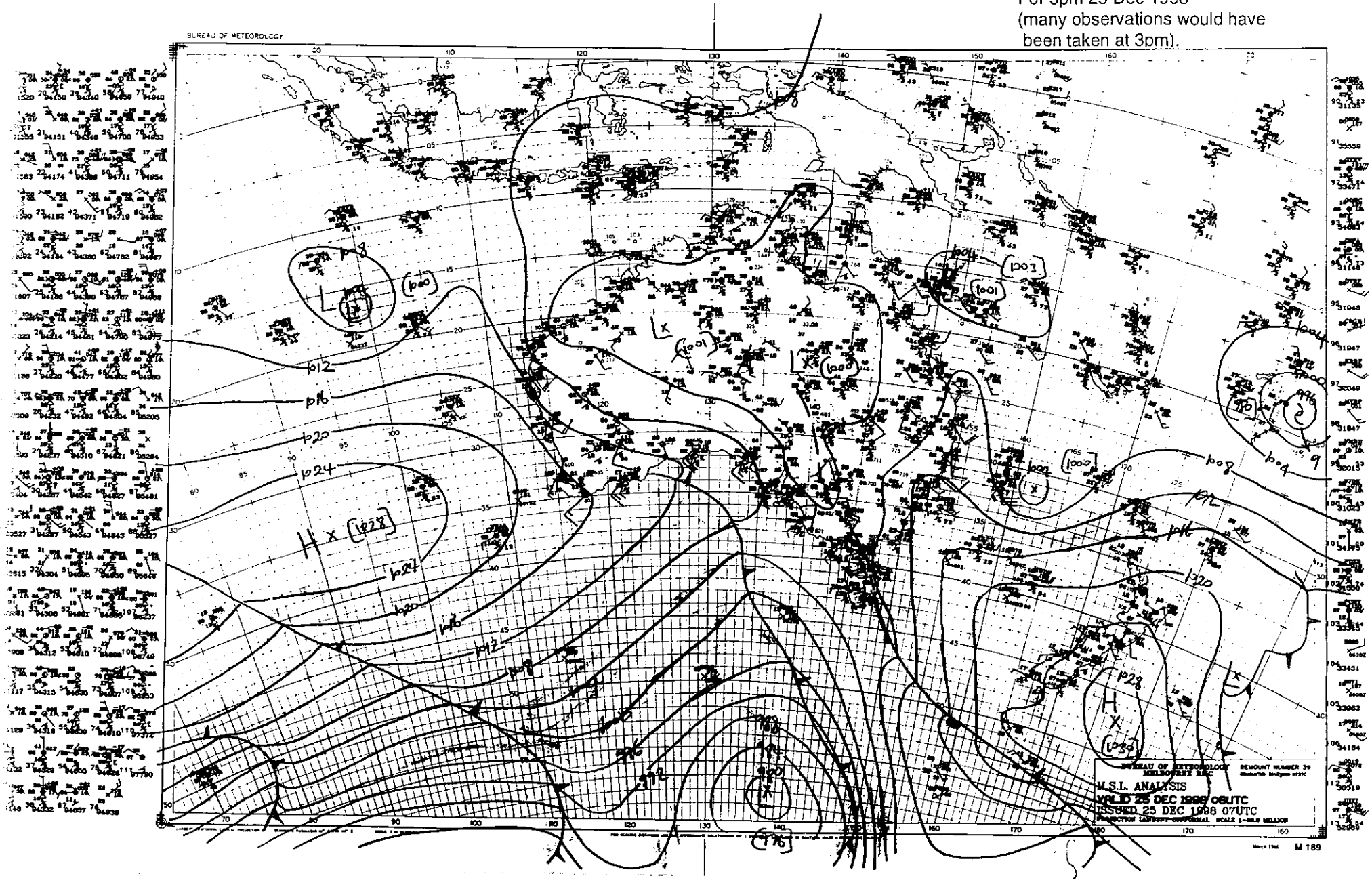

Figure 11B
Mean sea level analysis nominally for 8pm 25 Dec 1998 (many observations would have been taken at 6pm).

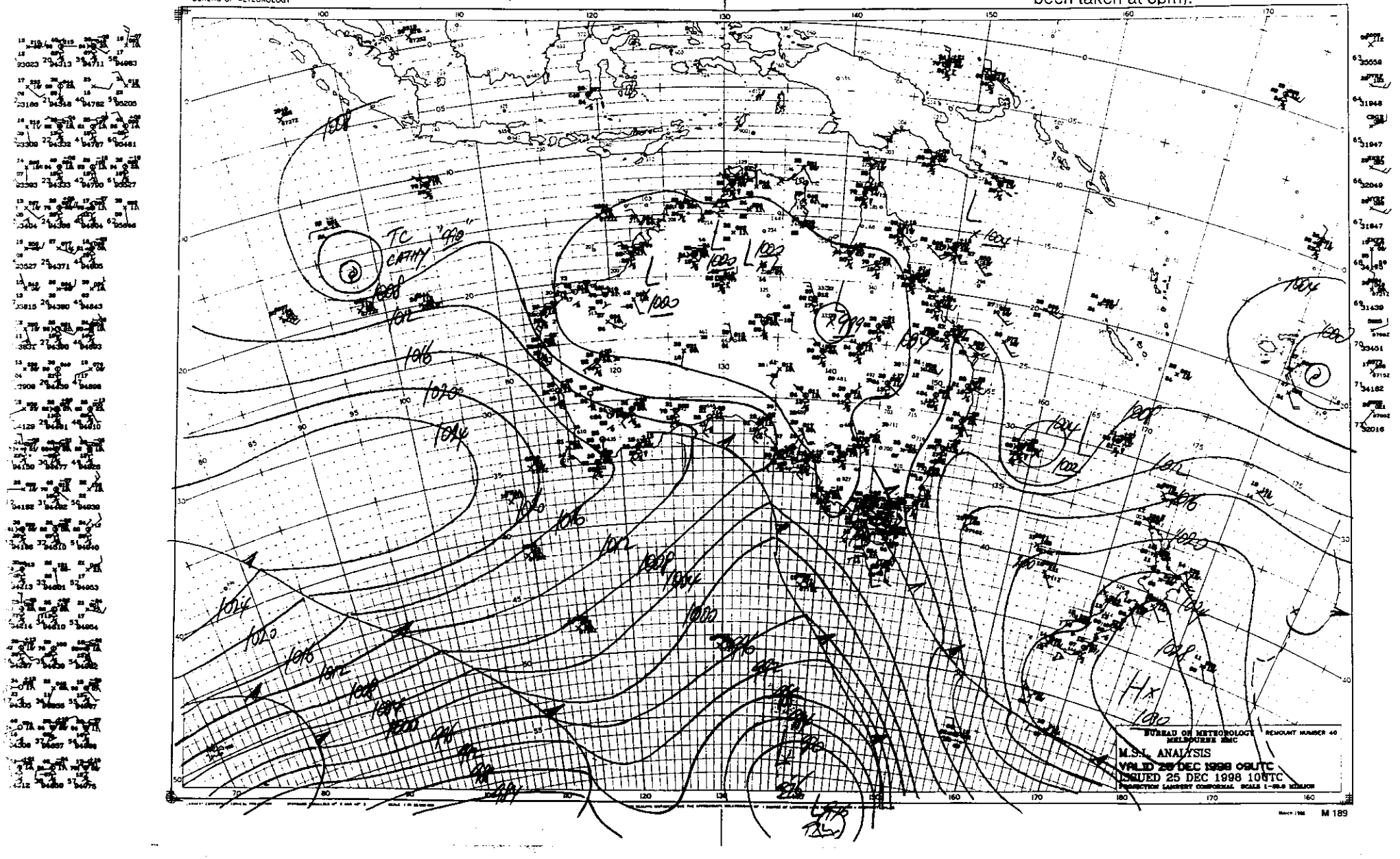

Figure 12B

Mean sea level analysis nominally for 11pm Dec 1998 (many observations would have been taken at 9pm).

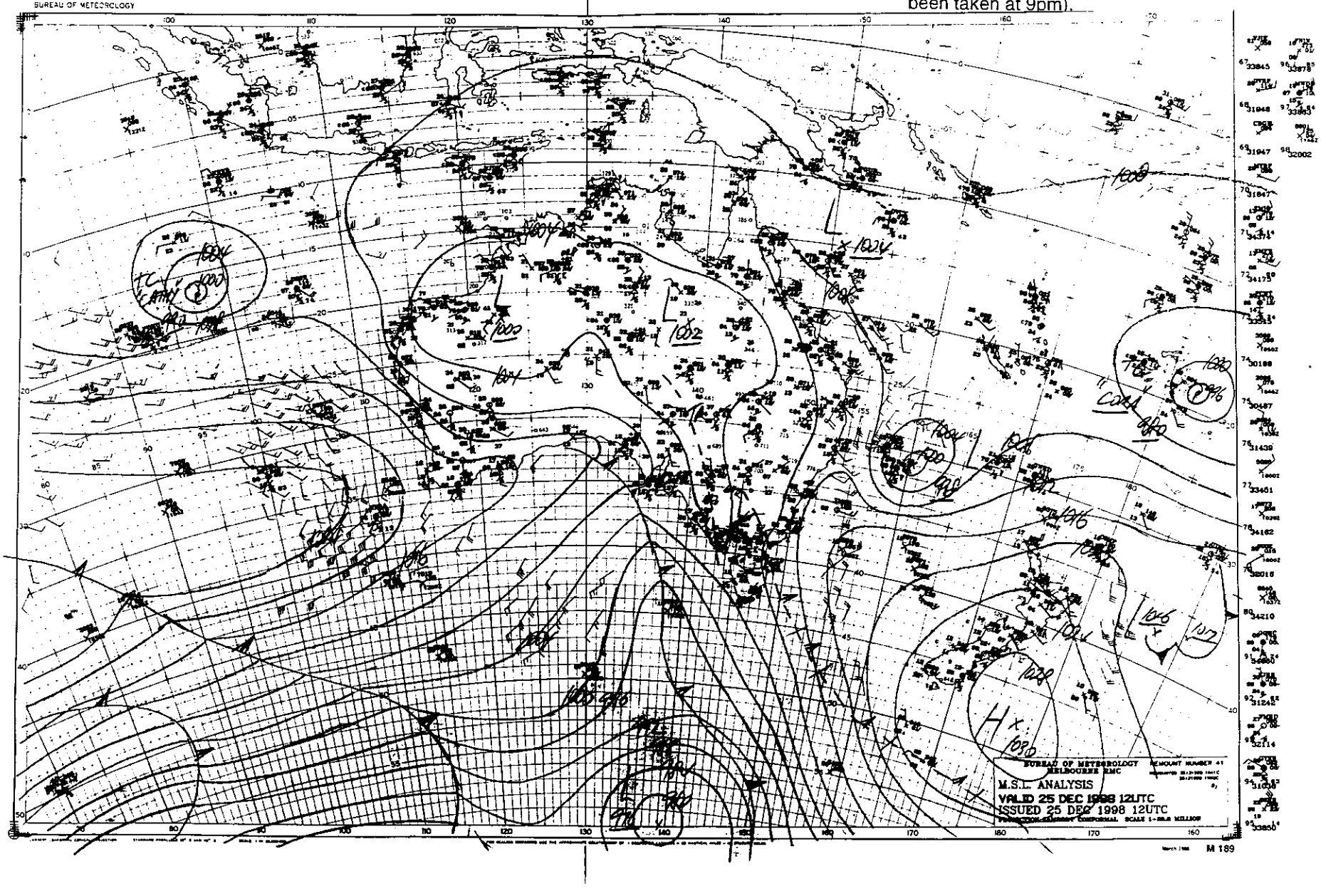

Figure 13B

No analysis available as there are few observations taken at midnight.

Figure 14B
Mean sea level analysis nominally for 5am 26 Dec 1998 (many observations would have been taken at 3am).

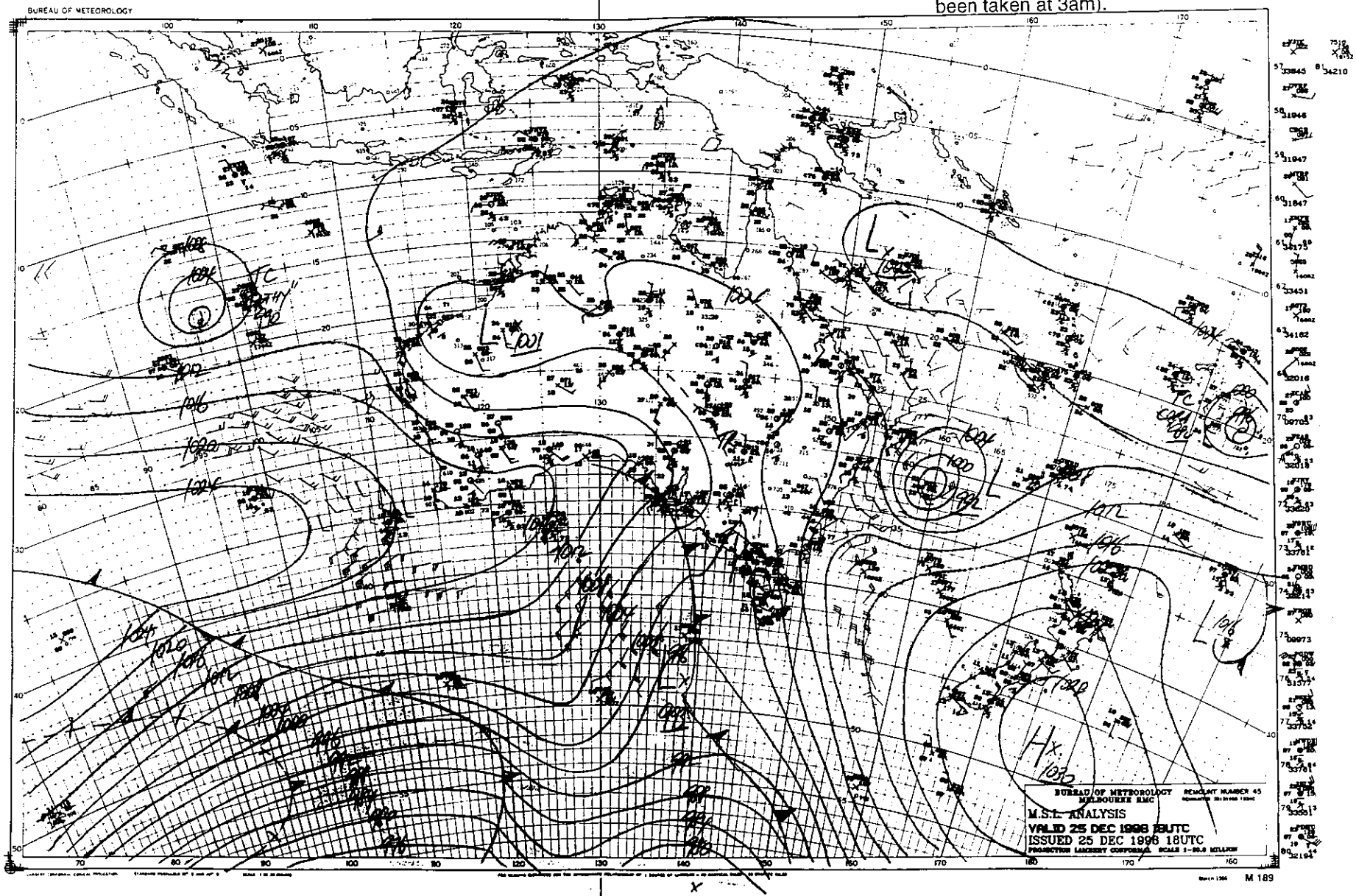

Figure 15B
Mean sea level analysis nominally for 8am 26 Dec 1998 (many observations would have been taken at 6am).

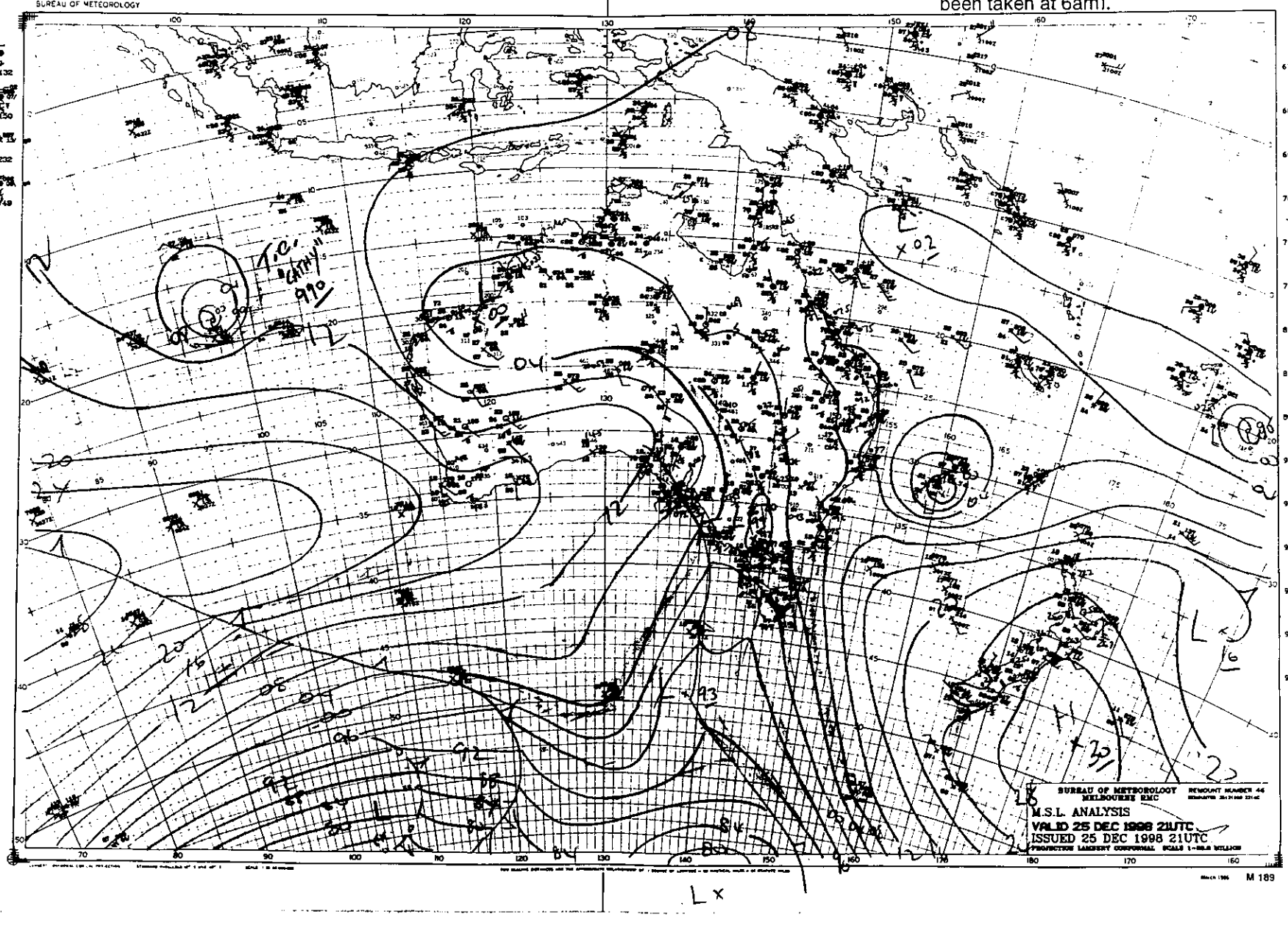

Figure 16B
Mean sea level analysis nominally for 11am 26 Dec 1998 (many observations would have been taken at 9am).

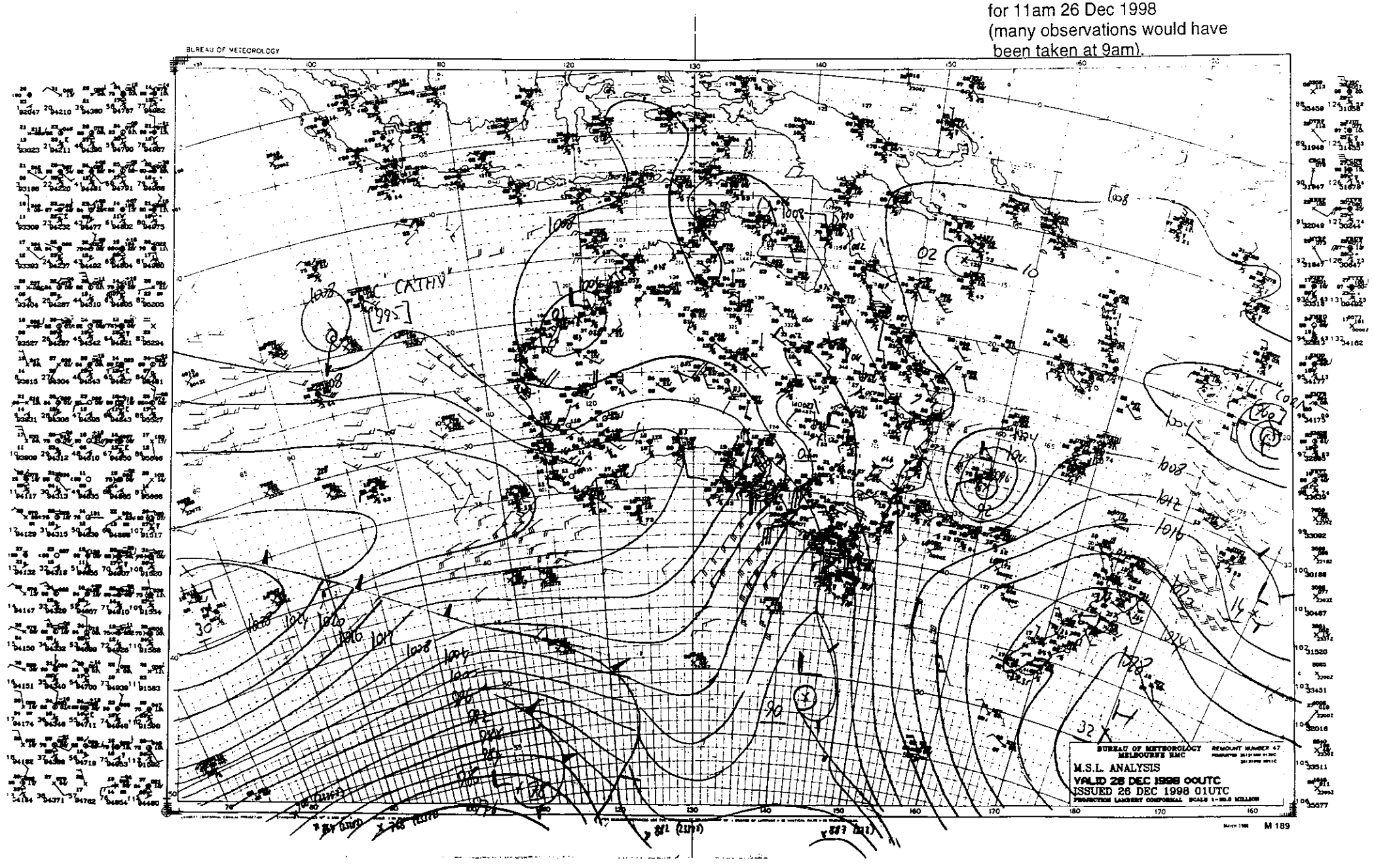

Figure 17B

Mean sea level analysis nominally for 2pm 26 Dec 1998 (many observations would have been taken at noon).

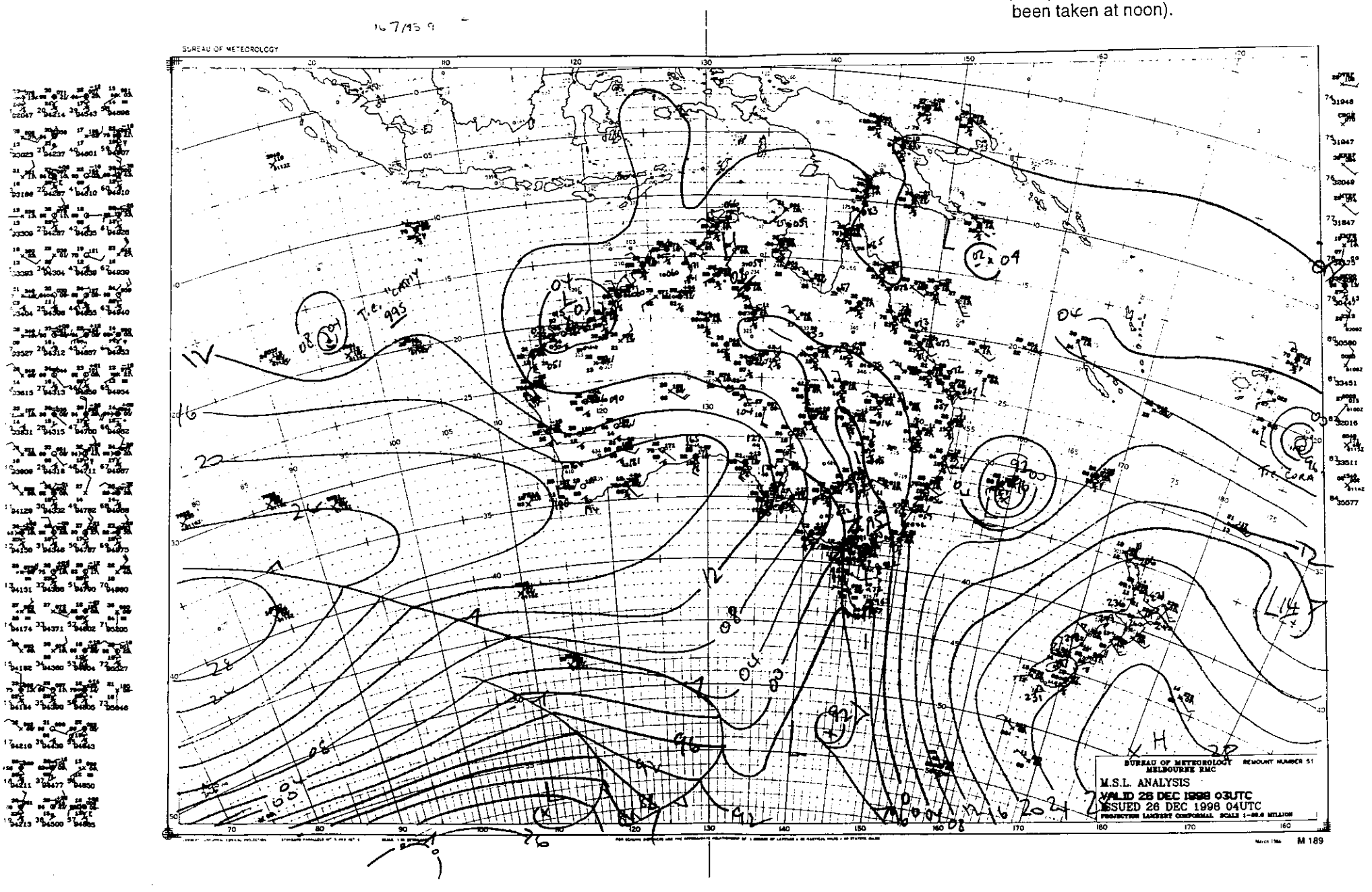

Figure 18B
Mean sea level analysis nominally for 5pm 26 Dec 1998 (many observations would have been taken at 3pm).

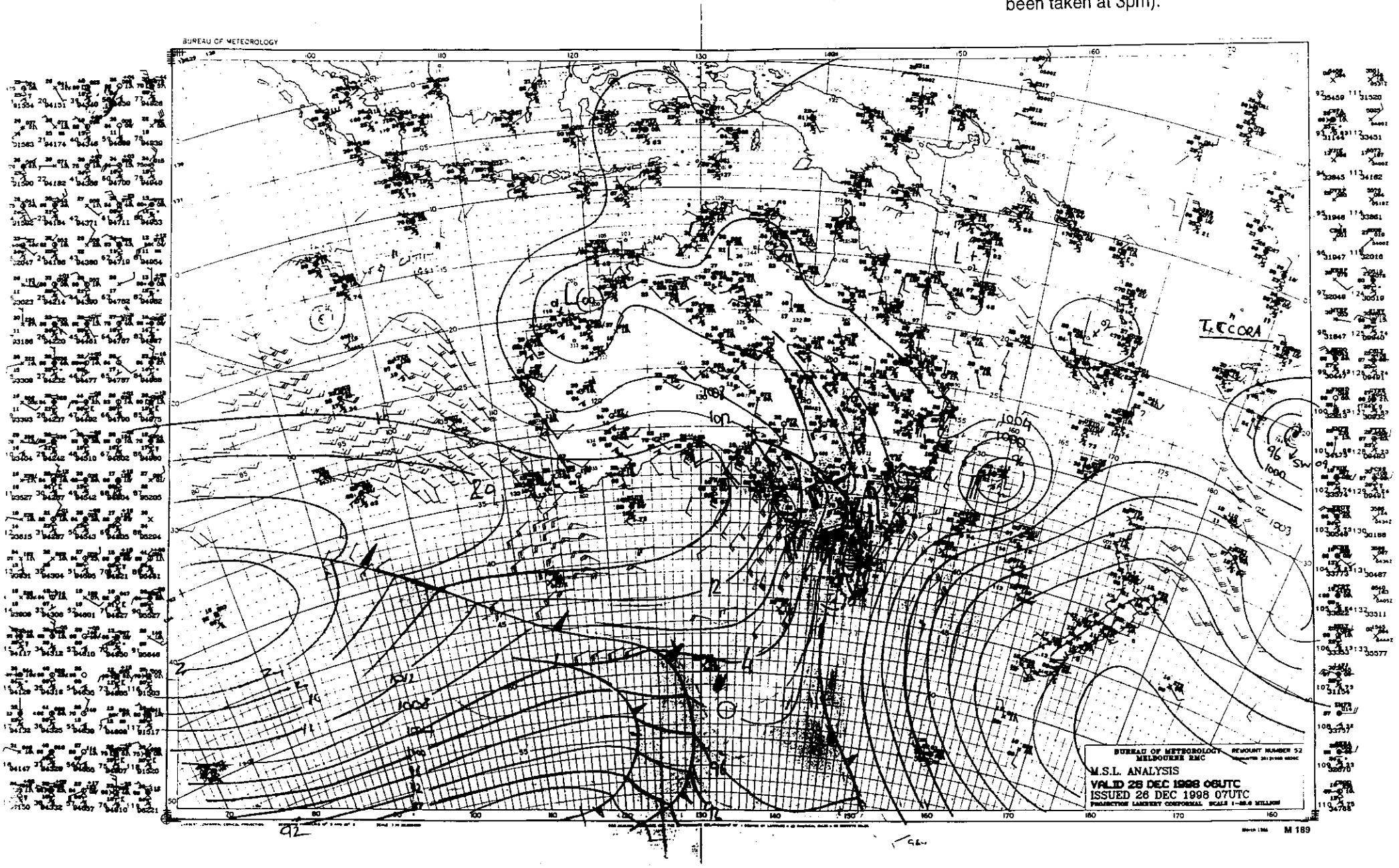

Figure 19B

Mean sea level analysis nominally for 8pm 26 Dec 1998 (many observations would have been taken at 6pm).

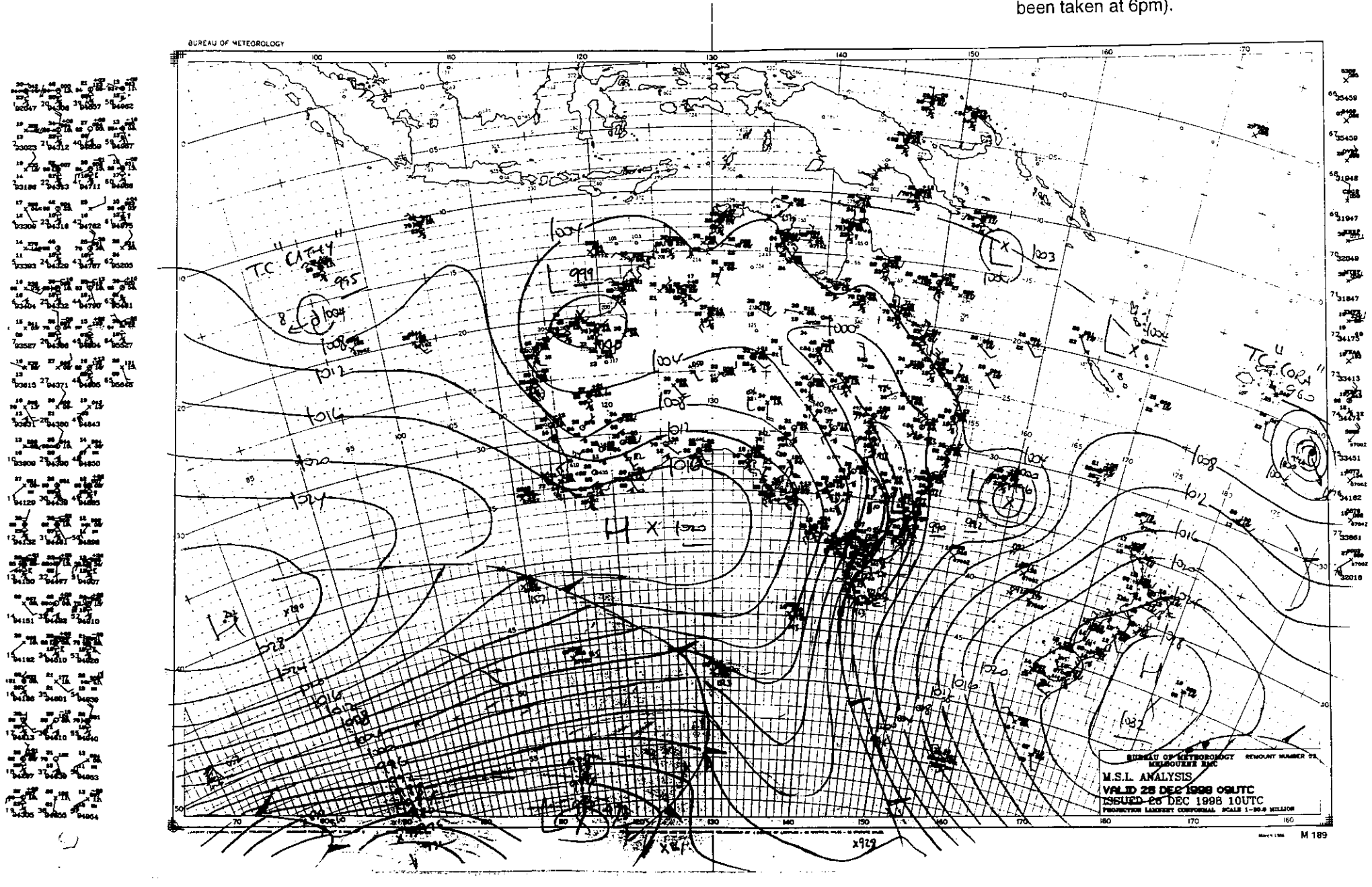

Figure 20B
Mean sea level analysis nominally for 11pm 26 Dec 1998 (many observations would have been taken at 9pm).

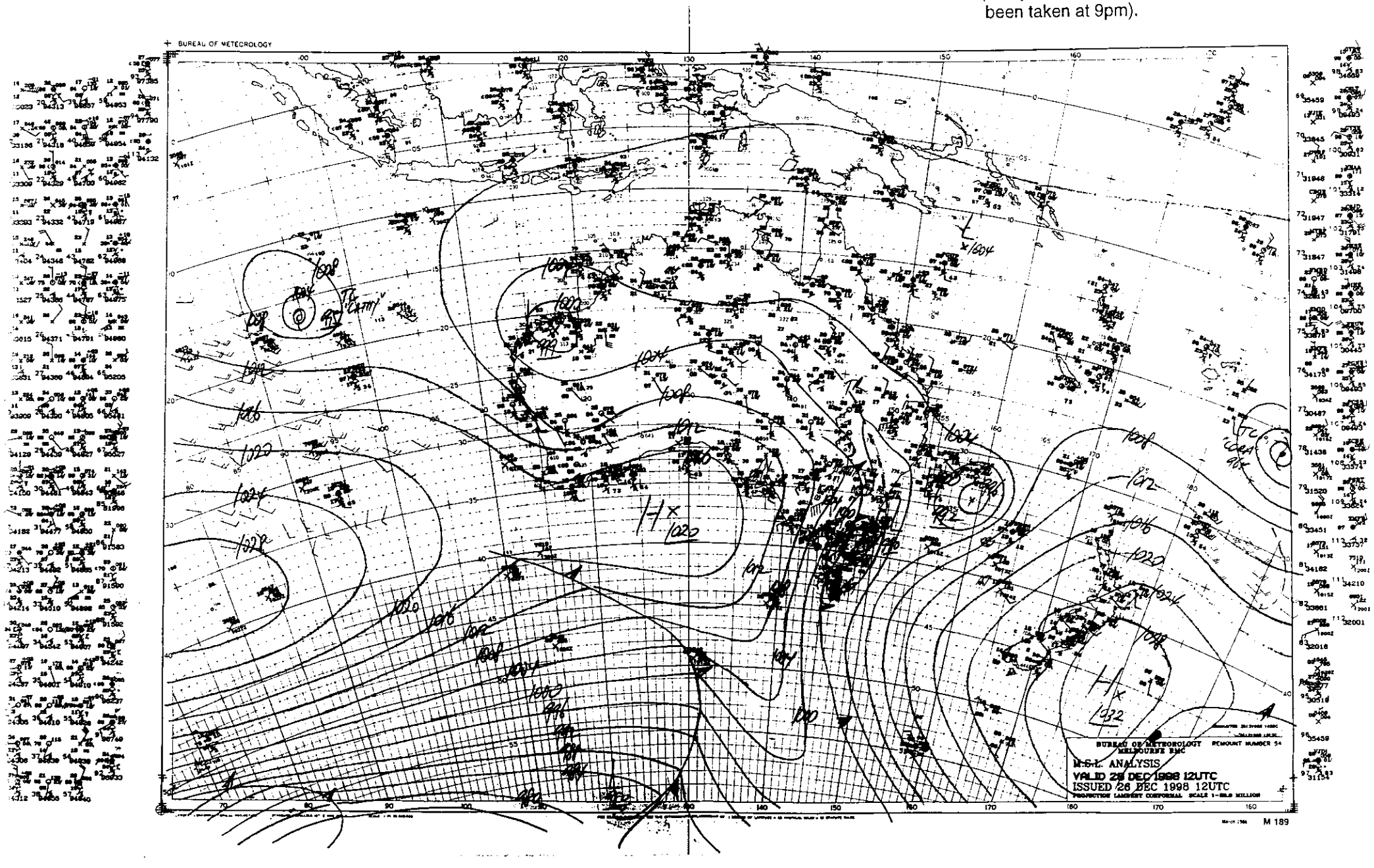

Figure 21B

No analysis available as there are few observations taken at midnight.

Figure 22B
Mean sea level analysis nominally for 5am 27 Dec 1998 (many observations would have been taken at 3am).

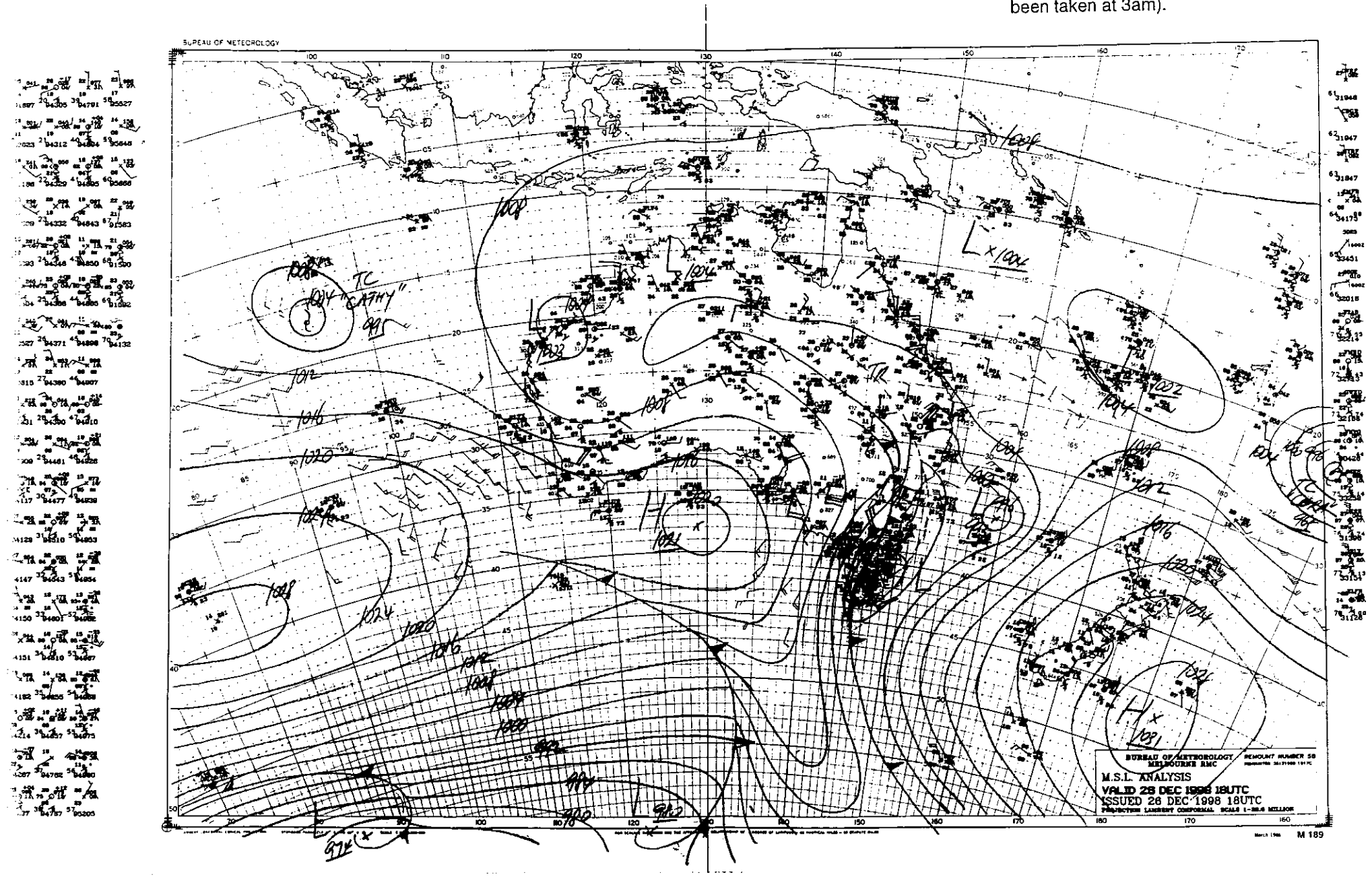

Figure 23B
Mean sea level analysis nominally for 8am 27 Dec 1998 (many observations would have been taken at 6am).