



National Report by Australia

SOT-V

18-22 May 2009, Geneva, Switzerland

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Australian Bureau of Meteorology

In collaboration with
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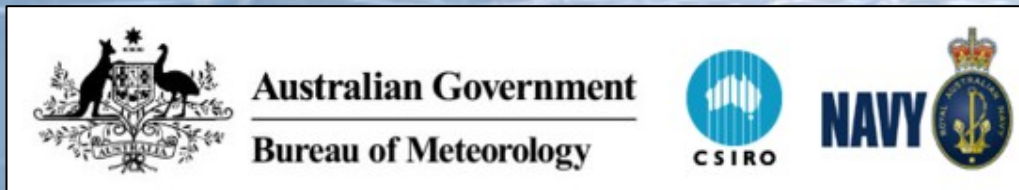


Outline

- Participating Agencies.
- VOS
 - » Australian Voluntary Observing Fleet.
- SOOP
 - » Australian XBT SOOP / Complementary Programs.
- Port Meteorological Agents.
 - » Description / Network / 2008 Activities.
- Overarching & Underpinning
 - » Awards & Goodwill / PMA Training / Challenges & Difficulties / R&D.

Participating National Agencies

Agency	Program
Australian Bureau of Meteorology (ABOM)	VOS & SOOP
Commonwealth Scientific Industrial and Research Organisation (CSIRO)	SOOP
Royal Australian Navy (RAN)	SOOP
Directorate of Oceanography and Meteorology (DOM)	SOOP / DM
Joint Bureau/CSIRO Australian Facility for Ocean Observing Systems (JAFOOS)	SOOP / DM





Australian Voluntary Observing Fleet



Australian Voluntary Observing Fleet

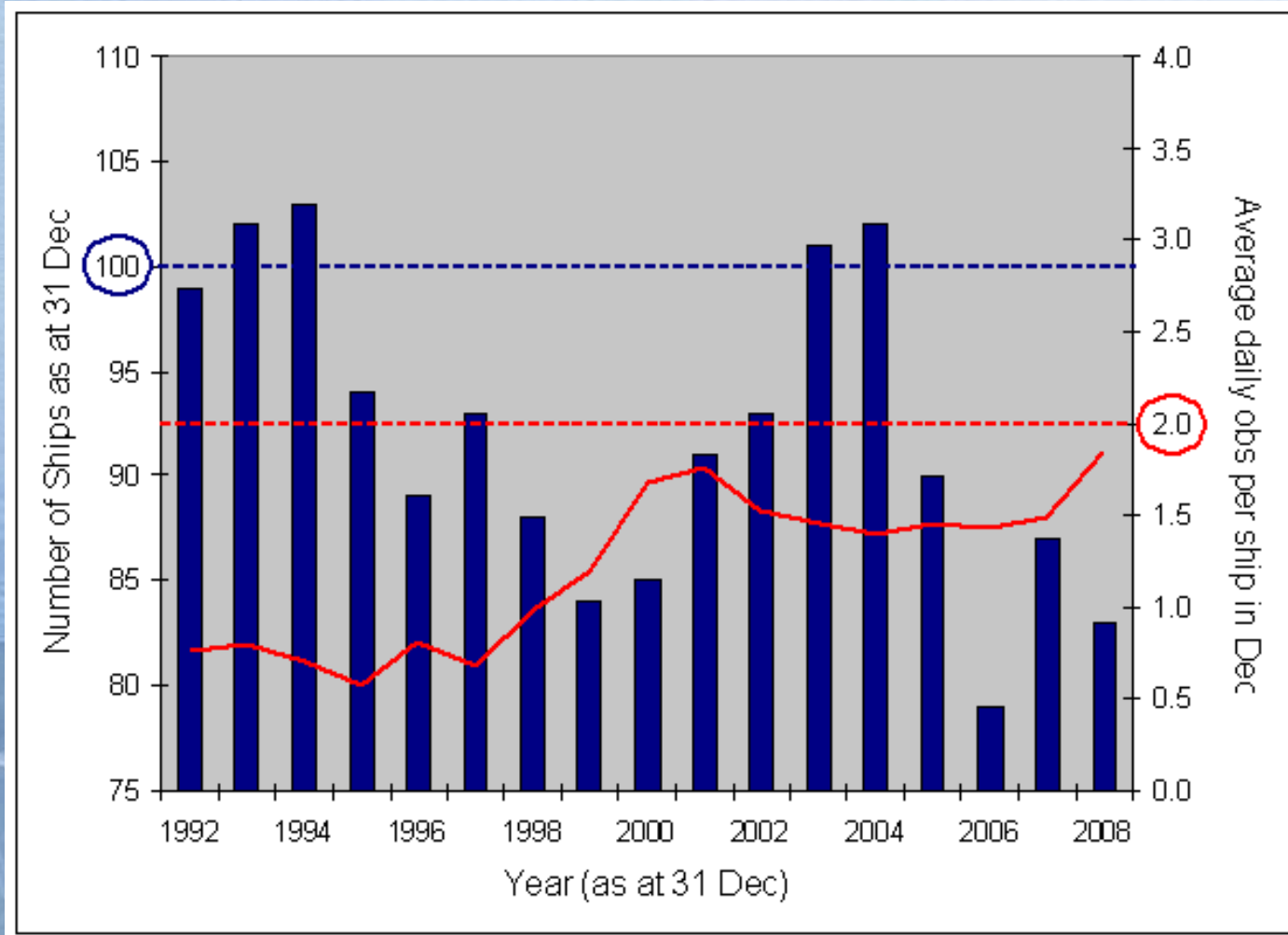
- Comprises Australian & foreign-owned ships recruited to take, record & transmit weather observations at sea, but predominantly in the Australian region.
- Goals of the AVOF:
 1. To maintain a fleet of 100 ships supplying an average of 2 BBXX per day from each ship.
 2. To provide R/T surface meteorological data of a high quality to support:
 - » Bureau's marine services.
 - » Climate analysis & research.
 - » End-user applications.

Status of the AVOF

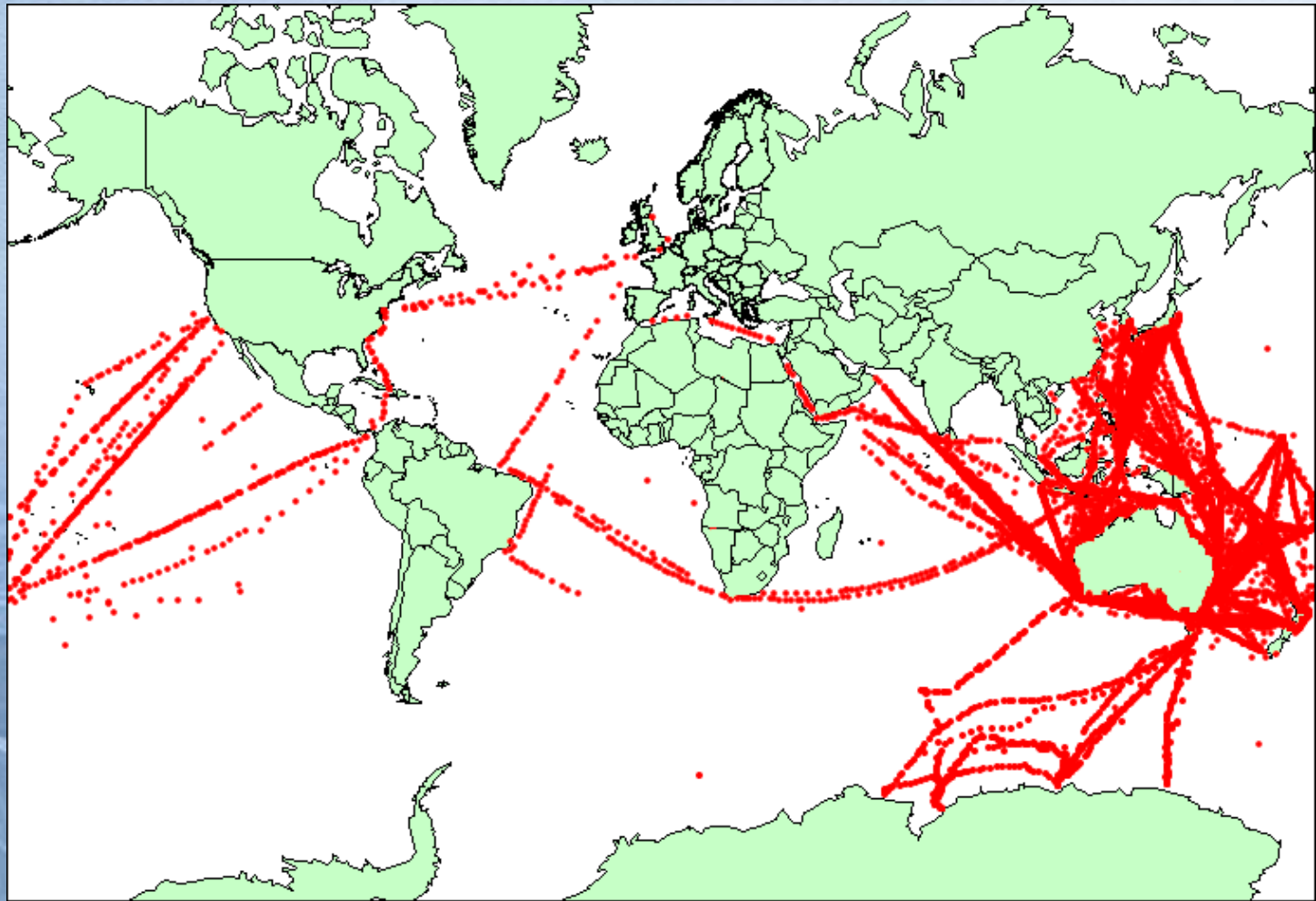
VOS Class	AVOF	VOSCLim	TurboWin (non-VOSCLim)	ShipAWS
Selected	81	10	48	9
Supplementary	1		1	
Auxiliary	1		1	
TOTAL	83	10	50	9
TARGET	100	20		
2008 Changes	+ 17 - 19	+ 0 - 2	83 % - 15	0 0
Nett Change	- 2	- 2	+ 2	0
2009 Plans		+ 6		+ 3

(as at 31 Dec 2008)

AVOF Goal 1 – Fleet Size & Reporting



Real-time BBXX in 2008



~44750 BBXX sent on the GTS in 2008 from the AVOF

AVOF Observing Program

Component	Manual Observation	ShipAWS Observation
Observation times	0000, 0600, 1200 & 1800 UTC	Configurable, but generally every 3 hours when moving
Recording	TurboWin (preferred) or paper logbook	Electronic
Transmission	Inmarsat to a LES using free service <i>SAC41</i> (<i>SAC1241</i> in the AU region)	Inmarsat <i>data reporting mode</i> to IOR 312 / POR 212 (formerly Perth)
Data format	BBXX	Binary subset of the BBXX which is converted to a full BBXX by the Bureau
Lodgement on GTS	NMS in the country hosting the receiving LES	Bureau

AVOF Meteorological Instrumentation

Instrument	Standard (VOSClm compliant)	ShipAWS
Barometer *	DA (Mk I or Mk II) or PTB220B	PTB220B
Barograph *	7-day Marine	
Screen	Marine (generally 2 per ship)	Vaisala DTR13 radiation shield
Thermometers	2 x Mercury-in-glass (wet & dry bulb) per screen	Vaisala HMP45 humidity probe & RTD temperature probe
Anemometer	Beaufort Scale (preferred) or ship's-own anemometer	Vaisala WAA151 anemometer & WAV151 wind vane
Sea Temp	Engine intake (preferred) or bucket & sea thermometer	Engine intake or hull-contact sensor

* Set to read station level pressure

TurboWin

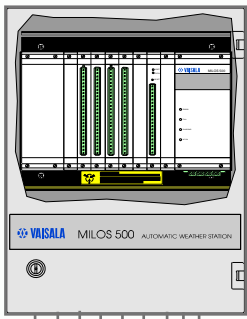
- Re-packaged by the ABOM to include:
 - » ABOM-prepared Installation Manual.
 - » ABOM-prepared User Guide.
 - » AU & NZ VOS contact details.
 - » List of LES that accept SAC41.
 - » AU & NZ Radiofax Schedules.
 - » AU Radiofax Brochure.
- Configuration sheet:
 - » Record the ship's TurboWin setup parameters.
 - » Remains onboard with the installation CD in case the software needs to be re-installed.



ShipAWS

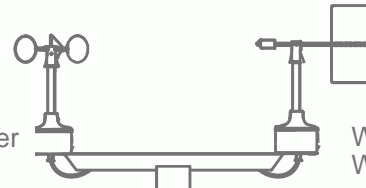
- Remotely sensed:
 - » AP, AT, RH, SST, Apparent WS & WD.
- Derived values:
 - » DP, WB, PT, True WS & WD.
- Manual input of visual elements:
 - » Cloud, weather, visibility, sea, swell.





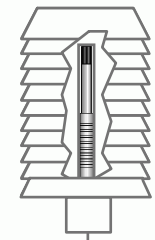
MILOS 500
Data Collection
and Processing
System
INSIDE
BOX50S
Equipment
Enclosure

Anemometer
WAA 151

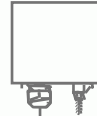


Wind Vane
WAV 151

Cross Arm
WAC 151



HMP 45D Humidity probe
and RTD temperature probe
inside DTR 13 Radiation
Shield



PTB 220B
Barometric pressure
transmitter installed
on ship's bridge

RS232 Standard/RS422

Data from Ship's compass
Koden gyro interface GRA-20A

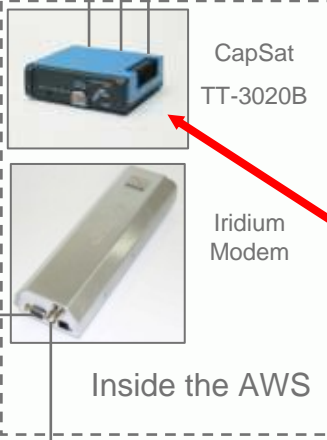
Gyro type _Tokyo Keiki Model 5000



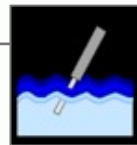
RS232

RS232

RS232

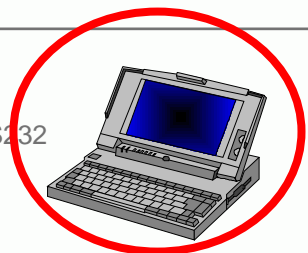


Inbuilt GPS



Sea Surface
Temperature

RS232



'Yourlink' console
on Ships bridge

ShipAWS

SYSTEM DIAGRAM

UPPER AIR AND MARINE LAB, SRUM JULY 2004

ShipAWS Console

Your Link [view] - REALTIME

Close

REALTIME DISPLAY for INSTANT VALUES

Date: 2001 03 27 Air Temperature: °C: 25.6
 Time: 06 : 15 UTC Wet Bulb Temperature: °C: 16.3
 Latitude: 37.82 S Dew Point Temperature: °C: 10.2
 Longitude: 144.97 E Relative Humidity: %: 38
 Track: 145 deg. 0 kt. Station Level Pressure: hPa: 998.0
 Heading deg: 355 Mean Sea Level Pressure: hPa: 1010.6

Instantaneous
 TRUE WIND 169 deg. T 9 kt.

Average Variation (deg. T) Range (kt.)

	Max.	Min.	Min.	Max.
2 min:	160 deg. T 7 kt.	076	282	3 to 12
10 min:	160 deg. T 8 kt.	351	254	3 to 15

Your Link [edit, time 07:50] - SHIP

Send Cancel

SHIP'S SURFACE WEATHER REPORT

Call sign: YY GG Iw LaLaLa Qc LoLoLo IR Ix h W N dd ff fff
 BBXX ROOF 27 18 4 99 378 3 1450 4 6 16 11 (00)

Sn TTT Sn TdTdTd PoPoPoPo PPPP a ppp ww w1w2 Nh CLCM CH
 1 0 243 2 0 100 3 9978 4 0012 5 2 003 7 8

Wind waves: Swell waves: 1st Swell waves: 2nd Swell waves:
 DsVs Ss TwTwTw PwPw HwHw dw1dw1dw2dw2 Pw1Pw1 Hw1Hw1 Pw2Pw2 Hw2Hw2
 222 0 0 0 2 3 4 5

IsEsEsRs Sw TbTbTb ci Si bi Di ai
 6 8 ICE

Previous SHIP message

BBXX ROOF 27154 99378 31450
 46/// 1709 10141 20076 39989 40120 52006
 22233 85106

Ship Call Sign

VOS Quality Monitoring

Source	Frequency	Parameters
Real-time feedback	Occasional	All parameters
Météo-France - VOS QM Tools	Weekly	AP
RSMC - QM Report	Monthly	AP, SST, AT, RH, WS, WD
RSMC - Suspect Ship List	Monthly	AP, SST, AT, RH, WS, WD
RTMC - VOSCLIM Suspect Ship List	Monthly	AP, SST, AT, RH, WS, WD
RSMC - Timeliness of Observations	Monthly	Timeliness of BBXX at RSMC
RSMC - Rejected Ship Reports	Monthly	Errors in BBXX at RSMC
ABOM - Performance Report	Monthly	Count of received BBXX

AVOF Goal 2 – High Quality Observations

RSMC/RTMC Suspect Ship Criteria – Bias Limits

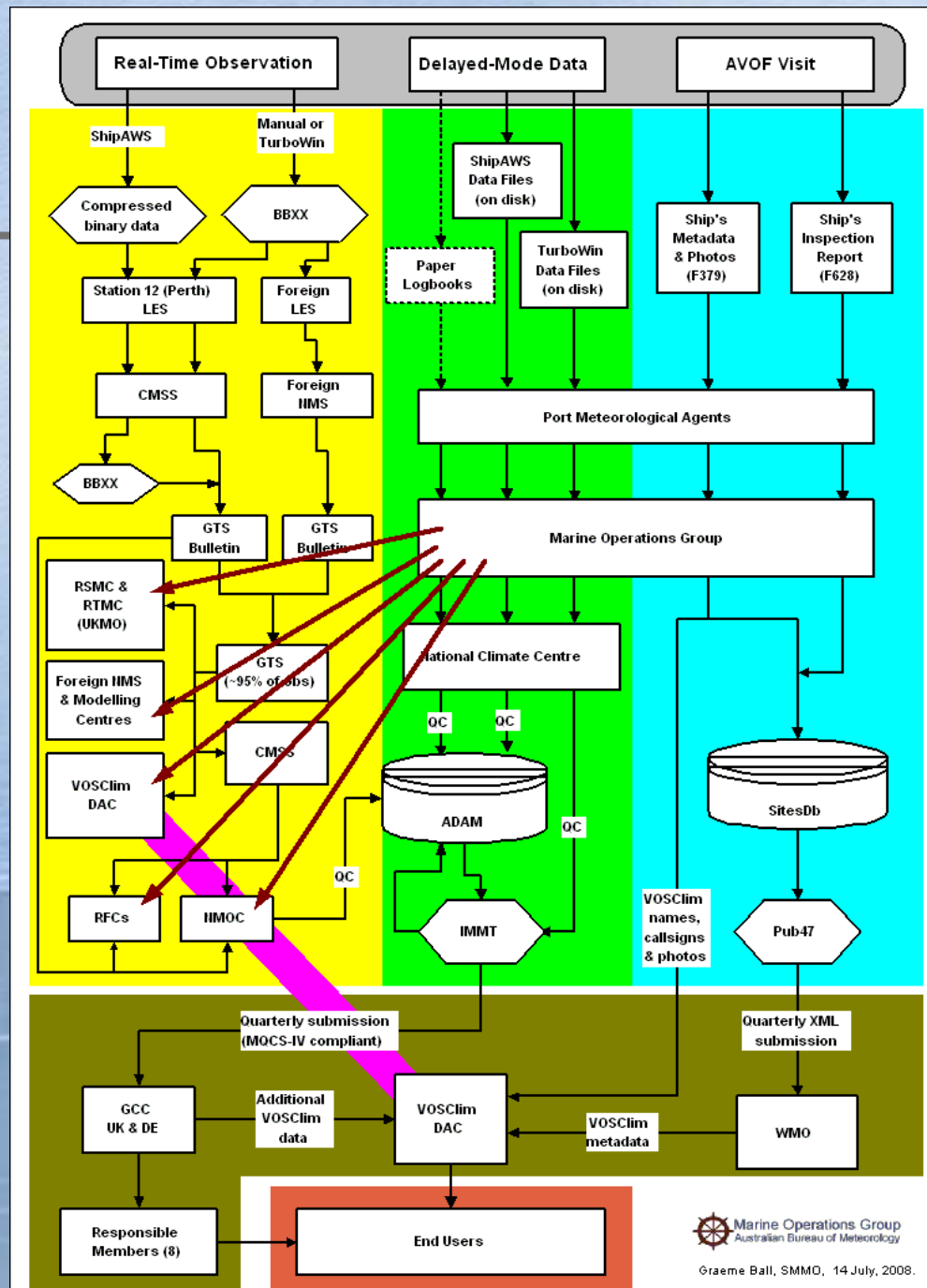
	AP (hPa)	WS (m/s)	WD (deg)	AT (deg C)	RH (%)	SST (deg C)
VOS	4.0	5	30	4.0	15	3.0
VOSclim	2.5	5	30	4.0	10	2.0
AVOF	2.0	5	22.5	2.0	10	2.0

Masked Callsigns

- MASK trial commenced in April 2008 with 3 ships.
- MASK callsign sequence: B2M0000 – B9M9999.
- REAL / MASK list to the RSMC:
 - » Monthly for QM of AVOF.
- REAL / MASK list to JCOMMOPS:
 - » Routinely every quarter.
 - » Whenever a change occurs to the MASK fleet.

Marine Climatological Summaries Scheme

- MQCS compliant QC applied to R/T messages from the GTS before archival in the ABOM's climate database.
- Processing of TurboWin IMMT & ShipAWS log files to recover data not received in R/T from the GTS:
 - » Missed data are imported into the ABOM's climate database.
- Quarterly submissions in IMMT-3 (since mid-2007) to the UK-GCC & DE-GCC.





Australian SOOP



Australian XBT SOOP

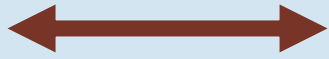
- Comprises Australian and foreign-owned ships recruited to routinely sample the upper 1000m of the ocean.
- Goals of the Australian XBT SOOP:
 - » To sample the XBT lines in accordance with the requirements set by expert panels for GCOS/GOOS and supplemented by national requirements.
 - » To provide timely and high quality upper-ocean thermal (UOT) data to support oceanographic research, climate analysis and research, defence and fisheries.
 - » To meet agreed national and international obligations, and to advance national interests in, and through the exchange of physical oceanographic data.

Australian XBT SOOP (cont)

- National Coordination:
 - » Annual National SOOP Coordination Panel (NSCP) meeting involving ABOM, CSIRO, RAN, DOM & JAFOOS.
 - » Bi-monthly UOT meetings involving the ABOM & JAFOOS.
- Probes Supply:

Program	Provider
ABOM	ABOM, RAN, AOML (for IX01)
CSIRO	RAN, SIO
RAN	RAN

Status of the Australian XBT SOOP

Line	Agency	Target Program				2008 Program		
		Mode	Transects	Profiles	Ships	Transects	Profiles	Ships
IX01	ABOM	FRX+	52	1148	1			5
IX12	ABOM	FRX	21	1147	4			4
IX22	ABOM	FRX	20	1036	3			3
PX11								
PX02	ABOM	FRX	26	365	2			2
IX28 *	CSIRO	HDX	6	600	1	5	582	1
PX30	CSIRO	HDX	4	500	1	4	470	1
PX34	CSIRO	HDX	4	280	1	4	269	1
PX33 *	CSIRO	HDX				1	59	1
-	RAN	Varies, depending on operational requirements & hydrographical sampling						

* Austral Summer only.

ABOM's XBT Fleet

Line	Ship	Callsign	Start	End
IX01	Wellington Express	VSUA5	16 May 2007	21 Oct 2008
	Adelaide Express	DHSN	4 Jun 2007	19 Jan 2009
	Canberra Express	DFCW2	2 Oct 2007	1 Dec 2008
	Sydney Express	VSXC4	2 Sept 2007	28 Aug 2008
	Medontario	VSUA5	23 May 2008	9 Apr 2009
PX02	Wana Bhum	HSB3403	27 Apr 2008	
	Xutra Bhum	HSB3402	21 Jan 2008	
IX12	Passat Springs	A8JY8	22 Feb 2009	
	CMA CGM Charcot	A8HE4	2 Mar 2009	
	CMA CGM Mimosa	A8IF2	9 Mar 2009	
	Stadt Weimar	V2CF9	30 Mar 2009	
	Wellington Express	VSUA5	27 Aug 2006	21 Oct 2008
	Adelaide Express	DHSN	25 Nov 2006	19 Jan 2009
	Canberra Express	DFCW2	2 Oct 2007	1 Dec 2008
	Sydney Express	VSXC4	2 Sept 2007	28 Aug 2008
IX22 & PX11	Pacific Triangle	ELXS8	18 May 2006	
	Lowlands Prosperity	ONDB	30 Mar 2008	
	Iron Yandi	VNVR	21 Jun 1999	

Shipboard XBT System

Agency	Probe Type	Interface	Acquisition Software
ABOM & CSIRO	Deep Blue	USB	Windows-based Devil XBT System (joint CSIRO/ABOM project).
RAN	T10 & Deep Blue	Mk12, Mk21 & Devil XBT	Windows-based Mk12 & Mk21 software developed under contract by Sippican. Windows-based Devil XBT System

Devil XBT System



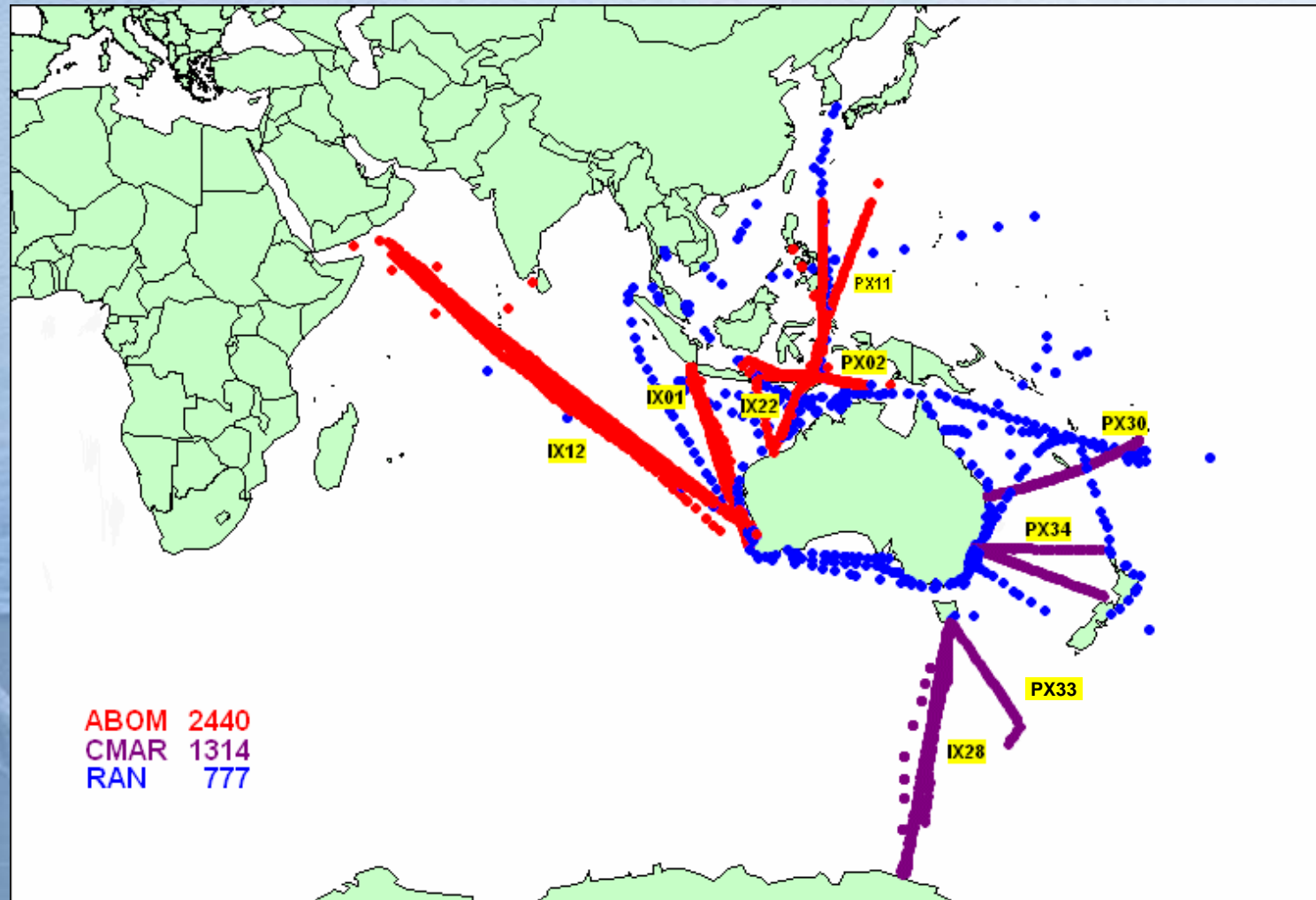
BATHY on the GTS in 2008

Agency	JJVV	Comment
ABOM	597	<p><u>Prior 16 Nov 2008</u>, manual QC and placement on the GTS.</p> <p><u>Post 16 Nov 2008</u>, automatic JJVV preparation by the Bureau and placement on the GTS.</p>
CSIRO	788	<p><u>Prior Nov 2008</u>, JJVV placed on the GTS by SIO after each voyage if the data are still in real-time (i.e. within 30 days).</p> <p><u>Post Nov 2008</u>, Iridium-based JJVV prepared by CSIRO then sent to ABOM for GTS distribution.</p>
RAN	508	Placed on the GTS by the Bureau. Many more JJVV are sent as SHIP.
	1893	

Delayed-mode XBT Data

- **ABOM & CSIRO:**
 - » Scientific QC of ABOM's delayed-mode XBT data by JAFOOS.
 - » Inter-agency exchange of annual datasets.
 - » Annual submission of the UOT datasets to NODC and DOM in MEDS-ASCII format with international QC flags appended.
 - » Annual submission of metadata summaries to JCOMMOPS.
- **DOM:**
 - » Annual submission to NODC in MarineXML format:
 - » includes occasional data from RNZN.

Delayed-Mode XBT Data in 208



Complementary Programs to SOOP

- **Argo Australia:**
 - » Partnership established in 2001 between the ABOM & CSIRO (additional contributions provided by the ACE-CRC* and RAN).
 - » Annual meeting held jointly with the NSCP.
 - » Floats deployed in the Indian Ocean, Southern Ocean, Coral & Tasman Seas, and southwest Pacific Ocean.

 - **Multi-disciplinary Sampling:**
 - » Sea-surface temperature & salinity.
 - » Atmospheric & surface ocean carbon.
 - » Fluorescence & pigments.
- } By CSIRO on IX28

* Antarctic Climate and Ecosystem Cooperative Research Centre



Port Meteorological Officers

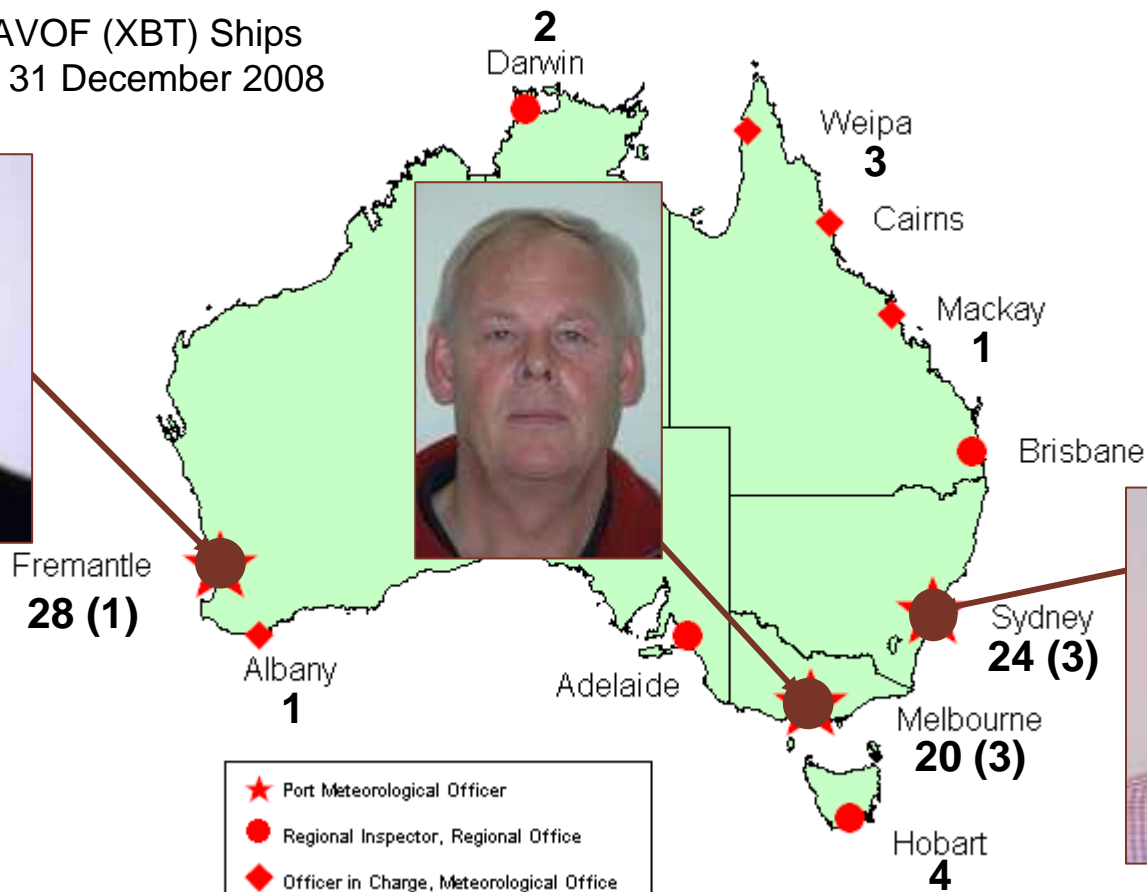


Port Meteorological Agents (PMA)

- Fremantle, Melbourne & Sydney:
 - » Part-time contractors.
 - » Full range of PMO services to the AVOF & the global VOF.
 - » Ship-greetings to the ABOM's XBT SOOP.
 - » Regular support to the ABOM's other marine programs.
- Other capital city & provincial ports:
 - » Full-time ABOM Regional Office.
 - » Full-time Field Office staff, but limited opportunities due staffing.
 - » Limited range of PMO services, generally provided 'on-request'.
 - » Occasional support to the ABOM's other marine programs.

PMA Network

AVOF (XBT) Ships
at 31 December 2008



PMA Activities in 2008

Routine visits to the AVOF	176
Courtesy visits to the AVOF	23
Courtesy visits to non-VOS or foreign-VOS	62
Recruitment or de-recruitment visits to AVOF or XBT SOOP	44
Ship-greetings to the XBT SOOP	57
Courtesy visits to load drifting buoys	25
Courtesy visits to load profiling floats	1



Overarching & Underpinning



PMA Training

- Regular PMA Workshop held every 2 years.
 - » Attended by the Chair of VOSP as an invited presenter.
- Ad-hoc training as necessary for the introduction of new technology, e.g. Devil XBT.
- Initial training for new PMA Sydney, January 2009.

Awards & Goodwill



Challenges & Difficulties

- Maintaining the number of ships in the AVOF in the current global economic environment.
- Sustaining adequate levels of AVOF equipment within a fixed budget & increasing equipment costs.
- Noted in May 2008, that ABOM's BATHY only sent internally. Proper GTS distribution from 11 June 2008.
- Full ABOM XBT network of 10 ships achieved in 2008, but short-lived due to the re-routing of several ships.

Challenges & Difficulties (cont)

- Re-routing of CSIRO's XBT ship across the Tasman Sea (PX34) means the track is further North than preferred.
- Four Navy ships fitted with a customised RAN version of "Devil" XBT system. No operational problems noted.
- Naming of the "Devil" XBT System is causing concern with some foreign crews on religious/cultural grounds:
 - » Turo is investigating solutions.

Research & Development

- ABOM's XBT fleet progressively upgraded to Devil XBT version 3.03.1 from November 2008:
 - » Improved QC procedures enabling automatic preparation of the BATHY by the ABOM for GTS distribution.
- Procedure developed to use Devil XBT system on new Armidale Class Patrol Boats.
- Successful testing of Iridium transmissions from Devil XBT system by CSIRO:
 - » BATHY processed by CSIRO.
 - » Sent to ABOM for GTS distribution.

Research & Development (cont)

- Testing of TurboWin 4.5 Beta:
 - » Includes ABOM recommendation for revised SWELL screens.
 - » Will update ABOM User Instructions for TW4.5 public release.

