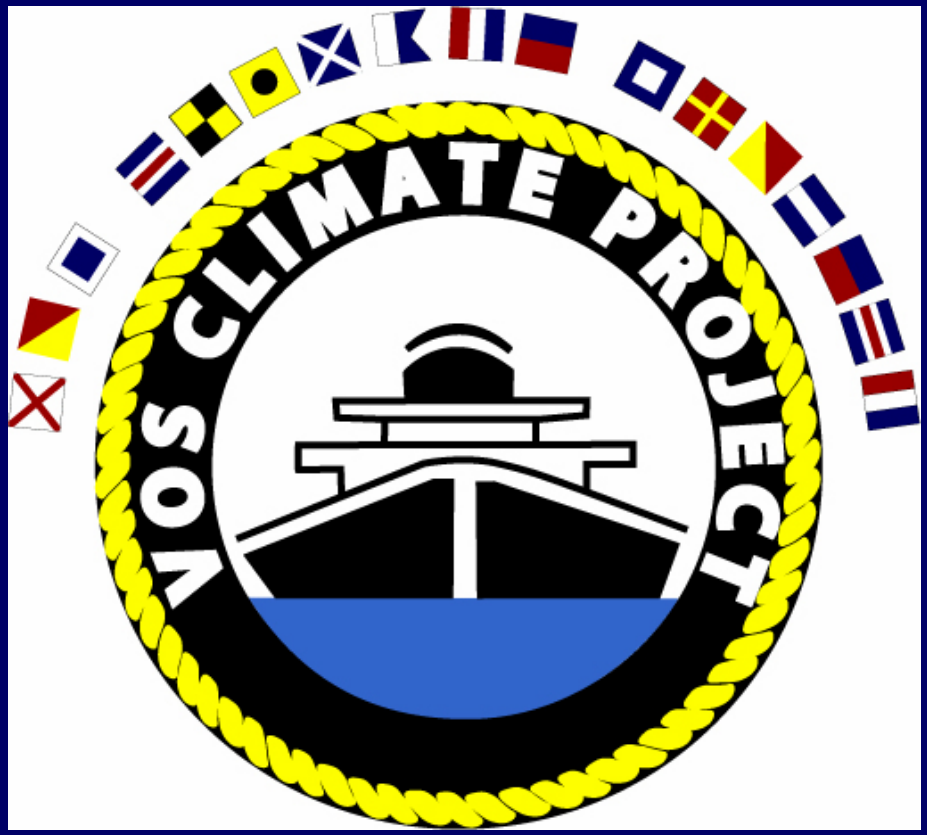
VOS CLIMATE PROJECT



Met Office

VOS CLIMATE PROJECT

Objectives

- Climate Change Studies
- Climate Research and Prediction
- Satellite Verification
- VOS Reference data

Ship Recruitment

~ 200 Target Ships

	Active [June 2003]	Planned [2003]	Target
• UK	21	11	30
• India	20	?	?
• Canada	14	5	23
• United States	12	42	50
• Australia	6	0	12
• Germany	8	11	14
• Netherlands	1	?	?
• Japan	0	5	5
• Poland	0	3	?
• France	0	6	8
	82 [+2]		142

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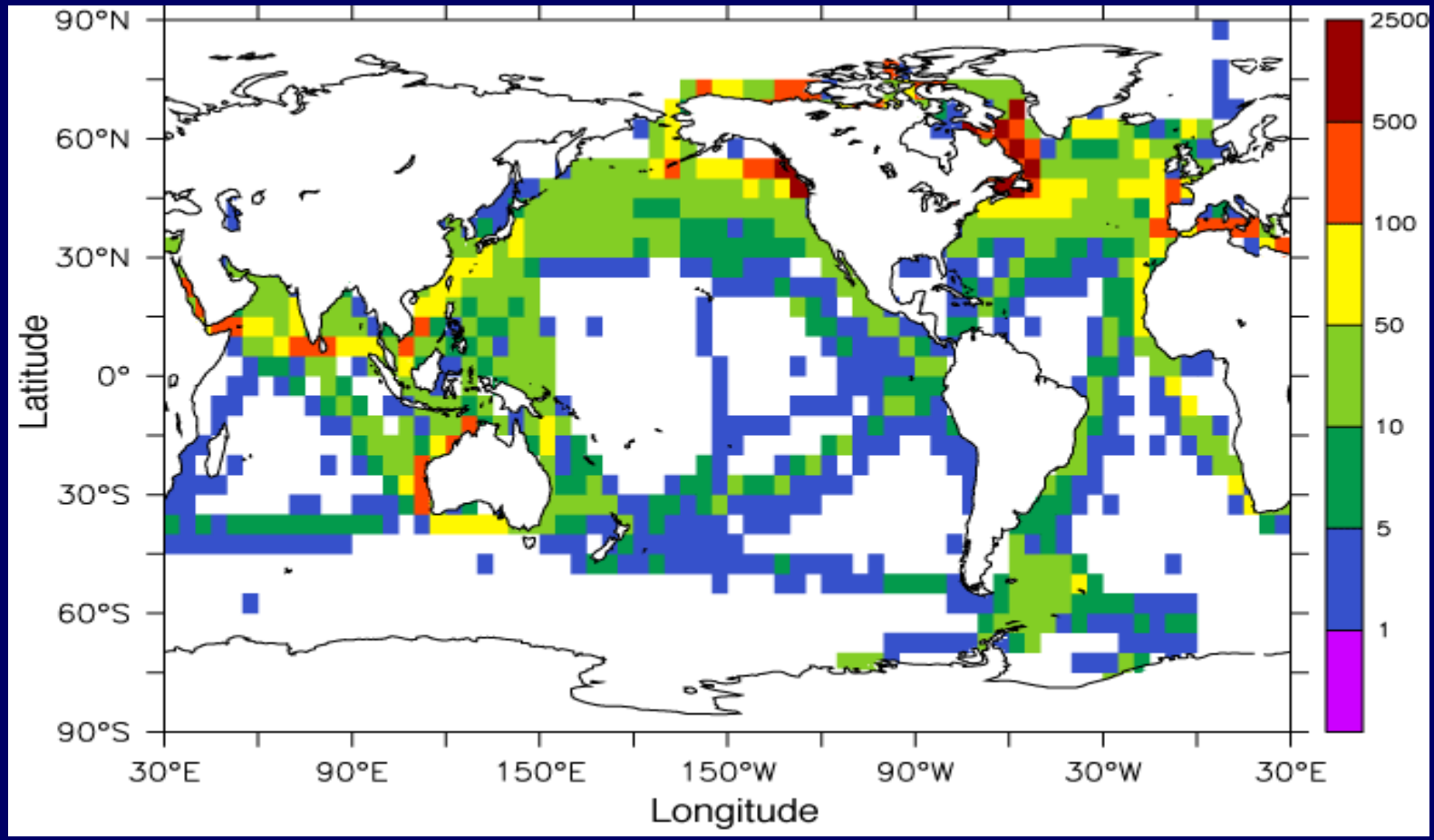
Global Coverage



Map of 5° observation density for real time data for period February 2002 to April 2003

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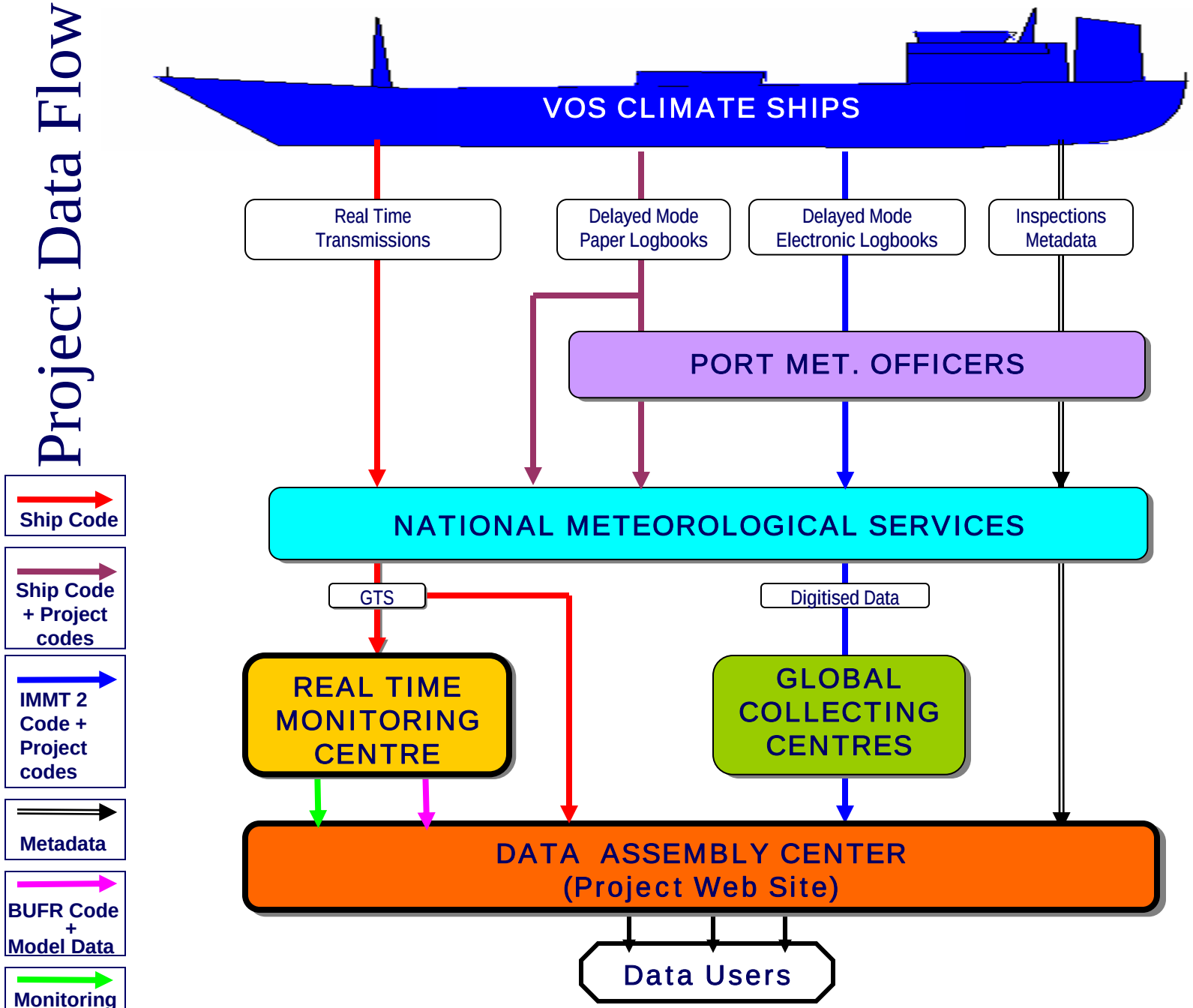
Data Streams

- **Real Time Data**
- **Delayed Mode Data**
- **Metadata**

Project Data Flow



Real Time Monitoring Centre

- Extracts GTS observation reports
- Associates observed variables (pressure, air temp, humidity, SST, wind speed & direction) with co-located model field values and compile BUFR data set
- Transfers data set to Data Assembly Centre
- Provides monthly monitoring statistics for observed variables

Data Assembly Centre

- Receives BUFR data sets of observed variables and model values from the RTMC
- Collects delayed mode observation reports from the GCC's
- Compiles real time /delayed mode project data sets for users
- Collects metadata
- Maintains project web site

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Project Code Groups

- HDG — Ships Heading - the direction to which the bow is pointing referenced to True North
- COG — Ships ground course - direction the vessel actually moves over the fixed earth referenced to True North
- SOG — Ship's ground speed in knots
- SLL — Max. height in metres of deck cargo above maximum summer load line
- $S_L$hh — Departure of maximum summer load line from actual sea level (m)
- RWD — Relative wind direction in degrees off the bow
- DD — Relative wind speed in knots or m/s

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PMO Involvement

- First Reconnaissance
- Ship Recruitment/Inspection Forms
- Digital imagery/ship dimensions
- Instrument exposure
- Observer training
- Resolution of observation monitoring problems
- Electronic logbooks (TurboWin/SEAS/OBSJMA) or hard-copy Logbooks/logsheets

Metadata

VOSCLIM — Form 001

RECRUITMENT / UPDATE/ DERECRUITMENT ADVICE

February 2002

Vessel Information

Vessel Name		Call sign	IMO Number	Recruiting Country	VOS Type	Auto-mation	Baseline check
1		2	3	4	9	10	11
Flag	**Home Port**	**Year of Construct.**	**Date of Recruitment /Derecruitment**		**Routes**		**3hr/6hr/Irreg**
					12		

Details of Ship's Manager		Details of Ship's Agent	
Name		Name	
Address		Address	
Email		Email	
Phone	Fax	Phone	Fax

Vessel Layout

Vessel Type	Gross Tonnage	Dist of bridge from bow
5	t	8 . m

Dimensions		
7 (a)	Length	. m
7 (b)	Breadth	. m
7 (c)	Freeboard	. m
7 (d)	Draught	. m
7 (e)	Cargo ht.*	. m

Digital Image 6

Location of observation points		
Height of barometer* :	15	. m.
Height of thermometers* :	23	. m.
Height of anemometer* :	30	. m.
Height of anemometer** :	31	. m.
Height of visual wind/wave observation point* :	38	. m.
Dist of anemometer (from bow) :	33	. m.
Dist of anemometer (from centre line) :	34 P/S	. m.
Depth of sea surface temperature# :	28	. m.

* above maximum summer load line # below maximum summer load line
** above deck on which it is installed

Communications

Inmarsat	A B C ...	
Inmarsat	A B C ...	
Inmarsat	A B C ...	
Inmarsat	A B C ...	
Radio Telephone		
Mobile Telephone		

Email	
Facsimile	
Telex	
SEATEX	
Argos	

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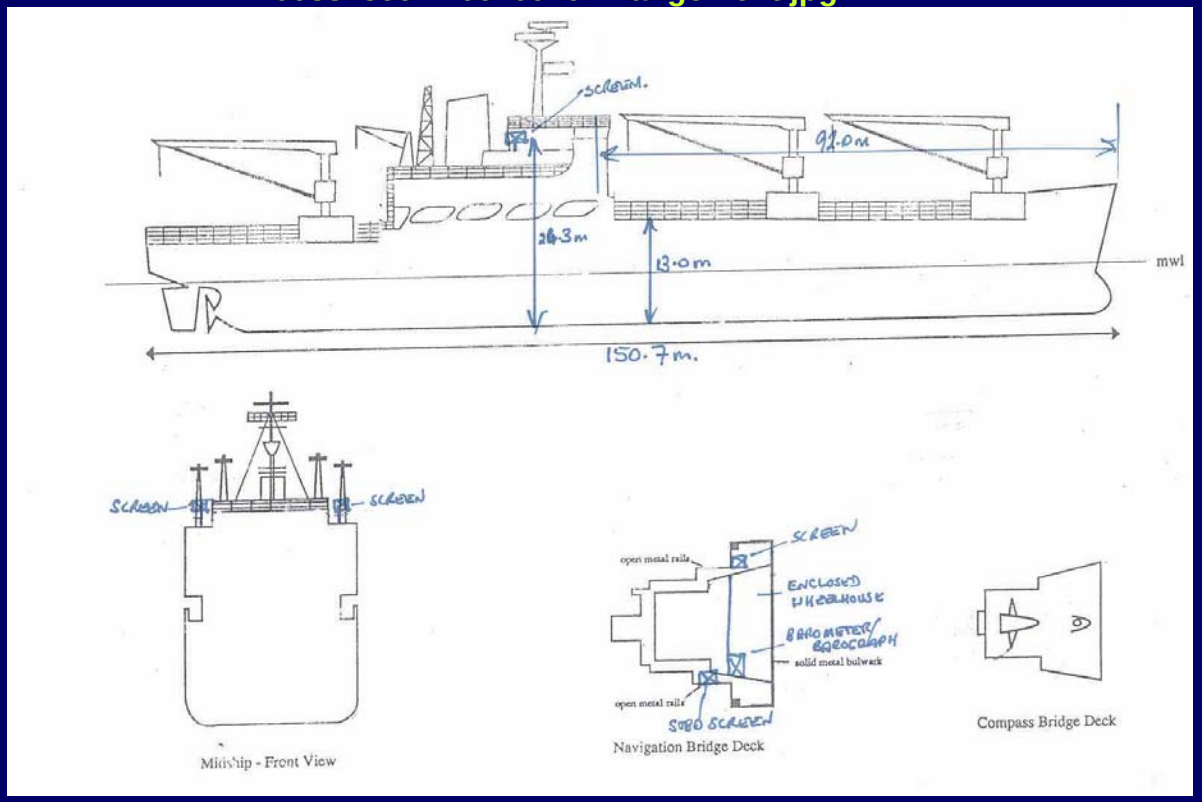
Recommended Instruments

- Electronic Logbooks (project code forms)
- SST from Hull Contact Sensors
- Permanent well exposed anemometers (0.1 m/s)
- Precision Aneroid Barometer (0.1hPa)
- Accurate well exposed thermometers (0.1^{0}C)

Digital Images

008315994 20010910Arrangement.jpg



Naming convention digital image files

xxxxxxxxx	**IMO Number (a nine digit number, include leading zeros if applicable)**
yyyymmdd	**Year, month, day**
aaa….aaa	**Short description of the photo**

Digital Images - ctd.

00831599420010910Starboard_Screen.jpg

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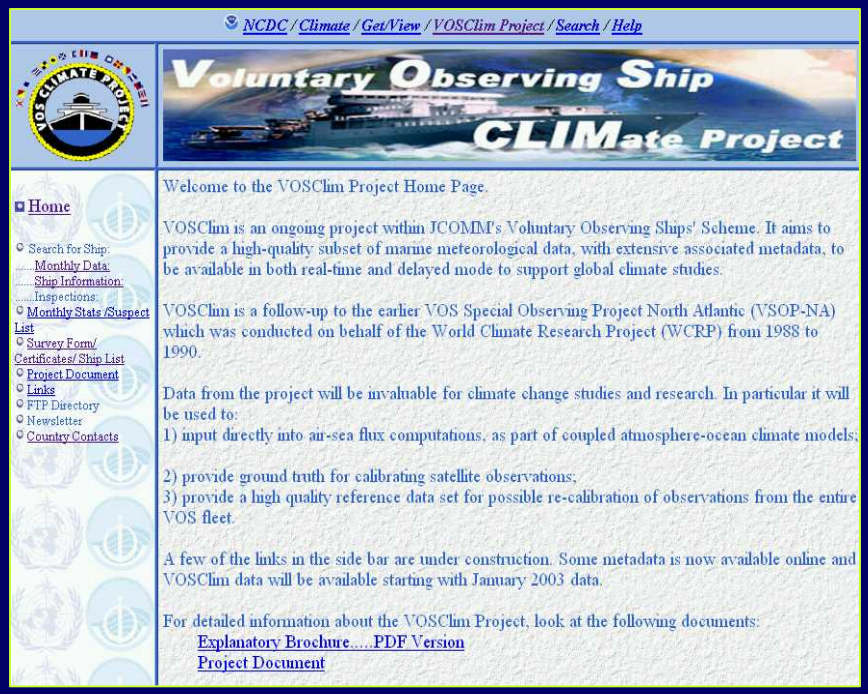
Project Web Site

….. http://lwf.ncdc.noaa.gov/oa/climate/vosclim/vosclim.html



- Metadata
- Monitoring statistics
- Observation data
- Project newsletter
- Project focal points
- Ship survey inspection forms
- Project document/information/links

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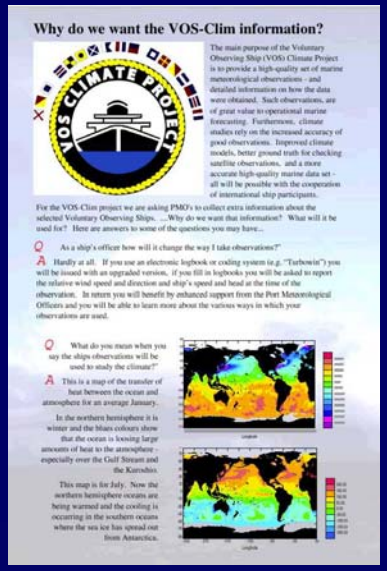
Project Promotion

- Promotional brochure
- Certificate of Participation
- Certificate of Appreciation



Why do we want the VOS-Clim information?

The main purpose of the Voluntary Observing Ship (VOS) Climate Project is to provide a high-quality set of marine meteorological observations - and detailed information on how the data were obtained. Such observations, are of great value to operational marine forecasting. Furthermore, climate studies rely on the increased accuracy of good observations. Improved climate models, better ground truth for checking satellite observations, and a more accurate high-quality marine data set - all will be possible with the cooperation of international ship participants.

For the VOS-Clim project we are asking PMO's to collect extra information about the selected Voluntary Observing Ships. ...Why do we want that information? What will it be used for? Here are answers to some of the questions you may have...

Q As a ship's officer how will it change the way I take observations?

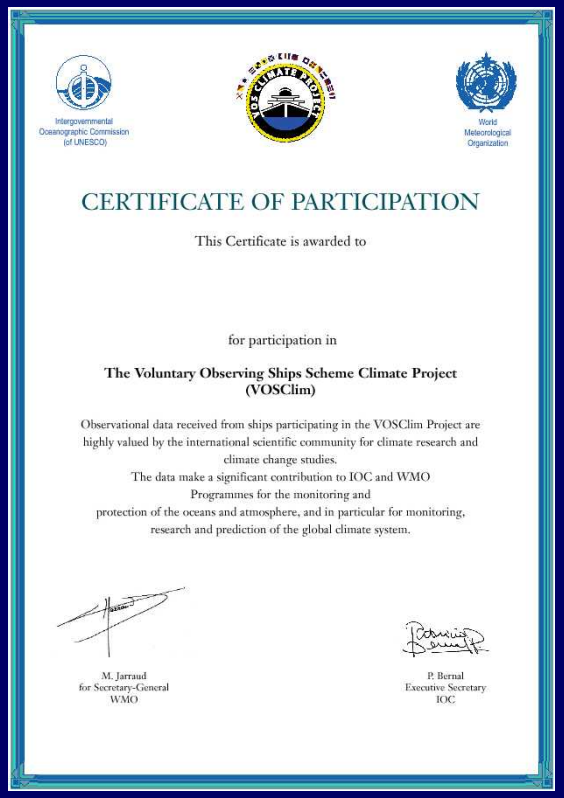
A Hardly at all. If you use an electronic logbook or coding system (e.g. "Turbowin") you will be issued with an upgraded version, if you fill in logbooks you will be asked to report the relative wind speed and direction and ship's speed and head at the time of the observation. In return you will benefit by enhanced support from the Met Meteorological Officers and you will be able to learn more about the various ways in which your observations are used.

Q What do you mean when you say the ships observations will be used to study the climate?"

A This is a map of the transfer of heat between the ocean and atmosphere for an average January.

In the northern hemisphere it is winter and the blues colours show that the ocean is loosing large amounts of heat to the atmosphere - especially over the Gulf Stream and the Kuroshio.

This map is for July. Now the northern hemisphere oceans are being warmed and the cooling is occurring in the southern oceans where the sea ice has spread out from Antarctica.



Intergovernmental Oceanographic Commission (of UNESCO)

World Meteorological Organization

CERTIFICATE OF PARTICIPATION

This Certificate is awarded to

for participation in

The Voluntary Observing Ships Scheme Climate Project (VOSClim)

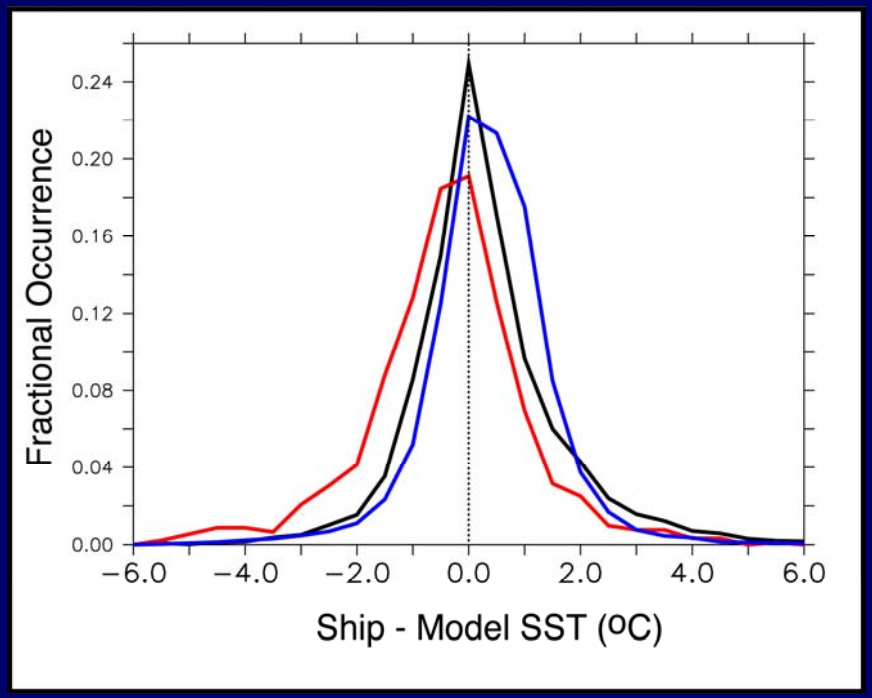
Observational data received from ships participating in the VOSClim Project are highly valued by the international scientific community for climate research and climate change studies.
The data make a significant contribution to IOC and WMO Programmes for the monitoring and protection of the oceans and atmosphere, and in particular for monitoring, research and prediction of the global climate system.

M. Jarraud
for Secretary-General
WMO

P. Bernal
Executive Secretary
IOC

Met Office

Sea Surface Temperature



black - engine intake
blue - hull sensor
red - bucket

- 3 main methods
  - Engine intake (black)
  - Hull sensor (blue)
  - Bucket (red - few in VOSClim)
- Each has different characteristics when compared with the model output.
- But .... model SST field is an unknown mix of satellite and the various types of ship data.

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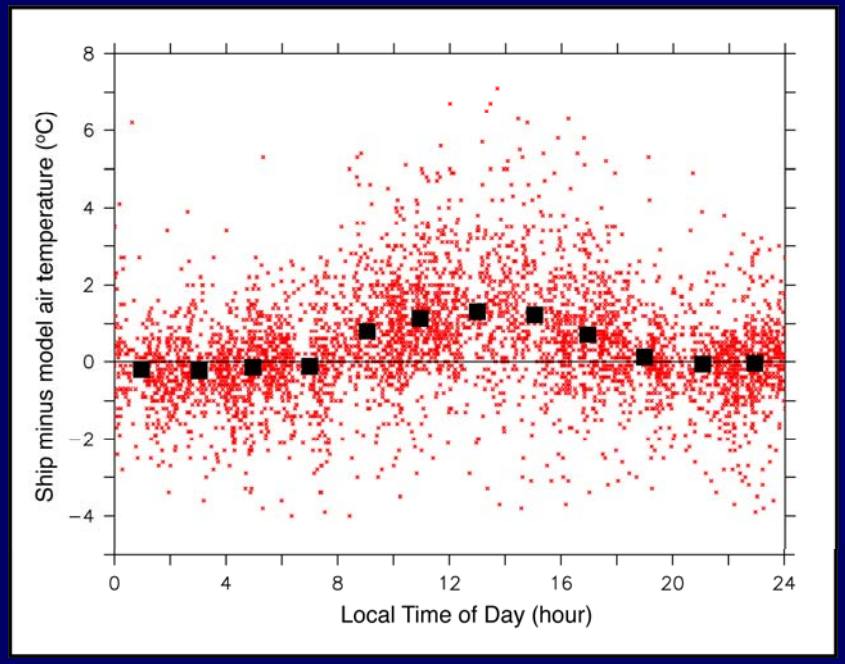
Air Temperature



- Strong diurnal cycle in ship-model differences.
- Asymmetry around local midday shows the effect of heat storage by the ship.
- We are working on a correction for this error in VOS data.

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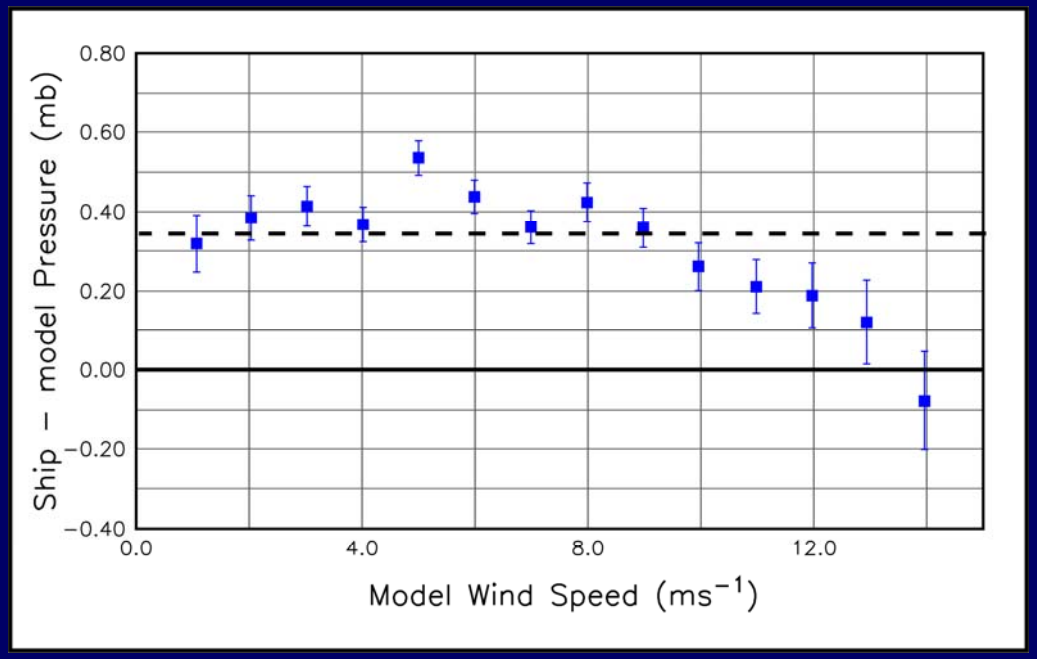
Pressure



- VOS pressures assimilated into model.
- Significant mean bias between VOSClim and model pressure.
- Evidence of variations both at high and low wind speeds.

- May be showing up problems with the model in low pressure systems - but more work is needed.

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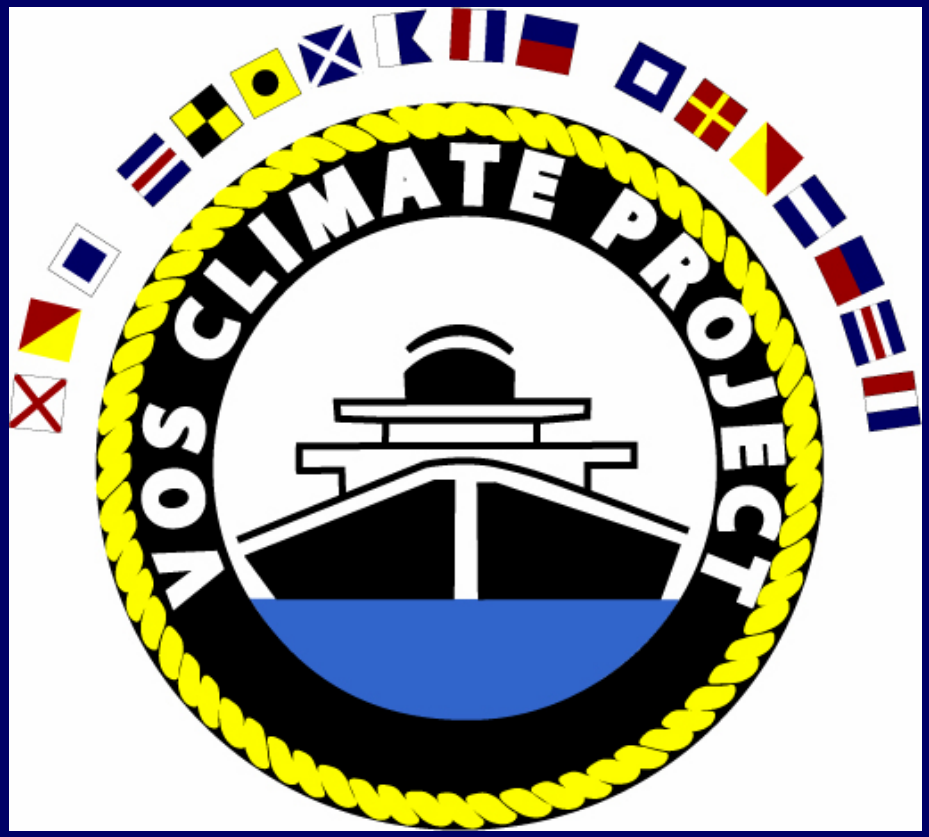
VOS CLIMATE PROJECT