VOS CLIMATE PROJECT SECOND PROJECT MEETING

Asheville, NC, USA, 30 October - 1 November 2000

FINAL REPORT

JCOMM Meeting Report No. 7

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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N O T E

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of the Intergovernmental Oceanographic Commission (of UNESCO), and the World Meteorological Organization concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

GENERAL SUMMARY OF THE MEETING

1. OPENING

1.1 Opening of the meeting

1.1.1 The second Project Meeting for the VOSClim Project was opened by the Project Leader, Capt. Gordon Mackie, at 0930 hours on Monday, 30 October 2000, in the conference room of the National Climatic Data Center (NCDC), Asheville, NC, USA. Capt. Mackie welcomed participants to the meeting, and expressed his appreciation to NCDC, and especially to Mr Joe Elms, for hosting the meeting and providing such excellent facilities and support. He stressed to participants the importance of this project to global climate studies and eventually to VOS operations and management, operational meteorology and oceanography and maritime safety services in general. The present meeting was crucial to the future of the project, in refining its management structures, agreeing data and metadata return and exchange details and initiating the implementation phase.

1.1.2 On behalf of the Secretary-General of WMO and the Executive Secretary IOC, the WMO Secretariat representative also welcomed participants to the meeting and expressed the sincere appreciation of both Organizations to NCDC for hosting and supporting the meeting so admirably. He noted that the VOSClim Project was very much a part of the work of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), and as such was sponsored by both WMO and IOC. This was particularly appropriate since the project directly addressed the air-sea interface and supported the common programmes of GCOS and GOOS. He then noted with satisfaction that substantial progress in the project had been made since its concept was agreed in November 1999, and expressed the belief that the present meeting would serve to finalize various essential details and initiate the implementation phase. He concluded by assuring the meeting of the continuing full support of the Secretariat and wishing everyone a successful meeting and enjoyable stay in Asheville.

1.1.3 The list of participants in the meeting is given in *Annex I*.

1.2 Adoption of the agenda

1.2.1 The meeting adopted its agenda for the session, which is given in *Annex II*.

1.3 Working arrangements

1.3.1 The meeting agreed its working hours and other practical arrangements. The documentation for the meeting was introduced by the Secretariat.

2. REVIEW OF ACTION ITEMS FROM VOSCLIM-I

2.1 Project Document

2.1.1 The meeting recalled that the VOSClim Project Document was reviewed and largely approved at VOSClim-I (Southampton, November 1999). It had subsequently been finalized by the Secretariat and Project Leader, published by WMO as JCOMM Technical Report No. 5 (WMO/TD-No. 1010), and distributed to all project focal points and other potential participants. The document contained, as Attachment 6, a preliminary action plan, containing actions to be implemented prior to the second project meeting.

2.1.2. This action plan is reproduced in *Annex III*, together with an indication of the status of implementation of each action item. The meeting recognized that a number of substantive action items were the subject of continuing work, with their present status and/or the final result of the action to be reviewed in detail at the meeting, under relevant agenda items. It further recognized that the results of the present meeting would most likely require some revisions to the project

document. These revisions are addressed under agenda item 5, where a new action plan is also considered.

2.2 Codes and formats

2.2.1 The meeting recalled that the first project planning meeting had proposed certain changes to both real time and delayed mode data exchange codes for the project, as well as associated changes to log books. With regard to the real time (SHIP) code, it was expected that CBS could be persuaded to modify this code to carry the additional elements required by the project which were so essential to the project's success.

2.2.2. It was noted that CBS had reviewed the proposal from the VOSClim project during their April 2000 meeting. However, because of their goal of converting all the alphanumeric codes to table driven codes (i.e. CREX, BUFR, and GRIB) they had not approved the modification to the FM 13-X SHIP code. They instead suggested that the BUFR or CREX codes be used to transmit the ship observations with the expanded elements, pointing out at the same time that it was now a principle within CBS to no longer approve modifications to the alphanumeric codes. Instead, a concerted move was underway to convert entirely to BUFR or CREX for GTS data distribution within a fixed time period. The meeting recognized that the CREX code was a table driven alphanumeric version of BUFR that could be manually encoded, with some difficulty, but was visually readable. However, it was noted that it would be virtually impossible to train all the VOS observers to code weather observations in CREX. The meeting recognized that it was not absolutely essential for the additional information to be provided in real time, neither for the real time monitoring nor for climate end-users, provided that the expected delay in the non-real time data delivery was not greater than 6-12 months. In view of these considerations, the meeting therefore agreed to retain the existing (unmodified) ship code for the real time reports from VOSClim ships. The additional information required with each observation would be recorded in the logbook/IMMT report, for eventual processing, archival and delivery to users through the DAC.

2.2.3 With regard to the modification required to the IMMT, to enable exchange of the full reports required by the project in delayed mode, the meeting noted with appreciation a draft revised version of IMMT which had been prepared by the JCOMM Subgroup on Marine Climatology in support of the VOSClim project. This new version (IMMT-2) is given in *Annex IV*. The meeting agreed that this version should be proposed to JCOMM-I for eventual inclusion in the appropriate WMO publications, but that in the meantime it should be implemented immediately within the project, in particular in electronic logbooks such as TurboWIN, SEAS, etc. In addition, appropriate modifications were required to be made by all participants to their paper logbooks to allow for the recording of this additional information.

2.3 Metadata catalogue

2.3.1 The meeting recalled that the first project planning meeting had agreed that a supplement to the main WMO ship metadata catalogue (WMO-No. 47) should be implemented for project ships. This supplement should expand on the new version of the ship metadata catalogue previously agreed by CMM (and being implemented by the WMO Secretariat within its new ship metadata base) to include specific additional information required for the project, including digital ship imagery. In this context, the meeting noted with appreciation the revised version of the catalogue format prepared for the project by the JCOMM Subgroup on Marine Climatology. This is reproduced in *Annex V*. The meeting reviewed and agreed this as the appropriate format for the project catalogue supplement, and requested the Secretariat and the DAC to implement it as soon as possible. The catalogue and supplement can be found at: http://www.wmo.ch/.

2.4 Project promotion

2.4.1 The meeting recalled that project promotional material included a distinctive project name and logo and a small explanatory brochure for shipping companies and crews. In this context, it noted with appreciation the drafts of the logo, prepared by Mr Vince Zegowitz, and of the brochure,

prepared by Dr Peter Taylor. Some proposed modifications to both were made at the meeting, and it was agreed that final revised versions should be made available to the Secretariat and participants by early December 2000. WMO would then prepare a multi-lingual format for the brochure, as well as text versions in French, Russian and Spanish. These would then be sent to Canada (Mr Ron Fordyce), which had kindly agreed to print the brochure as a contribution to the project. It was agreed that an initial print run of 2000 English, 200 French and 200 Spanish brochures would be required. WMO would also make available to participants the basic brochure format and English text, for translation into additional languages, if so required. Finally, the meeting accepted with appreciation the offer by NOAA to prepare wall plaques, to include the project logo and a short text, for distribution to all project ships.

2.5 Ship survey report

2.5.1 The first project planning meeting had agreed that a special ship survey/ship inspection report format should be designed for the project. The meeting noted with appreciation the drafts of both formats provided to the meeting by Mr David Evans, based on the existing formats in use by the Australian Bureau of Meteorology. A number of modifications to these formats were proposed at the meeting, and participants were also asked to pass copies of their own national formats to Mr Evans, for use in preparing revised versions of both, for use in the project. These revised drafts should be available, in both paper and electronic forms, by December 2000, for one further review by participants. Once finalized, both forms, together with simple instructions for completion, should then be passed to the Secretariat, for preparation of French, Russian and Spanish versions. All four versions would then be sent, again in both paper and electronic forms, to participants and the DAC, if possible by the end of February 2001. The DAC would, in turn, make both forms (with instructions), in all these languages, available for use by participants via the project web site in read only/download form.

2.5.2 The meeting agreed that it would be highly advantageous if the ship survey report were to be adopted for use by all VOS operators as a unique WMO standard, which would, **inter alia**, greatly facilitate the collection of ship metadata for inclusion in WMO-No. 47. To this end, the Secretariat was requested to present the format to JCOMM-I, for adoption and eventual inclusion in the *Guide to Marine Meteorological Services*.

2.5.3 The meeting agreed that the initial ship survey report should be completed by PMOs immediately following ship recruitment to the project, with the completed forms to be submitted to the DAC (in electronic form via email) for maintenance and access via the web site as a primary project metadata base. Follow-up ship inspection visits should be made every time project ships visited their home ports, and in any case at least quarterly. The completed inspection reports should then also be submitted to the DAC, for maintenance with the survey reports as a complete metadata history for each ship.

3. DATA MANAGEMENT

3.1 Project Data Assembly Centre

3.1.1 The meeting noted with appreciation that the National Climatic Data Center, NOAA, had formally agreed to assume the role of Data Assembly Centre (DAC) for the project. It further noted and approved both the global data flow structure for the project, which is given schematically in *Annex VI*, and also the proposed data management structure within the DAC, which is given in *Annex VII*. It was agreed in particular that the delayed mode data (in IMMT format) would be routed to the DAC via the existing Global Collecting Centres for the Marine Climatological Summaries Scheme. This would greatly simplify such data submissions for both participants and the DAC, while not introducing any additional time delays.

3.2 Real Time Monitoring Centre

3.2.1 The meeting noted with appreciation that The Met. Office (U.K.) had formally agreed to act as Real Time Monitoring Centre (RTMC) for the project, as an extension of its existing CBS responsibilities. In this context, the meeting reviewed a report from the RTMC, including in particular a number of proposals concerning its operations. An extract from this report is given in *Annex VIII*. With regard to these proposals, the meeting:

(i) agreed the proposed ship monitoring process and the format for distributing monthly monitoring statistics;
(ii) agreed that email should be used for the distribution of both the monthly and additional weekly "suspect" ship lists;
(iii) urged the recruiting PMOs of identified "suspect" ships to follow-up such notification as quickly as possible, including by forward notification of ship arrival in the ports of other participating PMOs, with a request for action; the results of this action should eventually be notified to the DAC through the project focal point of the action PMO, with copy to the recruiting country PMO;
(iv) advised the RTMC to regularly check the project web site for changes to call signs of participating ships;
(v) proposed that the DAC and RTMC should immediately establish an expert group to resolve possible problems regarding the formats for transfer of data and associated model fields from the RTMC to the DAC;
(vi) agreed minor modifications to the TOR for the RTMC, which are included in the revised project document.

3.3 Information exchange

3.3.1 The meeting recognized that the primary means of information exchange for the project would be via a project web site, which was being implemented and maintained by the DAC. In this connection, it noted with interest a brief report on this web site, presented by the DAC. The meeting noted and agreed that the web site would be housed on the NCDC server, but with a direct access URL, and should, at least initially, be fully open. However, it was recognized that it might be necessary to provide the site with some password protection in the future, to protect it against abuse or to safeguard potentially sensitive information. Further decisions on this matter would be addressed as the project evolved.

3.3.2 The meeting reconfirmed that the web site should include at least the basic project support information, data and metadata as given in Section 9 of the project document. The primary access to the ship metadata catalogue should be via the ship name, call sign or IMO number, which would then allow selection of any required subsets of ships, instruments, etc. This catalogue should also allow access to ship status reports, with links to the observational data and monitoring reports. The project data (observations, metadata, real time monitoring data and the additional observational data) should also have a direct access through the web site for ftp download. As noted above, the ship survey and inspection forms (including instructions for completion) should be available from the web site for download for completion and return by participating PMOs to the DAC by email. Unique observational data reports delivered to the DAC through all three data streams should be archived for access by users.

3.3.3 The meeting agreed that a skeleton version of the web site, including sample data and metadata, should be prepared by the DAC and made available for review by participants by the beginning of January 2001. Following this review and possible modifications, the site could then be progressively populated, to be effectively operational, to receive real data and metadata input and for use by the project, by April 2001.

3.3.4 The meeting recognized that a newsletter would be an essential component of the project, to provide a means of informing and communicating with participating ships as well as among meteorological services, data centres, users and other participants. As noted in the project document, the newsletter should contain information, reports, results and statistics from participating ships and PMOs, the RTMC and DAC, and users. It would be edited by the

Secretariat, made available via the web site, and published if possible at least every six months. The meeting agreed that an outline format and list of contents for the newsletter should be prepared by the Project Leader, with assistance from the Secretariat, Ms Sarah North and Dr Peter Taylor, with this outline circulated to participants for review by late December 2000. If possible, a first newsletter should be prepared for submission to the DAC by the end of July 2001.

4. SHIP RECRUITMENT

4.1 The meeting recognized that ship recruitment was clearly a critical component of project implementation, and recalled that some criteria for ship selection were given in the project document. It agreed that, in addition to these criteria, it was important that, within the context of the JCOMM objective of developing integrated marine observing systems and as recognized at the first project planning meeting, VOSClim ships should, to the extent possible, also be supporting SOOP and/or ASAP. As an aid in developing an initial list of potential VOSClim ships, the meeting noted the full lists of ASAP and SOOP ships, which had been prepared by the Secretariat. While being very conscious of the importance of not overburdening cooperating ships officers with substantive additional observational requirements, the meeting nevertheless agreed that the additional burden for the ships officers which were required by VOSClim were relatively minor. In contrast, a proportion of the additional work required in the project would fall on the participating PMOs, while the project itself would actually assist the participating VOS in generating extra PMO support for all their observational work. This latter point might be used as a further enticement to ships to participate. It was therefore agreed that, where feasible, VOSClim ships would be recruited from among existing SOOP and ASAP ships.

4.2 Participants provided the meeting with preliminary lists of potential participating ships from among their national VOS. These lists were restricted to basic operational information, as an aid in making the initial global selection, and were regarded as very much provisional, since no recruitment actions had yet been taken. Such lists were provided by Australia, Canada, France, Germany, India, Japan, Poland, UK and USA. They included many existing SOOP and ASAP ships, and together amounted to an initial potential total close to the ideal project minimum of 200 ships. In addition, it was recognized that there were several countries not represented at the presented meeting which were also potential project participants, and thus with ships to contribute. The Project Leader and Secretariat were requested to follow-up with these countries as soon as possible.

4.3 The meeting was very encouraged by this first estimate, which it agreed augured well for the future of the project. The meeting accepted the kind offer of Dr Liz Kent (SOC) to merge these individual national lists into an initial integrated list of potential project ships, with any duplicates eliminated, and also to prepare a map showing the potential global route coverage of these ships. This list and map should then be distributed to all participants, the DAC, RTMC and Secretariat, to serve as an aid in planning national recruitment. It would also allow the selective targeting of obvious data sparse areas as recruitment proceeded. The meeting requested the DAC to make the list and map available on the web site, to be eventually replaced by the actual list of project ships as recruitment progressed.

4.4 Finally on this topic, the meeting agreed that direct recruitment should begin around March/April 2001, once all preliminary documentation was available and the DAC and RTMC were in a position to accept and process data and metadata.

5. REVISED ACTION PLAN

5.1 Based on decisions taken under preceding agenda items, the meeting reviewed the Project Document, and identified a number of small revisions which would be necessary (e.g. regarding the proposed SHIP code modifications, revised RTMC TOR, updated focal points and new action plan). The Secretariat was requested to incorporate these revisions into the document and to publish a fully revised version. This revised project document should then be made available to participants through the WMO and project web sites, as well as in paper form. Again based on

decisions taken under preceding agenda items, the meeting also prepared an updated action plan for the second year of project development/implementation. This action plan is given in *Annex IX.*

6. DATE AND PLACE OF THE NEXT MEETING

6.1 The meeting agreed that a third project meeting, at least, would be required, to review progress in implementation, consider possible modifications to structure and operations in the light of initial experience, and also to review some preliminary results from users. It therefore proposed that this meeting should take place around mid-November 2001, at the WMO headquarters in Geneva. The project leader and Secretariat were requested to make the necessary arrangements and to inform participants of these, if possible well in advance.

6.2 The meeting further agreed that the project would require the ongoing services of a Project Leader, and nominated Capt. Gordon Mackie to continue in this role, subject to the availabilty of the necessary funding support from WMO.

7. CLOSURE OF THE MEETING

7.1 In closing the meeting the Project Leader, Gordon Mackie, expressed his appreciation once more on behalf of all participants, to NCDC and in particular Joe Elms, for hosting the meeting and providing such excellent support and facilities. He also thanked participants for their valuable input to what had been a very successful meeting. Finally he wished everyone a successful implementation of the project, and expressed the hope of seeing all focal points at the next project meeting in Geneva.

7.2 The second project planning meeting for the VOSClim Project closed at 1030 hours on Wednesday, 1 November 2000.

oOo

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Annex II

AGENDA

1. OPENING

1.1 Opening of the meeting
1.2 Adoption of the agenda
1.3 Working arrangements

2. REVIEW OF ACTION ITEMS FROM VOSCLIM-I

2.1 Project Document
2.2 Codes and formats
2.3 Metadata catalogue
2.4 Project promotion
2.5 Ship survey report

3. DATA MANAGEMENT

3.1 Project data assembly centre
3.2 Real time monitoring centre
3.3 Information exchange

4. SHIP RECRUITMENT

4.1 Preliminary ship list
4.2 Line selection
4.3 Future actions

5. REVISED ACTION PLAN

6. DATE AND PLACE OF THE NEXT MEETING

7. CLOSURE OF THE MEETING

Annex III

STATUS OF IMPLEMENTATION OF PRELIMINARY ACTION PLAN

ACTION	WHOM	WHEN	STATUS
1. Agree project leader and national focal points	Meeting	First meeting	Done
2. Identify and agree Real Time Monitoring Centre/terms of reference	UKMO/NCEP	Feb 2000	Done
3. Identify and agree Data Assembly Centre/terms of reference	NCDC/DWD/UKMO	Feb 2000	Done
4. Implement agreed SHIP code change	WMO/CBS	6 months	Not approved by CBS
5. Implement agreed IMMT format change	WMO/JCOMM	April 2000	Reviewed and agreed at meeting
6. Develop and implement required electronic and paper log changes	KNMI/USA, participants, WMO	6 months (dep. on 4 and 5)	After meeting
7. Develop, agree, distribute draft project promotional material	P. Taylor, V. Zegowitz, WMO with participants	Mar 2000	Reviewed at meeting. To be finalized late 2000
8. Finalize project plan	WMO, Project Leader	Feb 2000	Done
9. Design/agree ship survey/ship inspection report form	SOC, BOM, NWS, Project Leader, with participants	Mar 2000	Reviewed at meeting. To be finalized late 2000
10. Design Metadata catalogue (No. 47) supplement	WMO, DAC, JCOMM	Aug 2000	Reviewed and agreed at meeting
11. Design ship award, project name and project logo	V. Zegowitz, Project Leader, WMO, participants	July 2000	Reviewed at meeting. To be finalized late 2000
12. Undertake preliminary ship identification	Participants	Before next meeting	Done at meeting
13. Convene second project meeting	WMO, Project Leader, DAC to host	Sep/ Oct 2000	Done

Annex III

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DRAFT

(NOVEMBER 9, 2000)

LAYOUT FOR THE INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT)

[VERSION IMMT-2]

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
1	1	i_T	Format/temperature indicator	3=IMMT format with temperatures in tenths of °C 4=IMMT format with temperatures in halves of °C 5=IMMT format with temperatures in whole °C
2	2-5	AAAA	Year UTC	Four digits
3	6-7	MM	Month UTC	01 - 12 January to December
4	8-9	YY	Day UTC	01 - 31
5	10-11	GG	Time of observation	Nearest whole hour UTC, WMO specifications
6	12	Q_c	Quadrant of the globe	WMO code table 3333
7	13-15	$L_aL_aL_a$	Latitude	Tenths of degrees, WMO specifications
8	16-19	$L_oL_oL_oL_o$	Longitude	Tenths of degrees
9	20		Cloud height (h) and visibility (VV) measuring indicator	0 - h and VV estimated 1 - h measured, VV estimated 2 - h and VV measured 3 - h estimated, VV measured
10	21	h	Height of clouds	WMO code table 1600
11	22-23	VV	Visibility	WMO code table 4377
12	24	N	Cloud amount	Oktas, WMO code table 2700; show 9 where applicable
13	25-26	DD	True wind direction	Tens of degrees, WMO code table 0877; show 00 or 99 where applicable
14	27	i_w	Indicator for wind speed	WMO code table 1855
15	28-29	ff	Wind speed	Tens and units of knots or meters per second, hundreds omitted; values in excess of 99 knots are to be indicated in units of meters per second and I_W encoded accordingly; the method of estimation or measurement and the units used (knots or meters per second) are indicated in element 14
16	30	s_n	Sign of temperature	WMO code table 3845
17	31-33	TTT	Air temperature	Tenths of degrees Celsius
18	34	s_t	Sign of dew-point temperature	0 - positive or zero measured dew-point temperature 1 - negative measured dew-point temperature 2 - iced measured dew-point temperature 5 - positive or zero computed dew-point temperature 6 - negative computed dew-point temperature 7 - iced computed dew-point temperature
19	35-37	$T_dT_dT_d$	Dew-point temperature	Tenths of degrees Celsius
20	38-41	PPPP	Air pressure	Tenths of hectopascals

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
21	42-43	ww	Present weather	WMO code table 4677
22	44	W_1	Past weather	WMO code table 4561
23	45	W_2	Past weather	WMO code table 4561
24	46	N_h	Amount of lowest clouds	As reported for C_L or, if no C_L cloud is present, for C_M, in oktas; WMO code table 2700
25	47	C_L	Genus of C_L clouds	WMO code table 0513
26	48	C_M	Genus of C_M clouds	WMO code table 0515
27	49	C_H	Genus of C_H clouds	WMO code table 0509
28	50	s_n	Sign of sea-surface temperature	WMO code table 3845
29	51-53	$T_wT_wT_w$	Sea surface temperature	Tenth of degrees Celsius
30	54		Indicator for sea-surface temperature measurement	0 - Bucket thermometer 1 - Condenser inlet 2 - Trailing thermistor 3 - Hull contact sensor 4 - "Through hull" sensor 5 - Radiation thermometer 6 - Bait tanks thermometer 7 - Others
31	55		Indicator for wave measurement	Shipborne wave recorder: 0 - Wind sea and swell estimated; 1 - Wind sea and swell measured; 2 - Mixed wave measured, swell estimated; 3 - Other combinations measured and estimated Buoy: 4 - Wind sea and swell measured; 5 - Mixed wave measured, swell estimated; 6 - Other combinations measured and estimated Other measurement system: 7 - Wind sea and swell measured; 8 - Mixed wave measured, swell estimated; 9 - Other combinations measured and estimated
32	56-57	P_wP_w	Period of wind waves or of measured waves	Whole seconds; show 99 where applicable in accordance with Note (3) under specification of P_wP_w in the Manual on Codes
33	58-59	H_wH_w	Height of wind waves or of measured waves	Half-meter values. Examples: Calm or less than $^1/_4$m to be encoded 00; $3^1/_2$m to be encoded 07; 7m to be encoded 14; $11^1/_2$m to be encoded 23
34	60-61	$d_{w1}d_{w1}$	Direction of predominant swell waves	Tens of degrees, WMO code table 0877; encoded 00 or 99 where applicable. Blanks = No observation of waves attempted
35	62-63	$P_{w1}P_{w1}$	Period of predominant swell waves	Whole seconds; encoded 99 where applicable (see under element 32)
36	64-65	$H_{w1}H_{w1}$	Height of predominant swell waves	Half-meter values (see under element 33)
37	66	I_S	Ice accretion on ships	WMO code table 1751
38	67-68	E_SE_S	Thickness of ice accretion	In centimeters
39	69	R_S	Rate of ice accretion	WMO code table 3551
40	70		Source of observation	0 - Unknown 1 - Logbook 2 - Telecommunication channels 3 - Publications (National) 4 - Logbook 5 - Telecommunication channels 6 – Publications (International data exchange)

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
41	71		Observation platform	0 - unknown 1 - Selected ship 2 - Supplementary ship 3 - Auxiliary ship 4 - Automated station/data buoy 5 - Fixed sea station 6 - Coastal station 7 - Aircraft 8 - Satellite 9 - Others ....
42	72-78		Ship identifier	Ship's call sign or other identifier encoded as follows: 7 characters call sign Columns 72–78 6 characters call sign Columns 72–77 5 characters call sign Columns 72–76 4 characters call sign Columns 72–75 3 characters call sign Columns 72–74
43	79-80		Country which has recruited the ship	According to the two-character alphabetical codes assigned by the International Organization for Standardization (ISO)
44	81		National use	
45	82		Quality control indicator	0 - No quality control (QC) 1 - Manual QC only 2 - Automated QC only (no time-sequence checks) 3 - Automated QC only (inc. time sequence checks) 4 - Manual and automated QC (superficial; no automated time-sequence checks) 5 - Manual and automated QC (superficial; including time-sequence checks) 6 - Manual and automated QC (intensive, including automated time-sequence checks) 7 & 8 - Not used 9 - National system of QC (information to be furnished to WMO)
46	83	i_X	Weather data indicator	1 - Manual 4 - Automatic If present and past weather data included Code tables 4677 and 4561 used 7 - Automatic If present and past weather data included Code tables 4680 and 4531 used
47	84	i_R	Indicator for inclusion or omission of precipitation data	WMO code table 1819
48	85-87	RRR	Amount of precipitation which has fallen during the period preceding the time of observation, as indicated by t_R	WMO code table 3590
49	88	t_R	Duration of period of reference for amount of precipitation, ending at the time of the report	WMO code table 4019
50	89	s_W	Sign of wet-bulb temperature	0 - positive or zero measured wet-bulb temperature 1 - negative measured wet-bulb temperature 2 - iced measured wet-bulb temperature 5 - positive or zero computed wet-bulb temperature 6 - negative computed wet-bulb temperature 7 - iced computed wet-bulb temperature
51	90-92	$T_bT_bT_b$	Wet-bulb temperature	In tenths of degree Celsius, sign given by element 50
52	93	a	Characteristic of pressure tendency during the three hours preceding the time of observation	WMO code table 0200

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
53	94-96	ppp	Amount of pressure tendency at station level during the three hours preceding the time of observation	In tenths of hectopascal
54	97	D_S	True direction of resultant displacement of the ship during three hours preceding the time of observation	WMO code table 0700
55	98	v_S	Ship's average speed made good during the three hours preceding the time of observation	WMO code table 4451
56	99-100	$d_{w2}d_{w2}$	Direction of secondary swell waves	Tens of degrees, WMO code table 0877; encoded 00 or 99 where applicable. Blanks = No observation of waves attempted
57	101-102	$P_{w2}P_{w2}$	Period of secondary swell waves	Whole seconds; encoded 99 where applicable (see under element 32)
58	103-104	$H_{w2}H_{w2}$	Height of secondary swell waves	Half-meter values (see under element 33)
59	105	c_i	Concentration or arrangement of sea ice	WMO code table 0639
60	106	S_i	Stage of development	WMO code table 3739
61	107	b_i	Ice of land origin	WMO code table 0439
62	108	D_i	True bearing of principal ice edge	WMO code table 0739
63	109	z_i	Present ice situation and trend of conditions over preceding three hours	WMO code table 5239
64	110		FM 13 code version	0 = previous to FM 24-V 1 = FM 24-V 2 = FM 24-VI Ext. 3 = FM 13-VII 4 = FM 13-VIII 5 = FM 13-VIII Ext. 6 = FM 13-IX 7 = FM 13-IX Ext. 8 = FM 13-X, etc.
65	111		IMMT version	0 = previous IMMT 1 = IMMT-1 (this version) 2 = IMMT-2 (next version) 3 = IMMT-3, etc.
66	112	Q_1	Quality control indicator for (h)	0 - no quality control (QC) has been performed in this element 1 - QC has been performed; element appears to be correct 2 - QC has been performed; element appears to be inconsistent with other elements 3 - QC has been performed; element appears to be doubtful 4 - QC has been performed; element appears to be erroneous 5 - The value has been changed as a result of QC 6 - 8 Reserve 9 - The value of the element missing
67	113	Q_2	QC indicator for (VV)	- IDEM -
68	114	Q_3	QC indicator for (clouds: elements 12, 24–27)	- idem -
69	115	Q_4	QC indicator for (dd)	- idem -
70	116	Q_5	QC indicator for (ff)	- idem -

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
71	117	Q_6	QC indicator for (TTT)	- idem -
72	118	Q_7	QC indicator for ($T_dT_dT_d$)	- idem -
73	119	Q_8	QC indicator for (PPPP)	- idem -
74	120	Q_9	QC indicator for (weather: elements 21–23)	- idem -
75	121	Q_{10}	QC indicator for ($T_wT_wT_w$)	- idem -
76	122	Q_{11}	QC indicator for (P_wP_w)	- idem -
77	123	Q_{12}	QC indicator for (H_wH_w)	- idem -
78	124	Q_{13}	QC indicator for (swell: elements 34–36, 56–58)	- idem -
79	125	Q_{14}	QC indicator for (i_RRRRt_R)	- idem -
80	126	Q_{15}	QC indicator for (a)	- idem -
81	127	Q_{16}	QC indicator for (ppp)	- idem -
82	128	Q_{17}	QC indicator for (D_s)	- idem -
83	129	Q_{18}	QC indicator for (v_s)	- idem -
84	130	Q_{19}	QC indicator for ($T_bT_bT_b$)	- idem -
85	131	Q_{20}	QC indicator for ships' position	- idem -

Additional requirements for the VOSCLIM Project

86	132-134	SHD	Ship's heading in degrees true at time of observation	(000-360); e.g. 360 = North 000 = No Movement 090 = East
87	135-136	ISS	Instantaneous ship's speed in knots at time of observation	Round to nearest whole knot (00-99)
88	137-138	SLL	Maximum height in meters of deck cargo above Summer maximum load line.	(00-99); report to nearest whole meter
89	139-141	hh	Departure of reference level (Summer maximum load line) from actual sea level. Consider the difference positive when the Summer maximum load line is above the level of the sea and negative if below the water line.	position 139; blank = positive (dash) - = negative positions 140-141; (00-99) is the difference to the nearest whole meter between the Summer maximum load line and the sea level.
91	142-144	RWD	Relative wind direction in degrees off the bow	Relative wind direction; e.g. 000 = no apparent relative wind speed (calm conditions on deck). Reported direction for relative wind = 001-360 degrees in a clockwise direction off the bow of the ship. When directly on the bow, RWD = 360.

90	145-147	f ‘f ‘	Relative wind speed reported in units indicated by i_W (knots or m/s)	Reported in either whole knots or whole meters per second (e.g. 010 knots or 005 m/s). Units established by i_W as indicated in Character Number 27.

Note: Since the relative wind speed can be greater than the true wind speed, e.g. i_W indicates knots and ff = 98, the relative wind speed may be 101 knots, therefore three positions must be allocated since i_W cannot be adjusted and the relative wind speed converted to meters per second as is done in element 15.

Note: Most of the codes (groups of letters) in the IMMT format with the exception of those added for the VOSCLIM project are defined in the Manual on Codes (WMO-No. 306) as they basically mirror the code groups used in FM 13-X Ship code. Because CBS was not persuaded to expand the FM 13-X Ship code for the VOSCLIM project the additional observed elements (selected codes) will not appear in WMO Manual on Codes (Pub. 306). Therefore an effort was made to select unique codes (groups of letters) not defined in WMO Pub. 306 for the elements added to the IMMT-2 format version modified for the VOSCLIM project. This was deliberately done to try and prevent a difference in meaning for a given code group (identical symbolic letters) in Pub 306 versus that in IMMT. Presumably none of the Character Code formats will be altered in the future by CBS

Publication No. 47
Layout and Abbreviations Used

Table 1. Layout of Columns

Column No.	Column/Field code name	Description of field
1	name	Ship=s name
2	call	Ship=s call sign
3	IMOn	IMO number
4	rcnty	Recruiting Country
5	vssl	Vessel type
6	vsslP	Vessel digital image (profile)
7	vsslD	Vessel Dimensions (in m)-length, breadth, average freeboard, average draft (max. summer loadline), average cargo height
8	brdg	Position of bridge - distance from the bow
9	vsslM	Type of meteorological reporting ship
10	Atm	Automation
11	blc	Baseline check
12	rte	Route(s)
13	barm	Type of barometer
14	bMS	Model (brand) of barometer (manufacturer/series no.)
15	brmH	Height of barometer (tenths of meters)
16	brmL	Barometer location
17	brmU	Pressure units
18	brmC	Barometer calibration date
19	thrm	Type of thermometer - dry bulb
20	thMS	Model (brand) of thermometer (manufacturer/series no.)
21	thmE	Conditions of exposure of thermometer
22	thmL	Location of instruments used to measure dry bulb/hygrometer
23	thmH	Height of thermometers
24	tscale	Temperature scale; original units
25	hygr	Type of hygrometer
26	hgrE	Conditions of exposure of hygrometer
27	sstM	Method of obtaining sea surface temperature
28	sstD	Depth of sea temperature measurement
29	barg	Type of barograph
30	anHL	Height of anemometer (above the maximum load line)
31	anHD	Height of anemometer (above the deck)
32	anmL	Anemometer location
33	anDB	Anemometer distance (from the bow)
34	anDC	Anemometer distance (from the center)
35	anmI	Anemometer Instrument type (manufacturer/series no.)
36	anmU	General anemometer usage
37	anmC	Anemometer calibration date
38	wwH	Visual wind/wave observational height
39	othI	Other meteorological instruments
40	phGr	Telephoney & telegraphy
41	prSt	Teleprinter & satellite
42	chgd	Change date

Table 2. Explanation of abbreviations used in fields

Column: No.	Name	Abbre-viation	Description of abbreviation
1	**name**		**Ship name** - full name of the ship
2	**call**		**Call sign** - 3 to 7 alphanumeric characters
3	**IMOn**		**IMO number** – this number is allocated by IMO and remains valid for the lifetime of the ship (Solas, Chapter 11).
4	**rcnty**	see list	**Recruiting Country** - International Organization for Standardization (ISO) country code (Alpha-2; two character alpha code)
5			**Vessel type**
	vssl	BC	Bulk Carrier
		CC	Closed container
		F	Ferry
		FV	Other fishing vessel
		GC	General Cargo
		GT	Gas tanker
		LT	Liquid tanker
		CS	Container Ship
		PV	Passenger vessel
		PL	Passenger liner
		RR	Ro/Ro container
		RF	Ro/Ro ferry
		RV	Research vessel
		SV	Support vessel
		T	Trawler
		Y	Yacht/pleasure craft
		BS	Banana ship
		OW	Ocean weather ship
		CG	Coast guard ship
		MS	Military ship
		DR	Dredger
		TU	Tug
		IF	Inshore fishing vessel
		B	Barge
		LV	Light vessel
		OT	Other (specify in a footnote)
6	**vsslP**		**Vessel Digital Image** - a photograph, schematic, diagram, or plan of the ships profile providing the ships shape. A publicity photo from the shipping Co. would be an ideal input source for this digital image to illustrate the ship=s shape. Otherwise, a photo taken by the PMO would suffice.
		AV	Available in separate digital file
		NA	Not available
		PA	Photograph available, but not yet scanned and placed in separate digital file
7	**vsslD**		**Vessel Dimension** (in metres) -- length, breadth, average freeboard, average draft (max summer loadline), average cargo height above the deck
8	**brdg**		**Bridge location on the ship** - distance of the bridge from the bow in tenths of meters (e.g. 23.7 m)
9	**vsslM**		**Type of Meteorological reporting ship** (VOS category/observing programme)
		10	SELECTED SHIPS
		20	Selected Ships (special)
		21	Selected Ships (merchant)

Column: No.	Name	Abbre-viation	Description of abbreviation
		22	Selected Ships (trawlers)
		40	SUPPLEMENTARY SHIPS
		60	Supplementary Ships (merchant)
		61	Supplementary Ships (trawlers)
		70	AUXILIARY SHIPS
		80	Auxiliary Ships (occasional)
		81	Auxiliary Ships (trawlers)
			(88-90) Additional codes for ships recruited by the USA, but not registered in the USA
		88	Selected Ships (not USA registry)
		89	Supplementary Ships (not USA registry)
		90	Auxiliary Ships (not USA registry)
		99	Unknown
10	**Atm**		**Automation of observation**
		1	Fully automated
		2	Always supplemented by manual input
		3	Occasionally supplemented by manual input
		4	Unknown
		5	Fully manual (no automation)
11	**blc**		**Baseline check** – does the automatic observing equipment run or allow a periodic baseline check to ensure the equipment is operating satisfactorily?
		1	Yes
		2	No
		3	No automation
12	**rte**		**Routes (s)** The areas or routes on which the ship is normally plying. Each recruiting country has defined its own set of routes - see separate data file AShips= Routes≅ for specific set of route codes.
13			**Type of barometer**
	barm	AN	Aneroid barometer (issued by Port Meteorological Officer or Meteorological Agency))
		DA	Digital aneroid barometer
		MER	Mercury barometer
		SAN	Ship=s aneroid barometer
14	**bMS**		**Model (brand) of barometer -** manufacturer/series no.
15	**brmH**		**Height of barometer** - height above the maximum load line in tenths of meters (e.g. 25.7 m)
16			**Barometer location** (e.g. wheelhouse, chart room, etc.)
	brmL	WH	Wheelhouse
		CR	Chart room
		OT	Other (specify in footnote)
17	**brmU**		**Pressure units** - as observed (e.g. millibars, hectapascals, inches Hg, millimeters Hg, etc.)
18	**brmC**		**Barometer Calibration Date** - date of latest calibration on the barometer (e.g. 01121998) - Day (01-31); Month (01-12); Year (e.g. 1998, 2005, etc.)-
19	**thrm**		**Type of thermometer** - dry bulb
		ALC	Alcohol thermometer

Column: No.	Name	Abbre-viation	Description of abbreviation
		ELE MER	Electric (resistance) thermometer Dry Bulb mercury thermometer
20	**thMS**		**Model (brand) of thermometer** - dry bulb (manufacturer/series no.)
21	**thmE**		**Conditions of exposure of thermometer**
		A S SG SL SN US VS W	Aspirated (Assmann type) Screen (not ventilated) Ship=s sling Sling Ship=s screen Unscreened Screen (ventilated) Whirling
22	**thmL**		**Location of instruments (dry bulb & wet bulb)**
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 OT	Bridge wing port Bridge wing starboard Bridge wing both sides Bridge wing windward side Wheelhouse top port Wheelhouse top starboard Wheelhouse top both Wheelhouse top center Wheelhouse top windward side Mainmast Foremast Mast on Wheelhouse top Main deck port side Main deck starboard side Main deck both sides Other (specify in footnote)
23	**thmH**		**Height of thermometers** - dry bulb/wet bulb above the maximum load line (in tenths of meters; e.g. 12.1 m)
24	**tscale**		**Temperature scale**; original units (general reporting practice)
		1 2 3 4 5 6 7 8	Centigrade to tenths* half degrees Centigrade* whole degree Centigrade* whole degree Fahrenheit* Fahrenheit to tenths* dry bulb in Centigrade, wet bulb in Fahrenheit dry bulb in Fahrenheit, wet bulb in Centigrade other combinations or scale (specify in footnote)
			* all reported temperatures (dry bulb & wet bulb/dew point)
25	**hygr**		**Type of hygrometer**
		E H P Hg C T Cm	Electric Hair hygrometer Psychrometer Hygristor Capacitance Torsion Chilled mirror

Column: No.	Name	Abbre-viation	Description of abbreviation
		OT	Other (specify in footnote)
26	**HgrE**		**Conditions of exposure of hygrometer**
		A	Aspirated (Assmann type)
		S	Screen (not ventilated)
		SG	Ship=s sling
		SL	Sling
		SN	Ship=s screen
		US	Unscreened
		VS	Screen (ventilated)
		W	Whirling
27	**SstM**		**Method of Obtaining sea surface temperature**
		BTT	Bait tanks thermometer
		BU	Bucket thermometer
		C	Thermometer in condenser intake on steam ships, or inlet engine cooling system on motor ships
		HC	Hull contact sensor
		HT	>Through hull= sensor
		RAD	Radiation thermometer
		TT	Trailing thermistor
		OT	Other (specify in footnote)
28	**SstD**		**Depth of sea temperature measurement** (tenths of meters below maximum load line; e.g. 5.7 m)
29	**Barg**		**Type of barograph**
		OS	Open scale barograph
		OS1	Open scale barograph with 1-day clock
		OS2	Open scale barograph with 2-day clock
		OS3	Open scale barograph with 3 day clock
		OS4	Open scale barograph with 4-day clock
		OS5	Open scale barograph with 5-day clock
		OS6	Open scale barograph with 6-day clock
		OS7	Open scale barograph with 7-day clock
		OS8	Open scale barograph with 8-day clock
		OS9	Open scale barograph with 9-day clock
		SS	Small scale barograph
		OT	Other (specify in footnote)
30	**AnHL**		**Height of anemometer** - height above the maximum load line, in tenths of meters (e.g. 30.4 m)
31	**AnHD**		**Height of anemometer** - height above the deck on which it is installed, in tenths of meters (e.g. 10.6 m)
32			**Anemometer location** - description of location
	AnmL	1	Not fitted
		2	Mainmast
		3	Mainmast port yardarm
		4	Mainmast starboard yardarm
		5	Aft mast
		6	Foremast
		7	Foremast port yardarm
		8	Foremast Starboard yardarm
		9	Meteorological mast
		10	Mast on wheelhouse top
		11	Mast on wheelhouse top port yardarm
		12	Mast on Wheelhouse top starboard yardarm

Column: No.	Name	Abbre-viation	Description of abbreviation
		13	Handheld
		OT	Other (specify in footnote)
33	**anDB**		**Anemometer distance-** distance from the bow in tenths of meters (e.g. 24.2 m)
34	**anDC**		**Anemometer distance -** distance of anemometer from center line in tenths of meters (plus port/starboard indicator; e.g. 3.6 m starboard)
35	**anmI**		**Anemometer instrument type** (manufacturer/series no.) ; Provide best available description e.g. propeller vane-Seiki Japan, Thomas Walker, Seiki F235, Jules Richard No. 64, anemograph, etc.
36	**anmU**		**Anemometer usage** (general observing practice)
		1	Anemometer measurement generally used, true wind computed
		2	Anemometer measurement generally used, true wind manually determined
		3	visual estimates (sea state) generally used
		4	visual estimate generally used for the open sea, anemometer used near port
37	**anmC**		**Anemometer Calibration Date (primary)** - date of latest anemometer calibration - Day (01-31); Month (01-12); Year (e.g. 1998, 2005, etc.)-
38	**wwH**		**Visual wind/wave observational height** - height above the maximum load line that the visual wind and wave observations are taken. Height in tenths of meters (e.g. 18.7 m).
39	**othI**		**Other meteorological instruments**
		BAT	Bathythermometer
		BT	Bathythermograph (towed)
		MAX	Maximum thermometer
		MIN	Minimum thermometer
		P	Pilot balloon sounding apparatus
		R	Radiosounding apparatus
		RG	Rain-gauge
		RSD	Radar storm and meteorological phenomena detection
		RT	Reversing thermometer
		ST	Sea thermograph
		TSD	Temperature/salinity/depth probe
		W	Radio or radarwind apparatus
		XBT	Expendable bathythermograph
		LWR	Long wave radiometer
		SWR	Short wave radiometer
		OT	Other - any instrument aboard a ship that does not appear on this list should be reported so it can be added to the list and entered into Pub. 47 (specify in a footnote)
40	**phGr**		**Telephony & telegraphy**
		R	Radiotelegraphy
		T	Radio telephone
41	**prSt**		**Teleprinter & satellite**
		A	Argos communication facility
		C	INMARSAT-C communication facility
		E	Environmental satellites communication facility
		I	INMARSAT-A communication facility
		Y	Direct printing radiotelegraphy
		G	Global positioning system (GPS)
42	**Chgd**		**Change Date** - the date the PMO last updated this table (information) on the ship

Column: No.	Column: Name	Abbre-viation	Description of abbreviation
			(e.g. 26021998) - Day (01-31); Month (01-12); Year (e.g. 1998, 2005, etc.)-

Publication No. 47 database
Fields

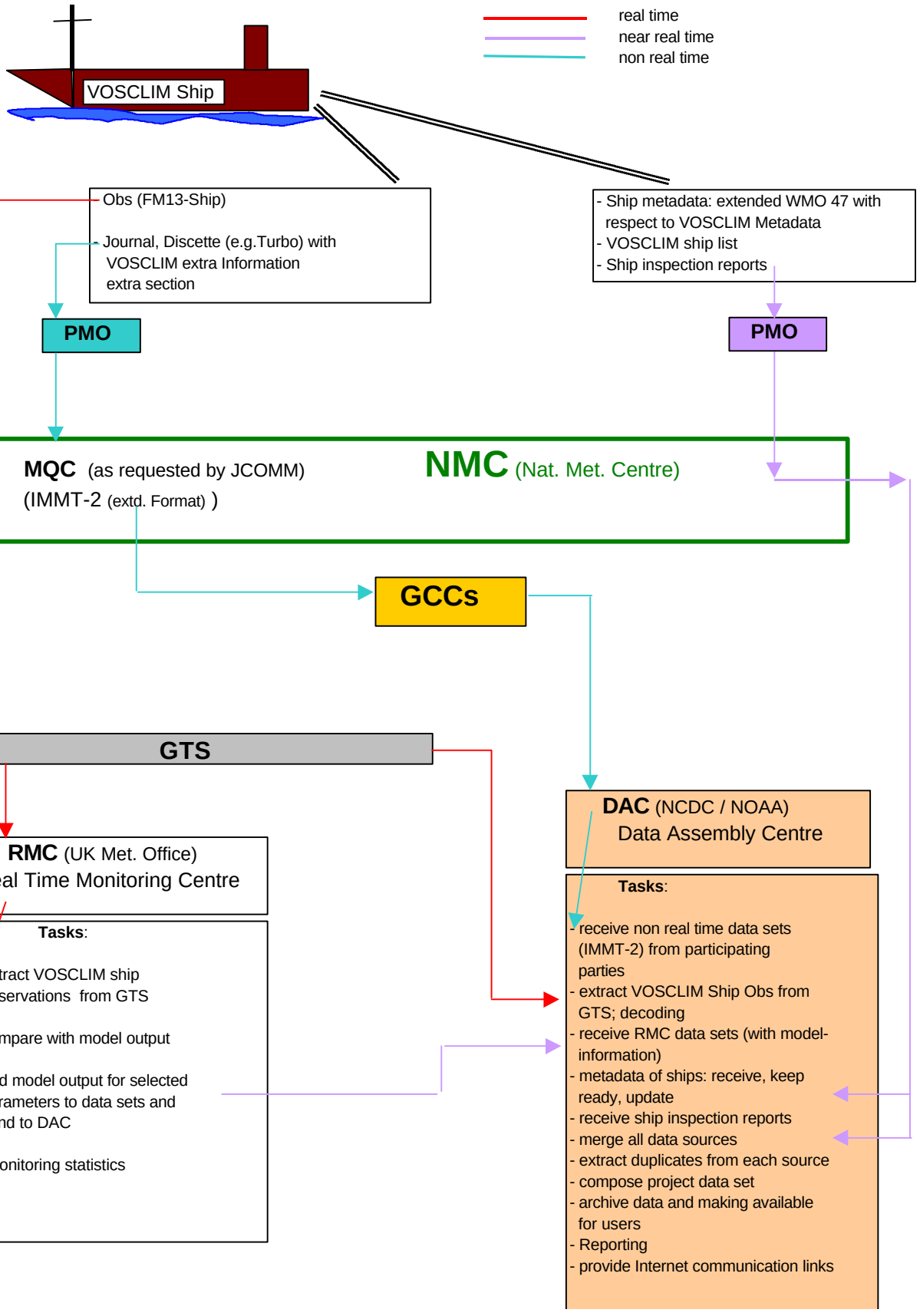
Order	Code name	Explanation
1	name;	Ship name
2	call;	Ship call sign
3	IMOn;	IMO number assigned to the hull
4	rcnty;	Recruiting country (two letter abbreviation)
5	vssl;	Vessel type (general cargo = GC, liquid tanker = LT, etc.)
6	vsslP;	Vessel digital image (profile)
7 8 9 10 11	lenvsslD; brdvsslD; frbvsslD; drfvsslD; chtvsslD;	Vessel dimension - length (in meters) - breadth - freeboard - draft (maximum summer loadline) - cargo height
12	brdg;	Distance of the bridge from the bow (to tenths of meters)
13	vsslM;	Type of VOS ship (Selected Ships = 01, Supplementary Ships = 40, etc.)
14	Atm;	Automation of observation
15	blc;	Baseline check
16 17 18 19 20 21 22 23 24 25	rte; rte; rte; rte; rte; rte; rte; rte; rte; rte;	Ships route No. 1 Ships route No. 2 Ships route No. 3 Ships route No. 4 Ships route No. 5 Ships route No. 6 Ships route No. 7 Ships route No. 8 Ships route No. 9 Ships route No. 10
26 27	barm; barm;	Barometer No. 1 - type Barometer No. 2 - type
28 29	bMS; bMS;	Model (manufacturer/series no.) No. 1 Model (manufacturer/series no.) No. 2
30 31	brmH; brmH;	Barometer No. 1 - height in meters to tenths from max load line Barometer No. 2 - height in meters to tenths from max load line
32 33	brmL; brmL;	Barometer No. 1 - location (e.g. wheelhouse, chart room, etc.) Barometer No. 2 - location
34 35	brmU; brmU;	Pressure Units No. 1 Pressure Units No. 2
36 37	brmC; brmC;	Barometer calibration date No. 1 Barometer calibration date No. 2
38 39	thrm; thrm;	Thermometer No. 1 - type Thermometer No. 2 - type
40	thMS;	Thermometer model (manufacturer/series no.) No. 1

Order	Code name	Explanation
41	thMS;	Thermometer model (manufacturer/series no.) No. 2
42 43	thmE; thmE;	Thermometer No. 1 - conditions of exposure Thermometer No. 2 - conditions of exposure
44 45	thmL; thmL;	Thermometer No. 1 - location Thermometer No. 2 - location
46 47	thmH; thmH;	Thermometer No. 1 - height Thermometer No. 2 - height
48 49	tscale; tscale;	Thermometer No. 1 - scale Thermometer No. 2 - scale
50 51	hygr; hygr;	Hygrometer No. 1 - type Hygrometer No. 2 - type
52 53	hgrE; hgrE;	Hygrometer No. 1 - conditions of exposure Hygrometer No. 2 - conditions of exposure
54 55	sstM; sstM;	Sea surface temperature measurement - Method No. 1 Sea surface temperature measurement - Method No. 2
56 57	sstD; sstD;	SST - depth of method No. 1 (tenths of meters below max load line) SST - depth of method No. 2 (tenths of meters below max load line)
58 59	barg; barg:	Barograph No. 1 - type Barograph No. 2 - type
60 61	anHL; anHL;	Anemometer No. 1 - height (meters to tenths), measured from max load line Anemometer No. 2 - height (meters to tenths), measured from max load line
62 63	anHD; anHD;	Anemometer No. 1 - height (meters to tenths), height above deck on which it is installed Anemometer No. 2 - height (meters to tenths), height above deck on which it is installed
64 65	anmL; anmL;	Anemometer No. 1 - description of location Anemometer No. 2 - description of location
66 67	anDB; anDB;	Anemometer No. 1- distance from the bow Anemometer No. 2- distance from the bow
68 69	anDC; anDC;	Anemometer No. 1 - distance from center line (port/ starboard indicator) Anemometer No. 2 - distance from center line (port/ starboard indicator)
70 71	anmI; anmI;	Anemometer No. 1- Instrument type (manufacturer/ series no./ etc.) Anemometer No. 1- Instrument type (manufacturer/ series no./ etc.)
72	anmU;	Anemometer - general observing practice
73 74	anmC; anmC;	Anemometer No. 1 - calibration date Anemometer No. 2 - calibration date
75	wwH;	Visual wind/wave observational height
76 77 78 79 80 81	othI; othI; othI; othI; othI; othI;	Other meteorological instrument aboard - No. 1 - type Other meteorological instrument aboard - No. 2 - type Other meteorological instrument aboard - No. 3 - type Other meteorological instrument aboard - No. 4 - type Other meteorological instrument aboard - No. 5 - type Other meteorological instrument aboard - No. 6 - type
82 83	phGr; phGr;	Radio-telephony and telegraphy - No. 1 - type Radio-telephony and telegraphy - No. 2 - type

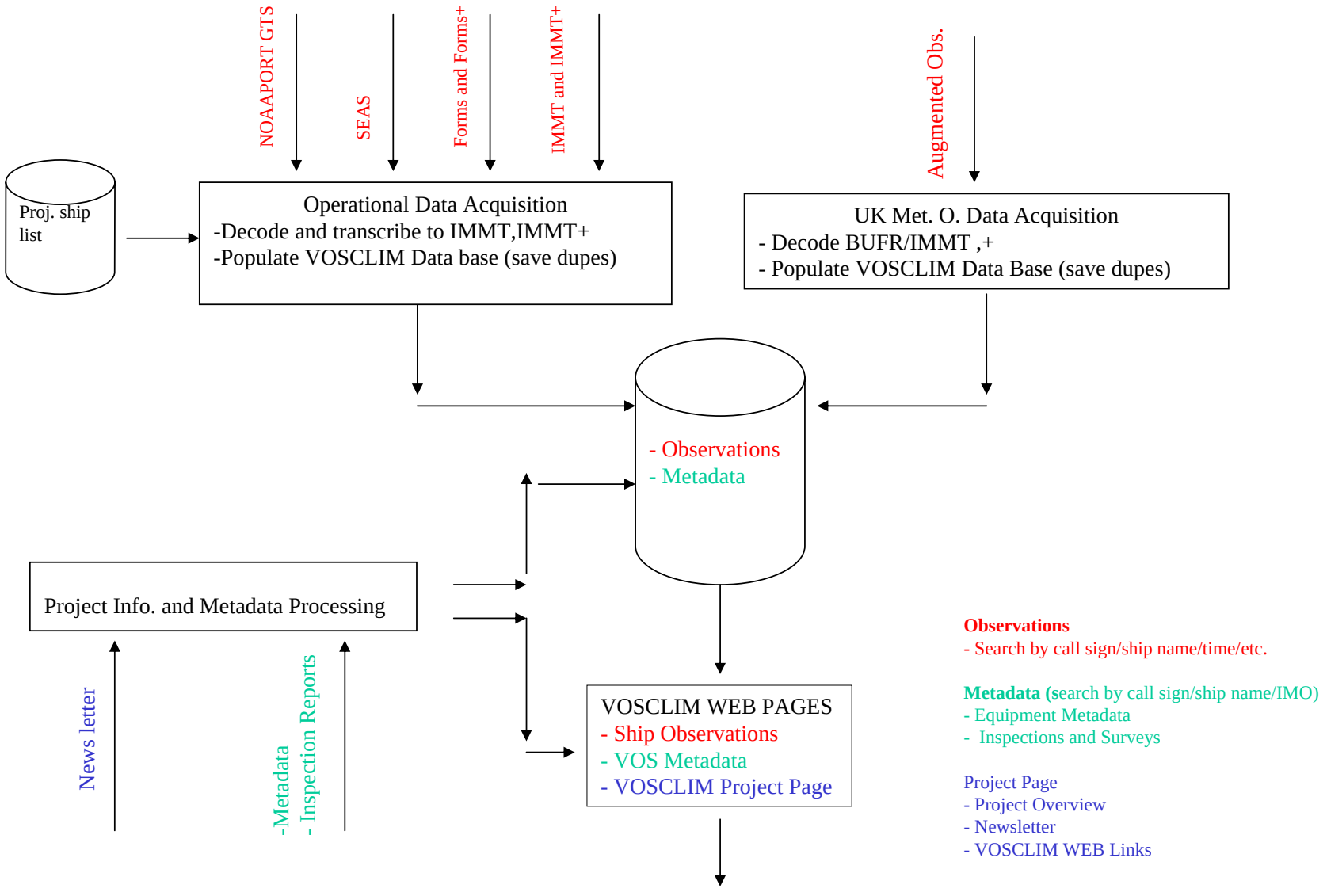
Order	Code name	Explanation
84	prSt;	Radio-telephony and satellite - No. 1 - type
85	prSt;	Radio-telephony and satellite - No. 2 - type
86	prSt;	Radio-telephony and satellite - No. 3 - type
87	prSt;	Radio-telephony and satellite - No. 4 - type
88	prSt;	Radio-telephony and satellite - No. 5 - type
89	chgd;	Change date (date information was updated on the ship by the PMO)
90	fieldAbrev;	Code name of field to which footnote No. 1 applies
91	fieldAbrev;	Code name of field to which footnote No. 2 applies
92	fieldAbrev;	Code name of field to which footnote No. 3 applies
93	fieldAbrev;	Code name of field to which footnote No. 4 applies
94	fieldAbrev;	Code name of field to which footnote No. 5 applies
95	fieldAbrev;	Code name of field to which footnote No. 6 applies
96	fieldAbrev;	Code name of field to which footnote No. 7 applies
97	fieldAbrev;	Code name of field to which footnote No. 8 applies
98	fieldAbrev;	Code name of field to which footnote No. 9 applies
99	fieldAbrev;	Code name of field to which footnote No. 10 applies
100	footID;	Footnote No. 1 - code number of text required
101	footID;	Footnote No. 2 - code number of text required
102	footID;	Footnote No. 3 - code number of text required
103	footID;	Footnote No. 4 - code number of text required
104	footID;	Footnote No. 5 - code number of text required
105	footID;	Footnote No. 6 - code number of text required
106	footID;	Footnote No. 7 - code number of text required
107	footID;	Footnote No. 8 - code number of text required
108	footID;	Footnote No. 9 - code number of text required
109	footID;	Footnote No. 10 - code number of text required

VOSCLIM Project

Data Flow



VOS-CLIM (NCDC)



REPORT BY THE RTMC

Status of ship monitoring at The UK Met. Office

1. As the appointed lead centre for monitoring marine surface data, the UK Met. Office produces detailed statistics to monitor the quality of ships observations. Statistics on the 'fit' of pressure and wind observations to our Global NWP Model's 6-hour background (first-guess) forecasts are used to produce lists of 'suspect' ships for inclusion in our Monthly Monitoring Reports (e.g. see Annex A). These reports are distributed to other National Meteorological Services (NMS's) and to WMO. Ships are flagged as being 'suspect' if the mean and standard deviation of their observation-minus-background (o-b) values meet certain agreed criteria.

2. Separate monthly statistics are also compiled for ships belonging to the UK Voluntary Observing Ship (VOS) fleet, and also for a number of other countries having established VOS fleets. These are then sent to the Met Office's marine section and to the other NMS's concerned in order that remedial action can be taken.

3. Some o-b statistics are also produced on a weekly basis, and in the UK our marine section is sent a provisional list of suspect ships in order that prompt action can be taken to resolve any observational problems arising on UK VOS ships. This is normally achieved by contacting the ship concerned directly via satellite communications or, when necessary, by a visit from the local Port Met Officer.

4. Otherwise, on a longer time-scale, The Met Office produces a bi-annual report on the quality of surface marine data, for WMO, which highlights all suspect ships identified over each 6-month period. This report is distributed widely to NMS's and WMO.

Additional monitoring planned for the VOSClim Project

5. For the VOS-Climate Project, we intend to extend our monitoring to include the 6 main variables that are to be observed, i.e. pressure, wind speed, wind direction, air temperature, relative humidity and sea surface temperature (SST). The monitoring of SST will require the most work, since it will come from a different data stream. Lists of statistics for each of the ~200 VOSClim ships will then be produced on a monthly basis. The format of these lists will be similar to that shown in Annex A, but without the "LEVEL", "NGE" and "RMS" columns, which are largely redundant. We propose to send these lists by e-mail to the Data Assembly Centre (DAC), to be made available on the DAC website. In addition, we intend to send similar lists to participating NMS's (and to the DAC), detailing those VOSClim ships which have been flagged as 'suspect'. Action can then be taken by the NMS that recruited the suspect ship to rectify any quality problems, if necessary with the assistance of other participating NMS's. The procedures and actions to be taken in the event of a ship being flagged as 'suspect' should be agreed at the VOSClim-II meeting.

6. The level at which the criteria should be set (for action to be taken) will need to be agreed once some experience of the statistics has been obtained. Here we suggest some preliminary values, which may need to be revised in the light of experience and then agreed to at a future VOSClim meeting - we propose that initially the following criteria be met for action to be taken:

> For each ship and each variable, there should be at least 20 reports during the period (if there are less than ~20 reports the statistics may be unreliable and no action need be taken).

Then, either;

a) The number of gross errors should exceed 10 % of the number of reports (where the o-b limits for individual gross errors are shown in Table 1, column 4); or,

b) one of the limits shown in Table 1 (columns 2 and 3) should be exceeded for either;

(i) the mean value of o-b over the period (absolute value), or
(ii) the standard deviation of o-b over the period.

An unexpected drop in the number/frequency of reports (of each variable) could also be noted, making allowance for when a ship is in port.

(1) **Variable**	(2) **Mean o-b limit**	(3) **Std Dev o-b limit**	(4) **Gross error limit**
Pressure (hPa)	1.5	3.0	15.0
Wind speed (ms^{-1})	4.0	8.0	25.0
Wind direction (^{o})	25.0	50.0	150.0
Air Temperature (^{o}C)	1.5	3.0	10.0
Relative humidity (%)	30.0	60.0	95.0
Sea surface temp. (^{o}C)	1.0	2.0	6.0

Table 1. Suggested limits on o-b statistics (columns 2 and 3) will, if exceeded, imply that a ship's observations of that variable are 'suspect' and need corrective action to be taken. Column 4 contains suggested limits on o-b values for each individual report, beyond which the observation will be counted as a 'gross error'.

7. Any ships failing the criteria should have their entries highlighted on the DAC monthly statistics web page until corrective action has been taken (this action could also be noted on the web page).

8. In addition to the monthly list of 'suspect' ships, which will be e-mailed to the DAC (to be displayed on their web site) and to participating NMS's, it is also proposed to despatch a weekly list of 'suspect' ships to participating NMS's in order that they can take early remedial action (e.g. notify the ship concerned of any coding or observational errors and instigate repair, re-calibration or replacement of any faulty instruments). The procedures for taking such action, and the individuals at each NMS responsible for ensuring that it is carried out, should be clearly defined.

9. It is stressed that the Real Time Monitoring Centre (RTMC) needs to be informed as soon as possible by each participating NMS of any changes to the call signs of VOSClim ships (and of any additional ship's call signs for newly recruited ships), to ensure that they are included in the processing.

Other aspects of the RTMC Terms of Reference

10. There are a number of details which need to be resolved regarding the data management process, in particular concerning the exchange of data between

the RTMC and the DAC, but also regarding the relationship with the Global Collecting Centres. For example, there are differences of view between the RTMC and the DAC about data exchange formats, each preferring to use the one most convenient to itself. The Met Office would prefer to use BUFR, as its systems already allow data to be output in this form; however, we understand the DAC would prefer to use the older IMMT format. Such details need to be resolved between the data management experts and we therefore propose that VOSClim-II should establish a small expert working group comprising representatives from the DAC, the RTMC and the GCC in Germany.

11. We also propose some minor amendments to the RTMC Terms Of Reference (ToR), so that they become:

1. Extract GTS reports of VOSClim Project ships (by call sign) and decode.
2. Associate project observed variables (pressure, air temperature, humidity, SST, wind speed and wind direction) for each project ship with co-located model field values (4 times daily).
3. Compile data sets of observations and associated model field values and transfer to the Data Assembly Centre.
4. Provide ship monitoring statistics for all VOSClim ships to the Data Assembly Centre (monthly).

12. The above amendments to the ToR remove the requirement to decode the additional project data (since this will not now be available on the GTS), and include the reference to VOSClim ships in item 4.

Summary

13. In order that The Met. Office can fulfil its role as the RTMC for the VOSClim project, the meeting is requested to agree the following:

1. the proposed ship monitoring process, including the general classification of ship reports as ‘suspect’;
2. the proposed format for disseminating the monthly monitoring statistics;
3. that the ‘suspect’ ship list should be sent to the DAC and to participating NMS's on a monthly basis;
4. that additional ‘suspect’ lists should be sent to participating NMS's on a weekly basis;
5. the procedures and actions to be taken in the event of a ship being flagged as ‘suspect’;
6. the procedures for notifying the RTMC of any changes to ships call signs;
7. to the establishment of an expert working group to address data management/transmission problems;
8. to the proposed changes to the ToR for the RTMC.

VOSCLIM PROJECT ACTION PLAN – SECOND YEAR

ACTION	WHOM	WHEN	STATUS
1. Modify electronic message/logbook software (e.g. TurboWIN) for new IMMT	KNMI, NOAA, JMA, other relevant participants	Jan. 2001	
2. Agree data transfer format RTMC-DAC	RTMC, DAC	Dec 2000	
3. Provide SOC with algorithms for computation of derived parameters in ship reports	Participants	Dec 2000	
4. Modify paper logbooks for new IMMT, including instructions for completion provided by SOC	SOC, relevant participants	Jan 2001	
5. Submit revised IMMT to JCOMM-I	WMO	June 2001	
6. Finalize project logo, prepare plaque	V. Zegowitz	Nov. 2000	
7. Finalize promotional booklet	P. Taylor, V. Zegowitz	Dec. 2000	
8. Prepare E, F, S versions of booklet	WMO	Jan. 2001	
9. Print booklet	Canada	March 2001	
10. Finalize survey report form and instructions, prepare electronic version and circulate for review	Australia	Dec. 2000	
11. Prepare electronic form in F, R, S and distribute to participants and DAC	WMO	Feb. 2001	
12. Submit standard survey form to JCOMM and eventually distribute to all VOS operators	WMO	June 2001 and after	
13. Finalize real time monitoring limits	Met Office and SOC	Nov. 2000	
14. Finalize ship inspection report form and instructions (paper and electronic) and circulate for review	Australia	Dec. 2000	
15. Prepare inspection form in F, S, R and distribute to participants and DAC	WMO	Feb. 2001	

16. Decide web site URL and provide to participants	DAC	Nov. 2000	
17. Prepare skeleton web site (including simulated data and metadata) and invite review by participants	DAC	Jan 2001	
18. Populate web site and initiate operations	DAC	April 2001	
19. Design newsletter format and list of contents and circulate to participants	WMO, Project Leader, P. Taylor, S. North	Dec. 2000	
20. Prepare first newsletter and transmit to DAC	WMO, participants	July 2001	
21. Prepare consolidated list of potential ships, plus line map and circulate to participants, DAC, RTMC	E. Kent	Dec. 2000	
22. Begin ship recruitment and submit survey forms to DAC	Participants	Apr 2001	
23. Third project meeting (Geneva)	Project Leader, WMO, participants	Nov. 2001	

Annex X

LIST OF ACRONYMS AND OTHER ABBREVIATIONS

ASAP	Automated Shipboard Aerological Programme
BUFR	Binary Universal Form for Representation of Meteorological Data
CBS	Commission for Basic Systems (WMO)
CMM	Commission for Marine Meteorology (WMO)
CREX	Character code for the representation and exchange of meteorological and other data
DAC	Data Assembly Centre
GCOS	Global Climate Observing System
GOOS	Global Ocean Observing System
GRIB	Processed data in the form of grid-point values expressed in binary form
GTS	Global Telecommunication System (WMO)
IMMT	International Maritime Meteorological Tape
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
NCDC	National Climate Data Center
NOAA	National Oceanographic and Atmospheric Administration (USA)
PMO	Port Meteorological Officer
RTMC	Real Time Monitoring Center
SEAS	Shipboard Environmental Data Acquisition System (USA)
SHIP	Report of Surface Observation from Sea Station
SOC	Specialized Oceanographic Centre
SOOP	Ship-of-Opportunity Programme
TD	Technical Document
TOR	Terms of Reference
URL	Universal Resource Locator
VOS	Voluntary Observing Ship
WMO	World Meteorological Organization