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.