# Maurice Ewing Automated Weather System Data Quality Control Report


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*Addendum:*

*Member's of the WOCE Hydrographic Project Office (WHPO) and WOCEMET met at the 13th Data Products Committee (DPC) meeting in College Station, TX to discuss reconciliation of the WOCE cruise line designators. This was done in anticipation of the future release of version 3 of the WOCE global data set, and resulted in changes to several WOCE cruise line designations.*

*On December 21, 2000, WOCEMET combined the WOCE designation for cruises A__17C/00 and A__17N/00 to be refrenced as A__17_/00. The quality control information for these data sets has been left in this report for the user, but please note that the lines previously known as A__17C/00 and A__17N/00 are now combined together under A__17_/00.*

*Introduction:*

This report summarizes the quality of automated weather system (AWS) data recorded on the *Maurice Ewing* (identifier: WLOZ) between 10 January 1994 and 14 March 1994. The data were provided to the Florida State University Data Assembly Center (DAC) in electronic format by L. Memery of the CNRS/IFREMER/UBO, France. They were converted to a standard DAC netCDF format. The data were then processed using an automated screening program which adds quality control flags to the data, highlighting potential problems. Finally, the Data Quality Evaluator reviewed the data and current flags. Flags were then added, modified, and deleted according to the judgement of the Data Quality Evaluator and other DAC personnel. An in depth description of the WOCE quality control procedures can be found in Smith et al. (1996). This data quality control report summarizes all flags for the *Maurice Ewing* AWS data and explains reasons why these flags were assigned.

*Statistical Information:*

The *Maurice Ewing* AWS data are expected to include observations taken every minute on one cruise covering two WOCE hydrographic lines. Values for the following variables were collected:

| | |
|---|---|
| Time | (TIME) |
| Latitude | (LAT) |
| Longitude | (LON) |
| Platform Heading | (PL_HD) |
| Platform Speed | (PL_SPD) |
| Platform Relative Wind Direction | (PL_WDIR) |
| Platform Relative Wind Speed | (PL_WSPD) |
| Earth Relative Wind Direction | (DIR) |
| Earth Relative Wind Speed | (SPD) |
| Atmospheric Pressure | (P) |
| Relative Humidity | (RH) |
| Sea Temperature | (TS) |
| Air Temperature | (T) |

Details for the entire cruise including cruise track codes, dates, number of records, number of values, number of flags, and percentage flagged are listed in Table 1. A total of 802,932 values are evaluated with 120,920 flags added by the preprocessor and Data Quality Evaluator for a total of 15.06 percent of the values being flagged.

**Table 1: Statistical Cruise Information**

| CTC | Cruise Dates | Number of Records | Number of Values | Number of Flags | Percentage Flagged |
|---|---|---|---|---|---|
| A__17C/00<br>A__17N/00 | 10 Jan 94 - 14 Mar 94 | 61,764 | 802,932 | 120,920 | 15.06 |

*Summary:*

The AWS data from the *Maurice Ewing* are in fair condition with 15.06 percent of the data being flagged. Table 2 provides the numbers and percentage of flags for each variable. A thorough discussion of the flags follows.

**Table 2: Number of Flags and Percentage Flagged by Variable**

| Variable | G | J | K | S | Total Number of Flags | Percentage of Variable Flagged |
|---|---|---|---|---|---|---|
| **DIR** | | | 36,250 | | 36,250 | 58.69 |
| **SPD** | 114 | | 36,250 | 14 | 36,378 | 58.90 |
| **P** | 476 | | 6,793 | 1 | 7,270 | 11.77 |
| **RH** | | 16,756 | | 24 | 16,780 | 27.17 |
| **TS** | | | 24,239 | | 24,239 | 39.24 |
| **T** | | | | 3 | 3 | 0.00* |
| **Total number of Flags** | 590 | 16,756 | 103,532 | 42 | 120,920 | |
| **Percentage of All Values Flagged** | 0.07 | 2.09 | 12.89 | 0.01 | 15.06 | |

<u>Value Greater Than 4 Standard Deviations from Climatology (“G” flags):</u>

The preprocessor assigned “G” flags to earth relative wind speed data and atmospheric pressure data. The flags identify values that are greater than 4 standard deviations from the Da Silva (1994) climatology for earth relative wind speed and atmospheric pressure. This test does not necessarily indicate erroneous values, just extreme data.

<u>Erroneous Data (“J” flags):</u>

The Data Quality Evaluator administered “J” flags to relative humidity data. Visual inspection revealed the relative humidity data to hold at a constant value for a physically unrealistic period of time. Clearly, some type of instrument error occurred but we could not confirm our suspicion. Regardless, the flagged data are erroneous and should NOT BE USED.

<u>Data Suspect (“K” flags):</u>

A unique feature was noted with regard to earth relative wind direction and earth relative wind speed data, resulting in the application of "K" flags. Visual Inspection revealed that a signal of the ship’s movement was evident in both DIR and SPD. If the PL_SPD was greater than approximately 3 meters per second, the signal was evident in DIR and SPD. This indicated possibly erroneous data because earth relative wind data should not show any indication of the ship’s movement as explained by Smith (1998). Since this problem was evident throughout the entire cruise, an automated procedure was applied to flag the true winds. Specifically, when the PL_SPD was less than 3 meters per second, a “K” flag was applied to the values of DIR and SPD with the corresponding time stamp. The Data Quality Evaluator then reviewed all the computer flagged data for accuracy. The "K" flags identify values that are of questionable quality.

Additional "K" flags were applied to the pressure and sea temperature data. The pressure data was flagged at times when the ship’s motion signal was evident. No cause for this signal could be identified. The Data Quality Evaluator also applied flags to a significant portion (39.24 per cent) of the sea temperature data. Throughout the second half of the cruise, the sea temperature exhibited constant values for periods that varied from a few minutes to several hours. Since, the actual values were not climatologically anomalous (see Da Silva (1994)) and the time periods of the questionable data varied considerably, “J” flags were not issued. The flagged data represent a significant percentage of the sea temperature data and should be used with extreme caution.

<u>Spike in the Data (“S” flags)</u>

The Data Quality Evaluator applied “S” flags to several parameters in this data set. The flags indicate data that are drastically out of the current data trend. Spikes are common to electronic data and may be associated with power surges that briefly disrupt the electronic integrity of the AWS systems.

*Final Comments:*

The *Maurice Ewing* AWS data quality is fair at best. Much of the earth-relative wind direction data, earth-relative wind speed data, atmospheric pressure data, and sea temperature data are suspect. No proof of the data being erroneous is available; however, extreme caution should be exercised by the user when utilizing these parameters.

*References:*

da Silva, A. M., C. C. Young and S. Levitus, 1994: Atlas of Surface Marine Data 1994, Volume 1: Algorithms and Procedures. NOAA Atlas Series. In preparation.

Smith, S.R., M.A. Bourassa, and R.J. Sharp, 1997: Establishing More Truth in True Winds. Submitted for publication in the *Journal of Atmospheric and Oceanic Technology,* April 1998

Smith, S. R., C. Harvey, and D. M. Legler, 1996: Handbook of Quality Control Procedures and Methods for Surface Meteorology Data. WOCE Report No. 141/96, Report WOCEMET 96-1, Center for Ocean Atmospheric Prediction Studies, Florida State University, Tallahassee, FL 32301