Melville IMET Data Quality Control Report
Cruises: P__21E/00
P__21W/00

Daniel M. Gilmore and Shawn Smith

World Ocean Circulation Experiment(WOCE)

Surface Meteorological Data Assembly Center

Center for Ocean Atmospheric Prediction Studies

The Florida State University

August 1, 1996

Report WOCEMET 96-9

Version 1.0

Introduction:

The data referenced in this report were collected from the research vessel Melville (call sign: WECB; data provider: Scripps Institute of Oceanography/ Woody Sutherland) IMET automated data collection system from 2 different cruises. The data were recieved in electronic format and converted to the FSU standard format. Then they were preprocessed using an automated data checking program. Next a visual inspection was completed by a Data Quality Evaluator who reviewed, modified and added appropriate quality control (QC) flags to the data. Details of the WOCE QC can be found in Smith et al (1996). The data quality control report summarizes the flags for the Melville data, including those added by both the preprocessor and the analyst.

Statistical Information:

The data from the Melville were expected to include observations every minute from 2 cruises, each of which was completed in 2 legs. The start and end dates, the number of observations, and the number and percentage of non-Z flags for each leg are given in table 1. Table 1 includes flags added to DIR and SPD. Time (TIME), latitude (LAT), longitude (LON), atmospheric pressure (P), air temperature (T), sea temperature (TS), relative humidity (RH), humidity temperature (T2), atmospheric radiation (RAD), (RAD2), and accumulation of precipitation (PRECIP) were quality controlled. A total of 1,312,800 values

were checked with 153,904 flags added resulting in 15.99 percent of the values being flagged. The distribution, including percentages flagged for each variable sorted by type, excepting SPD and DIR, is detailed in table 2.

Table 1: List of dates and number of records and flags for each of the cruises

CTC	Dates Checked	Number of Records	Number of Values	Number of Flags	Percent Flagged
P__21E/00	03/27/94 - 04/08/94	18604	390684	113855	29.14
P__21E/00	04/27/94 - 05/14/94	24808	520968	148290	28.46
P__21W/00	05/19/94 - 05/29/94	15782	331422	88901	26.82
P__21W/00	05/31/94 - 06/20/94	26890	564690	227202	40.23

Summary:

Normally for IMET vessels, the data assembly center(DAC) receives only winds relative to the ship along with the necessary navigation values--platform heading or wind compass, platform speed over ground and platform course over the ground. From these, the DAC computes true winds using the method described in smith et, al. (1996).

However, the Melville IMET data did not contain the needed parameters to compute a true wind. In fact, 100% of the platform heading data and 100% of the wind compass data were 0.0 degrees. This is unrealistic for a ship on a 3 month cruise.

Table 1: Number and Percentage of Flags Used per Variable

Variable	B	F	G	J	K	L	S	Total Number of Flags	Percent-age of Data Flagged
TIME								0	0
LAT		354				6	8	368	0.42
LON	1	354				6		361	0.41
PL_CRS								0	0.00
PL_SPD								0	0.00
DIR								0	0.00
SPD								0	0.00
TS			3	13	170		23	206	0.24
P			9753	41090			271	41361	58.40
T			4	239	170		50	459	0.53
T2			3	15626	170			17596	18.05
RH				15624	170		1	15794	18.05
PRECIP				29041	950		2287	32278	36.88
RAD	45462			217	170			45849	52.39
RAD2								0	0.00
Totals:	45463	708	9763	86226	1800	12	2640	153904	
Percent-age of data flagged	3.46	0.05	0.74	6.57	0.14	0.00	0.20	11.72	

B: Data point out of bounds
F: Unreal platform movement
G: Data point >4 standard deviations from climatological mean
J: Erroneous data point
K: Caution/Suspect data
L: Ship position plotted over land
S: Spike

Consequently, it is not possible for the DAC to calculate accurate true wind speed or direction values for the Melville. Therefore, the true wind direction and speed are set to the missing value flag of -9999; and the heading, wind compass, and other supporting wind parameters are omitted from the v100 files.

For some research applications, the DAC created a course corrected true wind (substituting the course for the heading in the calculation). These approximate true wind values would be acccurate for some applications, however they have a quantity of high frequency noise and are likely less reliable at low ship speeds. The course corrected winds can be obtained upon request.

The remaining data are in good shape, despite the high percentage of flags. PRECIP had observations that were so noisy that they were incomprehensible. These, such as the PRECIP data on 03/27/94, were as "J". Pressure was also flagged with "J" flags because the system would report the same pressure for several days in a row, one example being 05/07/94-05/09/94 when 1019.1mb was recorded as pressure for that entire period. T, T2, and RH were also all flagged with "J" for similar reasons.

The only other major problem with the data set was that the Epply precision spectral pyranometer used with the IMET system seemed to have a calibration

problem. The atmospheric radiation should be near, but above, 0.0 W/m^2 during nightfall. However, the pyranometer would return a reading below 0.0 W/m^2. This resulted in 45,462 "B" flags being assigned by the prescreener. These flags were left as an indication of the problem.

The prescreener also assigned 9,753 "G" flags to P. This was due to the Melville being located close to the Antarctic coastline and encountering very low atmospheric pressures. The analyst left these flags for descriptive purposes. A relatively large number(271) of spikes were also found in the P data. Almost all of these were single values, within a day's normal observations, close to 0.0.

In addition to the "J" flags described above, PRECIP also had 2 other problems. One is that the data contains 2,287 spikes. The analyst allowed that water can slosh around within the rain guage, resulting in a large amount of noise within the data. The "S" flags were for values that did not fall within the normal range of noise (which the analyst determined to be 1-2mm). The other problem was that the PRECIP data on 06/06/94 did not seem to be accurate. Specifically, the observations were at exactly the same value for half of the day, then the data became very noisy, fluctuating between 0mm and 20mm for the rest of the day. All of this day's values (950) were flagged with "K".

One other problem worth noting exists. On 06/05/94, the records for TS, T2, T, RH, and RAD all have observations for the first 3 hours, then there is no data for 21 hours. When observations reappear, they are all at 0.0 for the remainder of the day. The values at 0.0 were flagged with "J", and the values during the first 3 hours, 170 observations, were flagged with "K".

All the flags described are indicative of major problems in the data set. There are an assortment of other flags that don't represent any major problems, but rather are expected when such a large data set is quality controlled. For purposes of brevity, these flags will not be discussed.

Final Note:

These data are in good shape. The user only needs to discard all the values flagged with the "J" flag from their analyses and be prepared to filter noise from the PRECIP data and make calibration adjustments to the RAD data. Other than these problems, the analyst forsees no difficulty in using this data.

References:

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 32310.