Discovery Multimet Automated Weather System Data Quality Control Report

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Introduction:

This report summarizes the quality of multimet automated weather system (AWS) data on the Discovery (identifier: GLNE) during one WOCE cruise between 22 December 1992 and 31 January 1993. The data were provided to the Florida State University Data Assembly Center (DAC) in electronic format by D. Turner of the British Oceanographic Data Center. They were converted to 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 reviews the data and current flags. Flags are 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). The data quality control report summarizes all flags for the Discovery multimet AWS data and explains reasons why these flags were assigned.

Statistical Information:

The Discovery multimet AWS data are expected to include observations taken every minute on the WOCE cruise. Values for the following variables were collected:

Time	(TIME)
Latitude	(LAT)
Longitude	(LON)
Earth Relative Wind Speed	(SPD)
Earth Relative Wind Direction	(DIR)
Air Temperature	(T)
Wet Bulb Temperature	(TW)
Longwave Atmospheric Radiation	(RAD)
Shortwave Atmospheric Radiation	(RAD2)
Pressure	(P)
Photosynthetically Active Radiation	(RAD3)

Details of the cruise including dates, number of records, number of values, number of flags, and percentage flagged are listed in Table 1. A total of 623,700 values are evaluated with 2136 flags added by the preprocessor and Data Quality Evaluator for a total of 0.34 percent of the values being flagged.

Table 1: Statistical Cruise Information

CTC	Dates	Number of Records	Number of Values	Number of Flags	Percentage Flagged
A__11_/00	22 Dec 92 - 31 Jan 93	56700	623,700	2136	0.34

Summary:

The multimet AWS from the Discovery are in excellent condition with only 0.34 percent of the data being flagged for errors. 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	B	G	K	Q	S	Total Number of Flags	Percentage of Variable Flagged
DIR		550		226	17	793	1.40
SPD				281	12	293	0.52
T				12	6	18	0.03
RAD	22		12	16	9	59	0.10
RAD2			21		2	23	0.04
P		947				947	1.67
RAD3					3	3	0.01
Total number of Flags	22	1497	33	535	49	2136	0.34
Percent-age of All Values Flagged	0.00*	0.24	0.01	0.09	0.01	0.34	

* percentage less than 0.01

Value Out of Realistic Range ("B" flags)

"B" Flags were administered to the longwave atmospheric radiation data by the preprocessor. The flags identify values that are less than 0 Watts per meter squared or greater than 1400 Watts per meter squared.

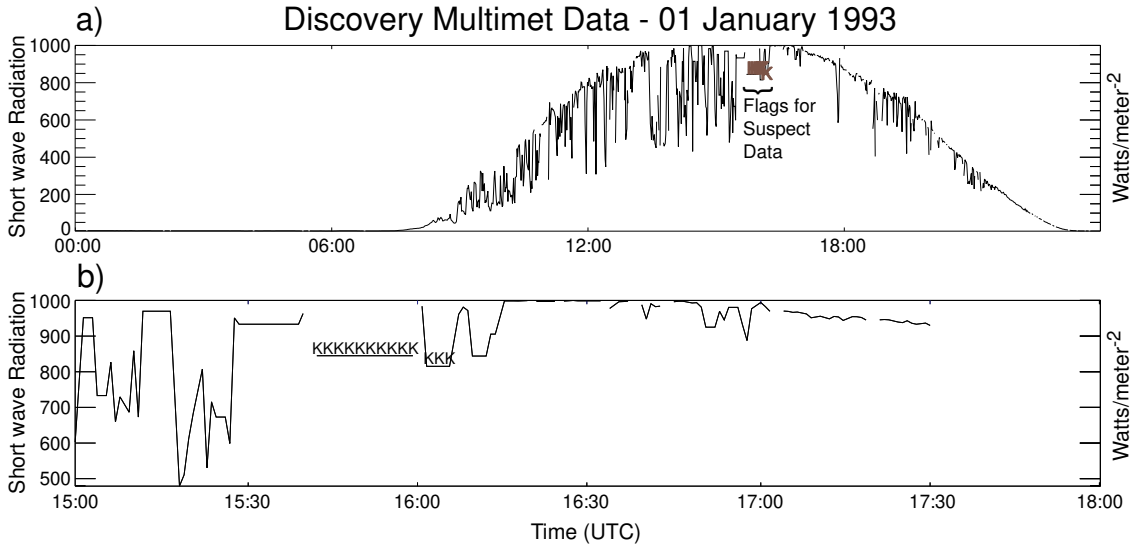
Value Greater Than 4 Standard Deviations from Climatology ("G" flags)

The preprocessor bestowed "G" flags upon earth relative wind direction data and pressure data. The flags identify values that are greater than 4 standard deviations from the Da Silva (1994) climatology for each parameter. This test does not necessarily indicate erroneous values, just extreme data.

Data Suspect ("K" flags)

The Data Quality Evaluator assigned "K" flags to shortwave atmospheric radiation. The flags identify values that are of questionable quality. In Figure 1a the graph of shortwave atmospheric radiation is shown for 1 January 1993 from 00:00 through 24:00 UTC with a small portion of the graph being flagged between 12:00 and 18:00 UTC. Figure 1b, a zoom of the data from 15:00 to 18:00 UTC, highlights the position of the flagged data. Note that the graph becomes displaced and has constant values between 15:30 and 16:30 UTC indicating unrealistic values of shortwave atmospheric radiation.

Figure 1: a) Shortwave radiation for 1 January 1993 with a region of suspect data highlighted. b) A zoom of the suspect region from 15:00 to 18:00 UTC. "K" flags mark the suspect data.



Data Arrived at the DAC Flagged Questionable ("Q" flags)

"Q" flags represent values that arrived at the DAC already flagged as suspect. No reason for these suspect values was provided to the DAC; however, the flags were retained in our format. The data should be used with caution.

Spike in the Data ("S" flags)

The Data Quality Evaluator applied "S" flags to various parameters. The flags indicate areas in the 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 multimet AWS systems.

Final Comments:

The Discovery multimet AWS data is of excellent quality and should be very reliable for the user.

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., 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