Charles Darwin Multimet Data Quality Control Report

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Introduction:

This report summarizes the quality of surface meteorological data collected by the research vessel *Charles Darwin* (identifier: GDLS) Multilmet automated data collection system during two WOCE cruises beginning 25 April 1991 and ending 8 June 1991. The pre-quality controlled data were provided to the Florida State University Data Assembly Center (DAC) in electronic format by D. Martin Gould of the British Oceanographic Data Center (BODC) and 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 (DQE) reviews the data and current flags, whereby flags are added, removed, or modified according to the judgement of the DQE and other DAC personnel. Details of the WOCE quality control procedures can be found in Smith et al. (1996). The data quality control report summarizes the flags for the *Charles Darwin* Multilmet data, including those added by the BODC, the preprocessor, and the DQE.

Statistical Information:

The *Charles Darwin* Multilmet data are expected to include observations taken every minute for the following variables on both of the WOCE cruises:

Time	(TIME)
Latitude	(LAT)
Longitude	(LON)
Earth Relative Wind Direction	(DIR)
Earth Relative Wind Speed	(SPD)
Sea Temperature	(TS)
Air Temperature	(T)
Wet Bulb Temperature	(TW)
Downwelling Longwave Radiation	(RAD)
Downwelling Shortwave Radiation	(RAD2)
Photosynthetically Available Radiation	(RAD3)

Details of the cruises are listed in Table 1 and include cruise dates, number of records, number of values, number of flags, and total percentage of data flagged. A total of 663,641 values are evaluated with 866 flags added by the BODC, the preprocessor, and the DQE resulting in a total of 0.13% of the values being flagged.

Table 1: Statistical Cruise Information

CTC	Dates	Number of Records	Number of Values	Number of Flags	Number Flagged
AR_12_/01	04/25/91 – 05/15/91	29,669	326,359	249	0.08
AR_12_/02	05/18/91 – 06/08/91	30,662	337,282	617	0.18

Summary:

The Multimet data from the *Charles Darwin* proves to be of excellent quality. No major problems were found in the data. The distribution of flags for each variable is detailed in Table 2. The BODC "Q" flag was assessed to any data that was thought to be questionable by the BODC.

Table 2: Number of Flags and Percentage Flagged for Each Variable

Variable	I	K	Q	S	Total Number of Flags	Percentage of Variable Flagged
TIME					0	0.00
LAT					0	0.00
LON					0	0.00
DIR			261		261	0.43
SPD			219		219	0.36
TS	2	50	5	12	69	0.11
T		108		2	110	0.18
TW					0	0.00
RAD			207		207	0.34
RAD2					0	0.00
RAD3					0	0.00
Total Number of Flags	2	158	692	14	866	
Percentage of All Values Flagged	0.00*	0.02	0.10	0.00*	0.13	

*Percentage<0.01

The Q Flag:
The *Charles Darwin* Multimet data came to the DAC already quality controlled by the BODC. The only flag used was the "Q" flag, which was assessed to data the BODC found to be suspect.

Other Flags and Missing Data:
Not only was there a lack of data in general, but a number of variables were plagued with sporadic gaps in the data. This made flagging difficult for the DQE, as there were not enough meteorological supporting data to flag potential problems. Flagging by the DQE was sparse, also because the data had already come quality controlled by those who provided it and have the most knowledge of the data's limitations.

Temperature:
There were 108 K flags and 2 S flags assessed to the temperature by the DQE. The temperature data that were flagged demonstrated characteristics resembling those associated with a ventilation problem. There was not enough supporting meteorological data to identify this as a definite problem. Therefore, the user should note that other

temperature data demonstrating these characteristics that were left unflagged could be experiencing a ventilation problem. Verification from the BODC of a potential problem will be investigated.

Sea Temperature:
The sea temperature received 50 K flags and 12 S flags for data that appeared anomalously noisy to the given trend of the data on 4 June.

The sea temperature also received two I flags on 23 May, bounding the beginning and end of an interesting phenomenon. The vessel was on a northward track, heading out of the warm waters of the Gulf Stream. The ship apparently passed through a cold core eddy, or a meander at the edge of the Gulf Stream that caused a drop in sea temperature of approximately 2 degrees C. The temperature then rose again to the original temperature of the Gulf Stream before the ship completely exited it, causing the sea temperature to drop again, 2 degrees, to the temperatures of the colder water, north of the Gulf Stream.

Wind:
The DQE recommends that the user be cautious of a possible wind flow distortion problem in the wind data. There were noisy, highly variable wind data that were not flagged by the BODC. There was not enough evidence to back this assumption and therefore, the data was not flagged by the DQE.

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 32306-2840