Takuyo Bridge Data Quality Control Report

Jesse Enloe and Shawn R. Smith

World Ocean Circulation Experiment

Surface Meteorological Data Assembly Center

Center for Ocean Atmospheric Prediction Studies

Florida State University

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Introduction:

This report summarizes the quality of surface meteorological data collected by the *Takuyo* (identifier: 7JWN) bridge crew during six WOCE cruises. Data were provided in electronic format by H. Yoritaka (Japanese Hydrographic Department). 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. Flags are then added, modified, and deleted according to the judgement of the DQE 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 on the *Takuyo* bridge data and explains reasons why these flags were assigned.

Statistical Information:

The *Takuyo* data are expected to include observations taken every four hours on cruises PR_03_/01, PR_03_/03, PR_03_/05, and PR_13_/10 and every six hours on cruises PR_03_/12 and PR_03_/13. Values for the following variables were collected:

Time	(TIME)
Latitude	(LAT)
Longitude	(LON)
Earth Relative Wind Direction	(DIR)
Earth Relative Wind Speed	(SPD)
Sea Temperature	(TS)
Atmospheric Pressure	(P)
Air Temperature	(T)
Relative Humidity	(RH)
Total Cloud Amount	(TCA)*

*The TCA is a coded value with only a limited quality control applied. Values that are out of the code range are changed to the special value, -8888, by the preprocessor. Coded values are not included in the flag statistics listed below.

Details of the six WOCE 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 5,571 values are evaluated with 158 flags added by both the preprocessor and the DQE resulting in a total of 2.84% of the values being flagged.

Table 1: Statistical Cruise Information

CTC	Dates	Number of Records	Number of Values	Number of Flags	Number Flagged
PR_03_/01	02/07/90 – 02/20/90	83	747	26	3.48
PR_03_/03	02/08/91 – 03/08/91	120	1080	32	2.96
PR_03_/05	02/12/92 – 03/06/92	125	1125	31	2.76
PR_03_/10	02/10/93 – 03/05/93	125	1125	49	4.36
PR_03_/12	02/08/94 – 03/02/94	79	711	9	1.27
PR_03_/13	02/15/95 – 03/12/95	87	783	11	1.40

Summary:

The bridge data for the *Takuyo* are of excellent quality except for the temperature and, correspondingly, the relative humidity. Details of this problem are discussed below. The distribution of flags for each variable is detailed in Table 2.

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

Variable	**F**	**K**	**S**	**Total Number of Flags**	**Percentage of Variable Flagged**
TIME				0	0.00
LAT	3			3	0.48
LON	3			3	0.48
DIR				0	0.00
SPD		13		13	2.10
TS			1	1	0.16
P			2	2	0.32
T		68		68	10.99
RH		68		68	10.99
Total Number of Flags	6	149	3	158	
Percentage of All Values Flagged	0.11	2.67	0.05	2.84	

Major Problems:

The major problem with these data occurs in the temperature readings. The ship's course was through the north tropical regions of the Western Pacific Ocean. Typical diurnal temperature cycles over the open ocean during the summer in this region are about three to four degrees Celsius; meaning the daytime high typically does not reach more than about three to four degrees warmer than the nighttime low. The ship frequently recorded daytime highs of 5 degrees higher than the nighttime low and, in many cases, as much as 8 or 9 degrees more. This problem is accentuated in the lower latitudes, at around 10 ~

20 degrees north, and indicates that there is a problem with the ship heating during the daytime hours. This is supported by the wind data. When the wind speeds are low the thermometer is inadequately ventilated, and the temperature readings are higher. The ship heats up during the day and subsequently, due to radiative heating, raises the recorded temperature aboard the ship. All values that showed greater than three degrees Celsius of heating during the day were flagged as questionable. The corresponding relative humidity values were also flagged questionable, as relative humidity was calculated using the temperature values. The DQE suggests avoiding the daytime temperature values.

Minor Problems:
The earth relative wind speed remained a constant 9 m/s from 02/15/93 0000 UTC to 02/17/93 0000 UTC. The K flag was applied to these suspect data, as it is unrealistic for the wind speed to remain constant for 2 days.

Other flags included the following: a spike (S) was used in place of the statistical flag (G) the preprocessor placed on the sea temperature data. An S flag was used here to represent a single value that was radically different from sea temperature trend. The pressure data also received an S for the data value that indicated a pressure drop of 9 mb in four hours followed by an increase of 12 mb in the next four hours. Three F flags were placed both on the longitude and latitude by the preprocessor to indicate unrealistic platform velocity, determined with platform position 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 32306-2840