Hawaiian Ocean Time Series Experiment Bridge Data Quality Control Report

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INTRODUCTION

This report summarizes the bridge observations collected over a four year period (1995-1998) during the Hawaiian Ocean Time Series Experiment (HOTS) by the research vessels Roger Revelle (identifier: KAOU), Maurice Ewing (identifier: WLOZ), and the Moana Wave (identifier: WUS9293). The data were provided to the Florida State University Data Assembly Center (DAC) in electronic format by Fernando Santiago-Mondujano (HOTS) and were converted to standard DAC netCDF format. The data arrived from HOTS already quality controlled and included of the HOTS' own unique set of flags (e.g. 2-acceptable data, 3-questionable data, 4-bad data, 5-not reported, 6-interpolated value). Upon arrival, these flags were converted to WOCEMET's quality control guidelines (e.g. 2→Z-good data, 3→Q-suspect data previously quality controlled, 4→J-bad data, 5→Z-null or absent value (good data), 6→R-interpolated value). The data were then processed using an automated screening program, which added quality control flags to the data, highlighting potential problems. Finally, the Data Quality Evaluator (DQE) reviewed the data and current flags (both by DAC and HOTS), whereby flags were added, removed, or modified according to the judgment of the DQE and other DAC personnel. Details of the quality control procedures can be found in Smith et al. (1994). The data quality control report summarizes the flags for the HOTS meteorological data, including those added by HOTS, the WOCEMET preprocessor, and the DQE.

DATA VARIABLES

The HOTS data include observations taken every four hours. 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)
Air Temperature	(T)
Wet Bulb Temperature	(TW)
Sea Temperature	(TS)
Total Cloud Amount*	*(TCA)
Present Weather*	*(WX)

*Denotes coded data variables that were not visually inspected by the DQE. These variables are very difficult to quality control since there is no true way to verify the data objectively. An automated screening program verified the valid range for the data.

HOTS FLAG SUMMARY

Statistical Information:

Details of the HOTS cruises are listed in Table 1 and include the cruise dates, number of records, number of values, number of flags, and total percentage of data flagged. A total of 7,631 values were evaluated with 156 flags added by both the preprocessor and the DQE resulting in 2.04% of the values being flagged.

Table 1: Statistical Cruise Information

Cruise Identifier	Cruise Dates	Number of Records	Number of Values	Number of Flags	Percent Flagged
KAOU					
PRS02_/87	09/24/97 – 09/26/97	7	91	1	1.10
WLOZ					
PRS02_/64	07/29/95 – 08/01/95	18	234	2	0.85
WUS9293					
PRS02_/60	02/04/95 – 02/09/95	18	234	0	0.00
PRS02_/61	03/02/95 – 03/07/95	14	182	14	7.69
PRS02_/62	04/04/95 – 04/09/95	17	221	4	1.81
PRS02_/63	05/05/95 – 05/10/95	15	195	4	2.05
PRS02_/65	08/27/95 – 09/01/95	16	208	2	0.96
PRS02_/66	09/25/95 – 09/29/95	14	182	6	3.30
PRS02_/67	10/25/95 – 10/30/95	16	208	5	2.40
PRS02_/68	11/15/95 – 11/19/95	14	182	2	1.10
PRS02_/69	01/15/96 – 01/19/96	14	182	5	2.75
PRS02_/70	03/25/96 – 03/29/96	15	195	4	2.05
PRS02_/71	04/22/96 – 04/26/96	13	169	1	0.59
PRS02_/72	05/20/96 – 05/24/96	14	182	5	2.75
PRS02_/73	06/24/96 – 06/28/96	13	169	5	2.96
PRS02_/74	07/25/96 – 07/29/96	16	208	0	0.00
PRS02_/75	08/19/96 – 08/23/96	14	182	2	1.10
PRS02_/76	09/30/96 – 10/04/96	15	195	4	2.05
PRS02_/77	10/28/96 – 11/01/96	17	221	1	0.45
PRS02_/78	12/09/96 – 12/13/96	16	208	4	1.92
PRS02_/79	01/06/97 – 01/10/97	17	221	3	1.36
PRS02_/80	02/16/97 – 02/20/97	14	182	4	2.20
PRS02_/81	03/10/97 – 03/14/97	14	182	0	0.00
PRS02_/82	04/07/97 – 04/11/97	14	182	5	2.75
PRS02_/83	05/05/97 – 05/09/97	16	208	3	1.44
PRS02_/84	06/02/97 – 06/06/97	14	182	4	2.20
PRS02_/85	07/07/97 – 07/11/97	14	182	3	1.65
PRS02_/86	08/01/97 – 08/05/97	15	195	2	1.03
PRS02_/88	12/03/97 – 12/07/97	10	130	0	0.00
PRS02_/89	01/09/98 – 01/13/98	15	195	6	3.08
PRS02_/90	02/17/98 – 02/21/98	14	182	10	5.49
PRS02_/91	03/16/98 – 03/20/98	13	169	5	2.96
PRS02_/92	04/13/98 – 04/17/98	16	208	6	2.88
PRS02_/93	05/11/98 – 05/15/98	15	195	1	0.51
PRS02_/94	06/15/98 – 06/19/98	12	156	4	2.56
PRS02_/95	07/13/98 – 07/17/98	15	195	4	2.05
PRS02_/96	08/07/98 – 08/12/98	12	156	10	6.41
PRS02_/97	09/26/98 – 09/30/98	11	143	2	1.40
PRS02_/98	10/17/98 – 10/21/98	15	195	4	2.05
PRS02_/99	11/09/98 – 11/13/98	14	182	4	2.20
PRS02_/00	12/07/98 – 12/11/98	11	143	5	3.50

Summary:

The overall bridge data from the HOTS cruises proves to be of excellent quality with 2.04% of the reported values flagged for potential problems, but please note the quality of the individual cruises may vary (see Table 1). The distribution of flags for each variable are detailed in Table 2.

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

Variable	B	D	G	J	Q	Total Number of Flags	Percentage of Variable Flagged
TIME							0.00
LAT							0.00
LON							0.00
PL_HD					4	4	0.68
PL_SPD					3	3	0.51
PL_WDIR				1	28	29	4.94
PL_WSPD					12	12	2.04
DIR							0.00
SPD							0.00
P	1		12		7	20	3.41
T		2		1	47	50	8.52
TW		2			25	27	4.60
TS				2	9	11	1.87
Total Number of Flags	1	4	12	4	135	156	
Percent of All Values Flagged	0.01	0.05	0.16	0.05	1.77	2.04	

Percentages > 0.01

<u>*B-flags*</u>:

One B-flag was assessed to atmospheric pressure (P) during the PRS02_/87 cruise. The value recorded was an unrealistic 25.3 mb.

<u>*D-flags*</u>:

Air temperature (T) and wet bulb temperature (TW) were both assessed two D-flags by the automated preprocessor on two different cruises: PRS02_/90 and PRS02_/94. D-flags are applied to both variables if TW is greater than or equal to T, a physically unrealistic occurrence.

<u>*G-flags*</u>:

Pressure (P) received 12 G-flags during two different cruises. Eleven G-flags were assessed to P during the PRS02_/61 cruise. These flagged values were approximately 18 mb lower than the climatological mean and were left in place to accent these extreme values.

One G-flag was assessed during the PRS02_/84 cruise for a pressure value at 1045 mb. This high pressure value was 30 mb higher than the climatological mean and was left in place to emphasis this extreme value.

The G-flags were left in place to highlight values that are greater than four standard deviations from the climatological mean (da Silva et al. 1994).

J-flags:

All of the J-flags discussed in this report were converted flags previously placed on the data by HOTS personnel. Two J-flags were discovered on sea temperature (TS) during the PRS02_/61 cruise, one on the platform relative wind direction (PLWDIR) during the PRS02_/69 cruise, and one on temperature (T) during the PRS02_/72 cruise, which all accentuated bad measurements.

Q-flags:

Data from the HOTS cruises that were deemed suspect by the HOTS staff were assessed Q-flags by WOCEMET, as they reveal that the data arrived at WOCEMET as questionable.

FINAL DISCUSSION

Special attention should be made to variables affected by the Q-flag, as WOCEMETs' DQE did not assign these flags and therefore, did not thoroughly discuss in this document the reasons for their use.

These data are in excellent condition and should prove reliable for the user.

REFERENCES

Smith, S.R., C. Harvey, and D.M. Legler, 1994: *Handbook of Quality Control Procedures and Methods for Surface Meteorology Data*. Report No. 141/96, Report MET 96-1, Center for Ocean-Atmospheric Prediction Studies Florida State University, Tallahassee FL 32306-2840

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.