COADS Bridge Data Quality Control Report

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Surface Meteorological Data Assembly Center

Center for Ocean-Atmospheric Prediction Studies

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Addendum:

Member's of the WOCE Hydrographic Project Office (WHPO) and WOCEMET met at the 13th Data Products Committee (DPC) meeting in College Station, TX to discuss reconciliation of the WOCE cruise line designators. This was done in anticipation of the future release of version 3 of the WOCE global data set, and resulted in changes to several WOCE cruise line designations.

On December 21, 2000, WOCEMET combined the WOCE designator for the Hudson (Identifier: CGDG) cruise AR_05_/01, A__04_/01, AR_20C/01, AR_22_/01 to the updated form, AR_05_/01, AR_20_/01, and AR_22_/01.

The cruise designators, AR_05_/02 and AR_13_/06 should be added to the CGDG's cruise A__01W/00.

The cruise designator AR_04_/05 for the Le Noroit (Identifier: FITA) was split into two different designators, AR_04E/05 and AR_04W/05.

On May 11, 2001 WOCEMET combined the WOCE designators for the Chofu Maru's (Identifier: JCCX) cruises PR_19_/01 and PR_19_/02 to be referenced as PR_19_/01. The quality control information for these data sets has been left in the report for the user, but please note that the lines previously known as PR_19_/01 and PR_19_/02 are now combined together under PR_19_/01.

WOCEMET combined the WOCE designators for the Discoverer's (Identifier: WTEA) cruises P__16N/01 and P__16N/02 to be referenced as P__16N/00. The quality control information for these data sets has been left in the report for the user, but please note that the lines previously known as P__16N/01 and P__16N/02 are now combined together under P__16N/00.

On June 4, 2001 WOCEMET updated the designator for the Franklin's (Identifier:VJJF) cruise line IR_02_/01 to be referenced as S__05_/00.

WOCEMET replaced data from the Franklin's (Identifier: VJJF) two cruises IR_04_/03 and IR_06_/04 with high resolution data. The quality control information for the old data has been left in the report for the user, but the quality control information for the new high resolution data can be found in the new Franklin AWS Data Quality Control Report: WOCEMET 01-08.

On August 6, 2001 WOCEMET removed the WOCE designation for the cruise PR_23_/03 for the Kaiyo (Identifier: JRPG). The quality control information for this data has been left in this report for the user, but please note that the line previously known as PR_23_/03 is NOT a WOCE cruise line.

The WOCE designator for the JRPG's cruise PR_24_/02 has been updated and will now also be listed as PR_23_/02.

WOCEMET removed the WOCE designation for the cruise IR_04_/05 for the Malcolm Baldrige (Identifier: WTER). The quality control information for this data has been left in this report for the user, but pleasr note that the line previously known as IR_04_/05 is NOT a WOCE cruise line.

On August 20, 2001 WOCEMET removed the WOCE designation for the cruise PRS03_/04 for the New Horizon (Identifier: WKWB). The quality control information for this data has been left in this report for the user, but please note that the line previously known as PRS03_/04 is NOT a WOCE cruise line.

On March 28, 2002 WOCEMET removed the WOCE designation for the cruises PR_16_/09 and PR_16_/10 for the Discoverer (Identifier: WTEA). The quality control information for these data have been left in this report for the user, but please note that the lines previously known as PR_16_/09 and PR_16_/10 are NOT WOCE cruise lines.

Introduction:

The data referenced in this report are bridge observations obtained from the Comprehensive Ocean Atmosphere Data Set (COADS) (Slutz et. al.). The data originated on the research vessels Takuyo (identifier: 7JWN), Hudson (identifier: CGDG), Sonne (identifier: DFCG), Le Noroit (identifier: FITA), Charles Darwin (identifier: GDLS), Chofu Maru (identifier: JCCX), Shumpu Maru (identifier: JFDG), Kaiyo (identifier: JRPG), T. Washington (identifier: KGWU), Tyro (identifier: PIBQ), Akademic A. Nesmeyanov (identifier: UBYK), Akademic Lavrentyev (identifier: UJFY), Franklin (identifier: VJJF), New Horizon (identifier: WKWB), Discoverer (identifier: WTEA), Vickers (identifier: WTEC), Malcom Baldrige (identifier: WTER), Oceanus (identifier: WXAQ), James Clarke Ross (identifier: ZDLP), and Agulhas (identifier: ZSAF). The data were provided to the Florida State University Data Assembly Center (DAC) in electronic format by 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) reviewed the data and current flags, whereby flags were 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 summaries the flags for the Comprehensive Ocean Atmospheric Data Set, including those added by both the preprocessor and the DQE.

Statistical Information:

The Comprehensive Ocean Atmospheric Data Set is expected to include observations taken at irregular time intervals on all 71 WOCE cruises. Values for the following variables were collected, although some variables were not measured on different research vessels and cruises:

Time	(TIME)
Latitude	(LAT)
Longitude	(LON)
Earth Relative Wind Direction	(DIR)
Earth Relative Wind Speed	(SPD)
Atmospheric Pressure	(P)
Air Temperature	(T)
Sea Temperature	(TS)

Dewpoint Temperature	(TD)
Wet Bulb Temperature	(TW)
Present Weather	(WX)
Total Cloud Amount	(TCA)
Low/Middle Cloud Amount	(LMCA)
Cloud Base Height	(ZCL)
Low Cloud Type	(LCT)
Middle Cloud Type	(MCT)
High Cloud Type	(HCT)

Sixteen of the 71 WOCE cruises were missing one or more of the variables listed above. These missing variables are listed by ship and by cruise in Table 1.

Table 1: Missing Variables

RV/CTC	TD	TW	WX	LMCA	ZCL	LCT	MCT	HCT
CGDG								
AR_05_/01; A__04_/01; AR_20C/01; AR_22_/01		X						
AR_07W/02		X						
AR_07W/03		X						
AR_13_/05					X			
FITA								
PR_15_/18		X						
PR_15_/19		X						
JCCX								
PR_19_/01			X					
PR_19_/03		X	X					

JFDG								
PR_17_/04		**X**						
PR_17_/19					**X**			
PIBQ								
AR_07E/01		**X**						
AR_07E/02		**X**						
UBYK								
P__01W/00	**X**	**X**						
UJFY								
PR_13N/03	**X**	**X**						
WXAQ								
AR_11_/02		**X**		**X**		**X**	**X**	**X**
ZSAF								
ISS01_/01		**X**						

Details of the cruises are listed in Table 2 and include cruise dates, number of records, number of values, number of flags, and total percentage of data flagged. A total of 70,354 values were evaluated with 1,132 flags added by the preprocessor and the DQE for a total of 1.61% of the values being flagged. The coded data (WX, TCA, LMCA, ZCL, LCT, MCT, HCT) were not included in these statistics.

Table 2: Statistical Cruise Information

RV/CTC	Dates	Number of Records	Number of Values	Number of Flags	Percentage Flagged

CGDG					
AR_05_/01; A__04_/01; AR_20C/01; AR_22_/01	04/25/91 - 05/23/91	88	792	12	1.52
AR_07W/02	05/27/91 - 06/04/91	20	180	0	0.00
AR_07W/03	05/28/92 - 06/13/92	40	360	0	0.00
AR_10_/07	04/07/93 - 05/12/93	72	720	6	0.83
AR_07W/04	06/19/93 - 06/28/93	32	320	8	2.50
AR_13_/02; AR_19_/02; AR_22_/02	11/05/93 - 12/16/93	79	790	0	0.00
AR_07W/05; AR_13_/03	05/25/94 - 06/12/94	45	450	1	0.22
AR_13_/04	10/13/94 - 11/09/94	91	910	4	0.44
AR_13_/05	04/20/95 - 05/16/95	60	600	2	0.33
A__01W/00	06/09/95 - 07/04/95	63	630	1	0.16
DFCG					
IR_04_/01	12/23/90 - 01/19/91	95	950	17	1.79

FITA					
PR_15_/17	02/01/91 - 03/03/91	139	1,390	10	0.72
PR_15_/18	03/11/91 - 04/06/91	83	747	6	0.80
PR_15_/19	07/18/91 - 08/13/91	70	630	7	1.11
PR_15_/20	01/02/92 - 02/16/92	224	2,240	7	0.31
PR_15_/21	02/21/92 - 03/17/92	185	1,850	7	0.38
PR_15_/22	08/06/92 - 08/31/92	177	1,770	10	0.56
PR_15_/23	09/05/92 - 10/02/92	173	1,730	13	0.75
AR_04_/05; AR_15_/16	09/09/95 - 10/11/95	239	2,390	21	1.51
GDLS					
AR_10_/03	05/09/92 - 06/07/92	113	1,130	9	0.80
AR_11_/08	10/01/92 - 10/20/92	59	590	3	0.51
AR_10_/08	04/23/93 - 05/24/93	125	1,250	24	1.92

JCCX					
PR_19_/01	11/13/90 - 11/16/90	25	250	3	1.20
PR_19_/02	11/18/90 - 11/21/90	29	290	0	0.00
PR_19_/03	11/07/91 - 11/08/91	12	108	0	0.00
PR_19_/05	11/08/92 - 11/18/92	75	750	14	1.87
JFDG					
PR_17_/04	10/14/91 - 10/16/91	22	198	0	0.00
PR_17_/17	10/01/94 - 10/05/94	37	370	0	0.00
PR_17_/19	07/01/95 - 07/05/95	34	340	0	0.00
JRPG					
PR_24_/02	10/06/92 - 10/19/92	15	150	0	0.00
PR_23_/03	12/13/92 - 12/23/92	56	560	9	1.61
KGWU					
P__17C/00	06/03/91 - 07/11/91	132	1,320	1	0.08
P__17S/00	07/17/91 - 08/25/91	120	1,200	10	0.83
P__16C/00	09/01/91 - 10/01/91	85	850	10	1.18
PIBQ					
AR_07E/01	07/03/90 - 08/02/90	64	576	5	0.87
AR_07E/02	04/13/91 - 04/30/91	31	279	3	1.08

UBYK					
P__01W/00	08/31/93 - 09/03/93	11	88	3	3.41
UJFY					
PR_13N/03	05/13/93 - 06/08/93	75	600	0	0.00
VJJF					
IR_04_/03	08/28/94 - 09/03/94	23	230	0	0.00
IR_02_/01	11/20/94 - 12/01/94	22	220	7	3.18
ISSO3_/01	04/01/95 - 04/22/95	66	660	3	0.45
IR_06_/04	09/20/95 - 10/09/95	66	660	2	0.30
WKWB					
PRS03_/04	11/17/94 - 12/04/94	29	290	1	0.34

WTEA					
PR_16_/01	11/28/90 - 12/06/90	74	740	19	2.57
P__16N/01	02/28/91 - 02/28/91	8	80	0	0.00
P__16N/02	03/07/91 - 04/06/91	241	2,410	28	1.16
PR_16_/03	11/01/91 - 11/13/91	231	2,310	36	1.56
PR_16_/05	10/14/92 - 11/18/92	209	2,090	43	2.06
PR_16_/09	09/18/93 - 10/15/93	168	1,680	40	2.38
PR_16_/10	01/27/94 - 01/29/94	19	190	0	0.00
PR_16_/14	02/06/95 - 05/02/95	189	1,890	15	0.79
PR_16_/16	08/05/95 - 08/26/95	156	1,560	6	0.38

WTER					
PR_16_/02	03/23/91 - 04/19/91	205	2,050	13	0.63
PR_16_/04	02/23/92 - 03/26/92	255	2,550	34	1.33
PR_16_/06	02/21/93 - 03/18/93	208	2,080	74	3.56
PR_16_/07	04/18/93 - 05/14/93	221	2,210	66	2.99
AR_21_/02	08/22/93 - 10/03/93	259	2,590	14	0.54
PR_16_/11	04/16/94 - 05/09/94	229	2,290	75	3.28
PR_16_/15	05/17/94 - 06/17/94	284	2,840	106	3.73
PR_16_/12	08/04/94 - 08/25/94	215	2,150	138	6.42
PR_16_/13	08/30/94 - 09/25/94	247	2,470	91	3.68
IR_04_/05	08/24/95 - 09/25/95	238	1,380	0	0.00
WXAQ					
AR_11_/02	06/19/91 - 07/04/91	8	72	0	0.00
ZDLP					
SR_01_/04	11/20/93 - 12/18/93	64	640	14	2.19
ZSAF					
ISS01_/01	04/05/91 - 05/07/91	186	1,674	81	4.84

Summary:

The overall quality of the bridge data for the COADS proves to be excellent, though the quality varies by ship and by cruise. The distribution of flags for each variable is detailed in Table 3.

Table 3: Number of Flags and Percentage Flagged for Each Variable

Variable	B	D	F	G	L	S	T	Total Number of Flags	Percentage of Variable Flagged
TIME							497	497	6.99
LAT			57		1	166		225	3.16
LON			57		1	145		202	2.84
DIR	55					5		60	0.84
SPD				20		13		33	0.46
P				4		10		14	0.20
T		7		17		8		32	0.45
TS	6			16		16		38	0.53
TD		6				7		13	0.18
TW		13				5		18	0.25
WX								0	0.00
TCA								0	0.00
LMCA								0	0.00
ZCL								0	0.00
LCT								0	0.00
MCT								0	0.00
HCT								0	0.00
Total Number of Flags	61	26	114	57	2	375	497	1,132	
Percentage of All Values Flagged	0.09	0.04	0.16	0.08	0.00*	0.53	0.70	1.61	

*Percentage < 0.01

Time Duplicate Problem:

Almost seven percent of the time stamps were flagged with the T flag by the preprocessor, indicating time duplication. If there are two values for any given variables that share the same time stamp they will both be displayed at that time by the visual data assessment tool (VIDAT). In many cases, this problem caused spikes in the data. Often times if a spike occurred the DQE determined which value was real and flagged the other value as a spike (S). Though the time duplicate spike occurred throughout the data, it was most common in the position data. The user may wish to avoid using meteorological data at times flagged as duplicates.

Other Problems:

Latitude and Longitude received F flags indicating unrealistic platform velocity as determined by the position data. Both variables also received an L flag, denoting a position over land. Erroneous position reports are not uncommon to bridge data.

A total of 26 D flags were assigned by the preprocessor to T, TW, and TD for failing the T>TW>TD test. In the free atmosphere, the value of the temperature is always greater than or equal to the wet-bulb temperature, which in turn is always greater than or equal to the dewpoint temperature (Smith et al. 1996).

The G flag designates data that have values four standard deviations or greater from the COADS climatological means (da Silva et al. 1994).

The B flag assigned by the preprocessor designates a wind direction outside the 0 to 360 degree bounds. A value of 362 degrees refers to variable wind and 361 degrees refers to calm wind in COADS data. All of these values were flagged with the B flag by the preprocessor, but can be considered as reliable data values.

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

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Slutz, R.J., S.J. Lubker, J.D. Hiscox, S.D. Woodruff, R.L. Jenne, D.H. Joseph, P.M. Seurer and

J.D. Elms, 1985: COADS - Comprehensive Ocean Atmosphere Data Set, CIRES/ERL/NCAR/NCDC, Boulder, Colorado.