

# **COADS Bridge Data Quality Control Report**

Jesse Enloe and Shawn R. Smith

**World Ocean Circulation Experiment (WOCE)**

Surface Meteorological Data Assembly Center  
Center for Ocean-Atmospheric Prediction Studies  
Florida State University

December 21, 2000

Report WOCEMET 99-13

Version 2.0

*Addendum:*

*Members of the WOCE Hydrographic Project Office (WHPO) and WOCEMET met at the 13<sup>th</sup> 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 changed the WOCE designators 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 designator, AR\_14\_/02 should be added to the CGDG's cruise AR\_07W/05; AR\_13\_/03.*

*The cruise designators AR\_05\_/02 and AR\_13\_/06 should be added to the CGDG's cruise A\_\_01W/00.*

*The designator AR\_04\_/05 for the Le Noroit (Identifier: FITA) was split into two different designators, AR\_04E/05 and AR\_04W/05.*

*The WOCE designator for the VJJF's cruise IR\_02\_/01, was updated to S\_\_05\_/00.*

### *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 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: VJFF), 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 summarizes the flags for the Comprehensive Ocean Atmospheric Data Set, including those added by both the preprocessor and the DQE.

### *Statistical Information:*



	AR_07E/01		X					
	AR_07E/02		X					
<b>UBYK</b>								
	P_01W/00	X	X					
<b>UJFY</b>								
	PR_13N/03	X	X					
<b>WXAQ</b>								
	AR_11_/02		X		X		X	X
<b>ZSAF</b>								
	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**

<b>RV/CTC</b>	<b>Dates</b>	<b>Number of Records</b>	<b>Number of Values</b>	<b>Number of Flags</b>	<b>Percentage Flagged</b>
<b>CGDG</b>					
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; AR_14_/02	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;AR_05_/02; AR_13_/06	06/09/95 - 07/04/95	63	630	1	0.16
<b>DFCG</b>					
IR_04_/01	12/23/90 - 01/19/91	95	950	17	1.79
<b>FITA</b>					

	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
<b>GDLS</b>						
	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
<b>JCCX</b>						
	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
<b>JFDG</b>						
	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
<b>JRPG</b>						
	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
<b>KGWU</b>						
	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
<b>PIBQ</b>						
	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
<b>UBYK</b>						
	P__01W/00	08/31/93 - 09/03/93	11	88	3	3.41
<b>UJFY</b>						
	PR_13N/03	05/13/93 - 06/08/93	75	600	0	0.00
<b>VJFF</b>						
	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
<b>WKWB</b>						
	PRS03_/04	11/17/94 - 12/04/94	29	290	1	0.34
<b>WTEA</b>						
	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
<b>WTER</b>						
	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
<b>WXAQ</b>						
	AR_11_/02	06/19/91 - 07/04/91	8	72	0	0.00
<b>ZDLP</b>						
	SR_01_/04	11/20/93 - 12/18/93	64	640	14	2.19
<b>ZSAF</b>						
	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
<b>TIME</b>							497	497	6.99
<b>LAT</b>			57		1	166		225	3.16
<b>LON</b>			57		1	145		202	2.84
<b>DIR</b>	55					5		60	0.84
<b>SPD</b>				20		13		33	0.46
<b>P</b>				4		10		14	0.20
<b>T</b>		7		17		8		32	0.45
<b>TS</b>	6			16		16		38	0.53
<b>TD</b>		6				7		13	0.18

<b>TW</b>		13				5		18	0.25
<b>WX</b>								0	0.00
<b>TCA</b>								0	0.00
<b>LMCA</b>								0	0.00
<b>ZCL</b>								0	0.00
<b>LCT</b>								0	0.00
<b>MCT</b>								0	0.00
<b>HCT</b>								0	0.00
<b>Total Number of Flags</b>	61	26	114	57	2	375	497	1,132	
<b>Percentage of All Values Flagged</b>	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. 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  $T \geq TW \geq TD$  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 are four standard deviations 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 a value of 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 WOCOMET 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.

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.