NODC Accession Number

NODC Electronic Data Documentation Form

NOAA FORM 24-13
(Revised 9/2001)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE
NATIONAL OCEANOGRAPHIC DATA CENTER
SSMC-3 FOURTH FLOOR, 1315 EAST WEST HWY
SILVER SPRING MD 20910-3282

FORM APPROVAL PENDING

This form should accompany all data submissions to the National Oceanographic Data Center. Section 1, Contributor Identification, must be completed when the data are submitted. It is highly desirable for NODC to also receive the remaining pertinent descriptive information about the submitted data at that time. Please include any relevant reports, publications, or other supporting documentation that assist in describing data collection, analysis, and format specifics.

SECTION 1. CONTRIBUTOR IDENTIFICATION

(PLEASE COMPLETE INFORMATION ABOUT WHO IS SENDING THE DATA TO NODC.)

1. Name of contributor Jeffrey Smart / Sarah Rennie	5. Telephone 443-778-4331 / 443-778-8178
2. Organization/Institution name Johns Hopkins University Applied Physics Lab	6. Email Jeffrey.Smart@jhuapl.edu Sarah.Rennie@jhuapl.edu
3. Mailing address Bldg 8-314 11100 Johns Hopkins Road	7. FAX 443-778-6908
4. City Laurel State/Province MD Zip/Postal Code 20723-6099 Country USA	8. Other contact methods/information

SECTION 2. DATA COLLECTOR IDENTIFICATION

(PLEASE COMPLETE INFORMATION ABOUT WHO COLLECTED THESE DATA.)

1. Name of data collector Compilation of many data collections from multiple collectors. See documentation file WOOD_AuthorID.htm	5. Telephone enter one or more phone numbers
2. Organization/Institution name enter organization name(s)	6. Email enter one or more email address
3. Mailing address enter up to 3 address lines	7. FAX enter one or more fax number
4. City enter city State/Province enter state/province Zip/Postal Code enter zip/postal code Country enter country	8. Other contact methods/information enter other relevant contact information

SECTION 3. GENERAL DATASET DESCRIPTION
(PLEASE COMPLETE GENERAL INFORMATION ABOUT THESE DATA.)

1. Dataset Title (if applicable) (may be sent in an included ASCII text file named “abcTITLE.TXT” where abc are your initials)

Worldwide Ocean Optics Database WOOD

2. Dataset Abstract (please provide a brief description of the contents of the dataset) (may be sent in an included ASCII text file named “abcABSTRACT.TXT” where abc are your initials)

WOOD was developed to be a comprehensive publicly-available oceanographic bio-optical database providing global coverage. It includes nearly 250 major data sources (including international contributions as well as US sources (e.g. NASA, NODC) of optics and chlorophyll profiles) and hold over 40 derived and measured physical properties of interest to optical oceanography, including Inherent and Apparent Optical Properties (IOPs and AOPs), pigments and nutrients, Secchi depths, along with co-located supporting parameters such as temperature and salinity.

3. Dataset Purpose (please provide a brief statement about the purpose for collecting these data) (may be sent in an included ASCII text file named “abcPURPOSE.TXT” where abc are your initials)

The primary goal of this work has been to establish a unified optics database that collects, in one place and in one format, as many of bio-optical data sets as possible. The data have been converted to a common data format with extensive efforts in editing wild points and the removal of spurious data regions. Optical measurements are recorded at the measured wavelength. One parameter of particular interest is Kd, the diffuse attenuation coefficient which is either computed from downwelling (Ed) light or from an empirical relation with chlorophyll which is good to within 10% in open ocean conditions.

4. Dataset collection dates

First day of data collection: 1900

Last day of data collection: 2011

5 Dataset location

Northernmost Latitude: 82

Southernmost Latitude: -84

Easternmost Longitude: 180

Westernmost Longitude: -180

Ocean/sea area names

global coverage

6. Platform(s) used to collect these data

Platform name(s) and type(s)

multiple platforms

7. Instruments used to collect these data

Instrument(s)

See accompanying documentation file WOOD_Export_ASCIIflatfile_datatables.doc Table 3.

8. Parameters measured

Parameters

See accompanying documentation file WOOD_Export_ASCIIflatfile_datatables.doc Table 2.

9. Project name(s)

multiple

10. Original cruise name(s)

multiple. See accompanying documentation file WOOD_CruiseID.htm

11. Volume of data transferred (in bytes)

103,665KB (zipped), 715,085KB(unzipped)

12. Filenames in data submission

all tab-delimited text files zipped together into WOODascii_datatables.zip

SECTION 4. SCIENTIFIC CONTENT OF DATASET

(PLEASE COMPLETE SPECIFIC INFORMATION ABOUT THESE DATA.)

Include enough information concerning the manner of observation, instrumentation, analysis, and data reduction techniques to make them understandable to future users. Furnish the minimum documentation considered relevant to each data type. Documentation will be retained 'as is' as a permanent part of the data and will be available for future users. Equivalent information already available may be substituted for this section of this form (i.e., publications, reports, and README files containing descriptions of observational and analytical methods).

NAME OF MEASURED PARAMETER	UNIT OF MEASURE USED FOR PARAMETER	OBSERVATION METHOD AND INSTRUMENT USED (TYPE & MODEL	ANALYTICAL METHOD AND LABORATORY PROCEDURES USED (INCLUDING MODIFICATIONS)	DATA PROCESSING TECHNIQUES (WITH FILTERING AND AVERAGING)
WOOD_Export_ASCIIflatfile _datatablesdoc Table 2			enter corresponding analytical method for each parameter	enter corresponding processing technique for each paramater

SECTION 5. DATA FORMAT OF DATASET

(PLEASE COMPLETE SPECIFIC INFORMATION ABOUT THE FORMAT OF THESE DATA.)

Include enough information concerning the format of these data to make them understandable to future users. Furnish at least the minimum documentation considered relevant for your data. Documentation will be retained 'as is' as a permanent part of the data and will be available for future users. Equivalent information already available may be substituted for this section of this form (i.e., publications, reports, and README files containing descriptions of the data format). At a minimum, please include the following information:

1. Media type on which data were submitted (e.g., FTP, exabyte tape, etc.)

FTP

2. Name of included file that contains specific record layout, if applicable, including:
FIELD NAME, POSITION FROM 0 MEASURED IN (BITS, BYTES, ETC.), LENGTH (NUMBER, UNITS), ATTRIBUTES, USE AND MEANING

WOOD_Export_ASCIItextfile_datatables.doc

3. Brief description of file organization

ASCII text files, one file per database table == 1 file per parameter

4. Record type(s)

each line contains YEAR DAY TIME LAT LON TEST CAST INSTR NPTS PTYPE L_EDIT L_EQUAL NEWHEAD TIMEFLAG CENTWAVE BANDWITH VERTRES DCODE AUTHOR DEPTH DATA WATER PROF_NUM DATETIME
see WOOD_Export_ASCIItextfile_datatables.doc Table 1 for definitions.

5. Data format information contact person

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Telephone 443-778-8178

Address Johns Hopkins University Applied Physics Lab
Bldg 8-314
Laurel, MD 20723 USA

SECTION 6. INSTRUMENT CALIBRATION

(PLEASE COMPLETE SPECIFIC CALIBRATION INFORMATION ABOUT INSTRUMENTS USED TO COLLECT THESE DATA.)

Include enough information about instrument calibration to make it understandable to future users. Furnish the minimum documentation considered relevant for each instrument. Documentation will be retained 'as is' as a permanent part of the data and will be available for future users. Equivalent information already available may be substituted for this section of this form (i.e., publications, reports, and README files containing descriptions of observational and analytical methods).

1. Name of included file that contains specific calibration details, if applicable, including:
INSTRUMENT TYPE (MFR., MODEL#), DATE OF LAST CALIBRATION, LAST CALIBRATED BY (NAME, ORGANIZATION), INSTRUMENT CALIBRATED AT (FIXED INTERVALS/BEFORE USE/AFTER USE/BEFORE AND AFTER USE/ONLY AFTER REPAIR/ONLY WHEN NEW/OTHER (SPECIFY)/INSTRUMENT NOT CALIBRATED

N/A

WOOD_Export_ASCIItextfile_datatables.doc

--- Exported ASCII Text Files from WOOD README (June 2012)--

The contents of the WORLD-WIDE OCEAN OPTICS DATABASE (WOOD) has been output to ASCII text files, one file per table from the database. The data fields are delimited by TABS (as denoted by the file suffixes ".tsv" meaning "tab separated values"). The oceanographic data is organized into profiles (parameter values vs depth at a given location). The first line of each file gives the 25 column headings which are:

```
YEAR  DAY   TIME  LAT   LON   TEST  CAST  INSTR NPTS  PTYPE L_EDIT
L_EQUAL     NEWHEAD     TIMEFLAG    CENTWAVE    BANDWITH    VERTRES
DCODE       AUTHOR      DEPTH DATA  WATER PROF_NUM    DATETIME    NODC
```

Except for "DEPTH" and "DATA", each column has a single value, described in Table 1. The "DEPTH" and "DATA" fields are 1-D vectors of measurement depths (in meters) and the parameter values (such as temperature in degrees Celcius). The number of points in these vectors is given by NPTS (the ninth column) and the values within vectors are separated by spaces.

Table 1. Column Headings and Contents

Column#	Heading	Contents
1	YEAR	YEAR of the data measurement (e.g., 1995)
2	DAY	Julian day of the data (1 to 366)
3	TIME	time the data was taken (HHMM -- military time format) TIMEFLAG in Column 14 indicates GMT or local. NULL for time not supplied
4	LAT	Latitude of the data measurement (e.g. +23.0987)
5	LON	Longitude of the data; negative in Western hemisphere.
6	TEST	Cruise ID number assigned in WOOD*. see documentation file WOOD_CruiseID.html
7	CAST	sequential cast number within a given Cruise
8	INSTR	2 digit code denoting instrument used to obtain the data (see Table 3)
9	NPTS	number of data pairs in the profile (length of vector in DEPTH and DATA)
10	PTYPE	2 digit code denoting the type of parameter measured
11	L_EDIT	code designating editing done to data in the profile (see Table 4)
12	L_EQUAL	code designating quality of data in the profile (see Table 4)
13	NEWHEAD	ASCII text description of the TEST or "Cruise"
14	TIMEFLAG	1=local time; 2=GMT=UTC; 3=time convention is unknown
15	CENTWAVE	3 digit integer for center wavelength in nm (e.g., 490 nm) for optical measurements
16	BANDWITH	2 digit integer for the bandwidth (in nm) of the sensor
17	VERTRES	vertical resolution (meters) of the data
18	DCODE	code for dissemination rules; 1 = unlimited public dissemination
19	AUTHOR	see documentation file WOOD_AuthorID.html or Metadata Info page at wood.jhuapl.edu
20	DEPTH	vector of depths (meters) separated by spaces
21	DATA	vector of parameter values separated by spaces
22	WATER	water depth in meters at the location of the profile from NAVOCEANO digital bathymetric data base DBDB-V
23	PROF_NUM	unique number assigned to each profile in WOOD; can be used to reconstruct multi-parameter profiles stored in different WOOD database tables
24	DATETIME	Date and Time of the profile measurement: year-month-day/hr-min-sec string (e.g., 1996-08-17 22:33:00)

25	NODC	NODC accession #; NULL for data NOT received from NODC

* Sometimes a single Cruise # is a compendium of multiple field deployments, but usually it refers to a particular field trip by a single ship or glider.

Table 2. Parameter Code and Table Names from WOOD.

PTYPE Code	*Parameter name and units*	*Symbol*	*TableName* (ascii file name)
1020	Gelbstoffe component of Absorption Coefficient (/m)	a_g	**ag_data.tsv**
1	Absorption Coefficient (/m)	a	**a_data.tsv**
1040	Part. Gelb. component of Absorption Coefficient (/m)	a_{gp}	**agp_data.tsv**
170	Ammonium (μMol)	NH4	**ammonium.tsv**
103	Particle component of Absorption Coefficient (/m)	a_p	**ap_data.tsv**
2	Scattering Coefficient (/m)	b	**b_data.tsv**
5	Backscatter (/m) * 1,000	b_b	**bb_data.tsv**
31	Particulate component of Beam Atten Coef ("c_p") (/m)	c_p	**beam_cp.tsv**
6	Angular Backscattering Coef. (/SR/m *10,000)	β(θ)	**beta_data.tsv**
23	Bioluminescence Potential (photons/s/cc x 10^{-8})	Biolum	**bio_data.tsv**
201	Particulate component of Scattering Coefficient (/m)	bp	**bp_data.tsv**
3	Beam Attenuation Coefficient (/m)	c	**c_data.tsv**
13	Chlorophyll a (μg/liter)	Chl a	**chl_a.tsv**
14	Chlorophyll b (μg/liter)	Chl b	**chl_b.tsv**
15	Chlorophyll c (μg/liter)	Chl c	**chl_c.tsv**
7	Downwelling Irradiance (μW/cm^2/nm)	E_d	**ed_data.tsv**
8	Upwelling Irradiance (μW/cm^2/nm)	E_u	**eu_data.tsv**
4*	Diffuse Attenuation Coefficient K_d (/m)	K_d	**k_data.tsv**
41	K_d from Sunlight (/m)	K_d	**k_data includes several PTYPE codes, combining Kd values from multiple sources**
44	K_d from bottle sampled total Pigment using GM algorithm[1] (/m)	K_d	
47	K_d from Downwelling Irradiance (/m)	K_d	
49	K_d from chl a only using GM algorithm [1] (/m)	K_d	
440	K_d from calibrated flourometer chlor_a using GM algorithm [1] (/m)	K_d	
422	K from PAR (/m)	Kpar	**k_par.tsv**
424	K from Upwelling Radiance (Lu)	KL	**kl_data.tsv**
423	K from Upwelling Irradiance (Eu)	Ku	**ku_data.tsv**
10	Upwelling Radiance (μW/cm^2/nm/SR)	L_u	**lu_data.tsv**
241	Natural Fluoresence (nE/m^2/sr/s)	Natfl	**natural_fl.tsv**
172	Nitrate (μMol)	NO3	**nitrate.tsv**
171	Nitrogen Dioxide (μMol)	NO2	**nitrite.tsv**
30	Organic Suspended Matter (Total; gm/l)	OSM	**osm.tsv**
18	Oxygen (ml/l)	O_2	**oxygen.tsv**

73	Photosynthetically Available Radiation (PAR)	PAR	**par_data.tsv**
16	Phaeophytin (μg/liter)	Phaeo	**pha_data.tsv**
173	Phosphate (μMol)	PO4	**phosphate.tsv**
12	Pigment Concentration (μg/liter)	C = Chl a + Phaeo	**pig_data.tsv**
24	Uncalibrated Fluorescence (volts)	Fl	**rel_fluor.tsv**
11	Radiance Reflectance	$R_l = L_u/E_d$	**rl_data.tsv**
111	Remote Sensing Reflectance	Rrs	**rrs_data.tsv**
20	Salinity (ppt)	S	**sal_data.tsv**
28	Secchi Depth (m)	Sec	**secchi.tsv**
174	Silicate (μMol)	SiO_4	**silicate.tsv**
19	Temperature (degC)	T	**temp_data.tsv**
29	Suspended Particulate Matter (Total; gm/l)	TSPM	**tspm.tsv**
51	Uncalibrated Scattering (Volts) (Turbidity)	Tu	**turbidity.tsv**
240	Gelbstoffe Fluoresence (V or counts)	Gelb_fl	**yellow_mat.tsv**

[1] Gordon, H. R., and A. Morel, " Remote Assessment of Ocean Color for Interpretation of Satellite Visible Imagery: AR, 114 pp., Springer-Verlag, NewYork, 1983. and
Morel, A., & Maritorena, S. (2001). "Bio-optical properties of oceanic waters: A reappraisal", Journal of Geophysical Research, 106, 7163– 7180.

Table 3. Instrument Types

Code	*Instrument Suite Used*
0	Unknown
	<u>Multi-Spectral Radiometers</u>
1	MER1012
2	MER1032
3	MER1048
4	MER2020 or MER2048
41	PRR 600s Profiling Reflectance Radiometer
42	SATLANTIC SPMR
43	SATLANTIC Hyper Spectral TSRB
44	Biospherical MCP 2300 (single-channel Ed sensor)
45	SATLANTIC Hyper Pro or Hyper Spectral OCR
46	VISLAB Irradiance meter
	<u>In situ Chlorophyll Measurements</u>
5	UN-Calibrated fluorometer
8	SeaTech fluorometer
9	APL fluorometer
	<u>Bottle Sampled Chlorophyll Measurements</u>
6	HPLC
7	Spectrophotometric Technique
71	Van Dorn (Japanese)
72	Laser fluorescence (e.g. LIDAR fluorosensor)
10	Calibrated fluorometer
	<u>Transmissometers:</u>
11	SeaTech Beam Transmissometer (660 nm, 40 nm BW) path length = 25 cm
110	WETLabs C-star Transmissometer (10 nm BW)

12	APL Custom Beam Transmissometer (80 nm FWHM)
111	Chelsea Alpha Tracker Mk II (660 nm)
112	SeaTech 5 cm, 660 nm transmissometer
	<u>Backscatter Meters:</u>
13	APL Towed chain style β(170°) unit (485nm), 75 nm FWHM
14	APL TOMS style β(170°) unit, 32 nm FWHM; 485 or 532 nm
15	SRI backscatter meters (pre-1995 vintage)
16	SRI β(π) system
161	SeaTech Scatter sensor (880 nm, Turbidity)
162	Wyatt Technologies Dawn Scattering Photometer
163	HOBILabs Hydroscat
164	HOBILabs a-Beta
165	WETLabs bb sensor (470 nm/20 nm FWHM;700 nm/70 nm FWHM)
	<u>Absorption Meters:</u>
17	SeaTech a-meter
18	WETLabs spectral **a**,**c** meter
	<u>CTD's</u>
19	SeaBird SBE-4 (pumped cond cell)
190	NAVO CTD
191	SeaBird SBE-3 temp. sensor
192	SeaBird SBE-3 temperature & SeaBird SBE-4 conductivity
193	APL MiniOPS temperature sensor
194	APL MiniOPS "bullseye" conductivity sensor
195	TOMS metal-cased 120 ms thermistor
196	TOMS flow-thru 4-electrode opposed conductivity cell
197	SeaBird SBE-9/911/911+
198	Generic CTD (model unknown)
199	SeaBird SBE 19
20	MINIOPS
21	XBT
	<u>Custom Environmental Sensors</u>
30	EOS - Environmental Optical System
31	NADC Prototype Expendable K meter (530 nm)
32	Ondercin APL/JHU Bathyphotomer
33	NRL Chain (single channel Ed sensor)
34	HIDEX (NAVO Biolum sensor suite)
35	OTIS (NAVO "Over-the Side" bathyphotometer)
	<u>Nutrients:</u>
400	Spectrometric (Strickland & Parsons, 1972)
401	Autoanalyzer (Strickland & Parsons, 1972)
402	Technicon autoanalyzer (Murphy & Riley, 1962)
403	Sumigraph autoanalyzer
	<u>Oxygen Measurements</u>
50	Winkler Method
51	Beckman POS
52	"CTD" Oxygen (NODC Usage)
53	Aanderaa "Optode"
60	<u>SECCHI DISK</u>
61	<u>Niskin Bottle</u>
100	WETLabs ECO FL NTU (Chla_a fluorescence/turbidity sensor)

Table 4. Data Quality/Editing Codes

Data Editing (“L_EDIT” Code)		*Data Quality (“L_EQUAL” Code)*	
Code	*Description*	*Code*	*Description*
0	unedited	1	good
1	noise spike edited	2	fair
2	spike edited & low pass	3	poor
3	edited and AVE	4	unknown
4	edited and Std. Dev.	5	Mixed
		6	Good relative structure, poor calibration

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