CATALOG DOCUMENTATION
EMAP-ESTUARIES PROVINCE LEVEL DATABASE
CAROLINIAN PROVINCE 1994-1997
SEDIMENT GRAIN COMPOSITION DATA

TABLE OF CONTENTS

1. DATA SET IDENTIFICATION

1.1 Title of Catalog Document

EMAP-Estuaries Province Level Database
Carolinian Province
Sediment Grain Composition Data

1.2 Authors of the Catalog entry

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1.3 Catalog Revision Date

March 04, 1998

1.4 Data Set Name

CP_GRAIN.DAT

1.5 Task Group

Estuaries

1.6 Data set identification codes

9

1.7 Version

001

1.8 Requested Acknowledgment

If you plan to publish these data in any way, EPA requires a standard statement for work it has supported:

"Although the data described in this article have been funded wholly or in part by the U. S. Environmental Protection Agency through its EMAP-Estuaries Program, it has not been subjected to Agency review, and therefore does not necessarily reflect the views of the Agency and no official endorsement should be inferred."

2. INVESTIGATOR INFORMATION

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3. DATA SET ABSTRACT

3.1 Abstract of the Data set

The CP_GRAIN.DAT data set contains sediment grain size data reported as percent silt+clay (SICL), percent sand (SAND), percent moisture content (MOISTURE), and percent total organic carbon (TOC) for all stations sampled in the EMAP Carolinian Province from 1994-1997.

The following reports are products of these and other data collected during the 1994-1997 Sampling period in the Carolinian Province. These reports may contain additional information and summary statistics that are not contained in this data set catalog or its respective data sets. We therefore recommend referring to them when using these data.

Hyland, J.L., T.J. Herrlinger, T.R. Snoots, A.H. Ringwood, R.F. Van Dolah, C.T. Hackney, G.A. Nelson, J.S. Rosen, and S.A. Kokkinakis. 1996. Environmental quality of estuaries of the Carolinian Province: 1994. Annual statistical summary for the 1994 EMAP-Estuaries Demonstration Project in the Carolinian Province. NOAA Technical Memorandum NOS ORCA 97. NOAA/NOS, Office of Ocean Resources Conservation and Assessment, Silver Spring, MD. 102 p.

Hyland, J.L., L. Balthis, C.T. Hackney, G. McRae, A.H. Ringwood, T.R. Snoots, R.F. Van Dolah, and T.L. Wade. 1998. Environmental quality of estuaries of the Carolinian Province: 1995. Annual statistical summary for the 1995 EMAP-Estuaries Demonstration Project in the Carolinian Province. NOAA Technical Memorandum NOS ORCA 123 NOAA/NOS, Office of Ocean Resources Conservation and Assessment, Silver Spring, MD. 143 p.

See Also: GERG (1997), Grimley and Hackney (1996), McRae and Nelson (1996), Nelson (1995), Ringwood et al. (1995), Ringwood et al.(1997), Ringwood et al. (1998), Wheeler et al (1995), Wheeler et al. (1996).

3.2 Keywords for the Data Set

Sediment grain size analyses, sand, silt, clay, silt-clay, moisture, TOC, EMAP Carolinian Province

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective

EMAP has three primary objectives:

1. To estimate the current status, extent, changes, and trends in indicators of the Nation's ecological resources on a regional basis;

2. To monitor indicators of pollutant exposure and habitat condition, and to seek correlative relationships between human-induced stresses and ecological condition that identify possible causes of adverse effects; and

3. To provide periodic statistical summaries and interpretive reports on ecological status and trends to the EPA Administrator and to the public.

4.2 Data Set Objective

The CP_GRAIN.DAT data set contains sediment grain size data reported as percent silt+clay (SICL), percent sand (SAND), percent moisture content (MOISTURE), and percent total organic carbon (TOC) for all stations sampled in the EMAP Carolinian Province from 1994-1997.

4.3 Data Set Background Information

Sediment characteristics such as grain size and organic content can have significant effects on the distribution of benthic species and on the concentrations and bioavailability of sediment associated contaminants. Higher percentages of sand, for example, may provide a greater number of microhabitats for interstitial species to exist and could increase sediment permeability allowing greater exchange of oxygen and nutrients at depth in the sediment (Hyland et al. 1991, Weston 1988). Grain size and organic content of sediments also are known to be strongly correlated with one another. Finer substrates tend to have a proportionally greater organic content than coarser sediments due to a higher surface-to-volume ratio of the sediment particles. There are logical functional links between benthic organisms and the presence of sediment organic matter as potential food sources. However, the higher surface-to-volume ratio of muds may also provide a greater surface area for sorption of chemical contaminants.

Percent water content of sediments, percent silt-clay, and percent total organic carbon (TOC) were measured at each station from subsamples of composited surface sediment (upper 2 cm) collected with a 0.04-m2 Young grab sampler. Subsamples for these sediment characteristics were obtained from the same composite source used for the analysis of contaminants and toxicity testing. Multiple grabs were taken at each station to produce enough composited surface sediment (~ 8 L) to support all of the various kinds of sediment analyses (including toxicity testing and contaminant analysis). A 300 mL subsample of the composite was obtained for the analysis of percent water and percent silt-clay, and a 50-mL subsample was obtained for the analysis of percent TOC.

Procedures for analyzing sediment characteristics were based on the general protocols provided in the EMAP-E Laboratory Methods Manual (U.S. EPA 1993, 1995). Percent water was calculated as a loss in the weight of the sample after drying (60 C) and correcting for salt content. For percent silt-clay, sediment samples were first dispersed with sodium hexametaphosphate and then sieved through a 63-micron screen. Coarser sediments retained on the screen were dried (60 C) and weighed. A 40-mL subsample of the filtrate also was dried (60 C) and used to estimate the percent silt-clay relative to the total sample weight.

Measurements of TOC were obtained from ~ 5 to 10 mg samples of dried sediment that were acidified (with 1M H3PO4) to remove carbonates, sonicated, and filtered. Filters containing the sediment were dried and combusted (Salonen 1979) on either a CHN or elemental analyzer to determine TOC concentration (expressed as percent TOC per gram of dried sediment).

4.4 Summary of Data Set Parameters

The CP_GRAIN.DAT data set contains sediment grain size data reported as percent silt+clay (SICL), percent sand (SAND), percent moisture content (MOISTURE), and percent total organic carbon (TOC) for all stations sampled in the EMAP Carolinian Province from 1994-1997.

4.5 Year-Specific Information about Data

TOC analyses were performed by different labs depending on year and station location. In 1994, each cooperator analyzed samples from their respective regions (i.e., UNC-W analyzed all stations from NC, SCDNR analyzed all stations from SC and GA, and FLDEP analyzed all stations from FL). In 1995, SCDNR analyzed all stations from NC, SC and GA, and FLDEP analyzed all stations from FL. In 1996, all TOC analyses were performed by GERG. In 1997, all TOC analyses were performed by UNC-W, with the exception of Chowan River samples (CP97345-CP97354) which were analyzed by an EPA contractor.

Grain size and moisture content analyses were also performed by different labs depending on year and station location.
In 1994 and 1995, each cooperator analyzed samples from their respective regions (i.e., UNC-W analyzed all stations from NC, SCDNR analyzed all stations from SC and GA, and FLDEP analyzed all stations from FL).In 1996, all grain size and moisture

analyses were performed by GERG. In 1997, all grain size and moisture analyses were performed by UNC-W, with the exception of Chowan River samples (CP97345-CP97354) which were analyzed by an EPA contractor.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition

5.1.1 Sampling Objective

See section 4.3 (Data Set Background Information)

5.1.2 Sample Collection Method Summary

See section 4.3 (Data Set Background Information)

5.1.3 Beginning Sampling Dates

30 June 1994
05 July 1995
09 July 1996
07 July 1997

5.1.4 Ending Sampling Dates

31 August 1994
14 September 1995
19 September 1996
25 August 1997

5.1.5 Platform

Samples were collected from various gasoline or diesel powered boats equipped with at least the following equipment: "A" frame boom or davit, winch, LORAN-C or GPS for location, and a depth finder.

5.1.6 Sampling Equipment

A 1/25 m2, Kynar-coated stainless steel, Young Grab sampler. This grab sampled an area of 440 cm2 and a maximum depth of penetration in the sediment of 10 cm.

5.1.7 Manufacturer of Sampling Equipment

Ted Young
Falmouth, MA

5.1.8 Key Variables

5.1.9 Sample Collection Method Calibration

The sampling gear does not require any calibration. It required inspection for deformities incurred due to mishandling or impact on rocky substrates.

5.1.10 Sample Collection Quality Control

Field site audits were conducted during sampling seasons by the QA Officer to determine compliance with the Quality Assurance Plan and Field Operations Manual.

Field technicians were trained to follow Standard Operating Procedures to insure the collection of representative, uncontaminated and high quality samples. QA/QC measures were taken in the field to avoid or reduce contamination and insure the collection of representative samples. These included: use of stainless steel instruments, thorough cleaning of the sampler between grabs, use of pre-cleaned containers for sediment storage and ensuring that engines were shut down when a sample was exposed to the air.
A successful grab had relatively level, intact sediment over the entire area of the grab and a sediment depth of 7-10 centimeters. Unacceptable grabs included those: containing no sediments, which were partially filled or had shelly substrates or grossly slumped surfaces. Grabs completely filled to the top, where the sediment was oozing out of the hinged top, were also unacceptable.

See: Hyland et al. (1996),
Hyland et al. (1998),
Kokkinakis et al. (1994a)

5.1.11 Sample Collection Method References

See: Hyland et al. (1996),
Hyland et al. (1998),
Kokkinakis et al. (1994b)

5.1.12 Sample Collection Method Deviations

None

5.2 Data Preparation and Sample Processing

5.2.1 Sample Processing Objective

Determine percent silt+clay, percent sand, percent total organic carbon, and percent moisture for sediment samples.

5.2.2 Sample Processing Methods Summary

5.2.2.1 Field Summary

NA

5.2.2.2 Laboratory Summary

See section 4.3 (Data Set Background Information)

5.2.3 Sample Processing Method Calibration

NA

5.2.4 Sample Processing Quality Control

Approximately 10% of each batch of samples analyzed by the same technician were re-analyzed as a quality control check for the analysis of percent water and percent silt-clay. Measurement differences could not exceed 10%.

Portions of the TOC samples, one for each batch of 25 or fewer samples, were run in duplicate as tests of analytical precision. Measurement differences could not exceed 20%. Quality control procedures for TOC also included the analysis of acetanilide standards and certified reference sediments (e.g., BCSS-1 marine sediment from NRC).

See: Hyland et al. (1996),
Hyland et al. (1998),
Kokkinakis et al. (1994a)

5.2.5 Sample Processing Method Reference

Procedures for analyzing sediment characteristics were based on the general protocols provided in the EMAP-E Laboratory Methods Manual (U.S. EPA 1993, 1995)

5.2.6 Sample Processing Method Deviations

None

6. DATA ANALYSIS AND MANIPULATIONS

6.1 Name of New or Modified Value

NA

6.2 Data Manipulation Description

NA

6.3 Data Manipulation Examples

NA

7. DATA DESCRIPTION

7.1 Description of Parameters

Variable	Type	Format	Label
STA_NAME	Char	7.	Carolinian Province Office Station Name
DATE	Num	YYMMDD6.	Sample collection date (YYMMDD)
SAND	Num	6.2	Sand (%) in sample

7.1 Description of Parameters, continued

Variable	Type	Format	Label
SICL	Num	6.2	Silt + Clay (%) in sample
TOC	Num	7.3	Total organic carbon (%) in sample
MOISTURE	Num	6.2	Moisture content (%) in sample

Note the conventions used in the Format column above:

For character (Char) variables, the number given is the maximum width (number of characters) for that variable.

For numeric (Num) variables, the format is given in W.D format, where W = maximum width (number of characters) for the number (including all digits and the decimal point), and D = number of digits to the right of the decimal point.

7.1.6 Precision to which values are reported

Variables SAND, SICL, and MOISTURE are reported to, and are valid to 0.01. Variable TOC is reported to, and is valid to 0.001.

7.1.7 Minimum Value in Data Set

Variable	Minimum
SAND	0.37
SICL	0
TOC	0.005
MOISTURE	7.20

7.1.8 Maximum Value in Data Set

Variable	Maximum
SAND	100.00
SICL	99.63
TOC	14.802
MOISTURE	90.69

7.2 Data Record Example

7.2.1 Column Names for Example Records

STA_NAME;DATE;SAND;SICL;TOC;MOISTURE

7.2.2 Example Data Records

CP95101;950809;24.89;75.11;1.519;59.10
CP95102;950809;62.66;37.34;1.155;47.57
CP95103;950808;0.37;99.63;6.830;72.88
CP95104;950810;97.59;2.41;0.295;28.93
CP95105;950811;97.88;2.12;0.241;21.06
CP95106;950811;91.44;8.56;0.374;34.10
CP95107;950810;2.76;97.24;2.473;69.87
CP95108;950808;99.27;0.73;0.347;31.23

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude

-81 Degrees, 43.83 Minutes West Longitude

8.2 Maximum Longitude

-75 Degrees, 33.82 Minutes West Longitude

8.3 Minimum Latitude

27 Degrees, 12.07 Minutes North Latitude

8.4 Maximum Latitude

36 Degrees, 43.43 Minutes North Latitude

8.5 Name of area or region

Coastal distribution of sampling is along the southeastern US from Cape Henry, VA, through St. Lucie Inlet, FL. States represented: Virginia, North Carolina, South Carolina, Georgia, and Florida.

9. QUALITY CONTROL/QUALITY ASSURANCE

9.1 Measurement Quality Objectives

See section 5.1.9 (Sample Collection Method Calibration) and section 5.1.10 (Sample Collection Quality Control) above.

9.2 Quality Assurance/Control Methods

See section 5.1.9 (Sample Collection Method Calibration) and section 5.1.10 (Sample Collection Quality Control) above.

9.3 Quality Assessment Results

NA

10. DATA ACCESS

10.1 Data Access Procedures

Data can be downloaded from the WWW site.

10.2 Data Access Restrictions

Data can only be accessed from the WWW site.

10.3 Data Access Contact Persons

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10.4 Data file Format

Delimited ASCII Text

10.5 Information Concerning Anonymous FTP

Not accessible

10.6 Information Concerning the WWW

Data can be downloaded from the WWW.

10.7 EMAP CD-ROM Containing the Data file

Data not available on CD-ROM.

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12. TABLE OF ACRONYMS

C	Degrees Celsius
cm2	Square centimeters
CMBAD	Coastal Monitoring and Bioeffects Assessment Division
CU	Clemson University
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
EPA-AED	EPA-Atlantic Ecology Division
EPA-GED	EPA-Gulf Ecology Division
EPA-RTP	EPA-Research Triangle Park, NC
FLDEP	Florida Dept. of Environmental Protection
FMRI	Florida Marine Research Institute
FTP	File Transfer Protocol
GIS	Geographical Information System
JCWS	Johnson Controls Word Services
km2	Square kilometers
m2	Square meters
mg/L	Milligrams per liter
mS/cm	MilliSiemens per centimeter (equiv. to milliohms/cm)
MRRI	Marine Resources Research Institute
NCNERR	North Carolina National Estuarine Research Reserve
NCSU	North Carolina State University, NC
NA	Not Applicable
ng/g	Nanograms per gram
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
ORCA	Office of Ocean Resources Conservation and Assessment
QA/QC	Quality Assurance/Quality Control
ppb	Parts per billion (equiv. to ng/g)
ppm	Parts per million (equiv. to ug/g)
ppt	Parts per thousand
SAIC	Science Applications International Corporation
SCDNR	South Carolina Dept. of Natural Resources
TOC	Total Organic Carbon
TAMU/GERG	Texas A&M University, Geochemical and Environmental Research Group
TPMC	Technology Planning and Management Corporation
ug/g	Micrograms per gram
um	Micrometers
UC	University of Charleston, SC
UGA	University of Georgia, GA

UNC-W	University of North Carolina - Wilmington, NC
USGS-GB	US Geological Survey - Gulf Breeze, FL
wt.	Weight
WWW	World Wide Web -Internet

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