SA Technical Memorandum 4153

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EMBER 1989

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Global Data Bases on Distribution, Characteristics and Methane Emission of Natural Wetlands: Documentation of Archived Data Tape

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National Aeronautics and
Space Administration
Office of Management
Scientific and Technical
Information Division

1989

INTRODUCTION

Global digital data bases on the distribution and environmental characteristics of natural wetlands, compiled by Matthews and Fung (1987), have been archived on tape. These data bases were developed to evaluate the role of wetlands in the annual emission of methane from terrestrial sources. Five global 1^0 latitude by 1^0 longitude arrays are included on the tape. They are: (1) wetland data source, (2) wetland type, (3) fractional inundation, (4) vegetation type and (5) soil type. The first three data bases on wetland locations were published by Matthews and Fung (1987). The last two arrays contain ancillary information about these wetland locations: vegetation type from the data of Matthews (1983) and soil type from the data of Zobler (1986). This short paper is designed only to document the tape, and briefly explain the data sets and their initial application to estimating the annual emission of methane from natural wetlands. For complete discussions of the data, including sources and uncertainties, consult original publications listed in the references.

Globally, wetlands occur in a total of 3233 1^0 cells and occupy about 5.3 X $10^{12}m^2$ (Matthews and Fung 1987). Each of the five data bases here includes information for the 3233 wetland locations; cells of other (non–wet) land and water are masked with unique values.

The outline below gives information about array characteristics such as dimensions, read formats, record lengths, blocksizes and value ranges. Sections 1–5 following the outline contain descriptions and translation tables of the individual data bases. The final section includes information on the first calculation of global methane emission from natural wetlands done by Matthews and Fung (1987) using these data sets in conjunction with field measurements of methane fluxes from various ecosystems and simple latitudinal estimates about the seasonality of methane production.

References

FAO (1971–1981): Soil Map of the World, Vols. 1–10 (1:5M scale maps and accompanying texts), UNESCO, Paris.

Matthews, E. (1983): Global vegetation and land use: new high–resolution data bases for climate studies. J. Clim. Appl. Meteorol., 22, 474–487.

Matthews, E. and I. Fung (1987): Methane emission from natural wetlands: global distribution, area and environmental characteristics of sources. Global Biogeochem. Cycles, 1, 61–86.

UNESCO (1973): International classification and mapping of vegetation. UNESCO, Paris.

Zobler, L. (1986): A world soil file for global climate modeling. NASA Technical Memorandum 87802.

OUTLINE

Name	Size	Type	Format	Description
<u>1. DATA SOURCES</u>				
ISRC	(360,180)	Integer*4	do 10 j=1,180 read(20,'(250I4,110I4)') *(ISRC(i,j),i=1,360) 10 continue	wetland: 1–7 other land: 0 water: –1 see Section 1, Table 1
<u>2. WETLAND TYPES</u>				
IWET	(360,180)	Integer*4	do 10 j=1,180 read(20,'(250I4,110I4)') *(IWET(i,j), I=1,360) 10 continue	wetland: 1–12 other land: 0 water: –1 see Section 2, Table 2
<u>3. FRACTIONAL INUNDATION</u>				
FRIN	(360,180)	Real*4	do 10 j=1,180 read(20,'(250F4.0,110F4.0)') *(FRIN(i,j), I=1,360) 10 continue	wetland: 1.–100. other land: 0. water: –1. see Section 3, Table 3
<u>4. VEGETATION TYPES</u>				
IVEG	(360,180)	Integer*4	do 10 j=1,180 read(20,'(250I4,110I4)') *(IVEG(i,j), I=1,360) 10 continue	wetland: 1–178 other land: 0 water: –1 see Section 4, Table 4
<u>5. SOIL TYPES</u>				
ISOL	(360,180)	Integer*4	do 10 j=1,180 read(20,'(250I4,110I4)') *(ISOL(i,j), i=1,360) 10 continue	wetland: 1–107 other land: 0 water: –1 see Section 5, Table 5

The tape: 9 track, 1600 bpi, ASCII, BLP, RECFM=F

The arrays:
record length = 1440, blocksize = 1440.
(i,j) arrays are (360,180), 1^0 (lon,lat) resolution
j = 1,180: j = 1: 1^0 band from 90^0S to 89^0S ...
j = 180: 1^0 band from 89^0N to 90^0N
i = 1,360: i = 1: 1^0 band from 180^0 (dateline) to 179^0W ...
i = 360: 1^0 band from 179^0E to 180^0 (dateline)

Section 1. DATA SOURCES

Description: ISRC

The array of data sources (ISRC) gives information on the source or combination of sources for wetland designations. The three independent data sources integrated to produce the final data base are: (1) vegetation (Matthews 1983) classified with the UNESCO (1973) system (reference UNESCO in Table 1); (2) ponded soils from the data base of Zobler (1986) based on FAO soil maps (reference FAO); and (3) fractional inundation compiled specifically for the Matthews and Fung (1987) study of methane emission from wetlands based on a global series of 1:1M scale Operation Navigation Charts (reference ONC). All cells identified as wetland by any single source or combination of sources are designated as wetlands in the integrated data set given here. The three data sources provide a total of seven source combinations as shown in Table 1. For example, type 1 locations are targeted as wetlands by all three source data bases while type 6 locations are identified as wetlands only by the ONC inundation data base.

Table 1. ISRC: Data Sources For Wetland Locations

Tape	M&F[1]	Data Source Combinations
1	A	UNESCO + FAO + ONC
2	B	UNESCO + ONC
3	C	UNESCO + FAO
4	D	UNESCO
5	E	ONC + FAO
6	F	ONC
7	G	FAO
0		other (non–wet) land
–1		water

[1] letter reference from Figure 5 of Matthews and Fung (1987)

Section 2. WETLAND TYPE

Description: IWET

A total of twelve wetland types are identified in the array IWET. Twenty-eight wetland vegetation types were originally chosen from the UNESCO system and classified into five major wetland groups on the basis of vegetational features and environmental characteristics that affect methane emission (as discussed in Matthews and Fung 1987); these are: (1) forested bog, (2) nonforested bog, (3) forested swamp, (4) nonforested swamp and (5) alluvial formations (see Table 2). Many additional locations identified as wetlands from the FAO and ONC data bases were occupied by about 100 vegetation types other than these 28 explicit wetland ecosystems. For the calculation of methane emission, vegetation types in these additional cells were initially grouped into seven categories on the basis of climate and vegetational structure (6A through 6G under G1, Table 2); each category was then associated with one of the five major wetland groups. Column G2 (Table 2) shows the secondary groupings of the additional seven vegetation categories with five major wetland groups. To allow for alternative combinations, all twelve wetland types are identified separately in the archived data base, as indicated in the Tape column.

Table 2. IWET: Wetland Types and Wetland Groupings

Tape	G1[1]	G2[2]	Description
1	1	1	forested bog
2	2	2	nonforested bog
3	3	3	forested swamp
4	4	4	nonforested swamp
5	5	5	alluvial formations
6	6A	3	tropical/subtropical forest/woodland
7	6B	3	temperate forest/woodland
8	6C	1	high–latitude temperate/boreal forest/woodland/shrub
9	6D	3	shrubland; xeromorphic formations; desert
10	6E	4	wooded grassland
11	6F	4	nonwooded grassland
12	6G	2	tundra
0			other (non–wet) land
–1			water

[1] type number from Table 2b and Table 5 in Matthews and Fung (1987)

[2] wetland group with which type was associated for methane emission calculation (Matthews and Fung, 1987)

Section 3. FRACTIONAL INUNDATION

Description: FRIN

The fractional inundation data base (FRIN) was compiled from a series of 1:1M scale Operational Navigation Charts (ONC). The values, which give the inundated proportion of 1^0 cells, were used to calculate the global wetland area of 5263 x $10^9 m^2$ (Matthews and Fung, 1987). For cells targeted as wetlands by UNESCO vegetation or FAO ponding but not by the ONC inundation data base (i.e., cases 3, 4 and 7 in Table 1), the fractional wetland coverage was prescribed as the mean inundation for the vegetation type occupying the cell; these locations were incorporated into the fractional inundation data base.

Table 3. FRIN: Fractional Inundation

Tape	Description
1. – 100.[1]	wetland
0.	other (non–wet) land
–1.	water

[1] unit is percent

	1.B	DECIDUOUS FOREST
40	**1.B.1**	**Tropical/subtropical drought–deciduous forest**
41	1.B.1a	broadleaved lowland/submontane
42	1.B.1b	montane (and cloud)
43	**1.B.2**	**Cold–deciduous broadleaved forest with evergreen trees or shrubs**
44	1.B.2a	with evergreen broadleaved trees and climbers
45	1.B.2b	with evergreen needleleaved trees
46	1.B.2c	subalpine and subpolar
47	1.B.2d	subalpine/subpolar alluvial
48	1.B.2e	waterlogged
49	**1.B.3**	**Cold–deciduous forest without evergreen trees**
50	1.B.3a	temperate lowland/submontane
51	1.B.3b	montane/boreal
52	1.B.3b1	broadleaved
53	1.B.3b2	needleleaved (e.g. Larix)
54	1.B.3c	subalpine/subpolar
55	1.B.3d	alluvial
56	1.B.3d2	regularly flooded with abundant herbaceous undergrowth
57	1.B.3e	swamp or peat
	1.C	EXTREMELY XEROMORPHIC FOREST
58	**1.C.1**	**Extremely xeromorphic sclerophyllous–dominated forest**
59	**1.C.2**	**Extremely xeromorphic thorn forest**
60	1.C.2a	mixed deciduous–evergreen
61	1.C.2b	deciduous
62	1.C.2c	evergreen
	2.A	EVERGREEN WOODLAND
63	**2.A.1**	**Evergreen broadleaved woodland**
64	**2.A.2**	**Evergreen needleleaved woodland**
65	2.A.2a	with rounded crowns
66	2.A.2a1	with evergreen sclerophyllous understorey (Mediterranean)
67	2.A.2b	with conical crowns (subalpine)
68	2.A.2c	with cylindro–conical crowns (boreal)
69	2.A.2d	waterlogged
	2.B	DECIDUOUS WOODLAND
70	**2.B.1**	**Tropical/subtropical drought–deciduous woodland**
71	2.B.1a	lowland/submontane, broadleaved
72	2.B.1b	montane (and cloud)
73	**2.B.2**	**Cold–deciduous woodland with evergreen trees**
	2.B.3	**Cold–deciduous woodland without evergreen trees**
74	2.B.3a	broadleaved
75	2.B.3b	needleleaved
76	2.B.3b2	mixed broadleaved–needleleaved
	2.C	EXTREMELY XEROMORPHIC WOODLAND
77	**2.C**	**Extremely xeromorphic woodland**
78	**2.C.1**	**Extremely xeromorphic schlerophyllous–dominated woodland**
79	**2.C.2**	**Extremely xeromorphic thorn woodland**
80	2.C.2a	mixed deciduous–evergreen
81	2.C.2c	deciduous
82	**2.C.3**	**Extremely xeromorphic succulent woodland**

	3.A	**EVERGREEN SHRUBLAND**
83	**3.A.1**	**Evergreen broadleaved shrubland or thicket**
84	3.A.1a	low bamboo thicket
85	3.A.1d	sclerophyllous shrubland or thicket
86	**3.A.2**	**Evergreen needleleaved or microphyllous shrubland or thicket**
87	3.A.2a	needleleaved
88	3.A.3b	microphyllous
	3.B	**DECIDUOUS SHRUBLAND**
89	**3.B.1**	**Drought–deciduous shrubland with evergreens**
90	**3.B.2**	**Drought–deciduous shrubland without evergreens**
91	3.B.2b	subalpine/subpolar
	3.B.3	**Cold–deciduous shrubland**
92	3.B.3b	subalpine/subpolar
93	3.B.3b1	dwarf shrubland, with forbs
94	3.B.3b2	dwarf shrubland, with lichens
95	3.B.3c	alluvial
	3.C	**EXTREMELY XEROMORPHIC SUBDESERT SHRUBLAND**
96	**3.C**	**Extremely xeromorphic subdesert shrubland**
97	**3.C.1**	**Extremely xeromorphic evergreen subdesert shrubland**
98	3.C.1a	evergreen
99	3.C.1a1	broadleaved
100	3.C.1a2	microphyllous, or leafless with green stems
101	3.C.1a3	succulent
102	3.C.1b	semi–deciduous
103	3.C.1b1	facultatively deciduous
104	**3.C.2**	**Extremely xeromorphic deciduous subdesert shrubland**
105	3.C.2b	with succulents
	4.A	**DWARF SHRUBLAND**
106	**4.A.1**	**Evergreen dwarf–shrub thicket**
107	**4.A.2**	**Evergreen dwarf shrubland**
108	4.A.2a	dense cushion
109	**4.A.3**	**Mixed evergreen dwarf shrub/herbaceous formation**
	4.C	**EXTREMELY XEROMORPHIC DWARF SHRUBLAND**
110	**4.C**	**Extremely xeromorphic subdesert dwarf shrubland**
	4.C.1	**Extremely xeromorphic subdesert dwarf shrubland**
111	4.C.1a	evergreen
112	**4.C.2**	**Extremely xeromorphic deciduous subdesert dwarf shrubland**
	4.D	**TUNDRA**
113	**4.D**	**Tundra**
114	**4.D.1**	**Mainly bryophyte tundra**
115	**4.D.2**	**Mainly lichen tundra**
116	4.D.2a	with caespitose dwarf shrubs and moss
117	4.D.2b	with creeping or matted dwarf shrubs and moss
	4.E	**MOSSY BOGS**
118	**4.E**	**Mossy bog formations with dwarf shrubs**
	4.E.2	**Non–raised mossy bog**
119	4.E.2b	string bog

	5.A	TALL GRASSLAND
120	**5.A.1**	**Tall grassland with 10–40% tree cover**
121	5.A.1a	with evergreen broadleaved tree cover
122	5.A.1a1	wet or flooded most of year
123	5.A.1c	with deciduous broadleaved tree cover
124	5.A.1c1	seasonally flooded
125	5.A.1c2	with deciduous broadleaved tree cover
126	**5.A.2**	**Tall grassland with <10% tree cover**
127	5.A.2c	with deciduous broadleaved tree cover
128	5.A.3c	with deciduous broadleaved shrub cover
129	**5.A.4**	**Tall grassland with tuft plant cover (usually palms)**
130	**5.A.5**	**Tall grassland without woody cover**
131	5.A.5a	tropical grassland
132	5.A.5a1	seasonally flooded
133	5.A.5a2	wet or flooded most of year
	5.B	MEDIUM GRASSLAND
134	**5.B.1**	**Medium grassland with 10–40% tree cover**
135	5.B.1a	with evergreen broadleaved tree cover
136	5.B.1a1	wet or flooded most of year
137	5.B.1b	with semi–evergreen broadleaved tree cover
138	5.B.1c	with deciduous broadleaved tree cover
139	**5.B.2**	**Medium grassland with <10% tree cover**
140	**5.B.3**	**Medium grassland with shrub cover**
141	5.B.3c	with deciduous broadleaved shrub cover
142	5.B.3e	with deciduous thorny shrub cover
143	**5.B.4**	**Medium grassland with open cover of tuft plants (usually palms)**
144	5.B.4a	subtropical, with open groves of palms
145	**5.B.5**	**Medium grassland without woody cover**
	5.B.5a	mainly sod grasses
146	5.B.5a1	wet or flooded most of year
147	5.B.5a2	on sandy soil or dunes
148	5.B.5b	mainly bunch grasses
149	5.B.5b2	wet or flooded most of year
	5.C	SHORT GRASSLAND
150	**5.C.1**	**Short grassland with 10–40% tree cover**
151	5.C.1a	with evergreen broadleaved tree cover
152	5.C.1c	with deciduous broadleaved tree cover
153	5.C.1d	with evergreen needleleaved tree cover
154	**5.C.2**	**Short grassland with <10% tree cover**
	5.C.2a	with evergreen broadleaved tree cover
155	5.C.2a1	seasonally flooded
156	5.C.2c	with deciduous broadleaved tree cover
157	**5.C.3**	**Short grassland with shrub cover**
158	5.C.3b	with semi–evergreen broadleaved shrub cover
159	5.C.3c	with deciduous broadleaved shrub cover
160	5.C.3e	with deciduous thorny shrub cover
161	**5.C.5**	**Short grassland without woody cover**
162	5.C.5a	tropical alpine, open/closed bunch–grasses with tuft–plant cover
163	5.C.5b	tropical alpine, open bunch grasses
164	5.C.5d	bunch grasses of varying coverage with dwarf shrubs
165	**5.C.6**	**Short grassland without woody cover**
166	5.C.6a	short–grass communities in semi–arid climates
167	5.C.6b	bunch–grass communities (tussock)

168	**5.C.7**	**Short to medium tall mesophytic grassland (meadow)**
169	5.C.7a	sodgrass communities, forbs in low altitude, cool humid climates
170	5.C.7b	alpine/subalpine meadows, high latitudes
171	5.C.7b2	alpine/subalpine meadows, high latitudes, rich in dwarf shrubs
172	5.C.7b3	snow–bed communities in high latitude alpine/subalpine meadows
173	**5.C.8**	**Graminoid tundra**
174	5.C.8a	bunch–form with mosses and lichens (Eriophorum)
	5.D	FORB FORMATIONS
175	**5.D.2**	**Low forb communities (<1m)**
176	5.D.2a	perennial flowering forbs and ferns
		OTHER
177	**6**	**desert**
178	**7**	**ice**
0		**other non–wet land**
–1		**water**

Section 5. SOIL TYPE

Description: ISOL

Soil types for wetland sites (ISOL) are from the data of Zobler (1986), digitized from the global series of soil maps produced by FAO (1971–1981). Locations are identified by integers associated with 106 soil units; ice is identified as 107. Table 5 lists integer values on the tape, along with FAO codes and FAO soil unit names. Note that FAO soil unit data in this array are independent of the distribution of ponded phase soils (from Zobler 1986) selected as one of three sources used to identify wetland locations by Matthews and Fung (1987).

Table 5. ISOL: FAO Soil Types of Wetland Locations

Tape	Code	Name	Tape	Code	Name
	A	ACRISOL		G	GLEYSOL
1	AF	Ferric Acrisol	29	GC	Calcaric Gleysol
2	AG	Gleyic Acrisol	30	GD	Dystric Gleysol
3	AH	Humic Acrisol	31	GE	Eutric Gleysol
4	AO	Orthic Acrisol	32	GH	Humic Gleysol
5	AP	Plinthic Acrisol	33	GM	Mollic Gleysol
			34	GP	Plinthic Gleysol
			35	GX	Gelic Gleysol
	B	CAMBISOL			
6	BC	Chromic Cambisol		H	PHAEOZEM
7	BD	Dystric Cambisol			
8	BE	Eutric Cambisol	36	HC	Calcaric Phaeozem
9	BF	Ferralic Cambisol	37	HG	Gleyic Phaeozem
10	BG	Gleyic Cambisol	38	HH	Haplic Phaeozem
11	BH	Humic Cambisol	39	HL	Luvic Phaeozem
12	BK	Calcic Cambisol			
13	BV	Vertic Cambisol			
14	BX	Gelic Cambisol	40	I	LITHOSOL
	C	CHERNOZEM		J	FLUVISOL
15	CG	Glossic Chernozem	41	JC	Calcaric Fluvisol
16	CH	Haplic Chernozem	42	JD	Dystric Fluvisol
17	CK	Calcic Chernozem	43	JE	Eutric Fluvisol
18	CL	Luvic Chernozem	44	JT	Thionic Fluvisol
	D	PODZOLUVISOL		K	KASTANOZEM
19	DD	Dystric Podzoluvisol	45	KH	Haplic Kastanozem
20	DE	Eutric Podzoluvisol	46	KK	Calcic Kastanozem
21	DG	Gleyic Podzoluvisol	47	KL	Luvic Kastanozem
22	E	RENDZINA		L	LUVISOL
			48	LA	Albic Luvisol
	F	FERRALSOL	49	LC	Chromic Luvisol
			50	LF	Ferric Luvisol
23	FA	Acric Ferralsol	51	LG	Gleyic Luvisol
24	FH	Humic Ferralsol	52	LK	Calcic Luvisol
25	FO	Orthic Ferralsol	53	LO	Orthic Luvisol
26	FP	Plinthic Ferralsol	54	LP	Plinthic Luvisol
27	FR	Rhodic Ferralsol	55	LV	Vertic Luvisol
28	FX	Xanthic Ferralsol			

	M	**GREYZEM**
56	MG	Gleyic Greyzem
57	MO	Orthic Greyzem
	N	**NITOSOL**
58	ND	Dystric Nitosol
59	NE	Eutric Nitosol
80	NH	Humic Nitosol
	O	**HISTOSOL**
61	OD	Dystric Histosol
62	OE	Eutric Histosol
63	OX	Gelic Histosol
	P	**PODZOL**
64	PF	Ferric Podzol
65	PG	Gleyic Podzol
66	PH	Humic Podzol
67	PL	Leptic Podzol
68	PO	Orthic Podzol
69	PP	Placic Podzol
	Q	**ARENOSOL**
70	QA	Albic Arenosol
71	QC	Cambic Arenosol
72	QF	Ferralic Arenosol
73	QL	Luvic Arenosol
	R	**REGOSOL**
74	RC	Calcaric Regosol
75	RD	Dystric Regosol
76	RE	Eutric Regosol
77	RX	Gelic Regosol
	S	**SOLONETZ**
78	SG	Gleyic Solonetz
79	SM	Mollic Solonetz
80	SO	Orthic Solonetz
	T	**ANDOSOL**
81	TH	Humic Andosol
82	TM	Mollic Andosol
83	TO	Ochric Andosol
84	TV	Vitric Andosol
85	**U**	**RANKER**
	V	**VERTISOL**
86	VC	Chromic Vertisol
87	VP	Pellic Vertisol
	W	**PLANOSOL**
88	WD	Dystric Planosol
89	WE	Eutric Planosol
90	WH	Humic Planosol
91	WM	Mollic Planosol
92	WS	Solodic Planosol
93	WX	Gelic Planosol
	X	**XEROSOL**
94	XH	Haplic Xerosol
95	XK	Calcic Xerosol
96	XL	Luvic Xerosol
97	XY	Gypsic Xerosol
	Y	YERMOSOL
98	YH	Haplic Yermosol
99	YK	Calcic Yermosol
100	YL	Luvic Yermosol
101	YT	Takyric Yermosol
102	YY	Gypsic Yermosol
	Z	**SOLONCHAK**
103	ZG	Gleyic Solonchak
104	ZM	Mollic Solonchak
105	ZO	Orthic Solonchak
106	ZT	Takyric Solonchak
107		ice
0		other (non-wet) land
-1		water

SECTION 6. METHANE EMISSION FROM NATURAL WETLANDS

The data bases presented here were developed to determine the distribution and characteristics of natural wetlands on a global scale and to evaluate the role of wetlands in the annual emission of methane from terrestrial sources. Table 6 (from Matthews and Fung, 1987) shows the latitudinal distribution of wetland areas and the annual methane emission from wetland groups (see Section 2 and Table 2 for explanation). The length of methane emission periods was derived from simple assumptions about the likely duration of thaw conditions in high latitudes and inundation conditions in the subtropics and tropics.

The latitudinal distribution of wetland area derived here shows approximately 50% of the world's wetlands, primarily peat–rich bogs, concentrated in the zone between 50^{0}N and 70^{0}N. Peat–poor swamps, with lower flux rates and longer methane production seasons, are prevalent in low latitudes; about one–third of the wetlands are spread throughout the area from 10^{0}N to 30^{0}S. In this study, the distribution of emission generally parallels that of areas since large daily flux rates for short seasons in the high latitudes balance lower fluxes for longer periods in the tropics and subtropics. The total annual emission of methane from natural wetlands was estimated to be ~110 Tg (10^{12}g), equal to about 20% of the total terrestrial source strength.

Wetlands are generally acknowledged to play a significant role in the global methane budget. The series of data sets presented here, integrated into a comprehensive data base of wetlands and their attributes, provides a framework to analyze and evaluate the role of wetlands in the methane cycle. However, estimates of the magnitude and seasonality of this source may be considered preliminary; further constraints on the wetland source will be provided by measurements in a greater variety of representative wetland ecosystems and throughout methane production seasons and by isotopic measurements.

Table 6. Latitudinal Distribution of Wetland Areas and the Annual Methane Emission From Wetland Groups (from Matthews and Fung, 1987)

		Forested Bog		Nonforested Bog		Forested Swamp				Nonforested Swamp			Alluvial	
Group		1	6C	2	6G	3	6A	6B	6D	4	6E	6F	5	Total
Emission Rate, $gCH_4m^{-2}d^{-1}$		0.2		0.2		0.07				0.12			0.03	
Latitude	*Period, days*						*Area x 10^9m^2*							
90°N - 80°N	100	-	-	-	-	-	-	-	-	-	-	-	-	-
80°N - 70°N	100	-	5	53	48	-	-	-	7	-	-	-	-	112
70°N - 60°N	100	35	889	334	71	-	-	-	-	-	26	-	-	1355
60°N - 50°N	150	238	556	369	9	22	-	-	1	-	30	10	-	1235
50°N - 40°N	150	95	96	1	0	5	-	0	25	19	64	11	-	319
40°N - 30°N	150	-	53	-	-	-	0	6	25	-	10	25	9	128
30°N - 20°N	180	-	25	-	-	-	11	2	23	16	7	9	1	94
20°N - 10°N	180	-	-	-	-	13	61	-	14	59	129	-	-	276
10°N - 0°	180	16	-	12	-	64	139	0	7	76	79	9	28	431
0° - 10°S	180	64	-	-	-	69	213	6	10	8	49	4	62	484
10°S - 20°S	180	-	-	-	-	3	99	10	17	77	107	25	23	360
20°S - 30°S	180	-	-	-	-	-	21	-	159	40	60	14	39	333
30°S - 40°S	150	5	-	-	-	-	-	18	33	11	10	23	33	132
40°S - 50°S	150	-	-	-	-	-	-	-	3	-	-	-	-	3
50°S - 60°S	150	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Area		453	1624	769	128	177	545	43	323	305	572	130	195	5263
							Emission x $10^{12}g$							
90°N - 80°N		-	-	-	-	-	-	-	-	-	-	-	-	-
80°N - 70°N		-	0.1	1.1	1.0	-	-	-	0.1	-	-	-	-	2.3
70°N - 60°N		0.7	17.8	6.7	1.4	-	-	-	-	-	0.3	-	-	26.9
60°N - 50°N		7.1	16.7	11.1	0.3	0.2	-	-	0	-	0.6	0.2	-	36.2
50°N - 40°N		2.9	2.9	0	0	0.1	-	0	0.3	0.3	1.2	0.2	-	7.9
40°N - 30°N		-	1.6	-	-	-	0	0.1	0.3	-	0.2	0.4	0	2.6
30°N - 20°N		-	0.9	-	-	-	0.1	0	0.3	0.3	0.1	0.2	0	1.9
20°N - 10°N		-	-	-	-	0.2	0.8	-	0.2	1.3	2.8	-	-	5.3
10°N - 0°		0.6	-	0.4	-	0.8	1.8	0	0.1	1.7	1.7	0.2	0.2	7.5
0° - 10°S		2.3	-	-	-	0.9	2.7	0.1	0.1	0.2	1.0	0.1	0.3	7.7
10°S - 20°S		-	-	-	-	0	1.3	0.1	0.2	1.6	2.3	0.5	0.1	6.1
20°S - 30°S		-	-	-	-	-	0.3	-	2.0	0.9	1.3	0.3	0.2	5.0
30°S - 40°S		0.1	-	-	-	-	-	0.2	0.4	0.2	0.2	0.4	0.2	1.7
40°S - 50°S		-	-	-	-	-	-	-	0	-	-	-	-	0
50°S - 60°S		-	-	-	-	-	-	-	-	-	-	-	-	-
Total Emission		13.7	40.0	19.3	2.7	2.2	7.0	0.5	4.0	6.5	11.7	2.5	1.0	111.1

Report Documentation Page

NASA — National Aeronautics and Space Administration

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM-4153		

4. Title and Subtitle	5. Report Date
Global Data Bases on Distribution, Characteristics and Methane Emission of Natural Wetlands: Documentation of Archived Data Tape	November 1989
	6. Performing Organization Code: 640
7. Author(s): Elaine Matthews	8. Performing Organization Report No.: 90-005
	10. Work Unit No.
9. Performing Organization Name and Address: Goddard Institute for Space Studies, New York, New York 10025	11. Contract or Grant No.
	13. Type of Report and Period Covered: Technical Memorandum
12. Sponsoring Agency Name and Address: National Aeronautics and Space Administration, Washington, D.C. 20546-0001	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract Global digital data bases on the distribution and environmental characteristics of natural wetlands, compiled by Matthews and Fung (1987), have been archived for public use. These data bases were developed to evaluate the role of wetlands in the annual emission of methane from terrestrial sources. Five global 1° latitude by 1° longitude arrays are included on the archived tape. They are: (1) wetland data source, (2) wetland type, (3) fractional inundation, (4) vegetation type, and (5) soil type. The first three data bases on wetland locations were published by Matthews and Fung (1987). The last two arrays contain ancillary information about these wetland locations: vegetation type is from the data of Matthews (1983) and soil type from the data of Zobler (1986).

Users should consult original publications for complete discussion of the data bases. This short paper is designed only to document the tape, and briefly explain the data sets and their initial application to estimating the annual emission of methane from natural wetlands. This memo includes information about array characteristics such as dimensions, read formats, record lengths, blocksizes and value ranges, and descriptions and translation tables for the individual data bases.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Wetlands, Data Base, Methane, Archived Tape, Inundation	Unclassified - Unlimited Subject Category 43

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified	24	A03

NASA FORM 1626 OCT 86

NASA-Langley, 1989