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ATLAS OF ARCHIVED VEGETATION, LAND-USE AND SEASONAL ALBEDO DATA SETS

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Atlas of Archived Vegetation, Land-Use and Seasonal Albedo Data Sets

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Introduction

Global digital data bases of natural vegetation and land use were compiled at 1° resolution from over 100 published sources (Matthews, 1983) for use in climate studies. A series of 6 data sets, derived from the original compilations, was prepared and archived on tape at the National Center for Atmospheric Research (NCAR) (Matthews, 1984). The first is a vegetation data set representing natural (pre-agricultural) vegetation based on the UNESCO (1973) classification system. The 178 vegetation types distinguished in the original compilation were grouped into 32 types for the archived tape. The second, derived from the land-use compilation, is a cultivation-intensity data set defining the areal extent (expressed as %) of presently-cultivated land in the 1° cells. The land-use data, classified according to a system developed by the author, included 119 land-use types which were grouped into 5 cultivation-intensity groups (see Matthews, 1983) for the archived tape. The last four are present integrated surface albedo data sets (January, April, July, October) for snow-free conditions, incorporating natural-vegetation and cultivation characteristics from the vegetation and cultivation-intensity data sets. Each of these data sets covers the entire land surface of the earth. They all include non-zero data for permanent land only, including continental ice; water, including oceans and lakes, is zero.

This report includes maps, presented by continent, of the complete archived data, with the exception of Antarctica. This series of maps is designed to be used independently or as a complement to the archived data. For the sake of brevity, the reader is referred to Matthews (1983) for a complete discussion of the vegetation and land-use data bases, including classification systems, methodology, compilation sources and results.

There are several differences between the presentation of these data in Matthews (1983, 1984) and in the present work. First, both the original vegetation compilation and the archived vegetation data set include 81 points designated as cultivation in areas of Southwest Asia with long use histories for which vegetation data were not readily available. These 81 points have been revised with natural-vegetation designations and are mapped here with these revisions. The four seasonal albedo data sets, since they were derived from the vegetation and cultivation-intensity data bases, underwent associated revisions which are incorporated in the maps presented here. All revisions to the vegetation and albedo data sets are detailed in Appendices 1 and 2, respectively, for tape users. Secondly, several changes in map symbols have been made simply to allow for ease in reading the maps. These symbol modifications are noted in the legends that accompany the maps (Tables 1.A and 3.A.2). Lastly, albedo-map symbols in Matthews (1984) were associated with truncated albedo values; here, they are associated with rounded albedo values.

For easy reference, the figures and tables of this report have been numbered consistently as follows:

Fig. 1	:	VEGETATION	Table 1	:	VEGETATION
1.A	:	North America	1.A	:	map legend for Figs. 1.A-1.F
1.B	:	South America			
1.C	:	Western Europe			
1.D	:	Africa			
1.E	:	Asia			
1.F	:	Australia			
Fig. 2	:	CULTIVATION INTENSITY	Table 2	:	CULTIVATION INTENSITY
2.A	:	North America	2.A	:	map legend for Figs. 2.A-2.F
2.B	:	South America			
2.C	:	Western Europe			
2.D	:	Africa			
2.E	:	Asia			
2.F	:	Australia			

Fig. 3 : ALBEDO

3.A - North America
3.A.1: January
3.A.2: April
3.A.3: July
3.A.4: October

3.B - South America
3.B.1: January
3.B.2: April
3.B.3: July
3.B.4: October

3.C - Western Europe
3.C.1: January
3.C.2: April
3.C.3: July
3.C.4: October

3.D - Africa
3.D.1: January
3.D.2: April
3.D.3: July
3.D.4: October

3.E - Asia
3.E.1: January
3.E.2: April
3.E.3: July
3.E.4: October

3.F - Australia
3.F.1: January
3.F.2: April
3.F.3: July
3.F.4: October

Table 3 : ALBEDO

3.A.1: 4 seasonal albedos for 32 types
3.A.2: map legend for Figs. 3.A.1-3.F.4

Table 1.A. The thirty-two vegetation types, briefly described in col. 3, are mapped in Figs. 1.A through 1.F using map symbols listed in col. 2.

1 Vegetation Type	2 Map Symbol	3 Description
1	1	tropical evergreen rainforest, mangrove forest
2	2	tropical/subtropical evergreen seasonal broadleaved forest
3	3	subtropical evergreen rainforest
4	4	temperate/subpolar evergreen rainforest
5	5	temperate evergreen seasonal broadleaved forest, summer rain
6	6	evergreen broadleaved sclerophyllous forest, winter rain
7	7	tropical/subtropical evergreen needleleaved forest
8	8	temperate/subpolar evergreen needleleaved forest
9	9	tropical/subtropical drought-deciduous forest
10	A	cold-deciduous forest, with evergreens
11	B	cold-deciduous forest, without evergreens
12	C	xeromorphic forest/woodland
13	D	evergreen broadleaved sclerophyllous woodland
14	E	evergreen needleleaved woodland
15	F	tropical/subtropical drought-deciduous woodland
16	G	cold-deciduous woodland
17	H	evergreen broadleaved shrubland/thicket, evergreen dwarf-shrubland
18	I	evergreen needleleaved or microphyllous shrubland/thicket

1 Vegetation Type	2 Map Symbol	3 Description
19	J	drought-deciduous shrubland/thicket
20	K	cold-deciduous subalpine/subpolar shrubland, cold-deciduous dwarf shrubland
21	L	xeromorphic shrubland/dwarf shrubland
22	M	arctic/alpine tundra, mossy bog
23	N	tall/medium/short grassland with 10-40% woody tree cover
24	O	tall/medium/short grassland with <10% woody tree cover or tuft-plant cover
25	P	tall/medium/short grassland with shrub cover
26	Q	tall grassland, no woody cover
27	R	medium grassland, no woody cover
28	S	meadow, short grassland, no woody cover,
29	T	forb formations
30	-[1]	desert
31	*[2]	ice
32	W	cultivation

[1] map symbol was 'U' in Matthews (1983; 1984)

[2] map symbol was 'V' in Matthews (1983; 1984)

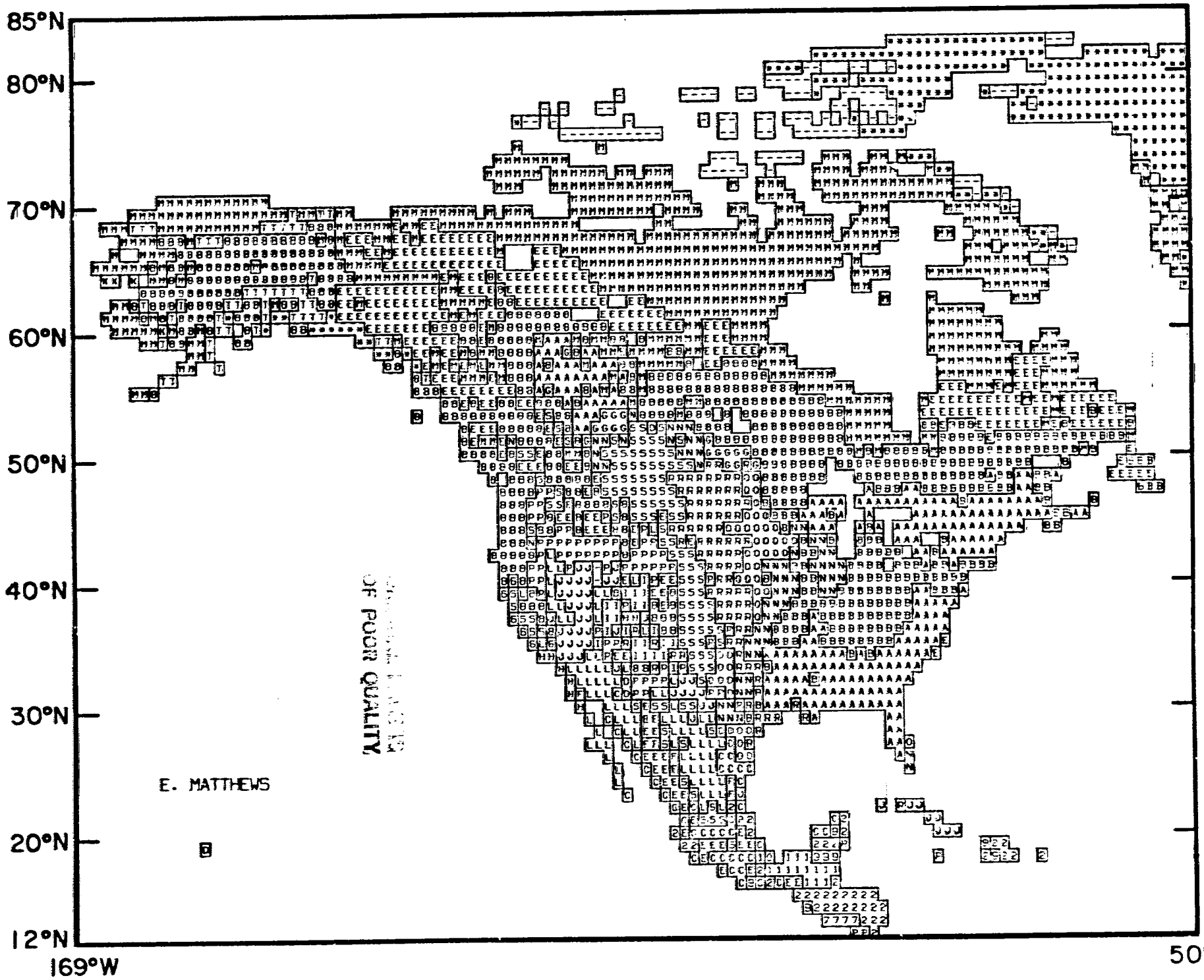


Fig. 1.A. Vegetation map of North America. Legend: Table 1.A

Fig. 1.B. Vegetation map of South America. Legend: Table 1.A

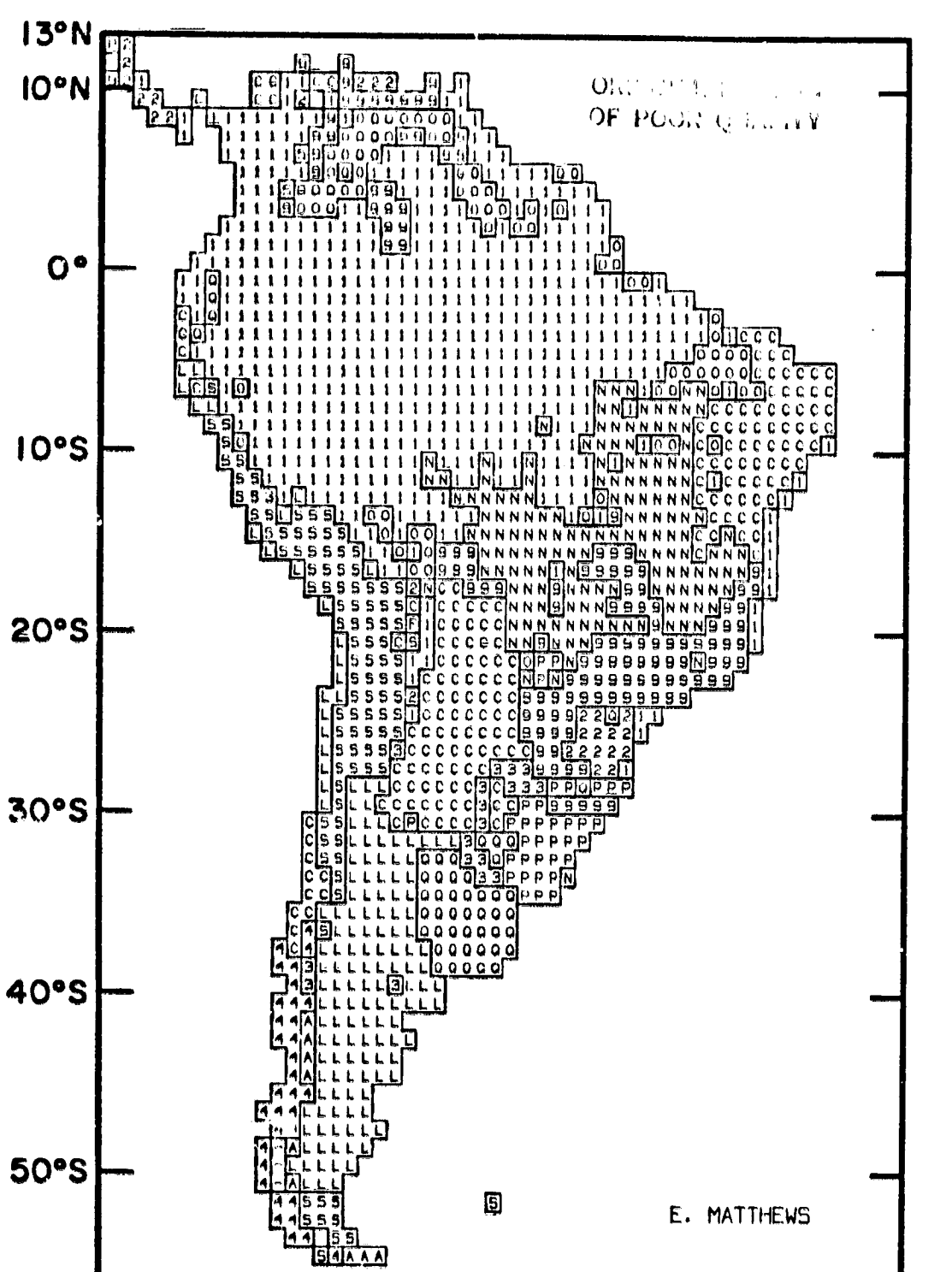


Fig. 1.C. Vegetation map of Western Europe. Legend: Table 1.A

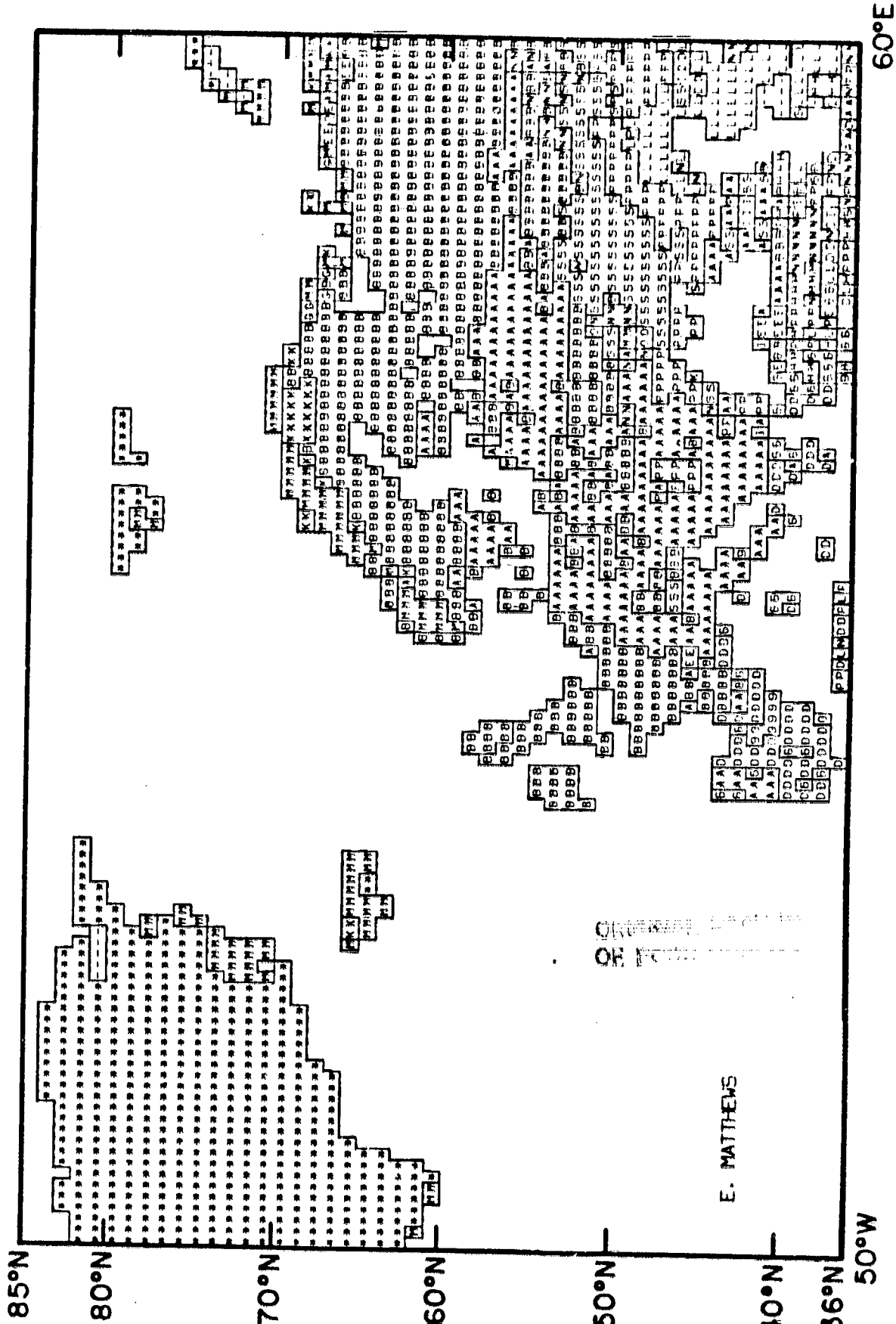


Fig. 1.D. Vegetation map of Africa. Legend: Table 1.A

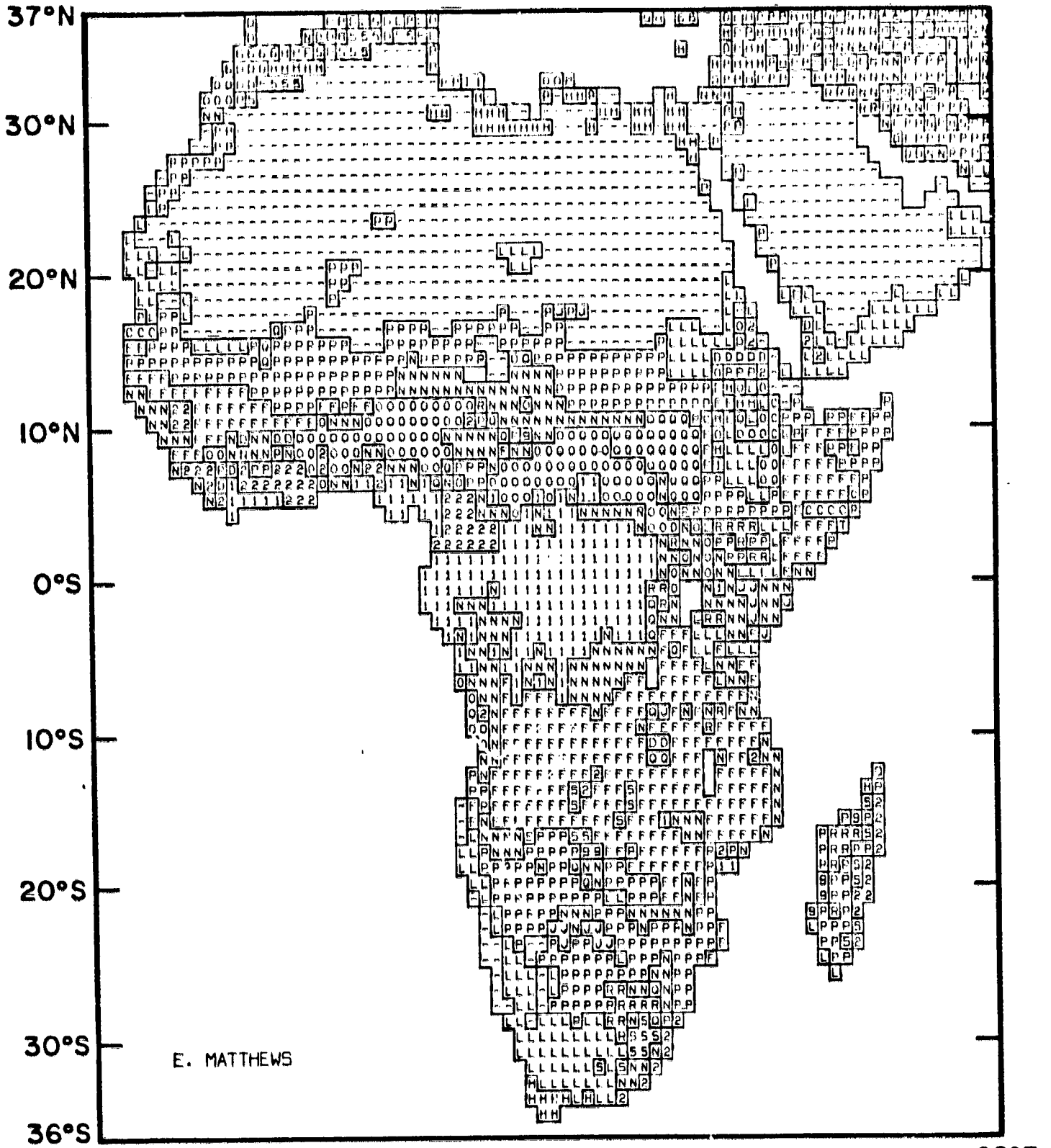


Fig. 1.E. Vegetation map of Asia. Legend: Table 1.A

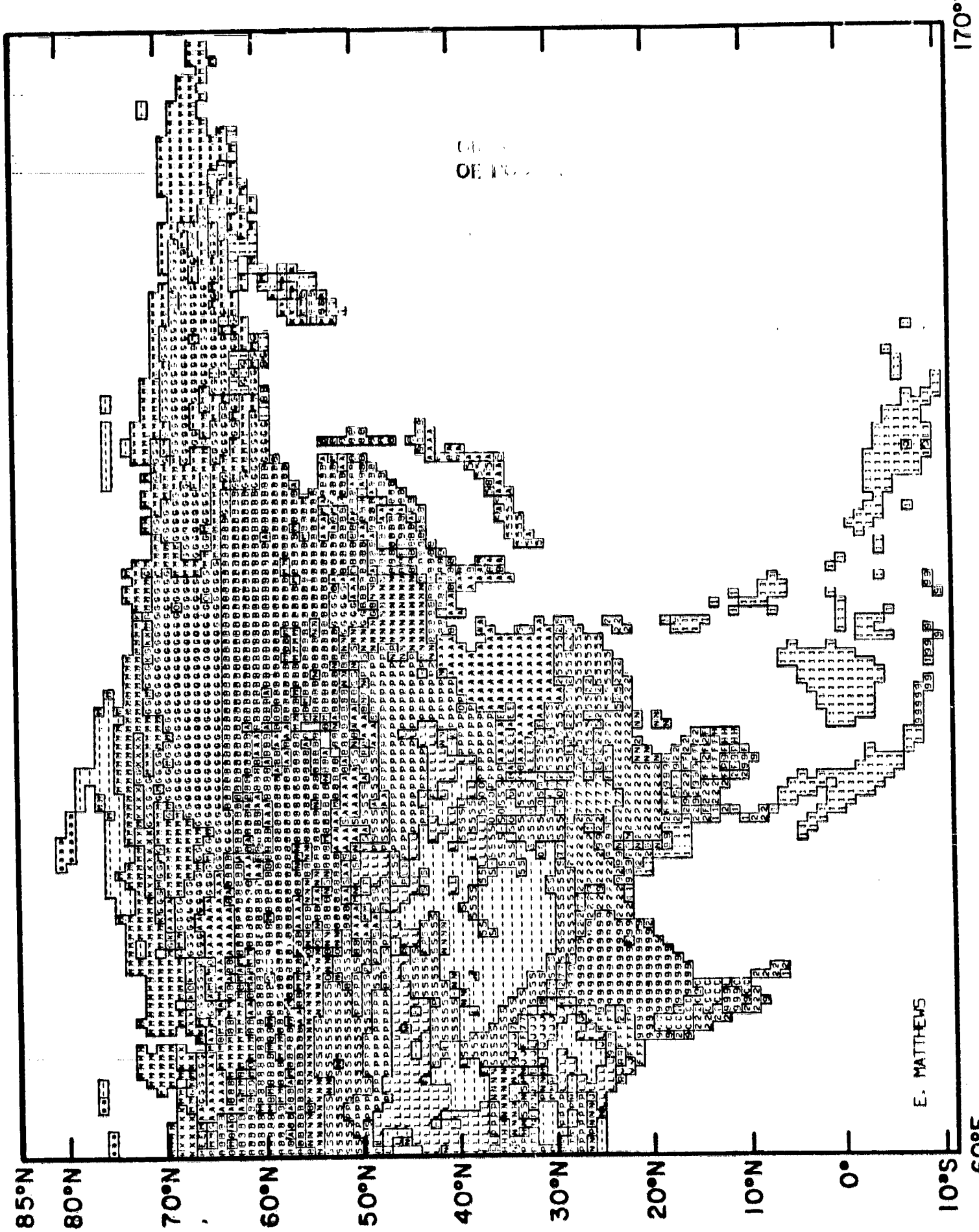


Fig. 1.F. Vegetation map of Australia. Legend: Table 1.A

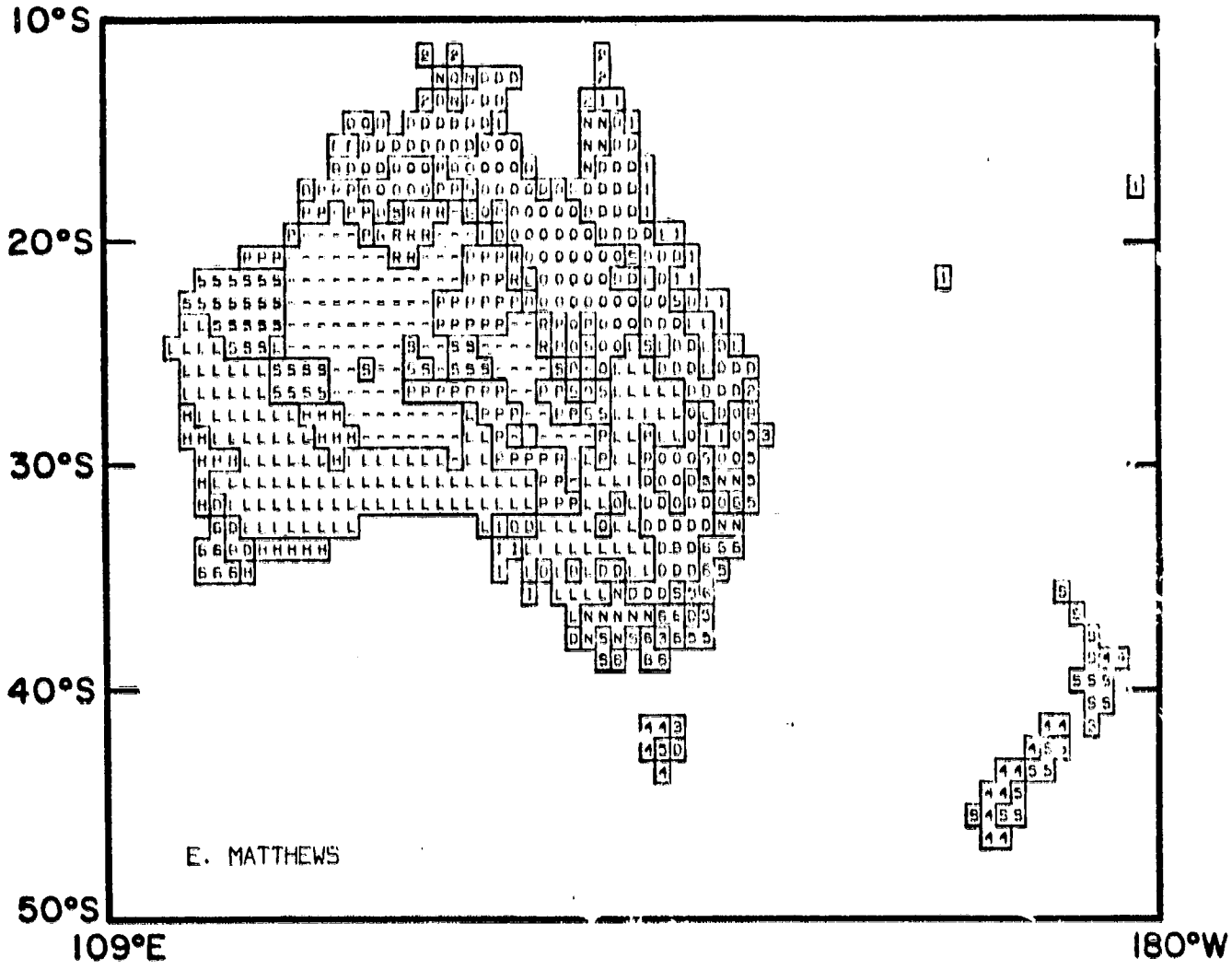


Table 2.A. Cultivation intensities, ranging from 1 to 5, translate into % cultivated and % natural vegetation as shown. Map symbols were used to map cultivation intensities in Figs. 2.A through 2.F.

Cultivation Intensity	Map Symbol	Description	
		% cultivated	% natural vegetation
1	-*	0	100
2	2	20	80
3	3	50	50
4	4	75	25
5	5	100	0

* map symbol was '1' in Matthews (1983; 1984)

Fig. 2.A. Cultivation-intensity map of North America. Legend: Table 2.A

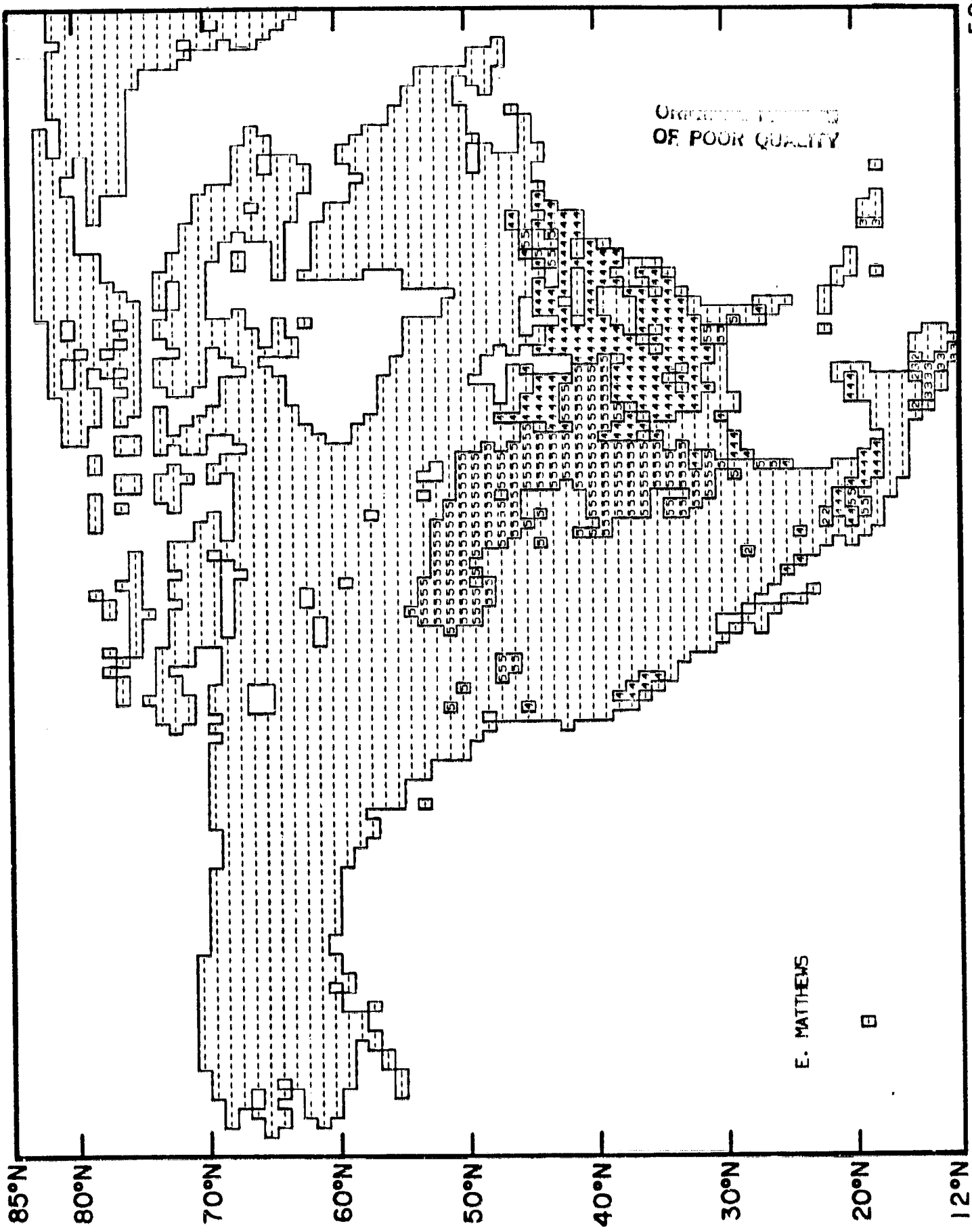


Fig. 2.B. Cultivation-intensity map of South America. Legend: Table 2.A

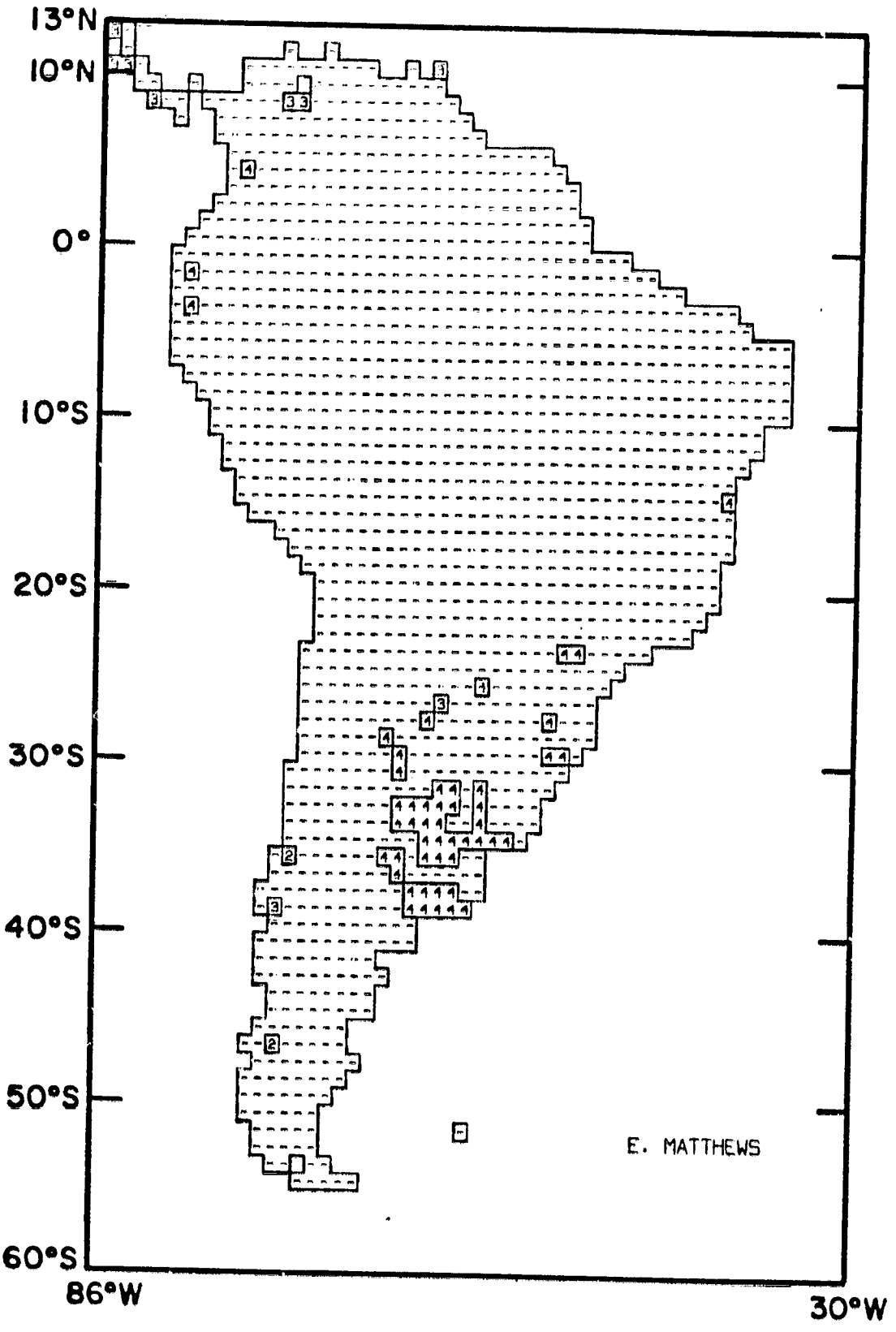


Fig. 2.C. Cultivation-intensity map of Western Europe. Legend: Table 2.A

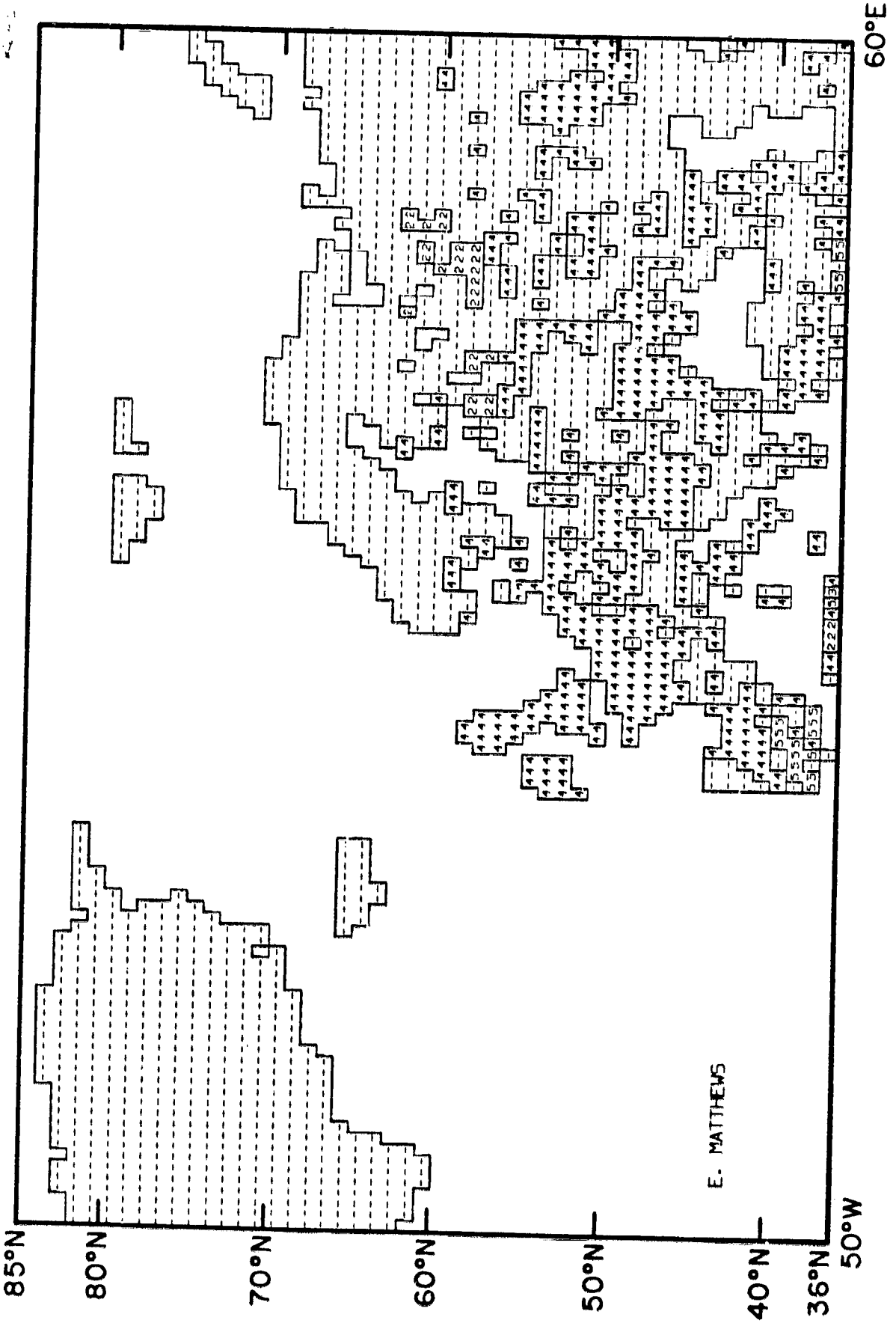


Fig. 2.D. Cultivation-intensity map of Africa. Legend: Table 2.A

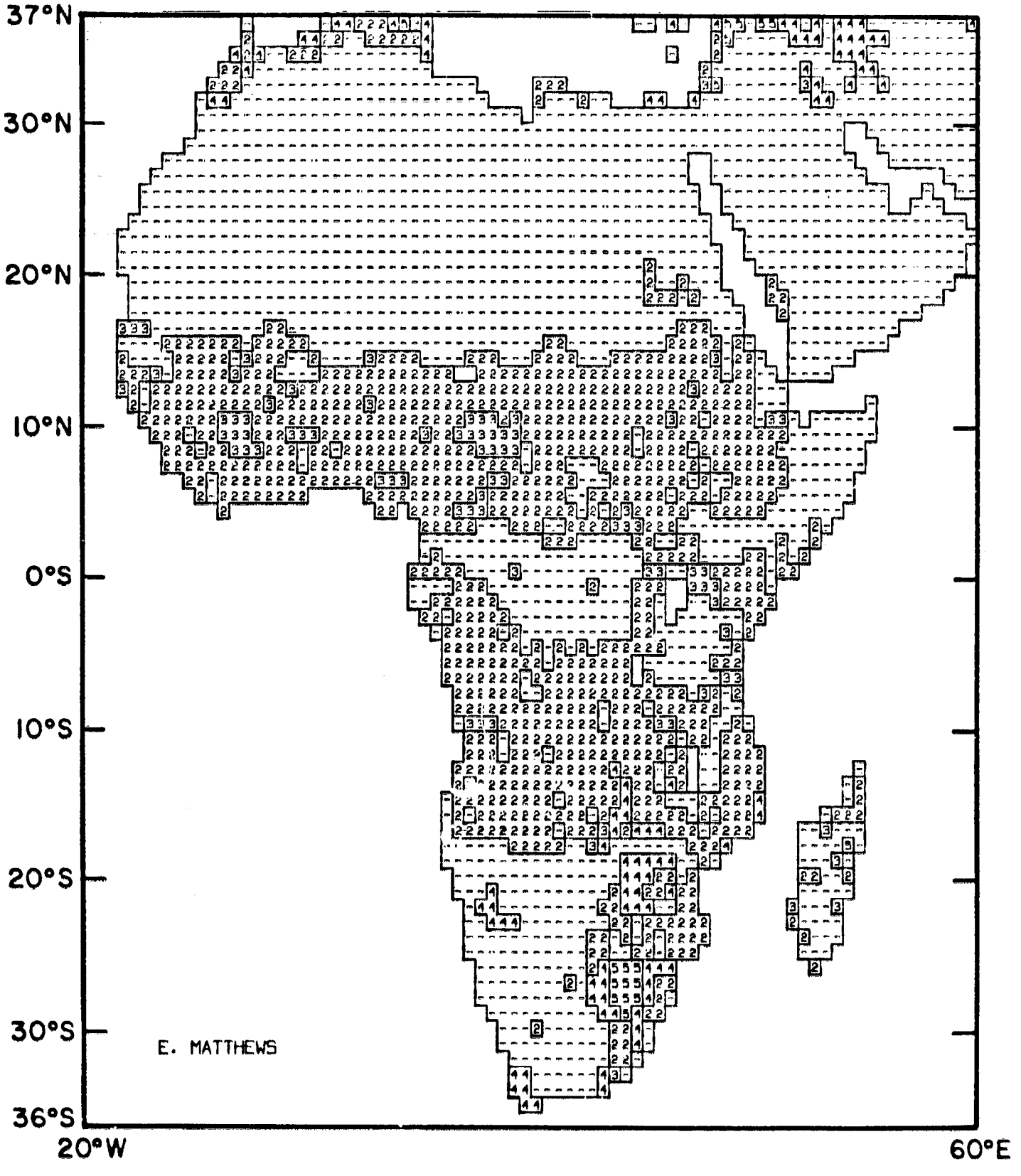


Fig. 2.E. Cultivation-intensity map of Asia. Legend: Table 2.A

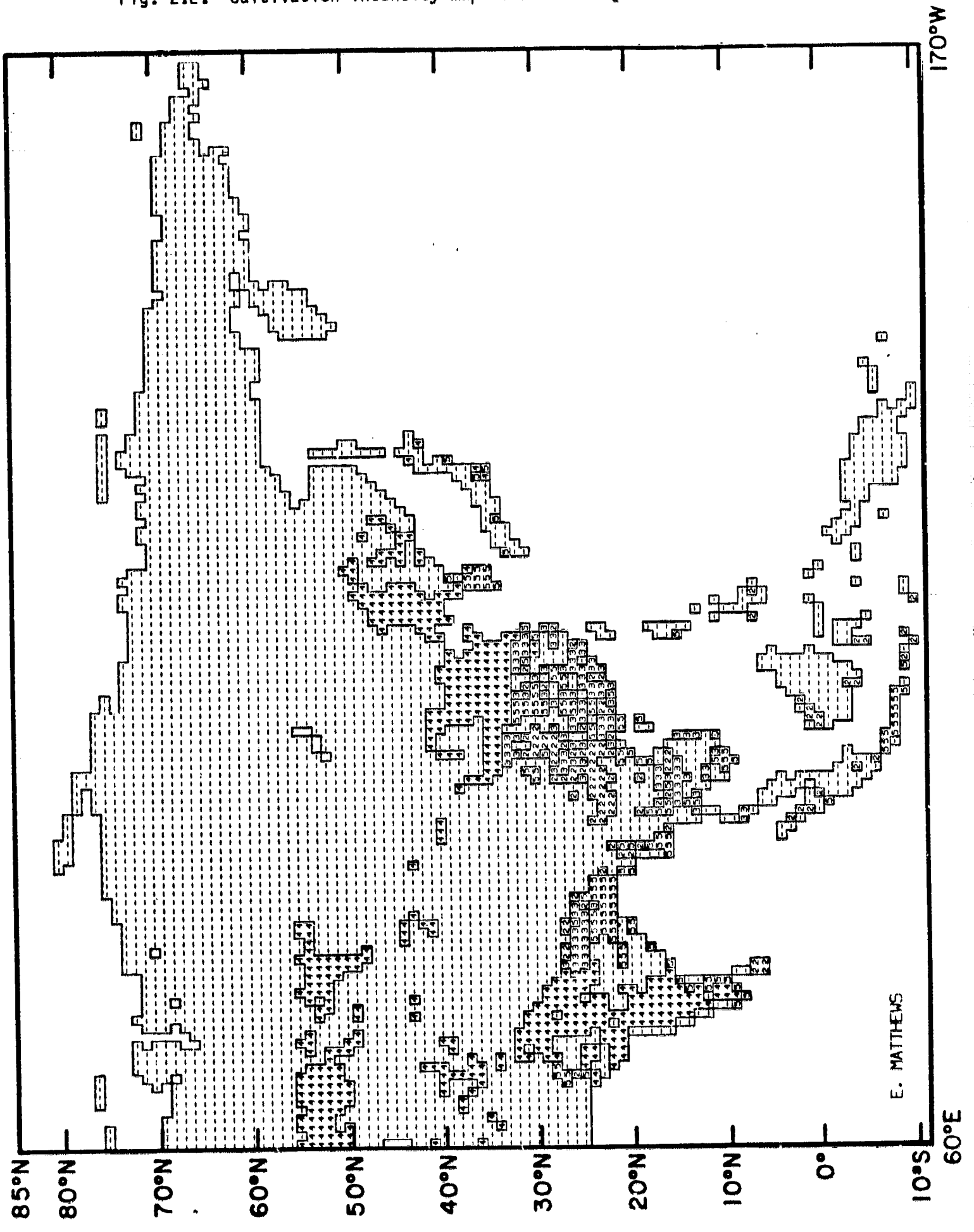


Fig. 2.F. Cultivation-intensity map of Australia. Legend: Table 2.A

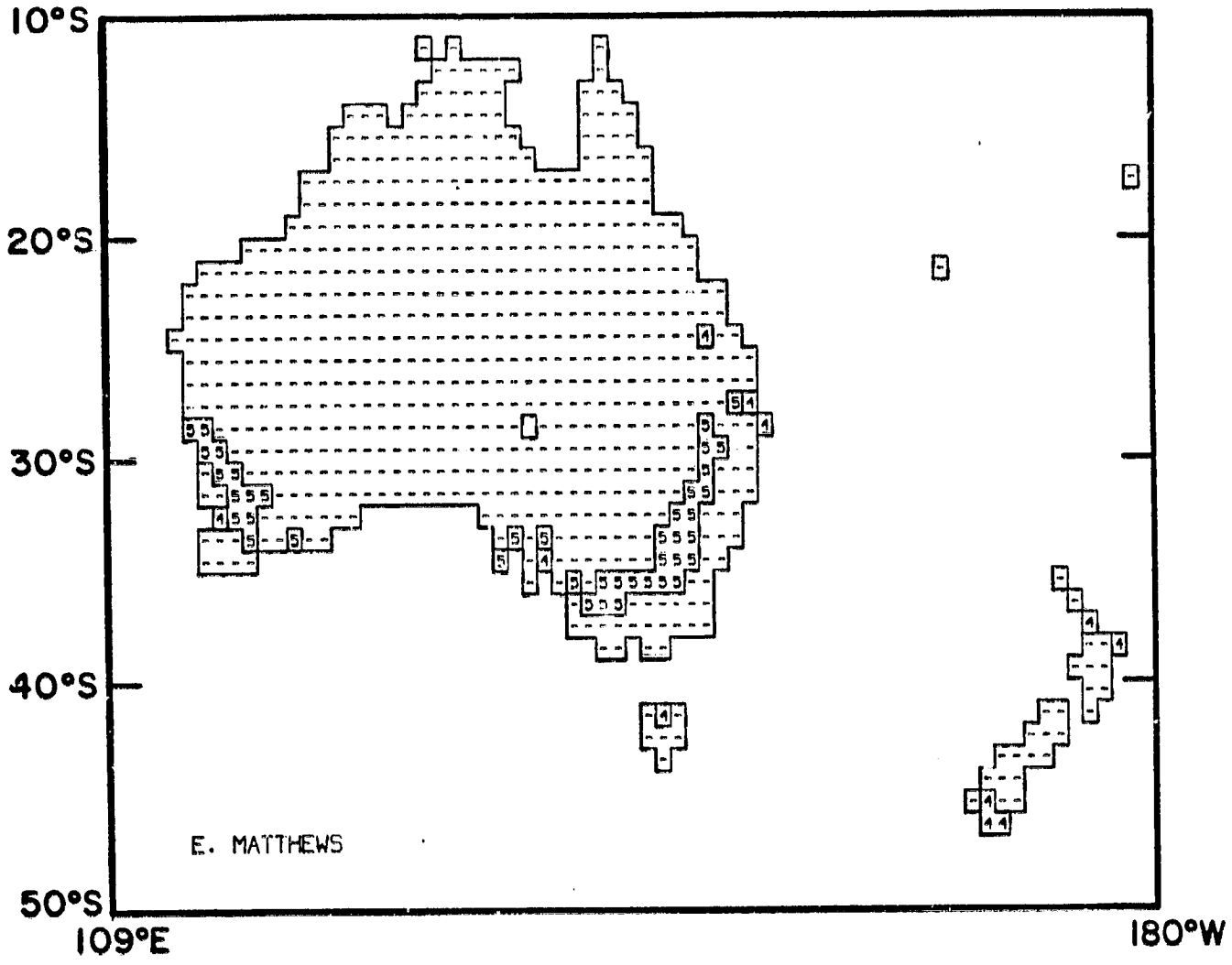


Table 3.A.1. Seasonal snow-free, integrated albedos for 32 vegetation types listed in Table 1.A. The winter, spring, summer and fall values correspond to January, April, July and October in the northern hemisphere and to July, October, January and April in the southern hemisphere. The appropriate seasonal values were used, in conjunction with the vegetation and cultivation-intensity data bases, to produce albedo data sets for January, April, July and October.

VEGETATION	WINTER	SPRING	SUMMER	FALL
1	11	11	11	11
2	11	11	11	11
3	11	11	11	11
4	12	12	12	12
5	12	13	14	13
6	17	14	13	14
7	13	14	16	13
8	11	12	15	12
9	18	16	15	16
10	12	15	18	13
11	12	15	18	13
12	28	32	28	28
13	15	13	12	13
14	14	14	16	14
15	20	18	17	18
16	14	14	17	14
17	15	15	18	15
18	15	15	18	15
19	17	20	20	17
20	17	20	20	17

VEGETATION	WINTER	SPRING	SUMMER	FALL
21	28	32	28	28
22	12	12	17	15
23	14	15	17	15
24	14	15	16	14
25	16	18	25	20
26	17	17	20	17
27	16	20	20	18
28	16	20	20	18
29	16	20	20	18
30	30	30	30	30
31	75	75	75	75
32	16	18	20	18

Table 3.A.2. Symbols used to map albedos in Figs. 3.A.1 through 3.F.4.

Albedo	Map Symbol
1.	1
2.	2
3.	3
4.	4
5.	5
6.	6
7.	7
8.	8
9.	9
10.	A
11.	B
12.	C
13.	D
14.	E
15.	F
16.	G
17.	H
18.	I
19.	J
20.	K
21.	L
22.	M
23.	N
24.	O
25.	P
26.	Q
27.	R
28.	S
29.	T
30.	U
31.	V
32.	W
33.	X
34.	Y
35.	Z
>35.	*

Fig. 3.A.1. January albedo map of North America. Legend: Table 3.A.2

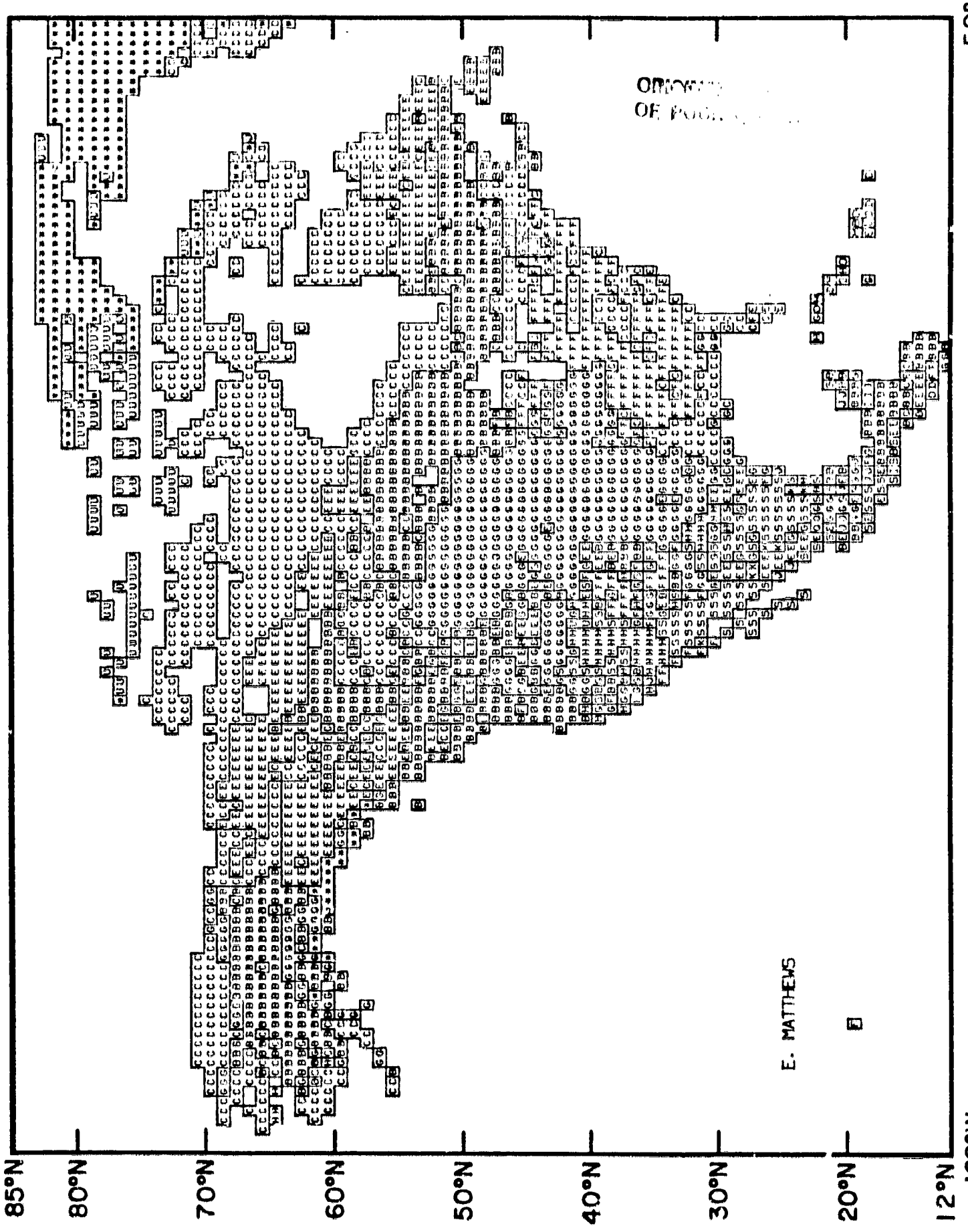


Fig. 3.A.2. April albedo map of North America. Legend: Table 3.A.2

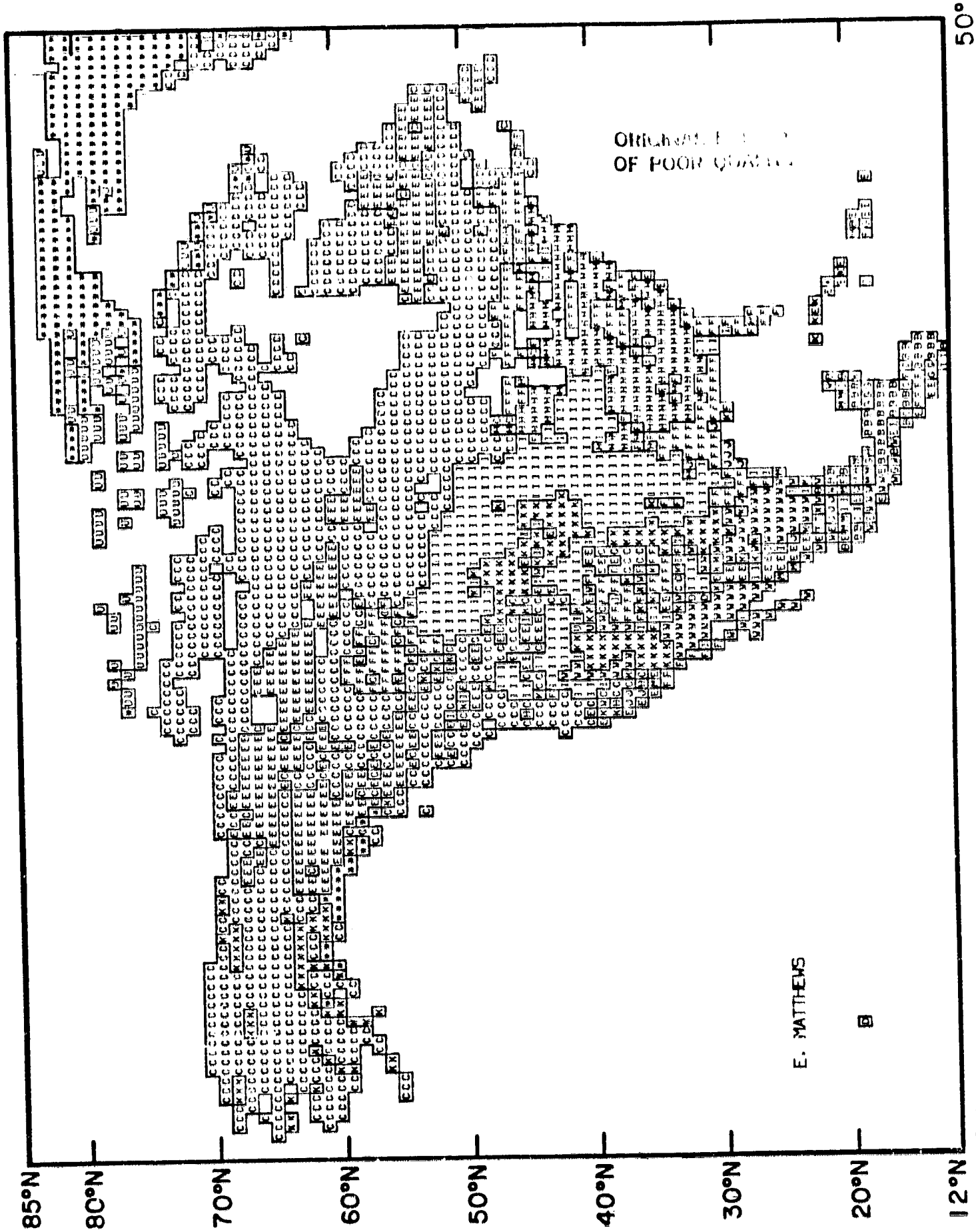


Fig. 3.A.3. July albedo map of North America. Legend: Table 3.A.2

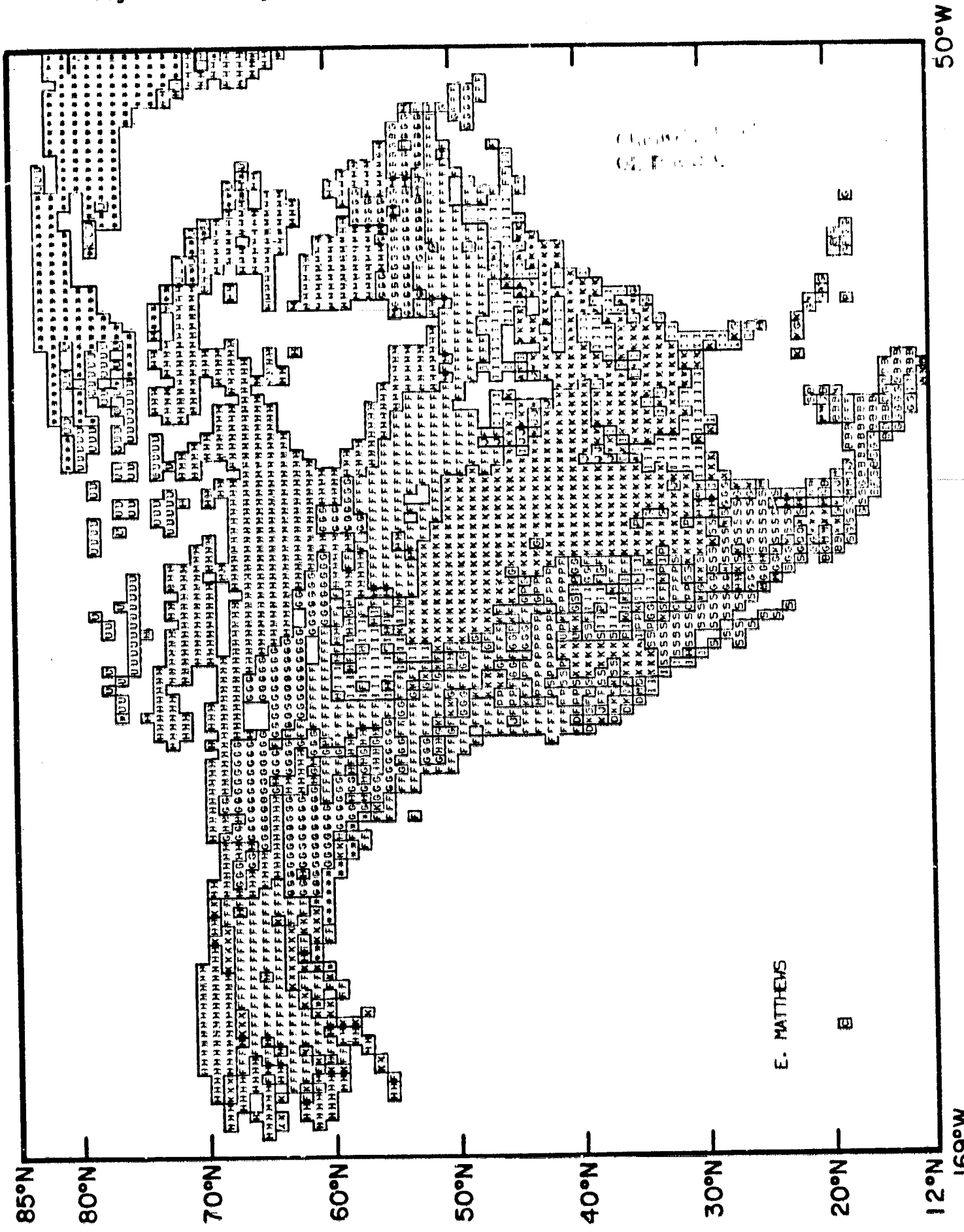


Fig. 3.A.4. October albedo map of North America. Legend: Table 3.A.2

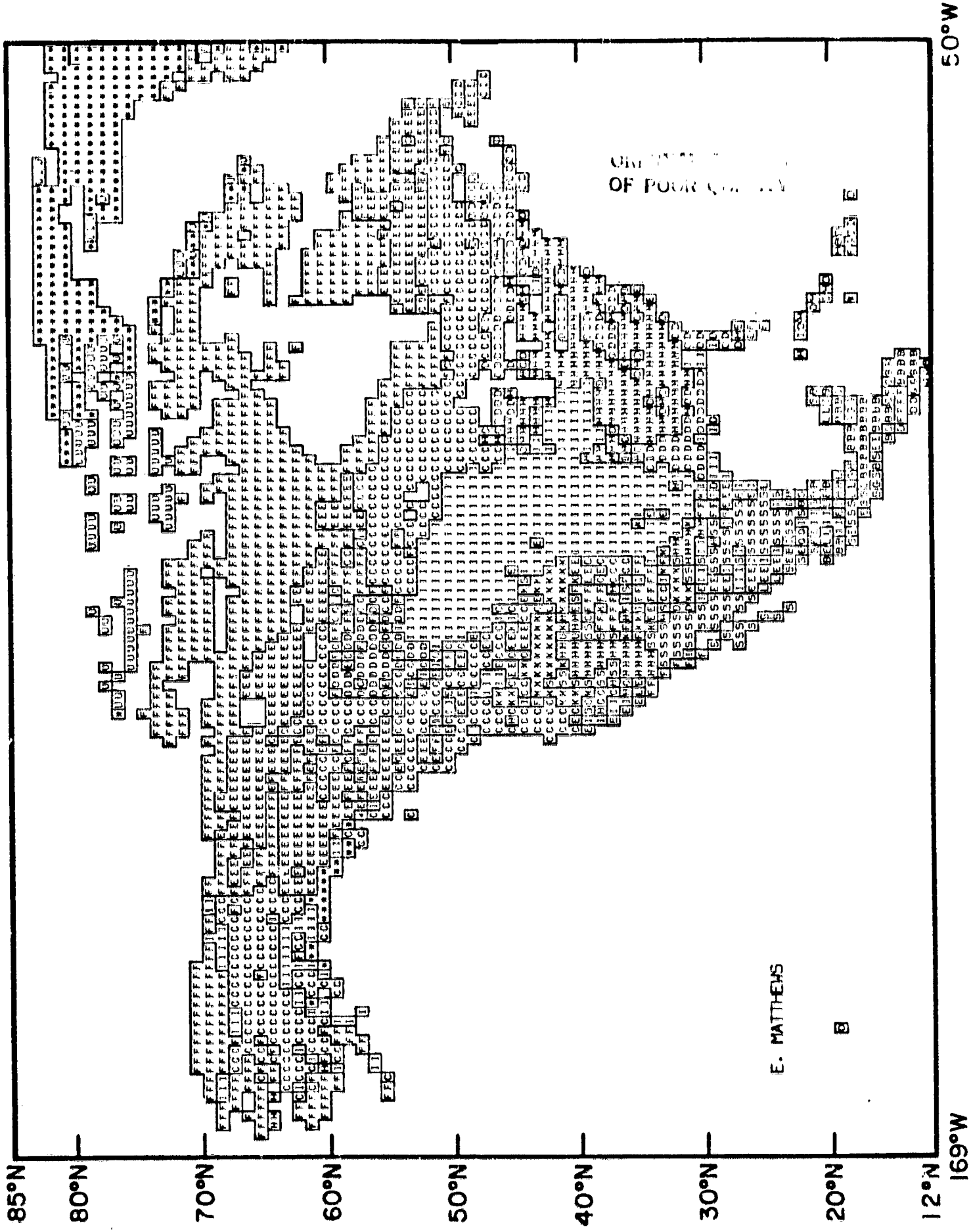


Fig. 3.B.1. January albedo map of South America. Legend: Table 3.A.2

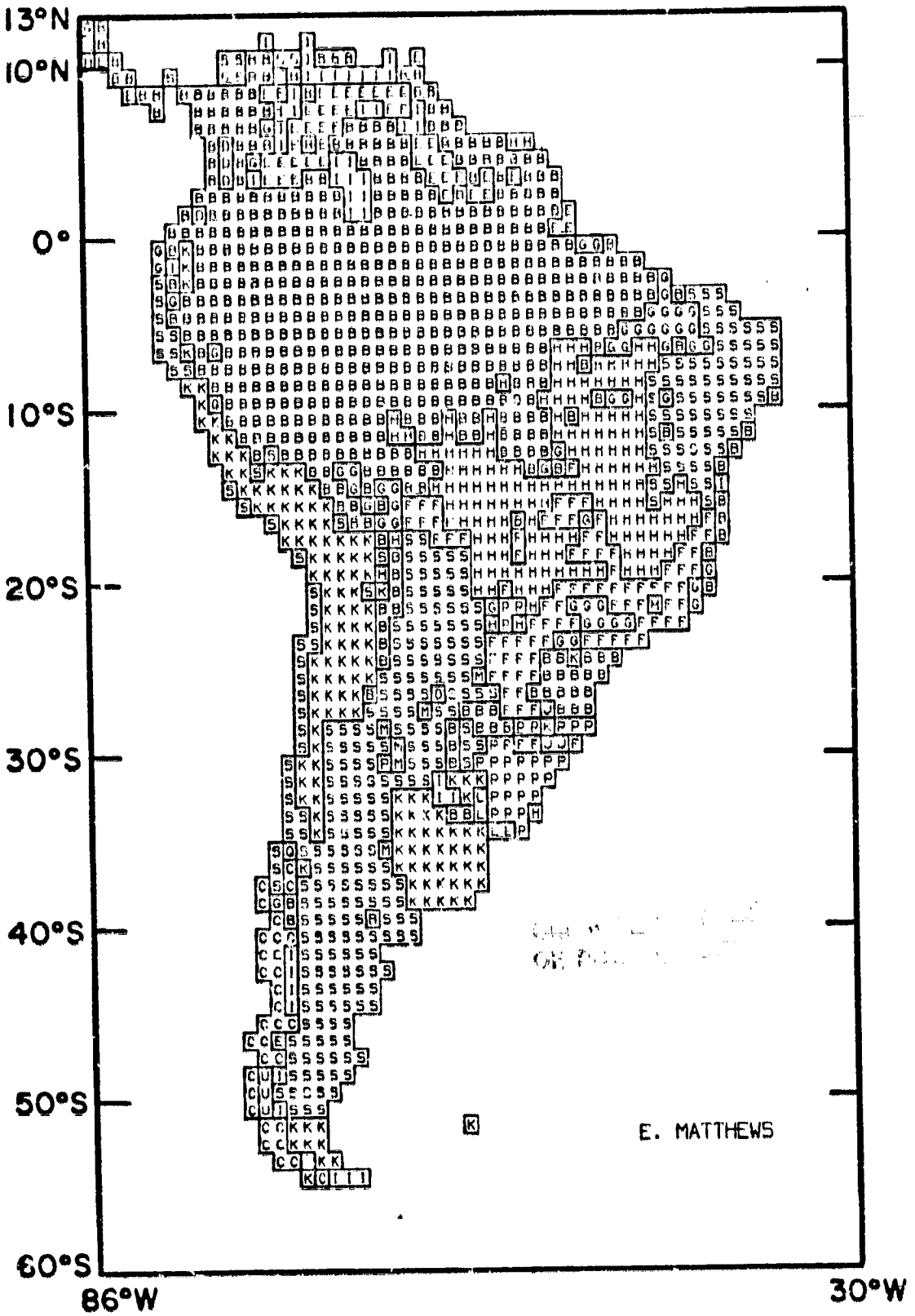


Fig. 3.B.2. April albedo map of South America. Legend: Table 3.A.2

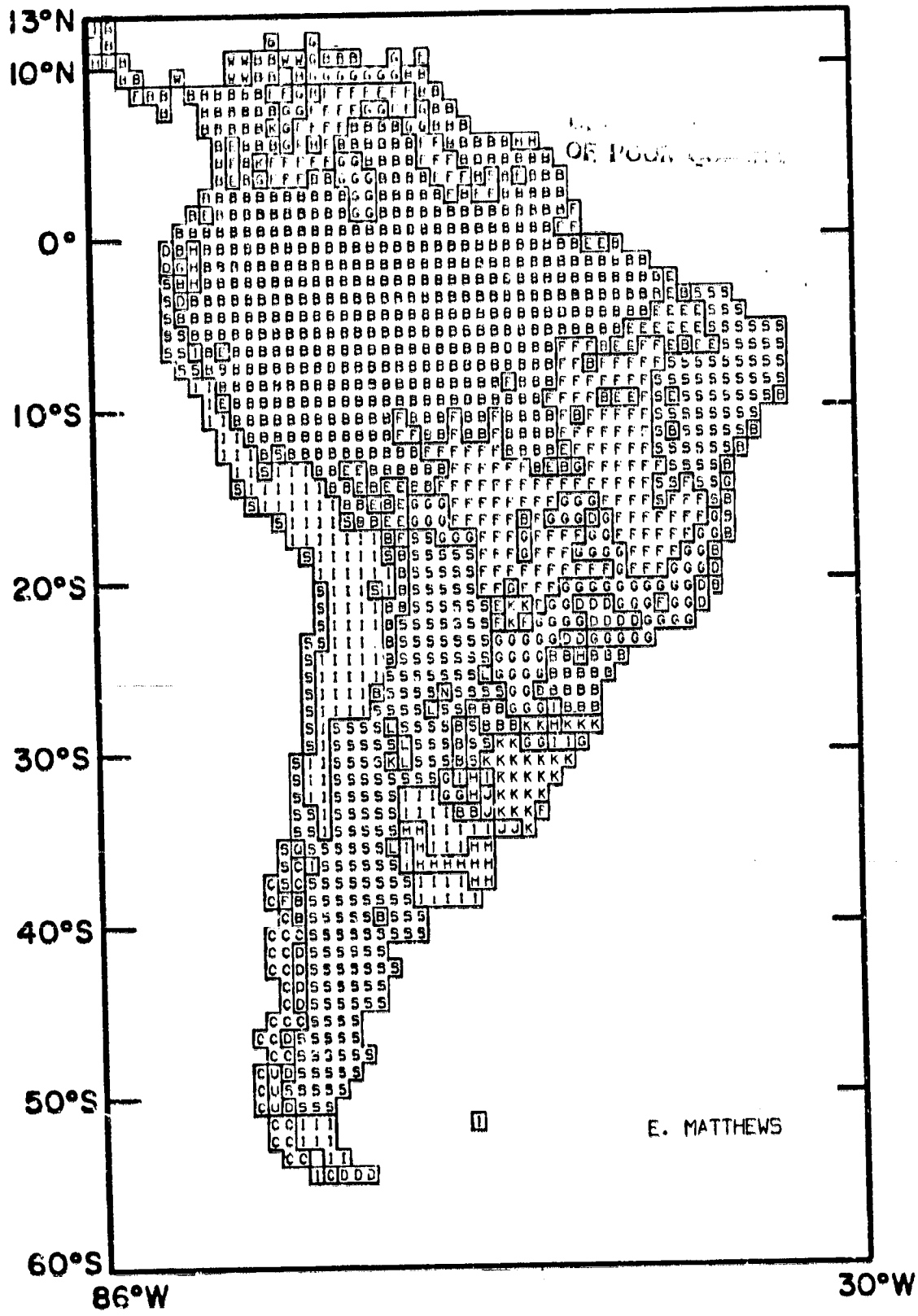


Fig. 3.B.3. July albedo map of South America. Legend: Table 3.A.2

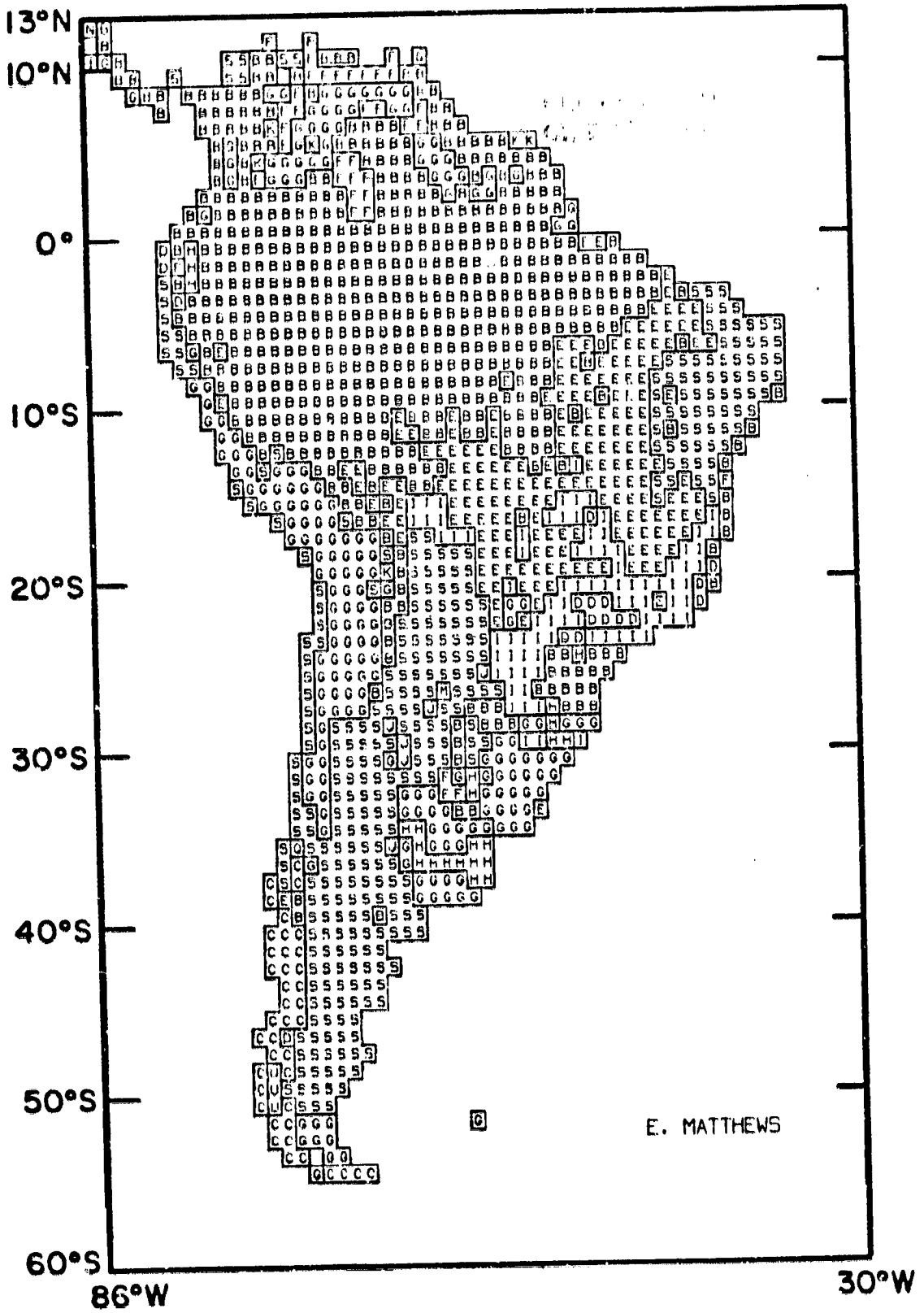


Fig. 3.B.4. October albedo map of South America. Legend: Table 3.A.2

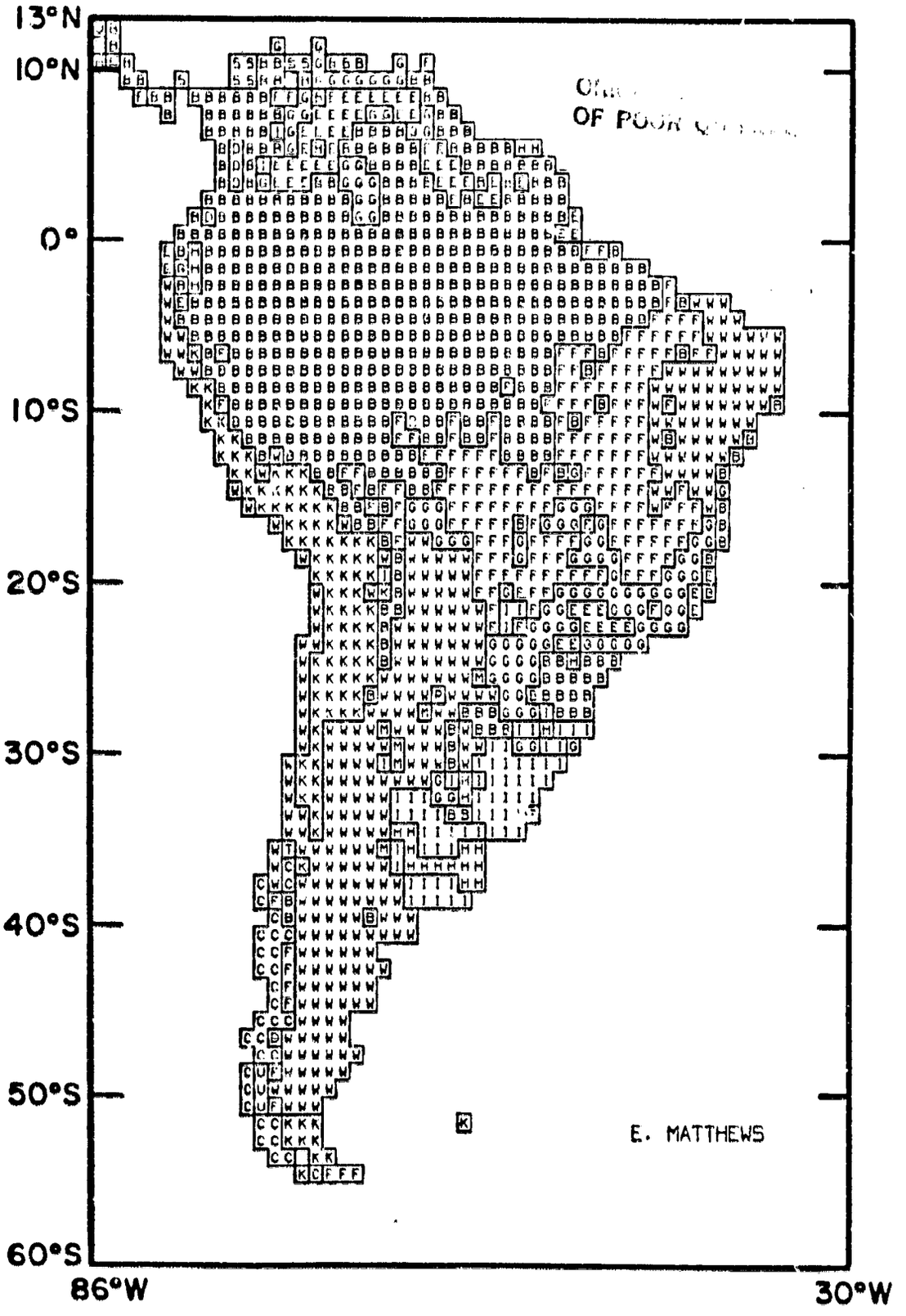


Fig. 3.C.1. January albedo map of Western Europe. Legend: Table 3.A.2

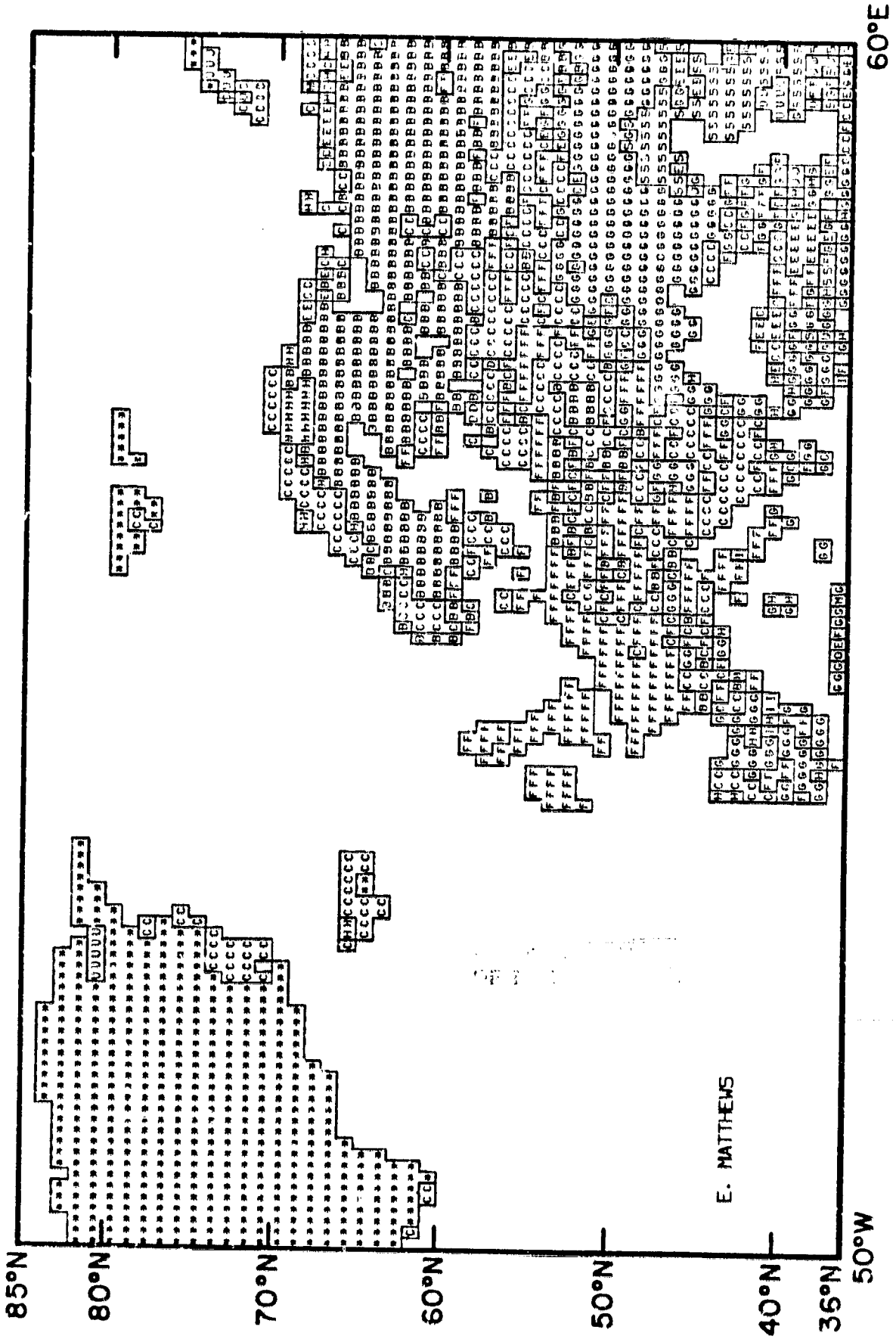


Fig. 3.C.2. April albedo map of Western Europe. Legend: Table 3.A.2

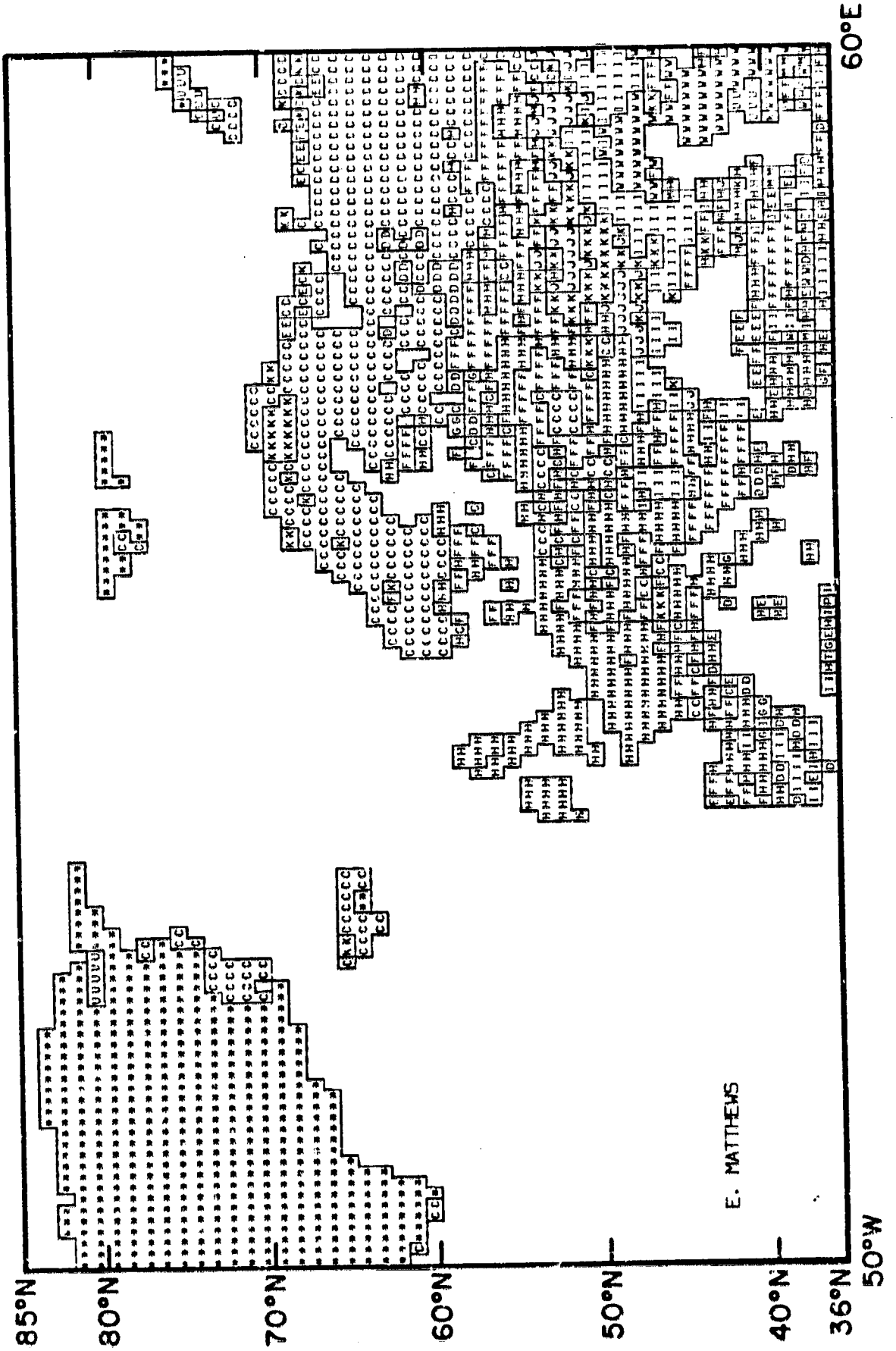


Fig. 3.C.3. July albedo map of Western Europe. Legend: Table 3.A.2

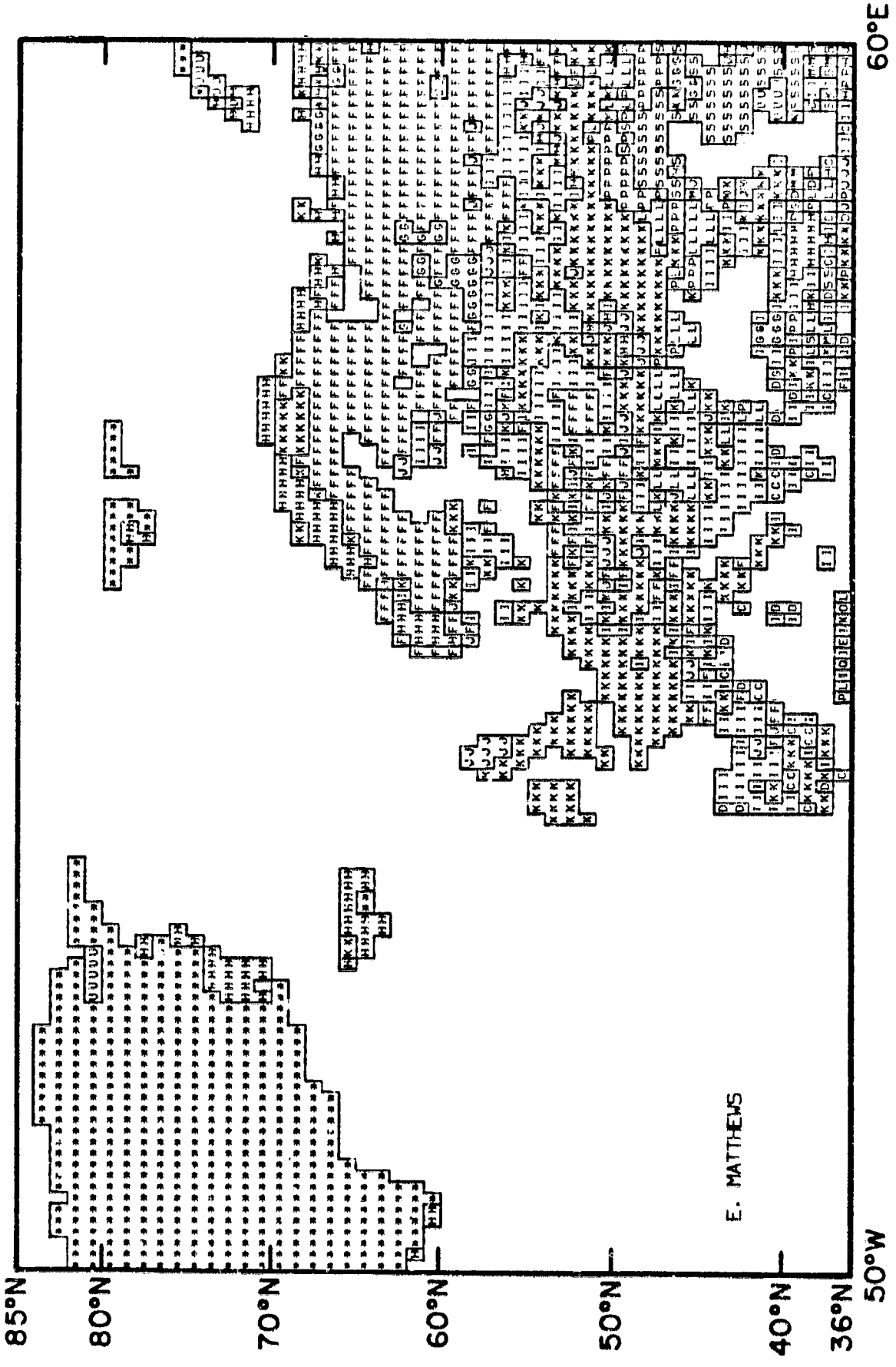


Fig. 3.C.4. October albedo map of Western Europe. Legend: Table 3.A.2

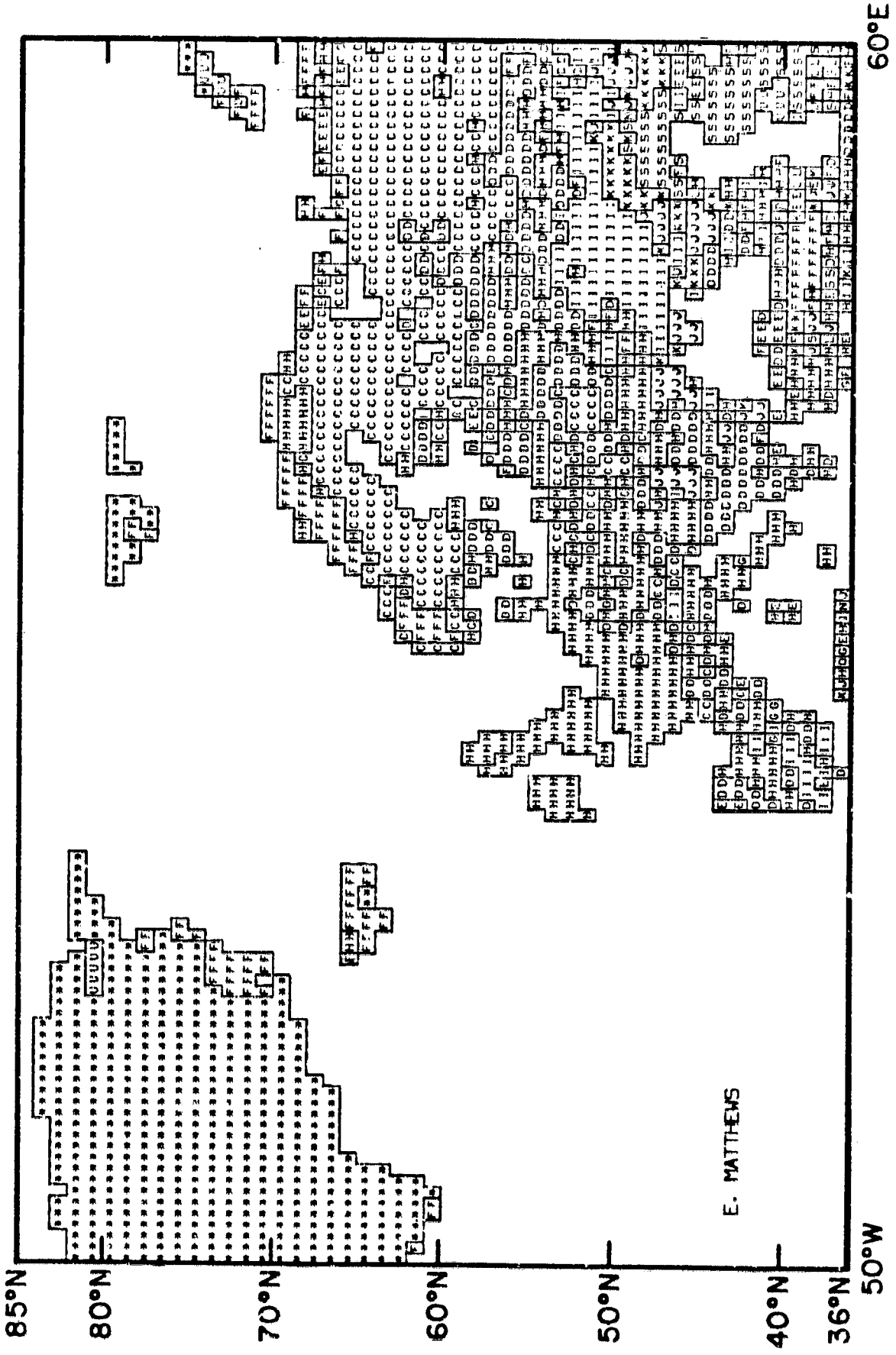


Fig. 3.D.1. January albedo map of Africa. Legend: Table 3.A.2

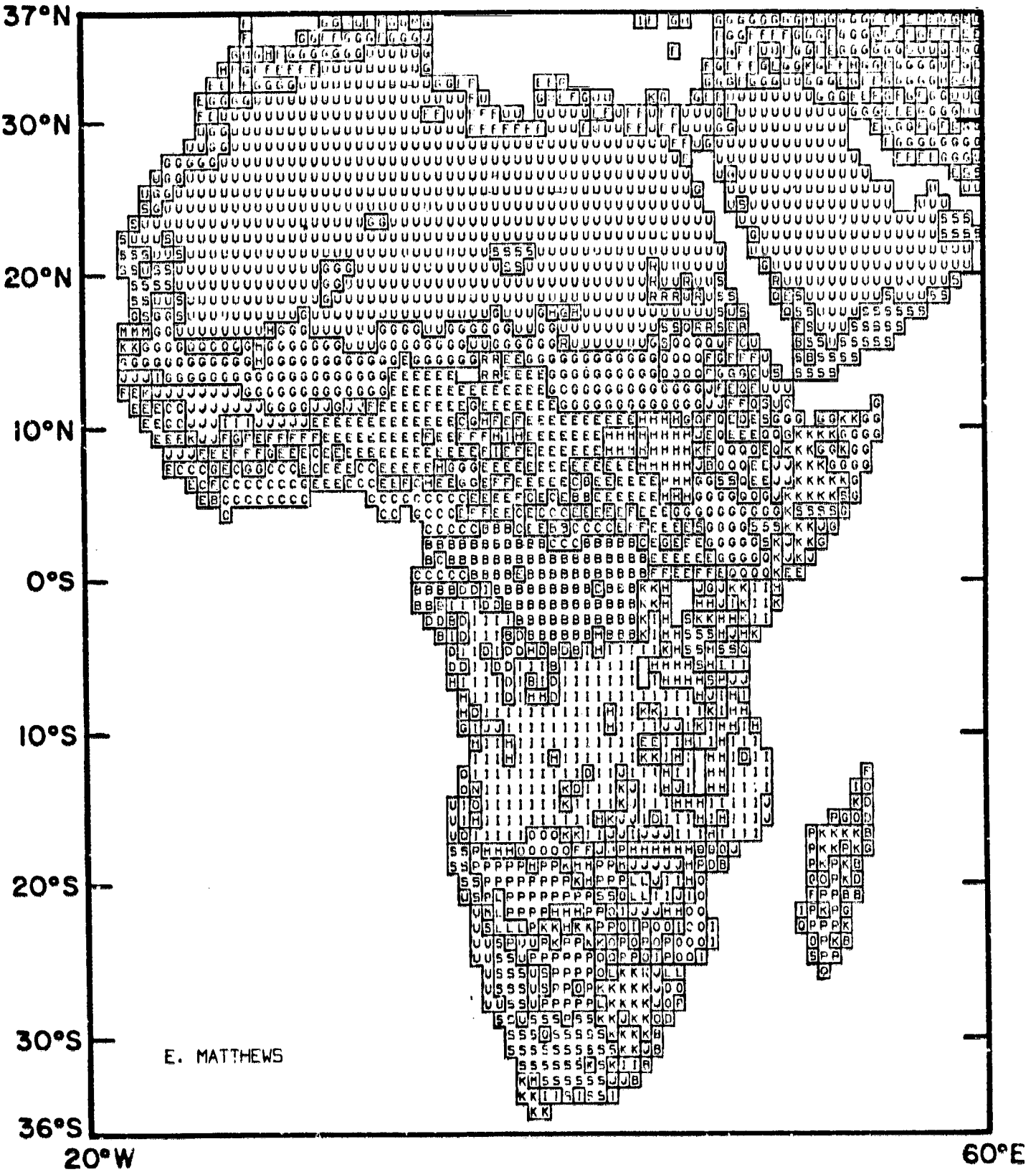


Fig. 3.D.2. April albedo map of Africa. Legend: Table 3.A.2

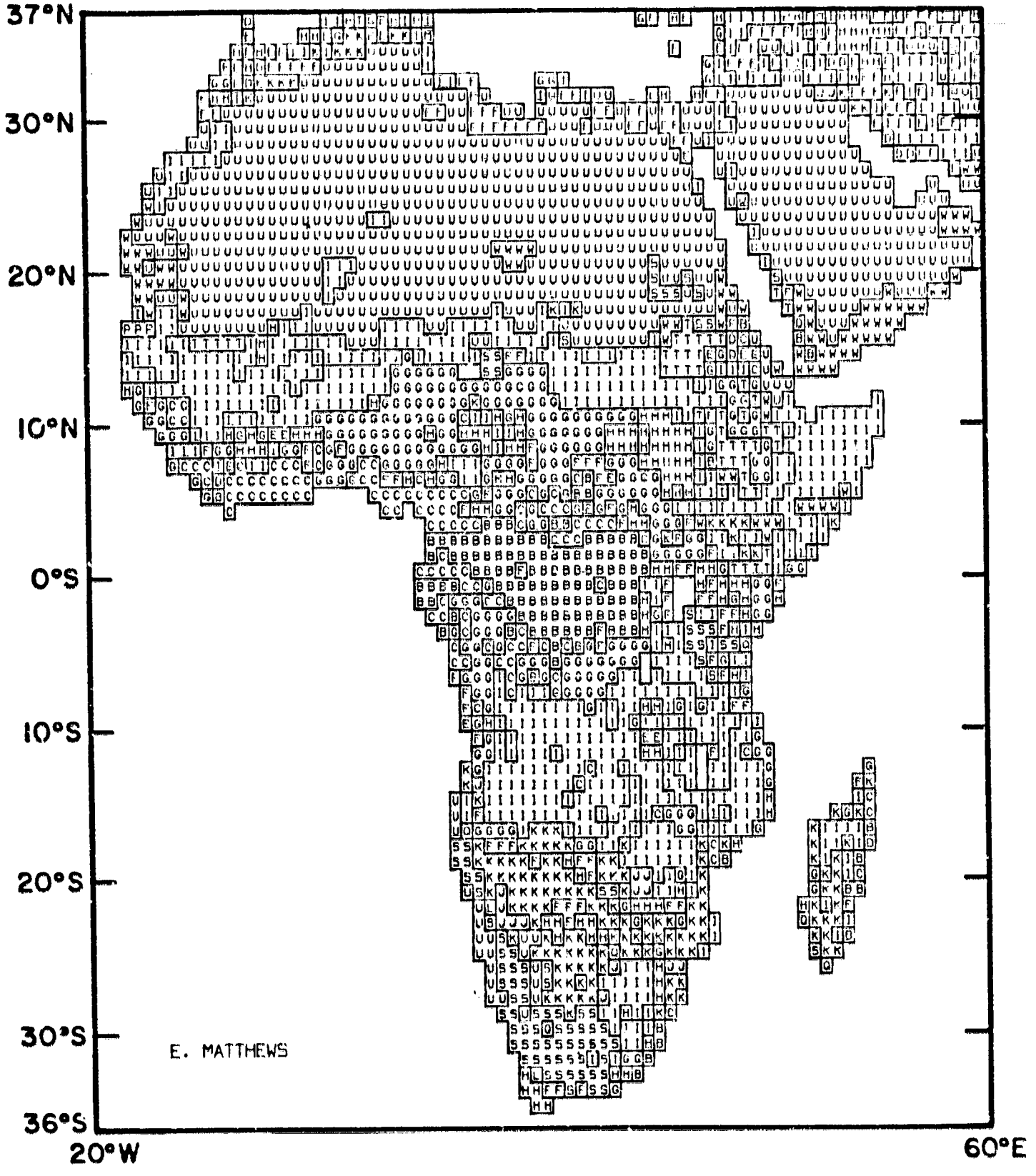


Fig. 3.D.3. July albedo map of Africa. Legend: Table 3.A.2

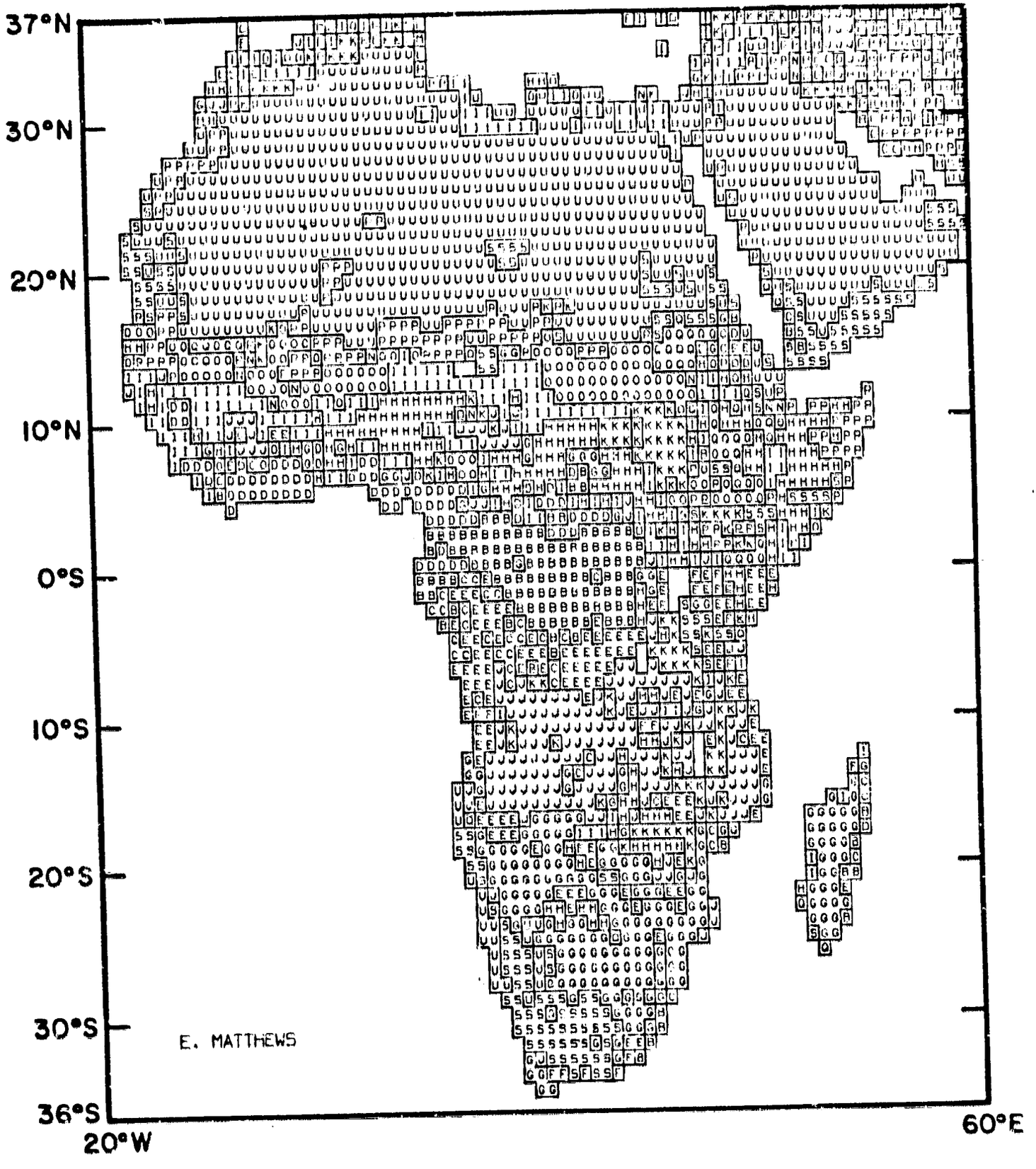


Fig. 3.D.4. October albedo map of Africa. Legend: Table 3.A.2

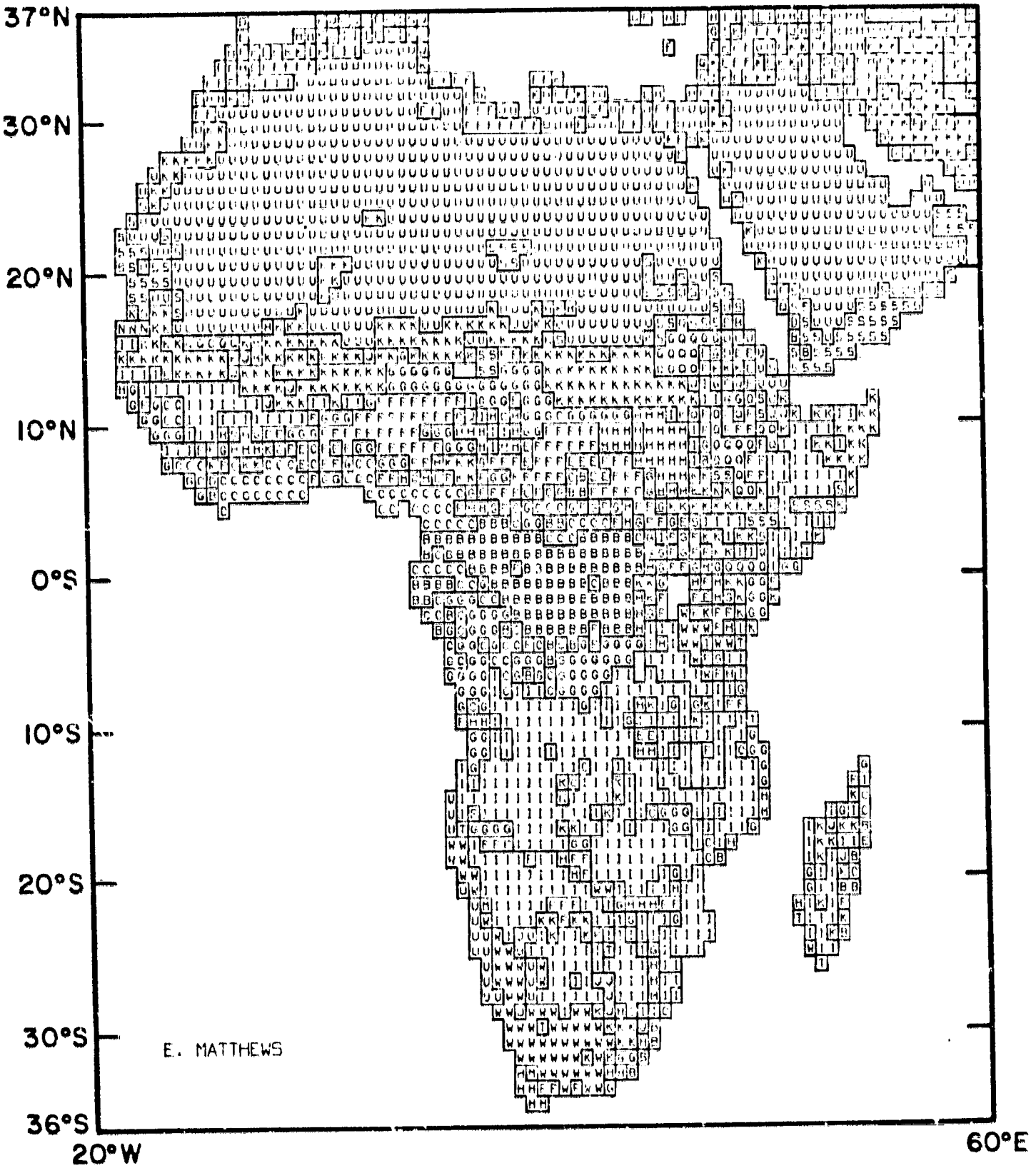


Fig. 3.E.1. January albedo map of Asia. Legend: Table 3.A.2

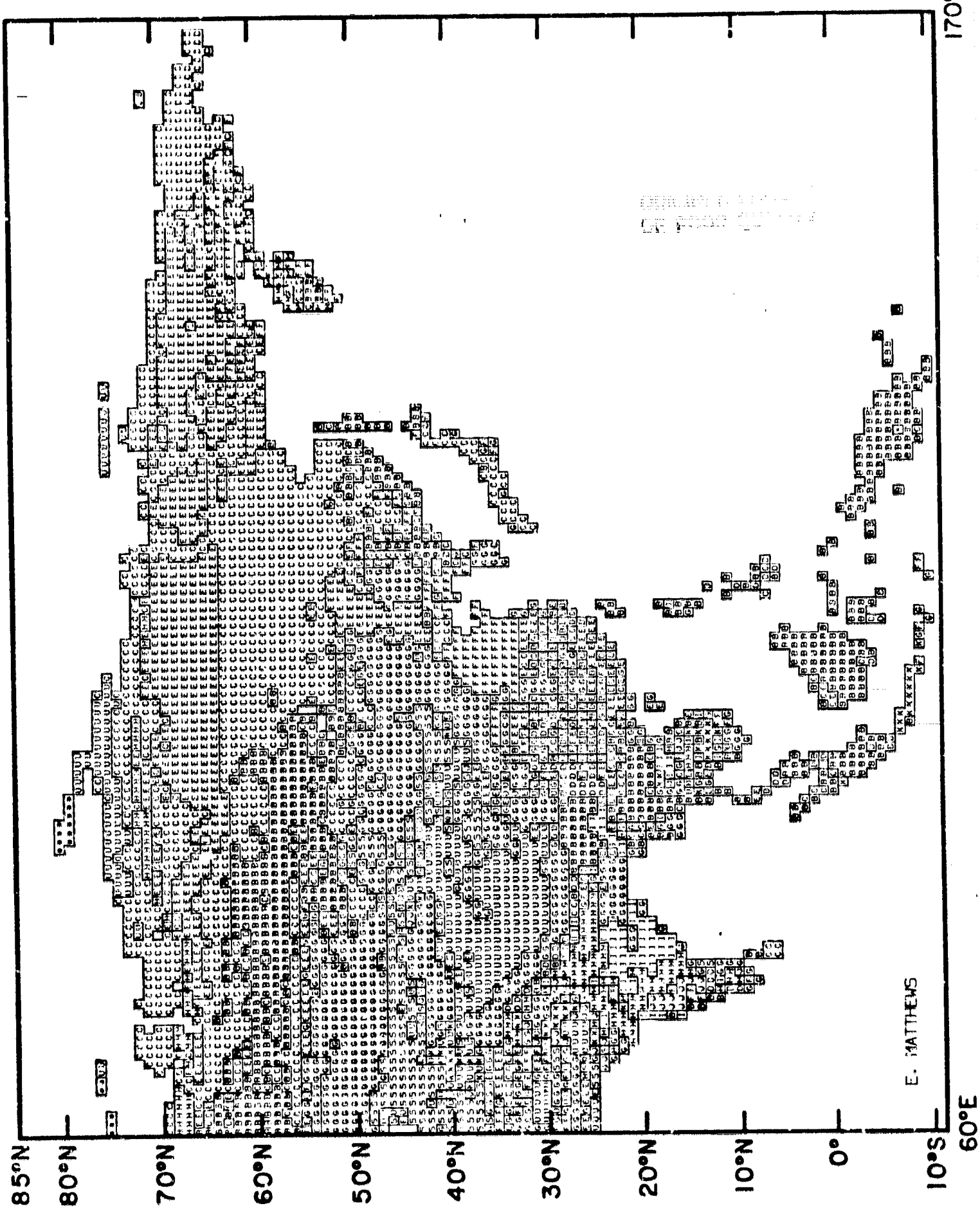


Fig. 3.E.2. April albedo map of Asia. Legend: Table 3.A.2

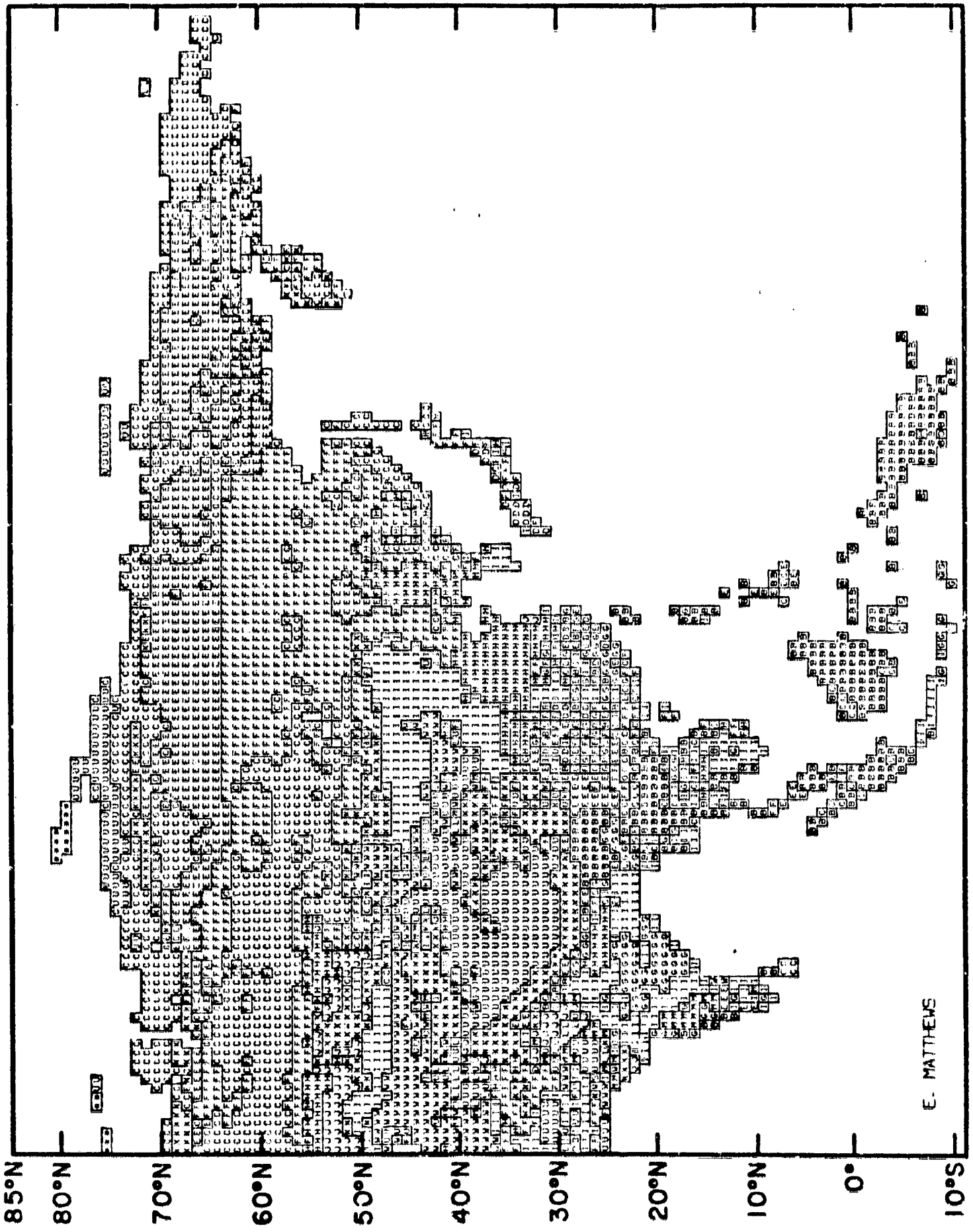


Fig. 3.E.3. July albedo map of Asia. Legend: Table 3.A.2

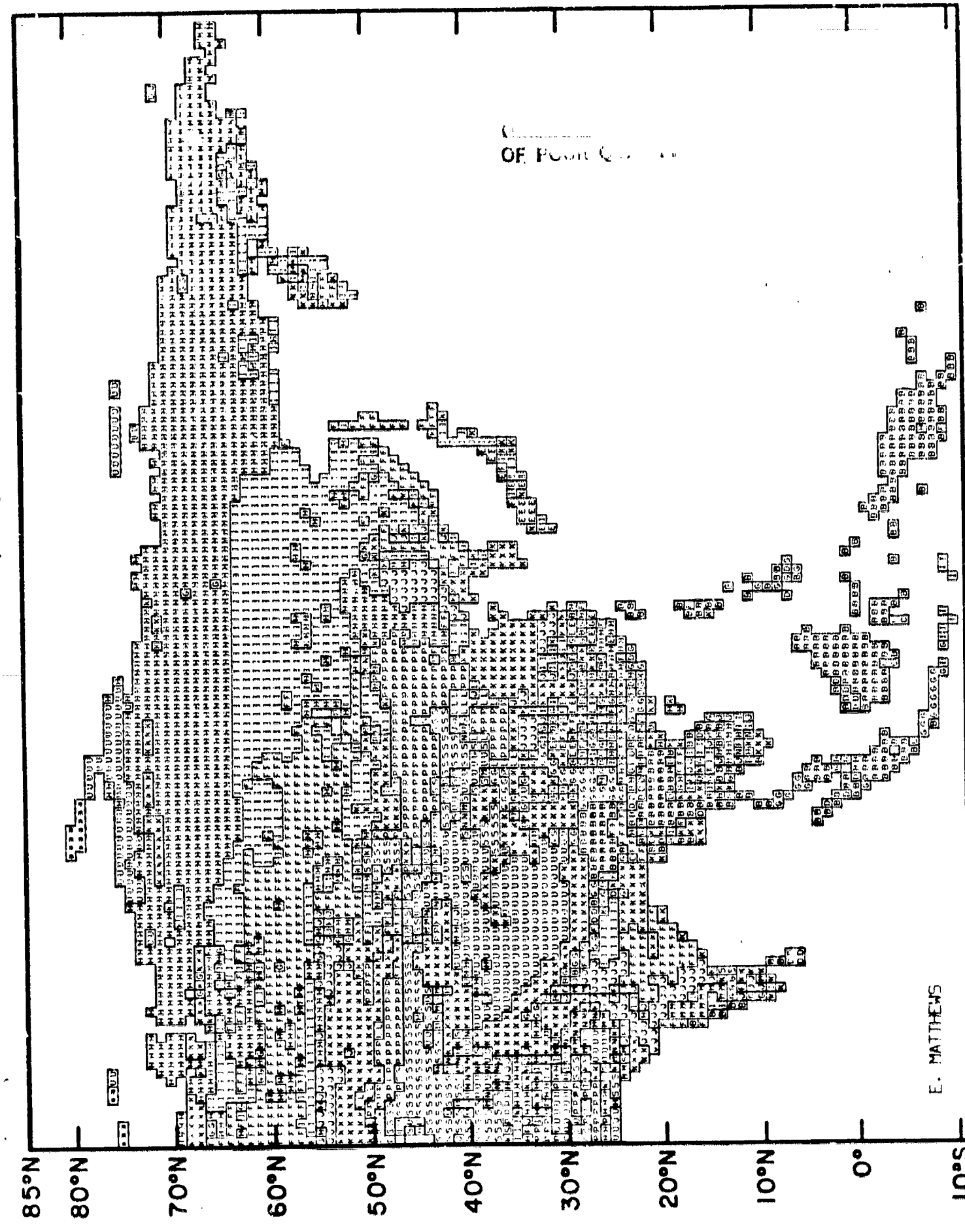


Fig. 3.E.4. October albedo map of Asia. Legend: Table 3.A.2

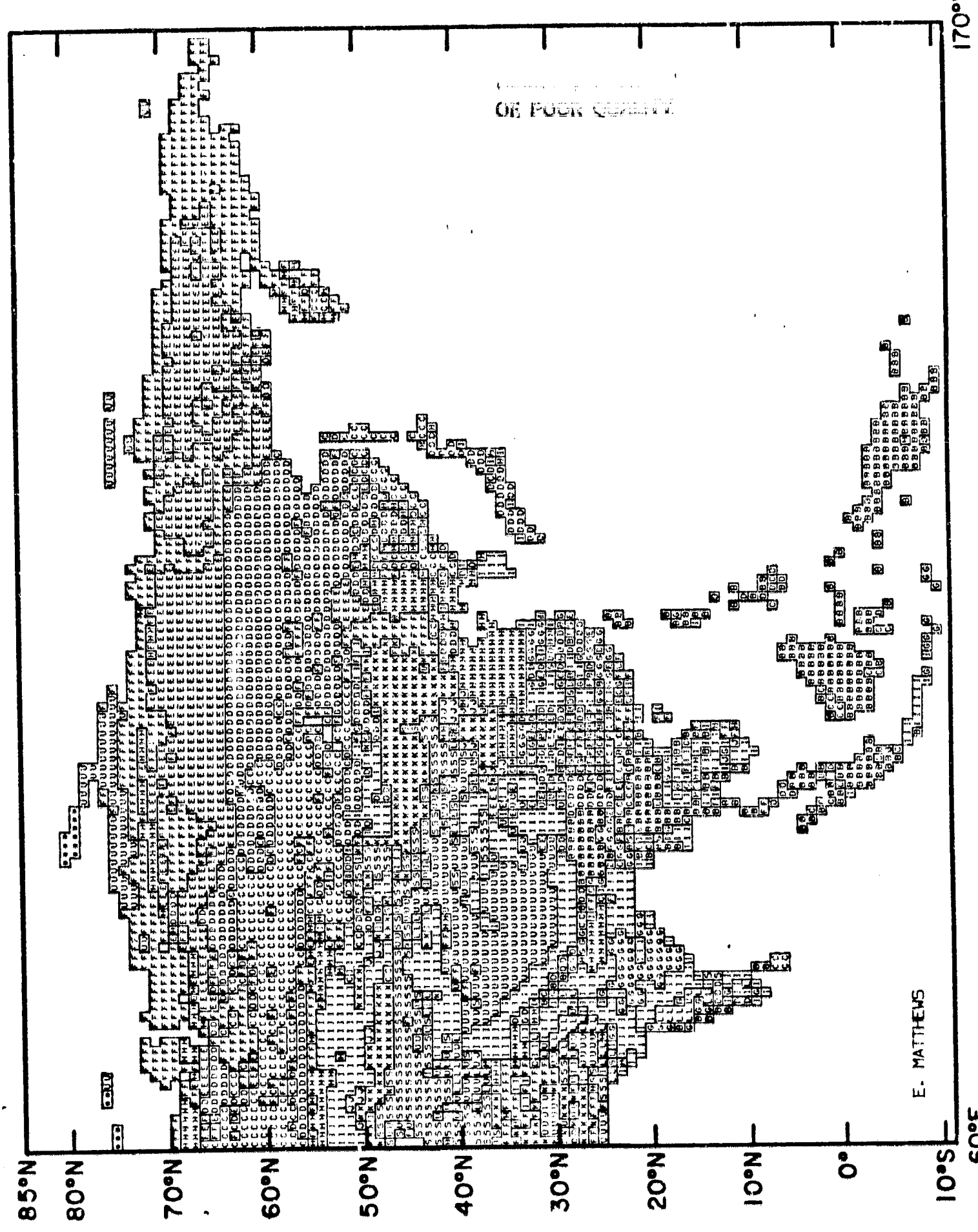


Fig. 3.F.1. January albedo map of Australia. Legend: Table 3.A.2

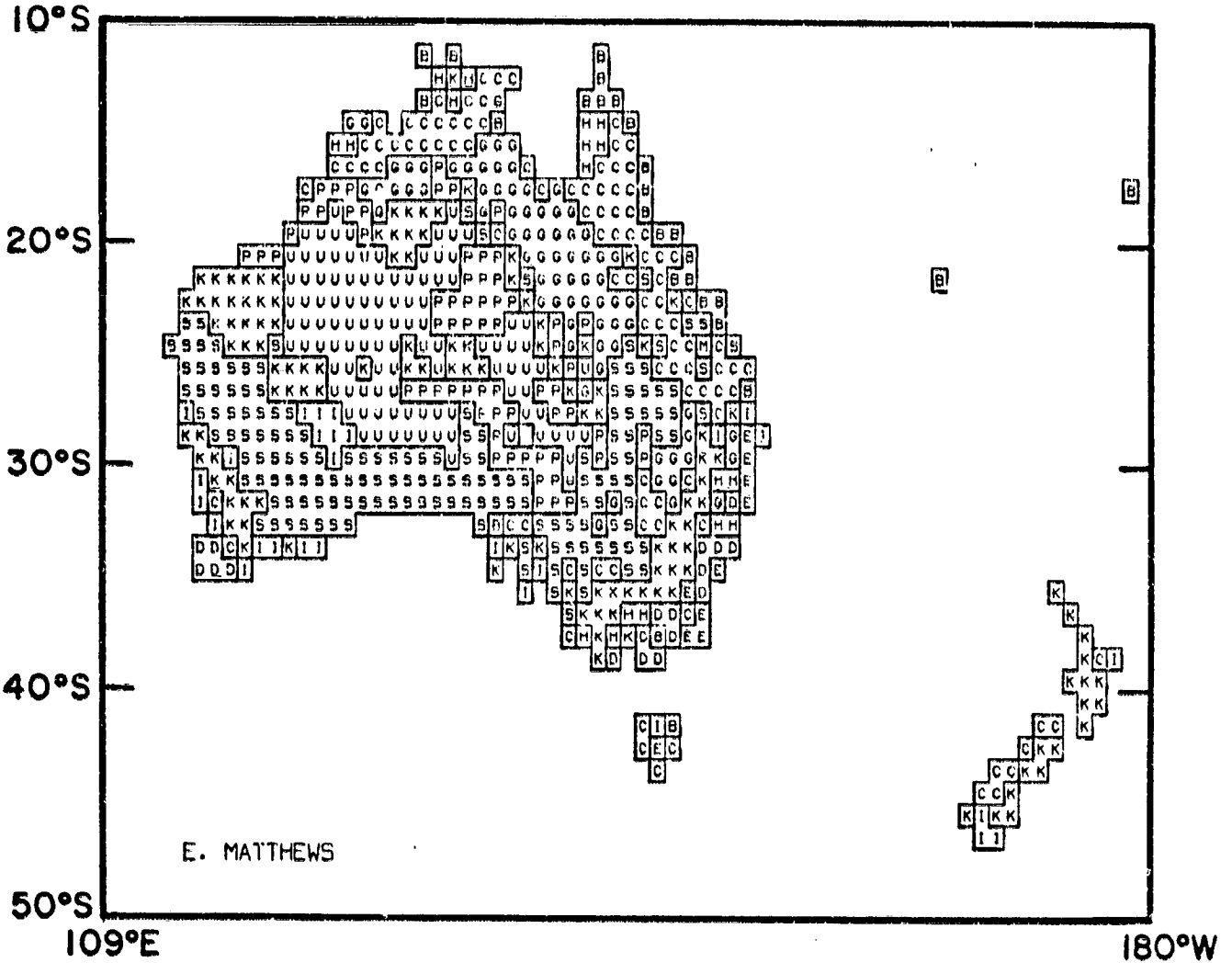


Fig. 3.F.2. April albedo map of Australia. Legend: Table 3.A.2

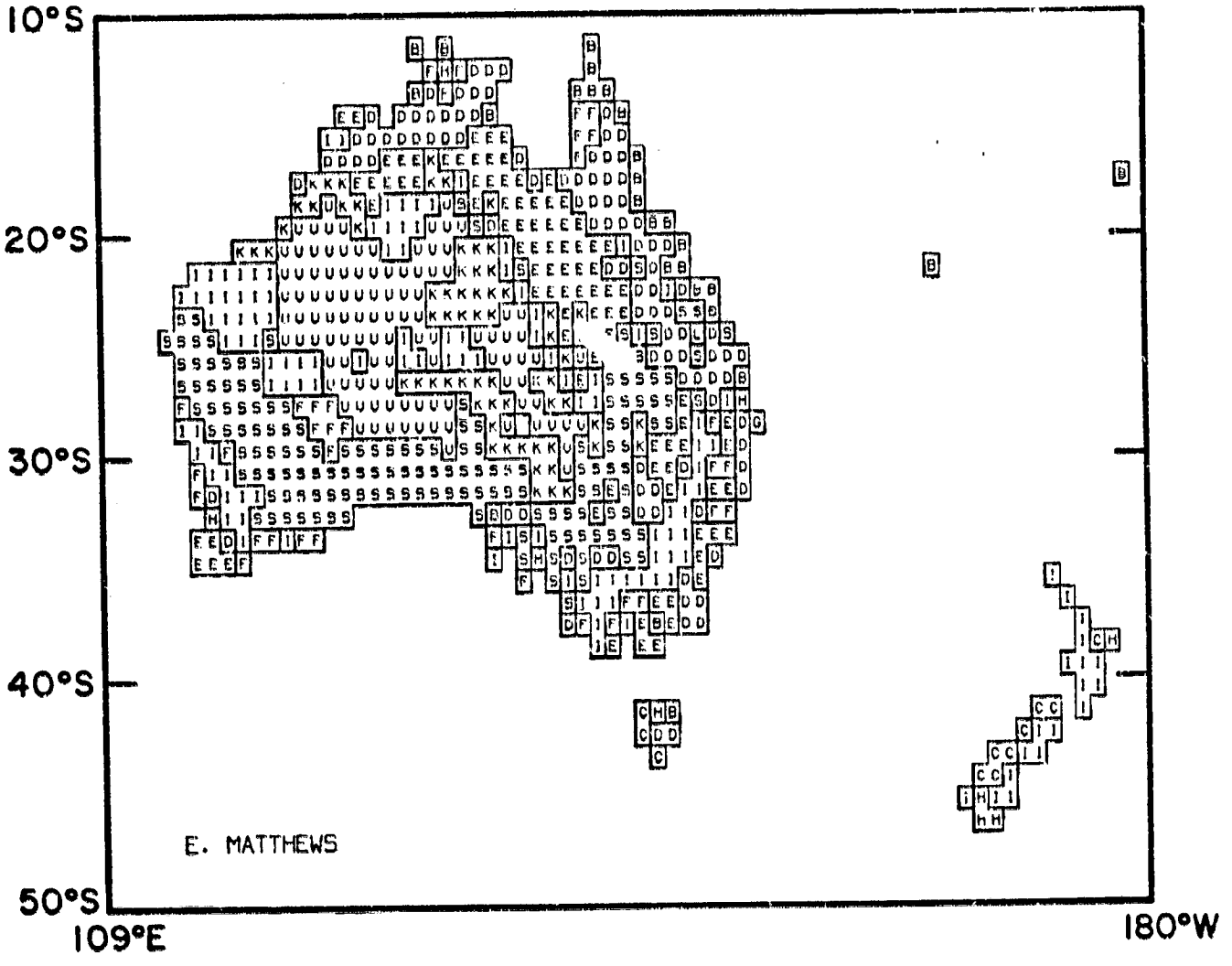


Fig. 3.F.3. July albedo map of Australia. Legend: Table 3.A.2

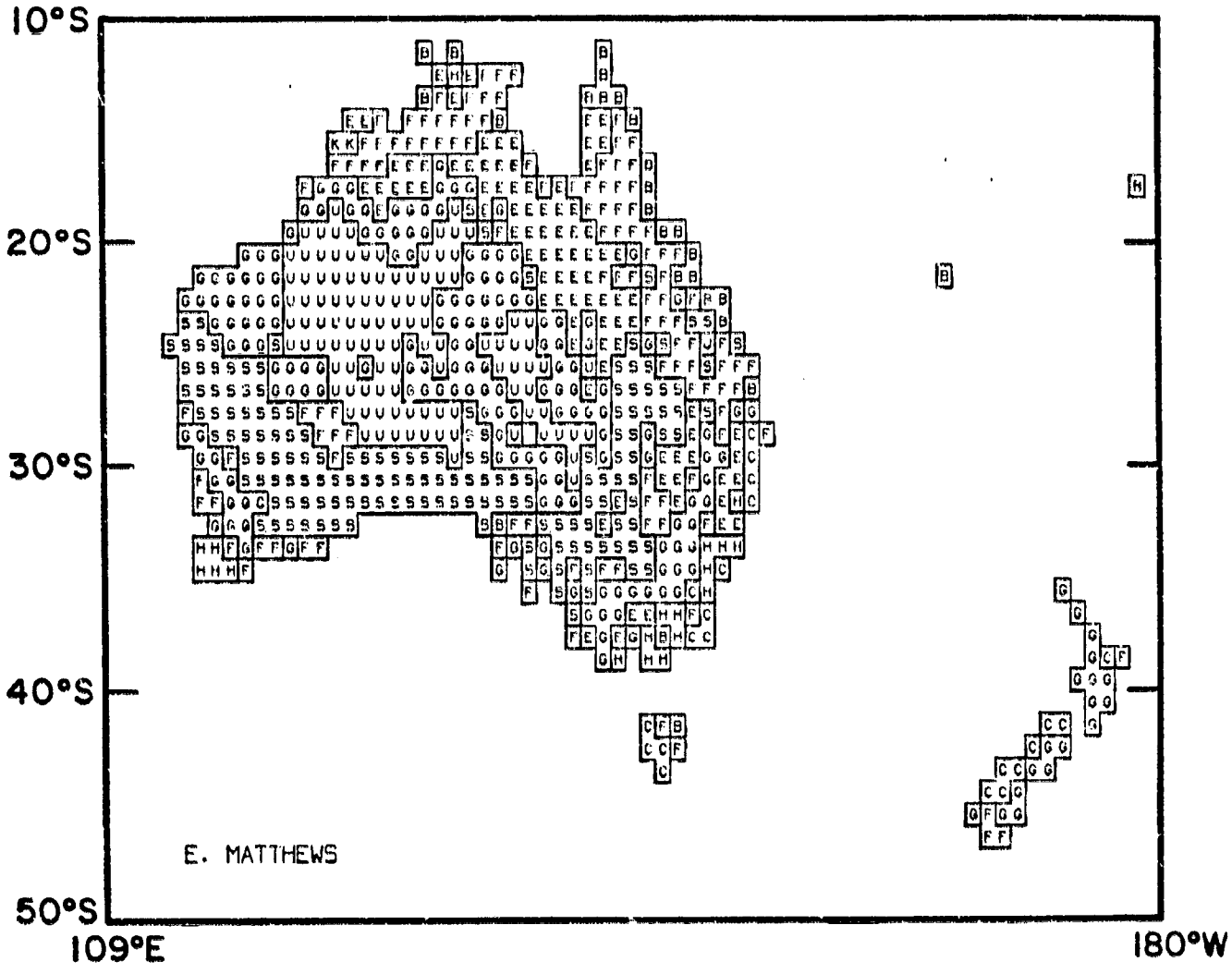
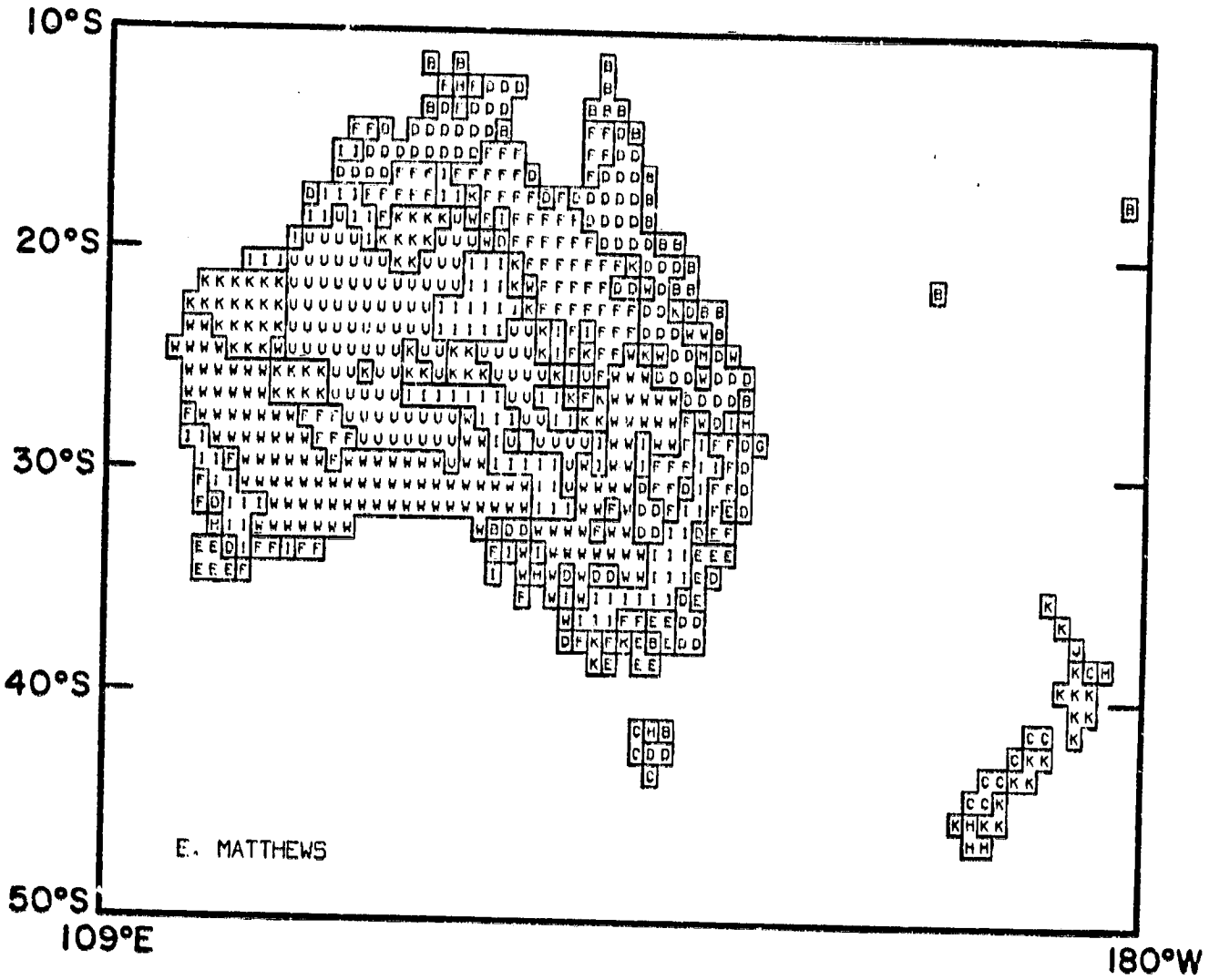


Fig. 3.F.4. October albedo map of Australia. Legend: Table 3.A.2



APPENDICES

The following appendices outline all revisions to the vegetation and seasonal albedo data sets mentioned in the introduction. Points are identified by (I,J) locations, compatible with the tape format outlined in Matthews (1984). I locations, extending from the dateline eastward through the Greenwich meridian to the dateline, are analogous to longitude and range from 1-360; I(1) is the 1° longitude band between 180° (dateline)-179°W, I(2) between 179°W-178°W, ... , I(360) between 179°E-180° (dateline). J locations are analogous to latitude and range south-to-north from 1-180; J(1) is the 1° latitude band between 90°S-89°S, J(2) between 89°S-88°S, ... , J(180) between 89°N-90°N.

Appendix 1. Eighty one points, identified as cultivation (type 32) in the vegetation compilation and in the vegetation array on the archived data tape (VEGTYPE) have been revised and mapped here with vegetation designations as shown below.

J	I	VEGTYPE
100	257	2
100	259	2
100	286	9
101	258	9
101	259	12
101	260	12
101	285	9
101	286	9
101	287	15
102	258	9
102	260	12
102	286	9
103	257	9
103	260	21
104	257	2
104	258	12
104	280	1
104	281	2
105	257	12
105	258	12
105	259	12
105	281	2
105	284	15
106	256	2
106	257	2
106	258	12
106	259	9
106	260	12
106	281	9
106	283	9
106	284	9
106	285	9
106	286	15
106	289	2
107	259	9
107	260	9
107	261	9
107	262	9
108	257	2
108	259	9
108	260	9
108	276	1
109	256	12
109	257	9
109	258	9
111	259	9
112	262	9
112	263	9
112	264	9
113	269	2
114	256	2
114	257	2
114	269	2
114	270	2
114	271	2
115	249	21
115	252	9
115	269	2
115	270	2
116	249	21
116	250	21
116	257	9
116	267	9
118	249	21
119	251	21
120	252	21
121	253	30
121	254	19
121	255	19
121	256	19
121	257	9
122	211	30
122	212	17
122	226	27
122	227	27
122	253	19
122	254	19
123	225	25
123	226	25
138	208	25
138	209	25

Appendix 2.A. Revisions to January albedo array on the archived data tape, resulting from revisions to the vegetation array (listed in Appendix 1).

J	I	ALBEDO	J	I	ALBEDO
101	250	16.50	109	256	19.00
101	259	19.00	109	257	16.50
102	258	16.50	109	258	16.50
103	257	16.50	111	259	16.50
104	280	13.50	114	256	14.75
105	257	19.00	114	257	14.75
105	258	19.00	115	249	19.00
105	284	18.00	115	252	16.50
106	256	14.75	115	269	13.50
106	257	14.75	116	250	19.00
106	258	19.00	116	257	16.50
106	259	16.50	116	267	17.00
106	281	17.00	119	251	19.00
106	283	17.00	120	252	19.00
106	284	17.00	121	253	19.50
106	285	17.00	121	254	16.25
106	286	18.00	121	255	16.25
106	289	13.50	121	256	16.25
107	259	16.50	121	257	16.50
107	260	16.50	122	211	19.50
107	261	16.50	122	212	15.75
108	257	14.75	122	253	16.25
108	259	16.50	122	254	16.25
108	260	16.50			

Apendix 2.B. Revisions to April albedo array on the archived data tape, resulting from revisions to the vegetation array (listed in Appendix 1).

J	I	ALBEDO	J	I	ALBEDO
101	258	17.50	109	258	17.50
101	259	21.50	111	259	17.50
102	258	17.50	114	256	16.25
103	257	17.50	114	257	16.25
104	280	14.50	115	249	21.50
105	257	21.50	115	252	17.50
105	258	21.50	115	269	14.50
106	256	16.25	116	250	21.50
106	257	16.25	116	257	17.50
106	258	21.50	116	267	17.00
106	259	17.50	119	251	21.50
106	281	17.00	120	252	21.50
106	283	17.00	121	253	21.00
106	284	17.00	121	254	18.50
106	285	17.00	121	255	18.50
106	289	14.50	121	256	18.50
107	259	17.50	121	257	17.50
107	260	17.50	122	211	21.00
107	261	17.50	122	212	17.25
108	257	16.25	122	226	18.50
108	259	17.50	122	227	18.50
108	260	17.50	122	253	18.50
109	256	21.50	122	254	18.50
109	257	17.50			

Appendix 2.C. Revisions to July albedo array on the archived data tape, resulting from revisions to the vegetation array (listed in Appendix 1).

J	I	ALBEDO	J	I	ALBEDO
101	258	18.75	108	260	18.75
101	259	22.00	109	256	22.00
102	258	18.75	109	257	18.75
103	257	18.75	109	258	18.75
104	280	15.50	111	259	18.75
105	257	22.00	114	256	17.75
105	258	22.00	114	257	17.75
105	284	18.50	115	249	22.00
106	256	17.75	115	252	18.75
106	257	17.75	115	269	15.50
106	258	22.00	116	250	22.00
106	259	18.75	116	257	18.75
106	281	17.50	116	267	17.50
106	283	17.50	119	251	22.00
106	284	17.50	120	252	22.00
106	285	17.50	121	253	22.50
106	286	18.50	121	257	18.75
106	289	15.50	122	211	22.50
107	259	18.75	122	212	19.50
107	260	18.75	123	225	22.50
107	261	18.75	123	226	21.25
108	257	17.75	138	208	21.25
108	259	18.75	138	209	21.25

Appendix 2.D. Revisions to October albedo array on the archived data tape, resulting from revisions to the vegetation array (listed in Appendix 1).

J	I	ALBEDO	J	I	ALBEDO
101	258	17.50	111	259	17.50
101	259	20.50	114	256	16.25
102	258	17.50	114	257	16.25
103	257	17.50	115	249	20.50
104	280	14.50	115	252	17.50
105	257	20.50	115	269	14.50
105	258	20.50	116	250	20.50
106	256	16.25	116	257	17.50
106	257	16.25	116	267	17.00
106	258	20.50	119	251	20.50
106	259	17.50	120	252	20.50
106	281	17.00	121	253	21.00
106	283	17.00	121	254	17.75
106	284	17.00	121	255	17.75
106	285	17.00	121	256	17.75
106	289	14.50	121	257	17.50
107	259	17.50	122	211	21.00
107	260	17.50	122	212	17.25
107	261	17.50	122	253	17.75
108	257	16.25	122	254	17.75
108	259	17.50	123	225	19.00
108	260	17.50	123	226	18.50
109	256	20.50	138	208	18.50
109	257	17.50	138	209	18.50
109	258	17.50			

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