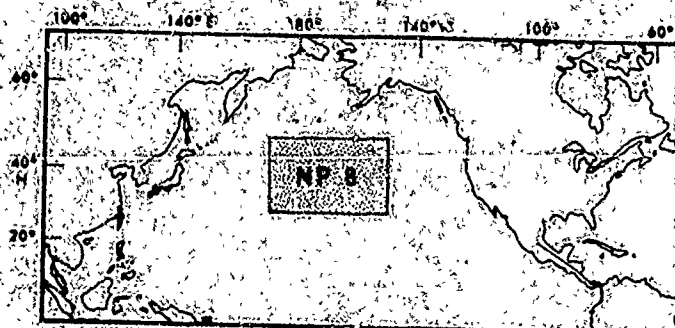


NAVAL OCEANOGRAPHIC OFFICE

SURFACE CURRENT

NORTH CENTRAL NORTH PACIFIC



JULY 1977



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DEPARTMENT OF THE NAVY
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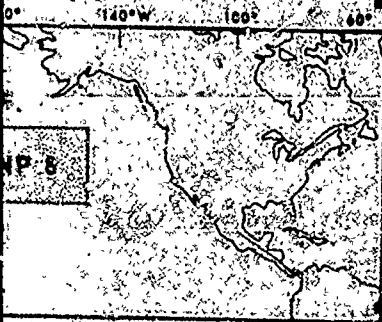
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CURRENTS

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NORTH PACIFIC OCEAN

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ABSTRACT

THIS ATLAS, AND THE SERIES OF WHICH IT IS A PART, IS COMPUTER GENERATED AND AUTOMATICALLY PLOTTED. IT MAKES AVAILABLE TO THE USER THE MOST RECENT SURFACE CURRENT DATA COLLECTED AND WILL BE UPDATED WHENEVER SUFFICIENT AMOUNTS OF DATA ARE ADDED TO THE DATA FILE. THIS AND THE OTHER ATLASES ARE BASED ON A VAST QUANTITY OF DATA AS COMPARED TO THE PREVIOUS MANUALLY-COMPILED EDITIONS PRINTED IN THE MID-THIRTIES.

THE SURFACE CURRENT INFORMATION IS BASED MAINLY ON SHIP DRIFT, WHICH IS THE DIFFERENCE BETWEEN THE DEAD RECKONING POSITION AND THE POSITION DETERMINED BY ANY TYPE OF NAVIGATIONAL FIX. THIS DIFFERENCE DESCRIBES THE DIRECTION AND SPEED OF THE CURRENT.

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6 **SURFACE CURRENTS**
NORTH CENTRAL NORTH PACIFIC

9 Special publication.



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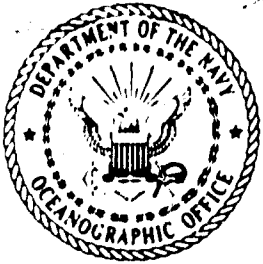
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ACKNOWLEDGMENTS

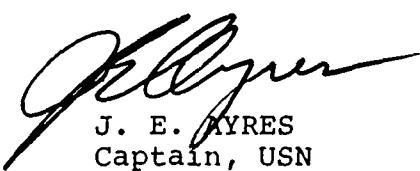
Messrs. Raymond J. Beauchesne* and William E. Boisvert made major contributions to this atlas.

*Mr. Beauchesne presently is employed by the Bureau of Naval Personnel.

FOREWORD

THIS ATLAS, ONE IN A SERIES OF 43 REGIONAL SURFACE CURRENT ATLASES, IS PRODUCED TO FULFILL A NEED OF NAVY PLANNING STAFFS AND THE SCIENTIFIC AND INDUSTRIAL COMMUNITIES FOR THE LATEST AVAILABLE OCEAN SURFACE CURRENT DATA. THESE ATLASES ADD TO THE WEALTH OF NAUTICAL INFORMATION UPON WHICH OPERATIONAL PLANNING, NAVIGATIONAL SAFETY, AND SHIPPING ECONOMY DEPEND. RAPID PRODUCTION AND WIDE DISSEMINATION OF THIS ATLAS ARE MADE POSSIBLE BY THE LATEST COMPUTER TECHNIQUES.

THE CONSTANT IMPROVEMENT IN THE QUALITY OF SURFACE CURRENT DATA RECEIVED OVER THE YEARS IS MADE POSSIBLE LARGELY BY THE MORE THOROUGH REPORTS OF VOLUNTARY OBSERVERS IN RECENT YEARS. THE DEFENSE MAPPING AGENCY, THE OCEANOGRAPHIC OFFICE, AND THE USER OF THE ATLASES RELY ON THE PERSONAL OBSERVATIONS OF THE MAN WHO HAS "BEEN THERE." MARINERS, IN REPORTING THEIR OBSERVATIONS, RENDER A SERVICE NOT ONLY TO THEMSELVES BUT ALSO TO ALL "WHO GO DOWN TO THE SEA IN SHIPS." WITH THE ADVENT OF NUCLEAR POWER, ELECTRONIC NAVIGATION AIDS, AND 300,000-TON SHIPS, UP-TO-DATE, RAPIDLY DISSEMINATED ENVIRONMENTAL AND NAVIGATIONAL INFORMATION HAS BECOME INCREASINGLY IMPORTANT.


J. E. AYRES
Captain, USN
Commander

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SURFACE CURRENT ATLASES

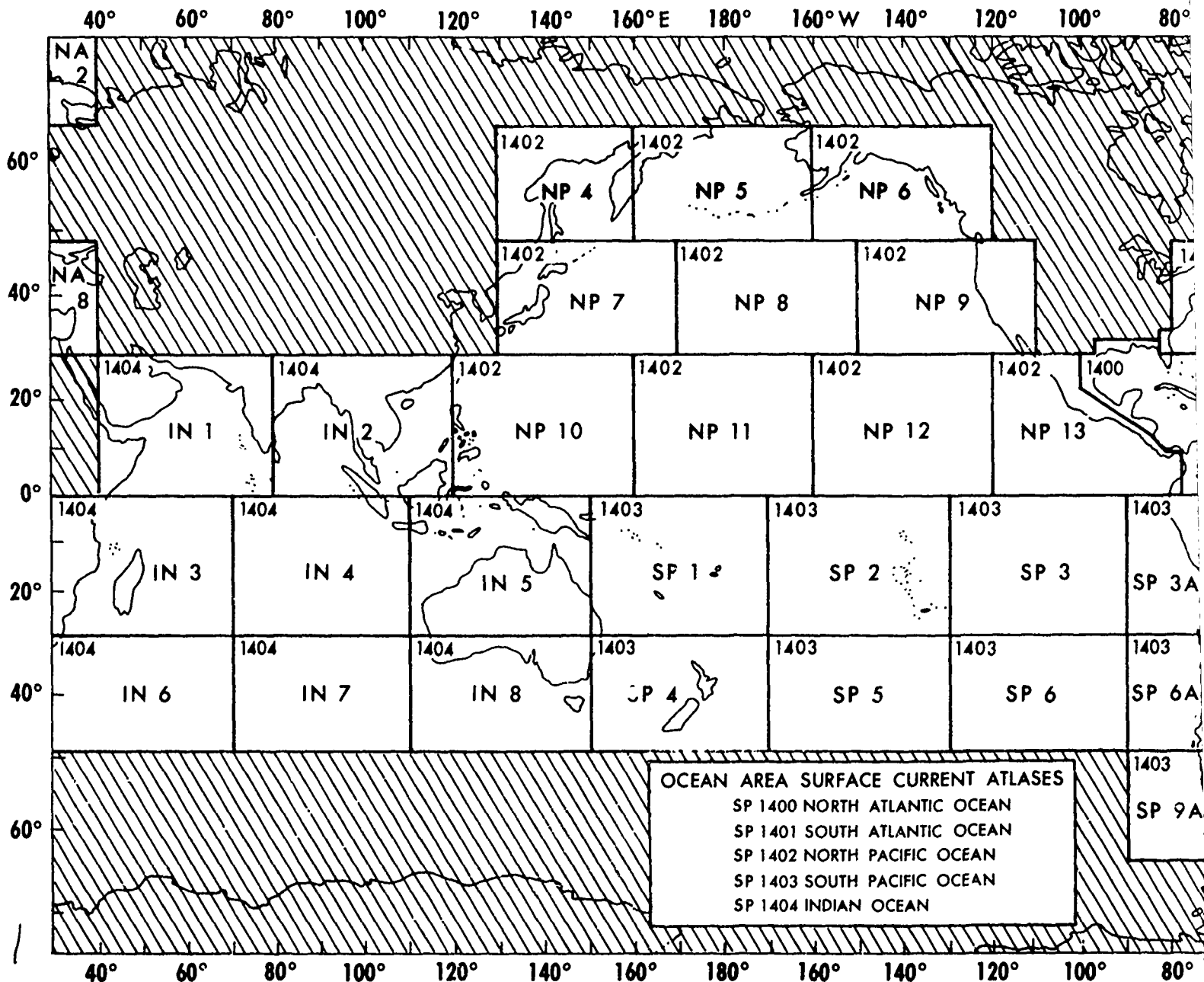
THIS SERIES OF COMPUTERIZED ATLASES REPLACES THE OLD HYDROGRAPHIC OFFICE ATLASES OF SURFACE CURRENTS (HOP 566, 568, 569, 570) WHICH WERE MANUALLY COMPILED FROM DATA OBTAINED DURING THE PERIOD 1903 - 1934. THESE NEW ATLASES CONFORM TO THE STANDARD NAVY OCEAN AREA AND REGION INDEX LIMITS SHOWN BELOW: e.g., NOO SP 1402-NP 10 COVERS NORTH PACIFIC REGION 10 EAST OF THE PHILIPPINES.

AS AMOUNTS OF NEW DATA WARRANT

THESE GRAPHICS MAY NOT BE USED IN AREAS AS THE NORTH SEA, PERSIAN GULF, ETC., WHERE CURRENTS ARE STRONGLY TIDAL AND PREDICTABLE HOURLY CHANGES OCCUR.

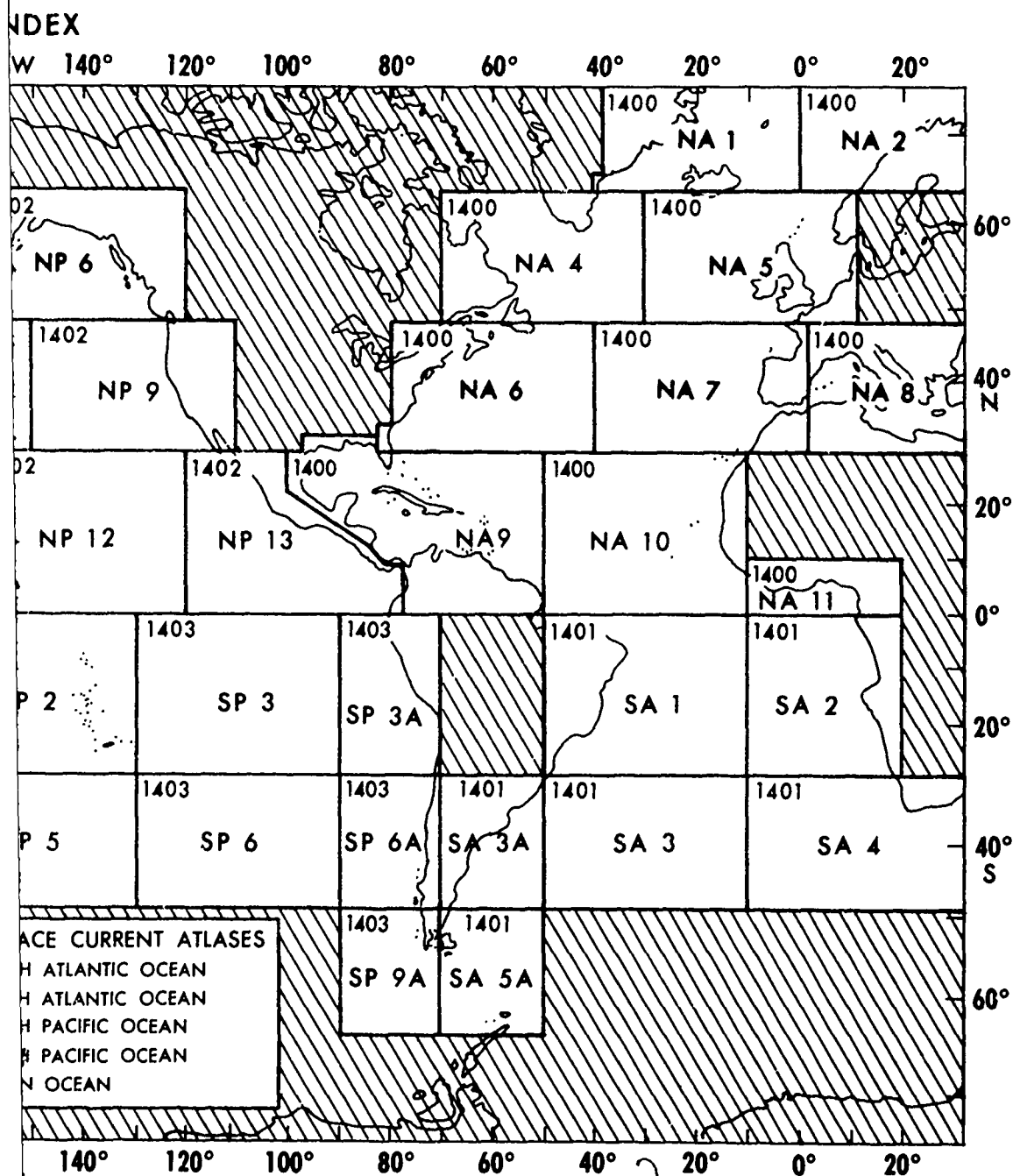
RECENT IMPROVEMENTS IN THE DATA FILE ASSURE THE INCLUSION OF THE LATEST, HIGH QUALITY SURFACE CURRENT DATA AVAILABLE. THE FILE NOW CONTAINS MORE THAN 4,200,000 OBSERVATIONS AND A GENERAL UPDATE OF THE FILE WILL BE MADE

INDEX



INDEX

THESE GRAPHICS MAY NOT BE TRULY REPRESENTATIVE OF THE ACTUAL FLOW IN SUCH AREAS AS THE NORTH SEA, PERSIAN GULF, GULF OF THAILAND, AND YELLOW SEA WHERE CURRENTS ARE STRONGLY TIDAL. FOR SUCH AREAS, OTHER SOURCES DESCRIBING PREDICTABLE HOURLY CHANGES OF TIDAL CURRENTS SHOULD BE CONSULTED.



Introduction

The Surface Current Data File, from which these atlases are derived, consists primarily of over four million ship set and drift observations. These data were collected by the Netherlands, Japan, Britain, France, and the United States. The file is supplemented by several thousand Geomagnetic Electrokinetograph (GEK) observations, mostly Japanese. The file spans the period from the early 1850's to the present. The earliest observations were collected by the Netherlands and Great Britain; those of the 1960's through the present are primarily United States data.

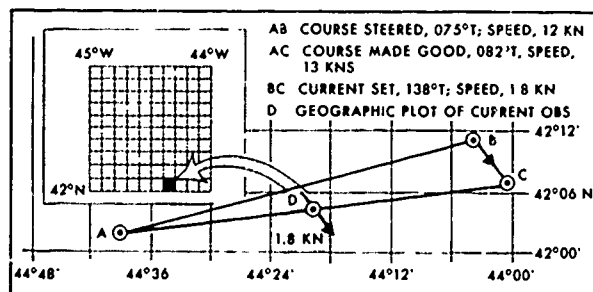
General Quality

The quality of this data file is considered high for this type of derived value. The data have been carefully screened for duplication; observations taken under adverse conditions (i.e. high winds and waves, time between observations greater than 12 hours) have been eliminated when warranted. Consideration was given to the reliability of the observer; doubtful shipboard computations of set and drift were edited; and observations with erroneous locations (mostly observations on land) have been eliminated. The accepted data are considered most useful when used collectively as in summaries where a number of observations show trends.

General Observation Technique

The set (direction) and drift (speed) are computed by the navigator from the difference between the dead reckoning (DR) position and the position determined by any type of navigational fix. The drift can be determined along any straight line track and includes all factors which cause changes in the DR position. When a fix is obtained, the current set (direction) is FROM the DR position TO the fix; the drift (speed) is equal to the distance in nautical miles between the DR and the fix, divided by the number of hours since the last fix. For successive observations, the TO POSITION of one observation becomes the FROM POSITION of the next observation.

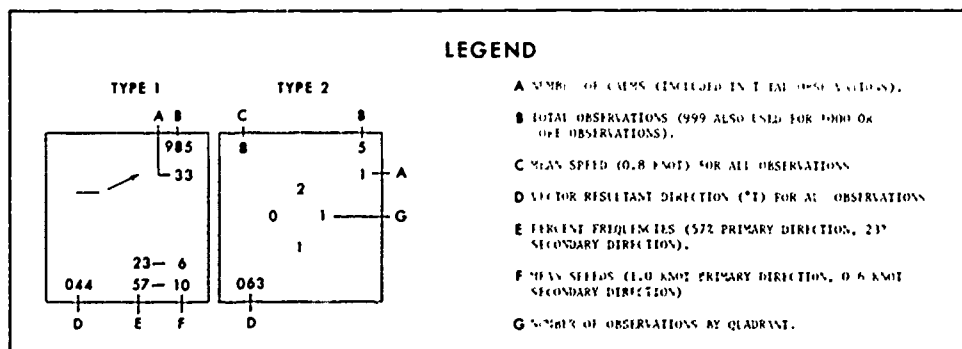
Because the influence of current may vary along a ship's track, the MEAN POSITION of the track is assigned as the geographic location of the current observation. An example of a current computation is shown in the figure below.



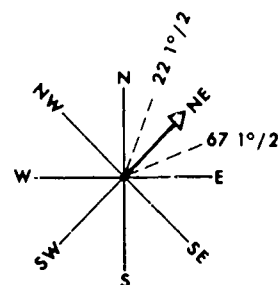
EXAMPLE OF A SURFACE CURRENT (SHIP'S DRIFT) OBSERVATION

Data Presentation

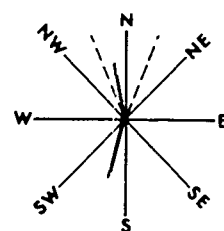
The following legend shows two types of surface current presentations by 1° quadrangle, type 1 with 12 or more observations and type 2 with fewer than 12 observations. Where there are 11 or fewer observations within a 1° quadrangle, the total number of observations is shown within the 90° quadrant containing the observations.



If there are 12 or more observations by vector resultants as follows:

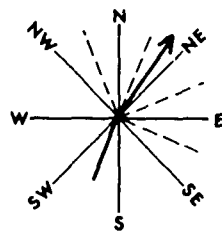
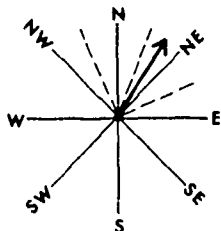
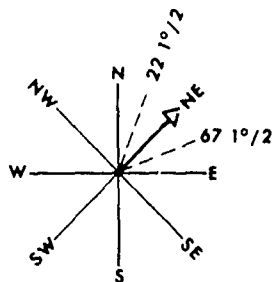


- (1) Persistent Current - 80 percent or more of all observations fall within a 45° sector of the 8-point compass. (2) Persistent Current - 80 percent or more of all observations fall within a 45° sector of the 8-point compass.



- (4) Bizonal Flow - Practically all observations are concentrated in opposite pairs of sectors, and one pair contains at least 80 percent as many observations as any other pair. This generally indicates variation that occurs in zones of entrainment of opposing currents (see examples A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ

If there are 12 or more observations in a 1° quadrangle, the surface current is depicted by vector resultants as follows:

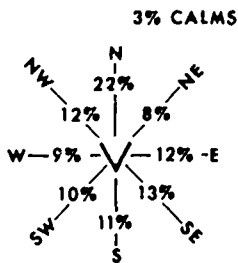
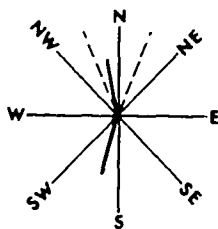


Persistent Current - 60 percent or more of all observations fall within a 45° sector of the 8-point compass.

(2) Prevailing Current - 70 percent or more of all observations fall within two adjacent 45° sectors.

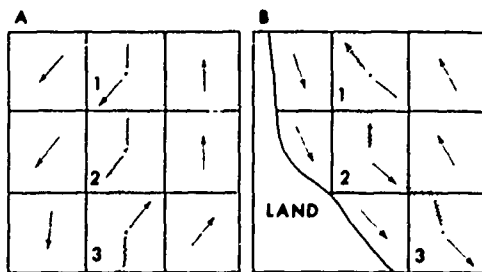
(3) Primary Current with Secondary Direction - (a) Primary Current - 50 percent or more of all observations fall within three adjacent 45° sectors.

(b) Secondary Direction - 20 percent or more of all observations fall within a 45° sector, and the two resultant vector directions are separated by more than 90° of arc.



(4) Bizonal Flow - Practically all observations are concentrated in opposite pairs of 45° sectors, and one pair contains at least 80 percent as many observations as the opposite pair. This generally indicates variability that occurs in zones of entrainment between opposing currents (see examples A and B, quadrangles 1, 2, and 3).

(5) Variable Current - The 45° sector with most observations has less than 25 percent of all observations; direction is indeterminate.



2

170 W 165 W 160 W 155 W 150 W

49 N

45 N

40 N

35 N

30 N

29 N

170 W 165 W 160 W 155 W 150 W

JANUARY

2

	170 E	175 E	180	175 W	170 W	165 W
49 N	1 2 0 0 6 0 2 0 8 0 1 0 2 0 0 0 1 2 0 0 2 1 1 0 3 2 0 0 1 0 1 1 2 0 0 0 1 0 2 0 1 2 1 0 5 0 0 0 1 0 1 0 2 0 0 0 1 0					

150 W

49 N

[illegible]

45 N

40 N

35 M

30 M

29 M

WARY

165 W

160 W

155 W

150 W

Figure 1 displays a 10x10 grid of maps showing the distribution of the 100 most common species of fish in the western North Atlantic. The grid covers latitudes from 29°N to 49°N and longitudes from 170°E to 165°W. Each map cell contains a grid of numbers representing species counts or distribution data. Some cells also contain small diagrams of fish species. The maps are arranged in a 10x10 grid, with latitude increasing from bottom to top and longitude decreasing from left to right.

MARCH

165 W

160 W

155 W

150 W

49 N

45 N

40 N

35 N

30 N

29 N

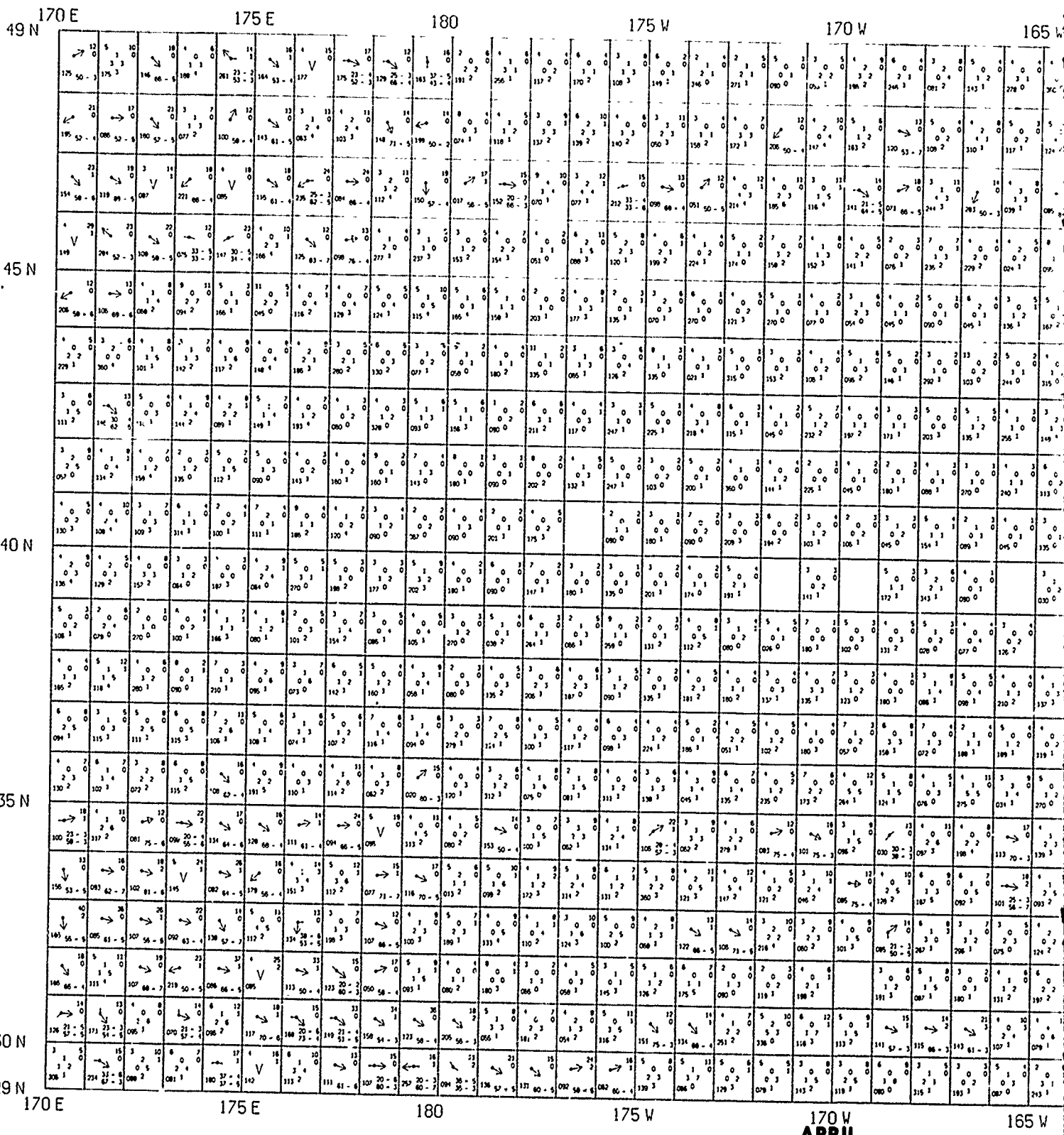
165 W

160 W

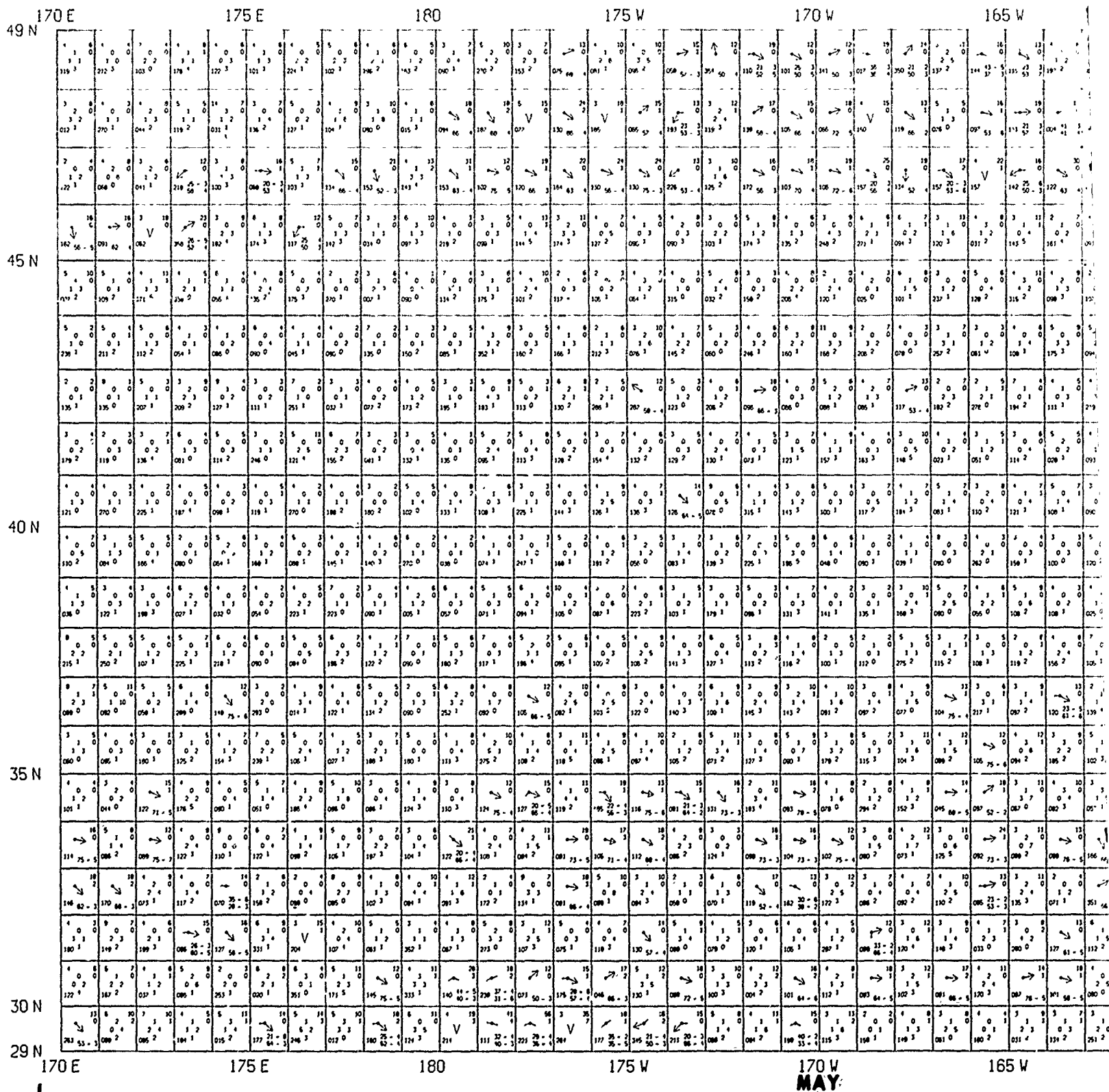
155 W

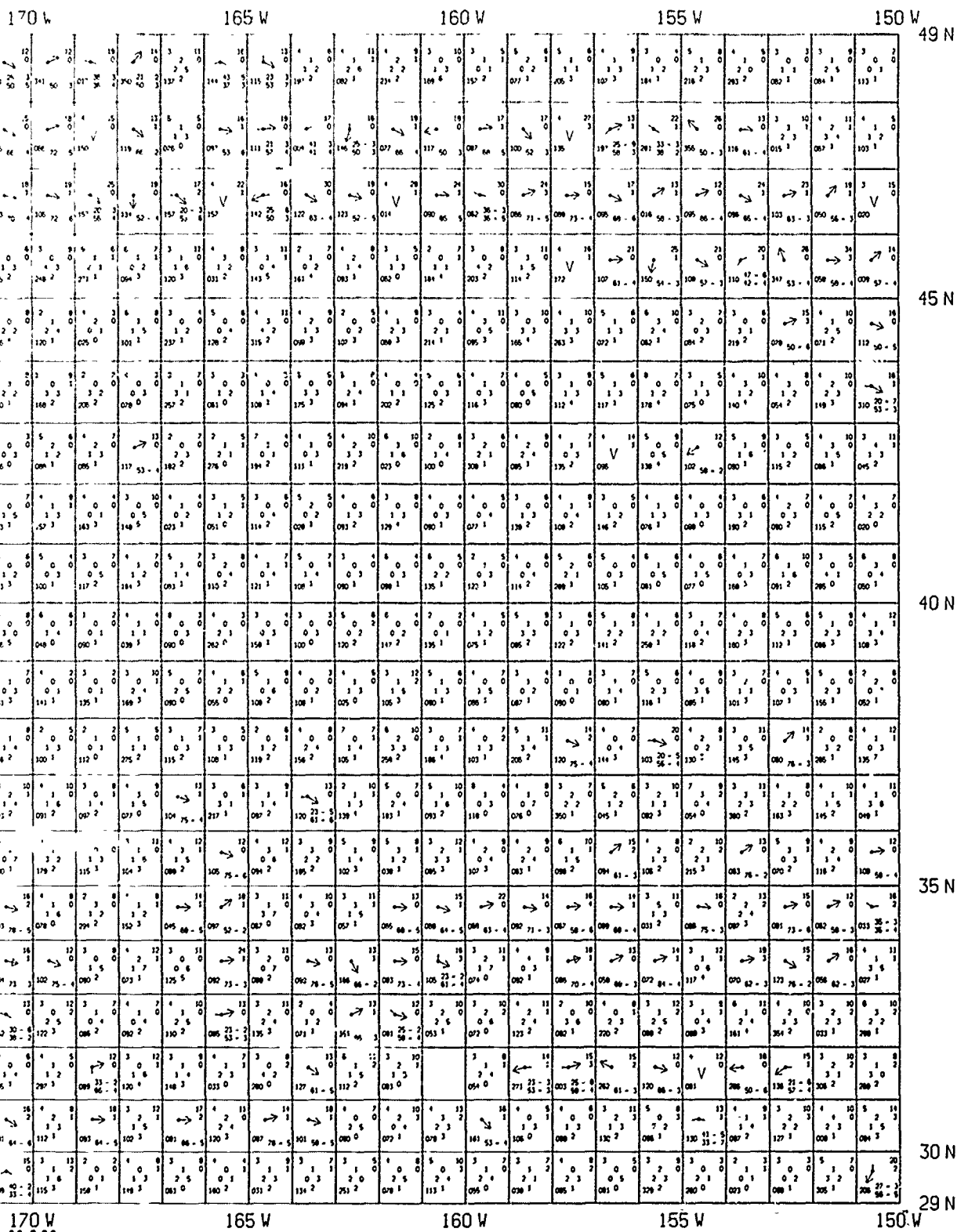
150 W

2



APRIL





This figure is a map of the Pacific Ocean showing magnetic declination for June. The map covers the area from 29°N to 49°N latitude and 170°E to 165°W longitude. The map is divided into a grid of 1-degree squares, each containing a numerical value representing the magnetic declination in degrees. The values are color-coded: red for positive declination (easterly variation) and blue for negative declination (westerly variation). The map also includes isogonic lines, which are lines of equal magnetic declination, and a compass rose in the upper right corner indicating the magnetic variation. The map is labeled with latitude and longitude coordinates along the edges, and the month 'JUNE' is printed at the bottom center.

170 W 165 W 160 W 155 W 150 W

49 N

45 N

40 N

35 N

30 N

29 N

170 W 165 W 160 W 155 W 150 W

JUNE

2

	170 E				175 E				180				175 W				170 W				165 W			
49 N	[Data grid for 49 N latitude]																							
45 N	[Data grid for 45 N latitude]																							
40 N	[Data grid for 40 N latitude]																							
35 N	[Data grid for 35 N latitude]																							
30 N	[Data grid for 30 N latitude]																							
29 N	[Data grid for 29 N latitude]																							
	170 E				175 E				180				175 W				170 W				165 W			
JULY																								

	170 E	175 E	180	175 W	170 W	165																			
49 N	161 3 158 3	135 2 113 2	180 1 113 2	028 0 090 0	048 0 102 0	110 3 133 2	248 1 158 3	220 3 056 0	117 2 030 1	113 2 182 4	173 2 044 1	085 3 101 2	188 1 186 2	180 1 146 3	083 0 052 2	180 1 087 64	043 2 138 0	343 0 144 1	270 2 148 1	123 1 093 2	083 0 138 2	117 2 253 1	027 0 094 0	129 1 100 1	096 0 098 0
	183 1 153 2	153 2 112 2	082 3 090 0	186 2 102 0	078 23-5 118 66-6	118 66-6 047 21-5	080 61-8 186 2	152 2 086 1	161 1 033 0	045 0 045 0	045 0 140 2	045 0 192 4	091 2 094 1	210 2 016 0	020 0 139 3	045 0 202 2	248 2 188 3	022 0 150 0							
45 N	294 1 100 3	180 0 088 7	078 2 193 2	084 1 000 0	380 0 14 1	086 0 01 0	135 1 282 0	144 2 045 0	104 0 215 1	134 1 120 1	040 1 080 0	040 1 172 1	109 0												
	096 1 057 0	308 0 086 0	058 0 042 0	014 1 052 0	090 0 135 0	380 0 087 0	101 0 175 0	120 1 080 0	082 0 127 1	180 1 137 0	087 0 080 1	231 1 093 1													
	104 0 02 0	032 0 087 2	1 1 072 1	013 0 1 4	086 1 208 1	103 1 081 1	208 1 103 1	103 2 027 0	107 2 077 1	1 3 041 1	104 2 087 0	051 1 073 0	314 2												
	086 1 146 1	072 0 087 0	294 1 081 0	045 0 046 0	017 0 080 2	325 0 111 2	084 1 098 0	232 1 083 1	058 0 085 1	263 1 308 0	086 0 341 0	052 1 073 0	058 0 107 0												
	044 0 297 1	380 0 057 0	054 0 045 0	050 1 286 1	236 1 045 1	090 0 088 1	046 0 117 2	038 0 051 1	111 1 045 0	135 1 084 78-3	276 1 296 1	112 1 070 0	180 2 108 1												
40 N	798 0 031 0	100 1 090 1	03 0 086 0	074 0 03 0	112 1 082 0	003 1 070 0	088 0 110 3	180 3 184 2	142 2 148 3	121 1 130 0	113 2 126 2	337 1 201 1	029 1												
	084 0 101 1	113 0 090 0	107 1 078 2	088 1 108 1	117 2 108 1	108 1 129 1	080 0 045 0	088 0 294 0	088 0 180 1	108 0 070 0	055 0 046 1	158 1 158 1													
	119 2 247 1	090 1 107 1	380 0 136 0	138 80-6 148 3	108 0 048 0	078 0 188 3	111 1 088 1	044 0 270 0	125 0 095 1	115 1 141 1	140 0 080 0	254 1 103 1	087 1 360 1												
	074 0 056 1	071 2 090 2	038 23-5 082 83-8	078 1 047 1	056 1 140 3	071 2 189 0	098 2 093 2	098 0 300 1	081 0 134 2	072 1 126 3	104 2 336 0	108 76-3 101 2													
	127 38-30-2 082 2	113 2 102 2	149 1 070 2	751 2 137 1	108 2 017 0	118 1 084 1	056 0 120 2	119 1 028 1	108 2 179 4	083 1 127 0	308 0 086 1	119 33-3 124 1	091 1												
35 N	080 0 117 2	113 1 126 2	080 0 134 0	152 4 270 0	080 0 186 2	087 1 151 1	098 0 097 2	090 0 087 0	151 1 111 3	263 1 386 0	096 1 050 0	278 2 315 0	025 0 186 3												
	147 1 056 68-1	096 21-5 083 1	072 0 178 2	028 1 112 1	109 2 101 3	071 1 150 1	325 1 148 2	112 2 113 2	072 0 183 2	072 0 118 1	108 2 270 1	178 5 088 0	011 0												
	080 58-5 094 50-3	130 52-8 020 0	325 0 110 1	284 0 118 1	101 2 070 0	071 0 040 0	085 0 105 1	138 0 080 0	072 0 075 1	122 1 023 0	123 2 270 0	085 2 078 0	041 0												
	108 1 103 1	088 90-4 184 22-8	284 53-5 014 58-1	272 0 304 26-8	270 1 132 0	080 0 326 0	319 0 236 1	270 0 260 1	077 1 381 0	286 2 090 0	086 1 215 1	240 1 238 2	289 0												
	132 1 071 0	192 0 146 2	13 0 338 20-5	200 3 325 11-3	305 64-4 304 56-1	242 20-50-1 273 2	148 2 104 1	283 1 157 3	331 0 131 2	271 66-4 278 2	341 1 102 2	091 1 288 2	288 2												
30 N	08 0 1 0	011 1 057 0	242 1 270 1	1 4 02 0	080 1 331 0	017 3 204 2	178 0 245 80-1	250 61-3 211 2	1 3 2 0	2 1 2 1	2 1 2 1	2 1 2 1	2 1 2 1												
29 N	170 E	175 E	180	175 W	170 W	165 W																			

AUGUST

AUGUST

170 W 165 W 160 W 155 W 150 W

49 N

45 N

40 N

35 N

30 N

29 N

170 W 165 W 160 W 155 W 150 W

AUGUST

2

165 W 160 W 155 W 150 W

49 N

45 N

40 N

35 N

30 N

29 N

	170 E	175 E	180	175 W	170 W	165 W																		
49 N	100 1 045 9	080 0 252 2	270 0 015 1	071 0 146 2	070 7 251 2	216 2 360 0	240 7 276 1	113 4 116 3	181 1 039 1	090 0 140 2	175 0 06 2	34 1 096 2	186 3 080 0	261 3 224 4	090 0 114 2	200 2 319 2	315 0 085 1	290 1 319 1	135 1 187 3	315 0 075 1	360 0 186 4	010 0 360 0	090 0 181 1	
45 N	009 1 206 3	225 1 144 78 - 1	193 3 263 68 - 1	080 1 151 22 - 8	109 3 143 2	113 2 151 2	042 4 216 7	208 3 199 58	170 43 - 8 143 2	066 2 115 1	274 3 098 1	158 52 - 6 142 7	081 3 268 3	035 3 218 2	098 1 136 0	005 0 214 1	171 4 184 2	127 4 183 1	150 2 184 3	315 1 045 0	130 3 146 1	081 2 117 1	122 2 162 4	308 2 104 1
46 N	090 1 140 1	360 0 149 1	251 1 022 0	080 1 180 1	175 2 247 1	045 0 113 2	154 3 144 2	119 1 080 1	129 1 275 1	182 4 050 1	041 1 127 1	270 0 270 1	119 2 096 2	244 1 090 0	007 1 116 2	290 0 107 1	315 0 156 1	113 1 047 0	136 1 294 2	080 1 157 1	076 2 180 1	045 1 058 0	080 1 086 1	
35 N	161 0 095 2	398 3 146 3	184 1 156 1	751 0 300 0	080 0 113 2	127 1 273 0	082 0 117 2	136 1 041 3	096 0 041 0	164 2 180 3	107 1 077 0	045 0 135 2	117 1 160 2	117 1 302 3	045 1 128 0	267 1 275 1	086 0 111 4	058 0 208 3	011 0 106 1	117 1 275 1	208 1 148 2	048 3 207 1	067 75 - 5 140 4	260 1 157 2
30 N	100 86 - 2 176 20 - 6	070 2 133 35 6	100 2 137 33 5	140 2 138 71 - 6	211 3 200 1	277 2 230 75 - 8	086 81 - 6 093 38 - 6	200 5 188 4	106 3 093 38 - 6	119 86 - 2 117 2	117 3 137 4	113 66 - 8 219 2	215 2 211 4	045 66 - 5 113 2	058 58 - 4 212 1	255 75 - 1 194 7	072 1 111 2	086 2 247 1	201 52 - 2 130 3	102 2 091 46 - 3	104 2 130 64 - 3	101 1 081 2	073 1 127 1	104 20 - 7 126 3
29 N	134 6 188 2	303 2 113 2	321 2 321 2	112 2 305 4	177 61 - 5 204 53 - 5	246 22 - 5 226 21 - 4	226 21 - 4 246 50 - 6	300 21 - 3 136 50 - 3	276 21 - 4 276 21 - 4	300 21 - 3 300 21 - 3	136 50 - 3 136 50 - 3	087 2 215 75 - 5	081 1 215 75 - 5	102 2 207 5	105 3 151 3	193 6 193 6	167 4 182 2	207 3 207 3	051 0 051 0	080 0 080 0	051 0 051 0	080 0 080 0	047 1 047 1	
	170 E	175 E	180	175 W	170 W	165 W																		
OCTOBER																								

170 W

165 W

160 W

155 W

150 W

49 N

45 N

40 N

35 N

30 N

29 N

OCTOBER

2

165 W

160 W

155 W

150 W

49 N

45 N

40 N

35 N

30 N

29 N

165 W

160 W

155 W

150 W

2

	170 E	175 E	180	175 W	170 W	165 W
49 N						

165 W 160 W 155 W 150 W

49 N

45 N

40 N

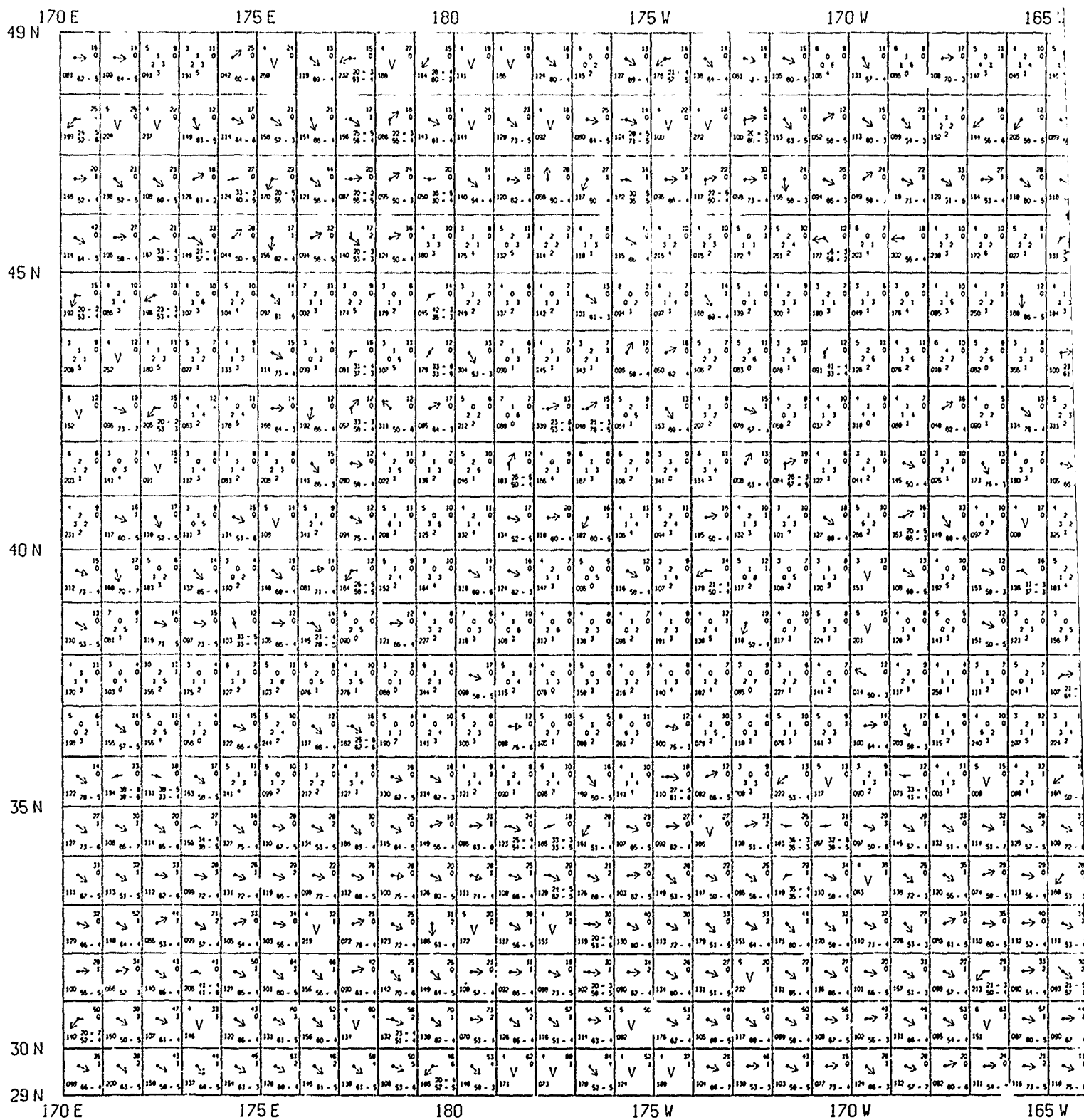
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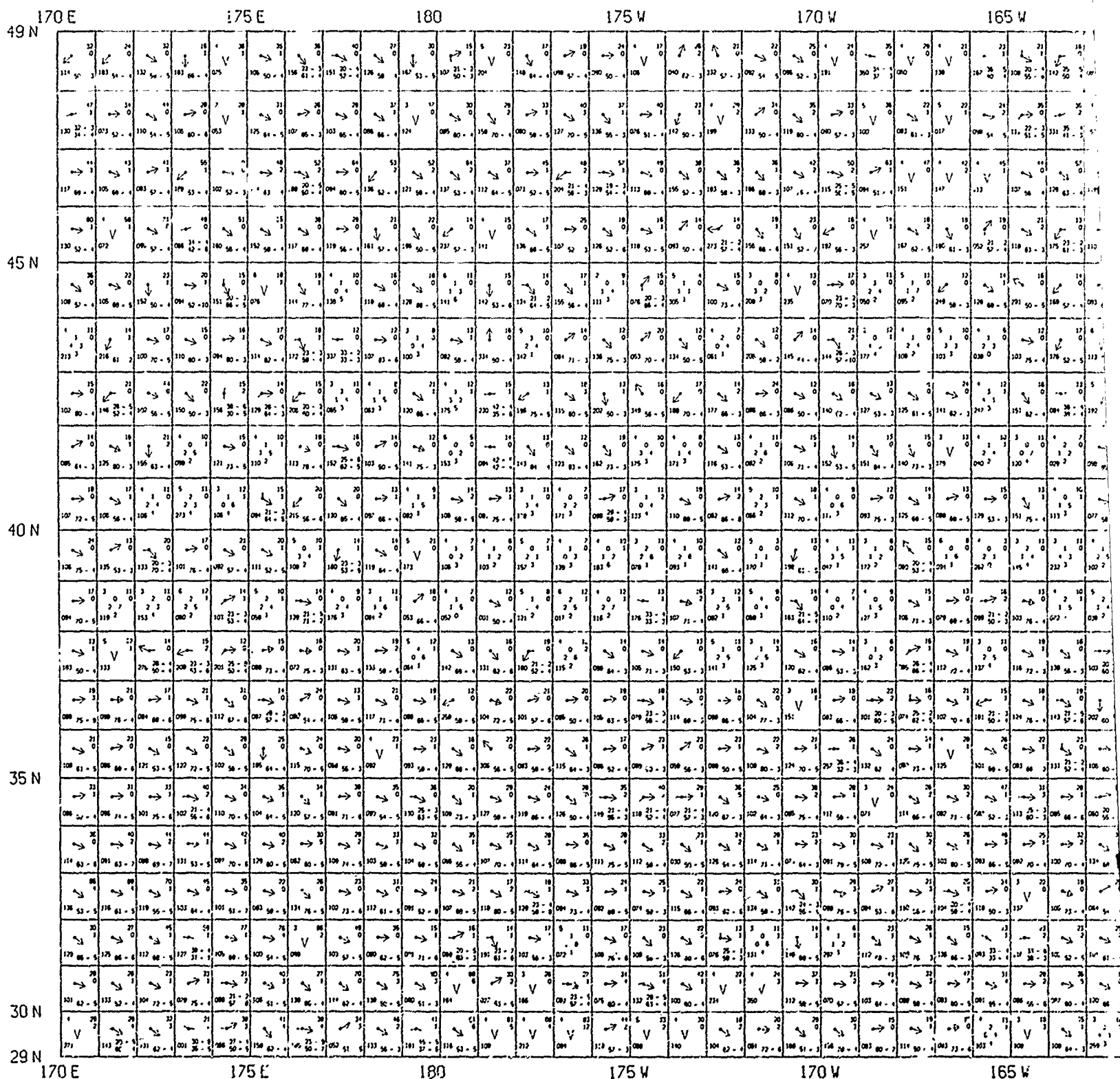
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29 N

165 W 160 W 155 W 150 W

2





SPRING-APR, MAY, JUN

170 W

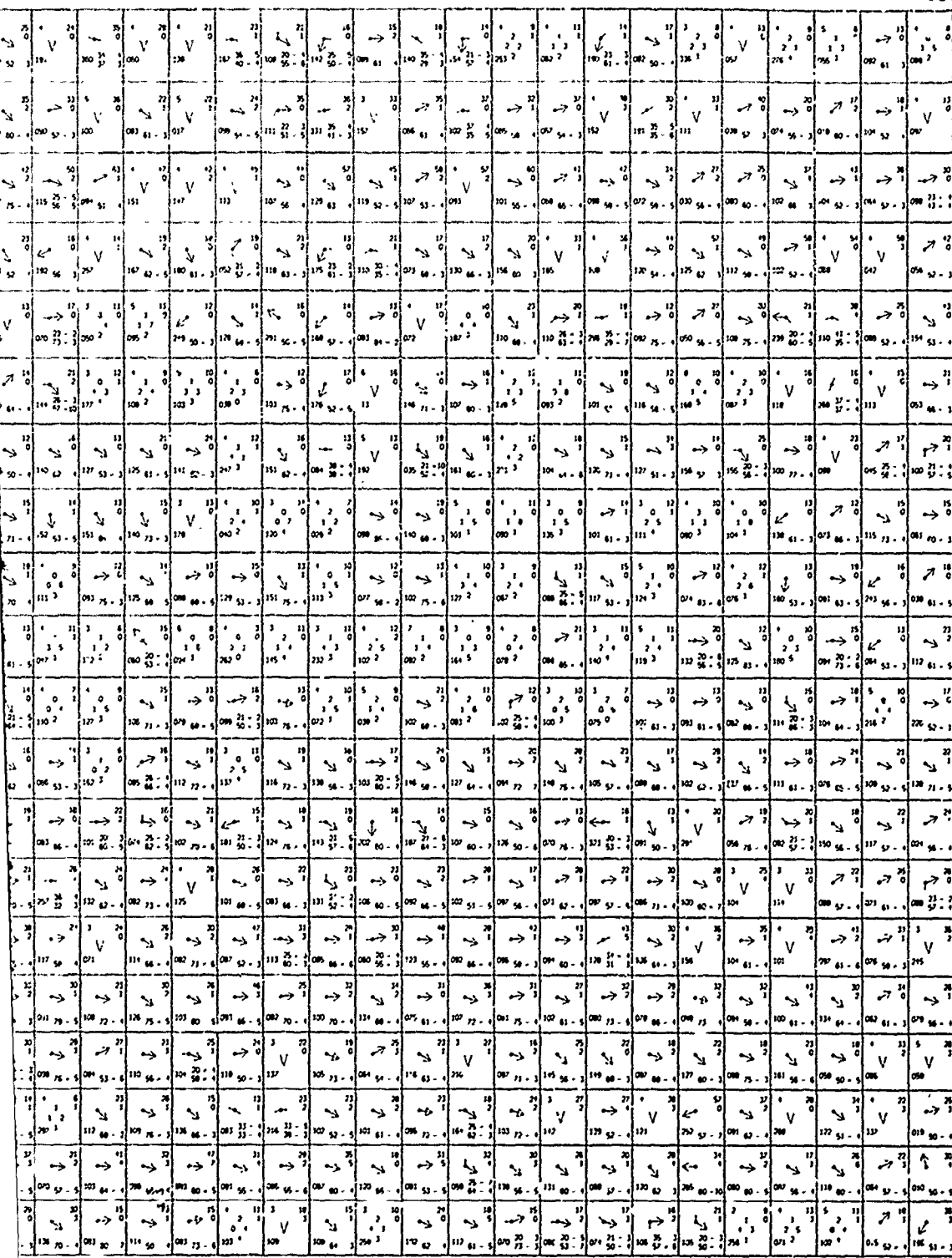
165 W

160 W

155 W

150 W

49 N



45 N

40 N

35 N

30 N

29 N

70 W

165 W

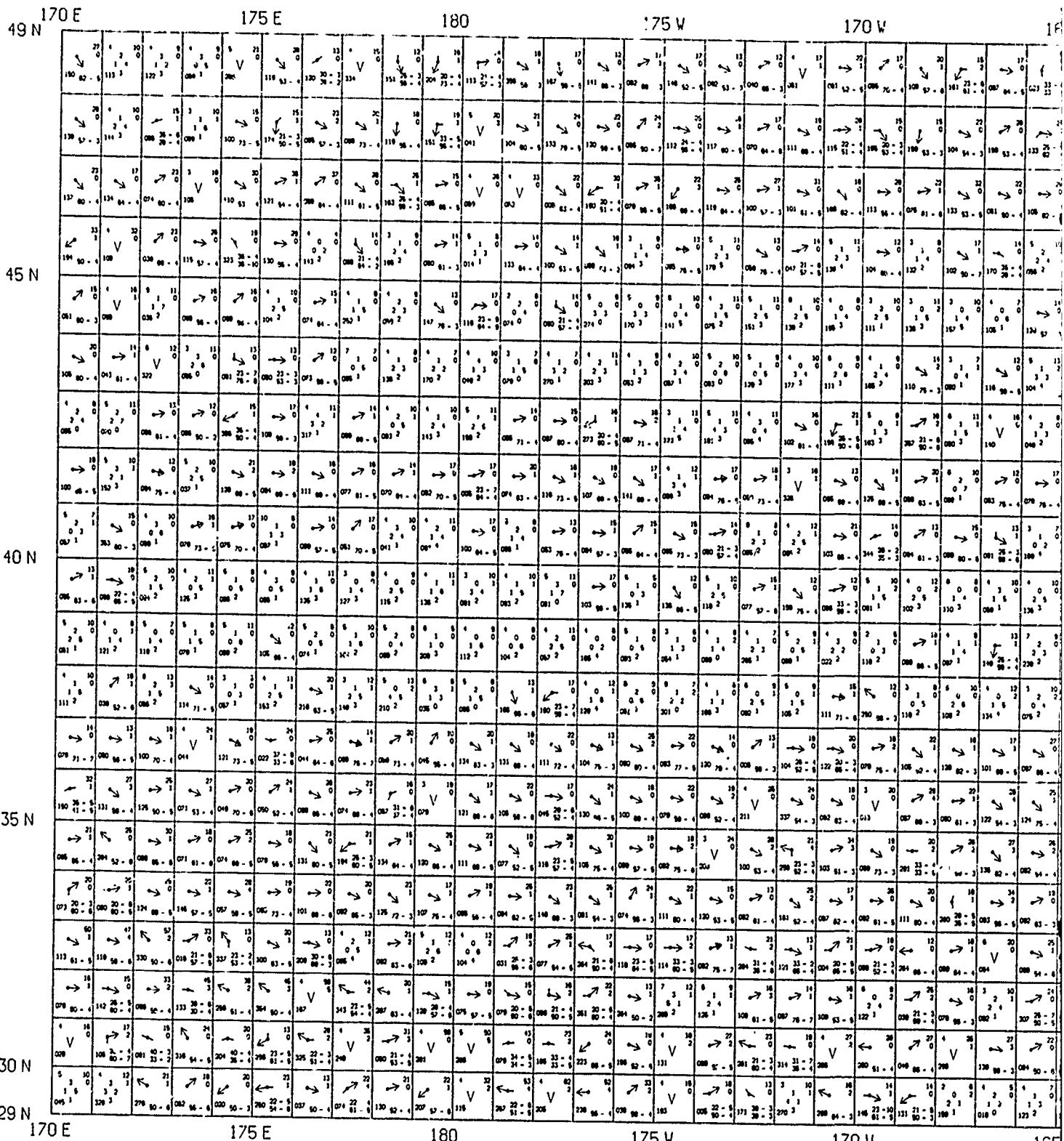
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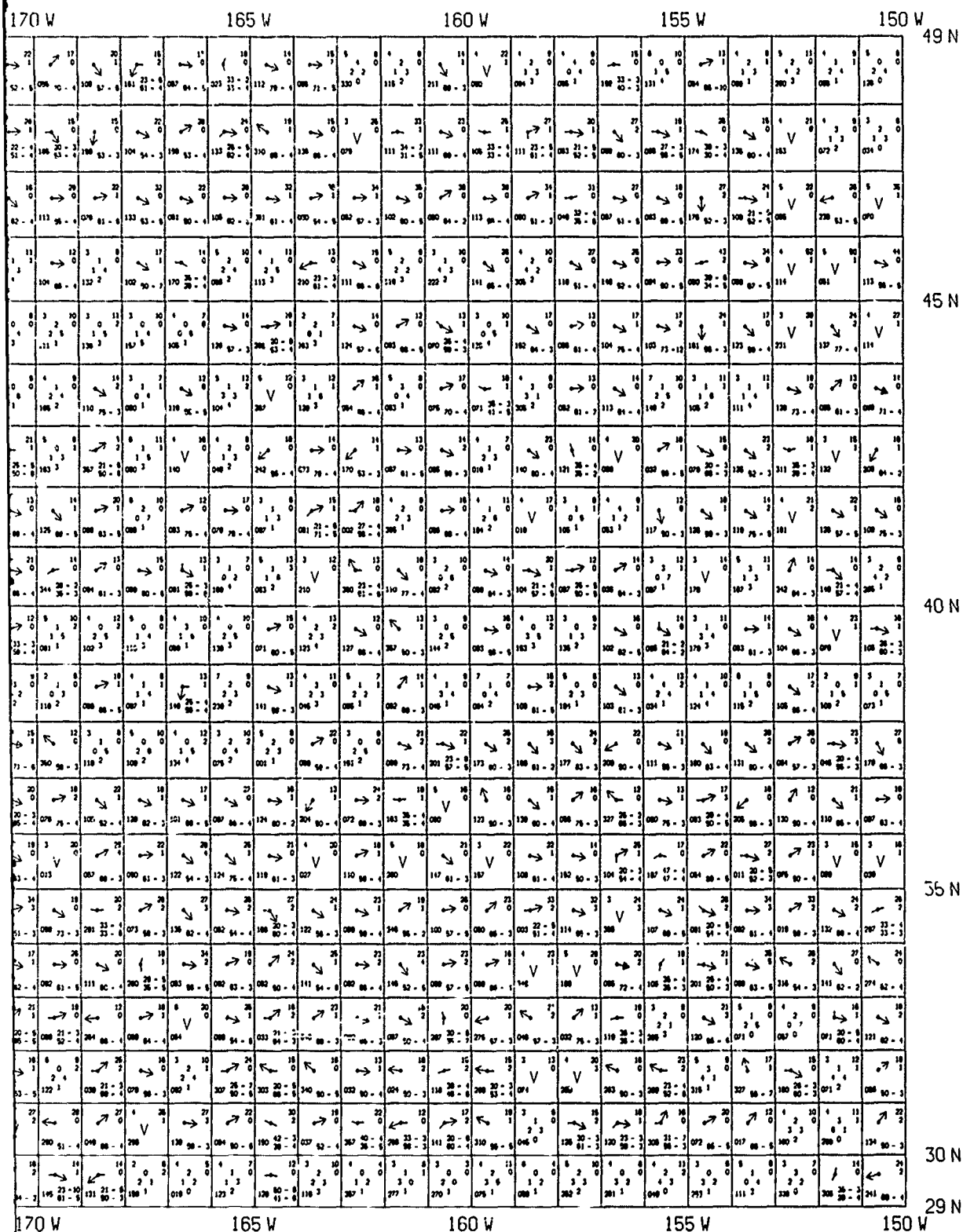
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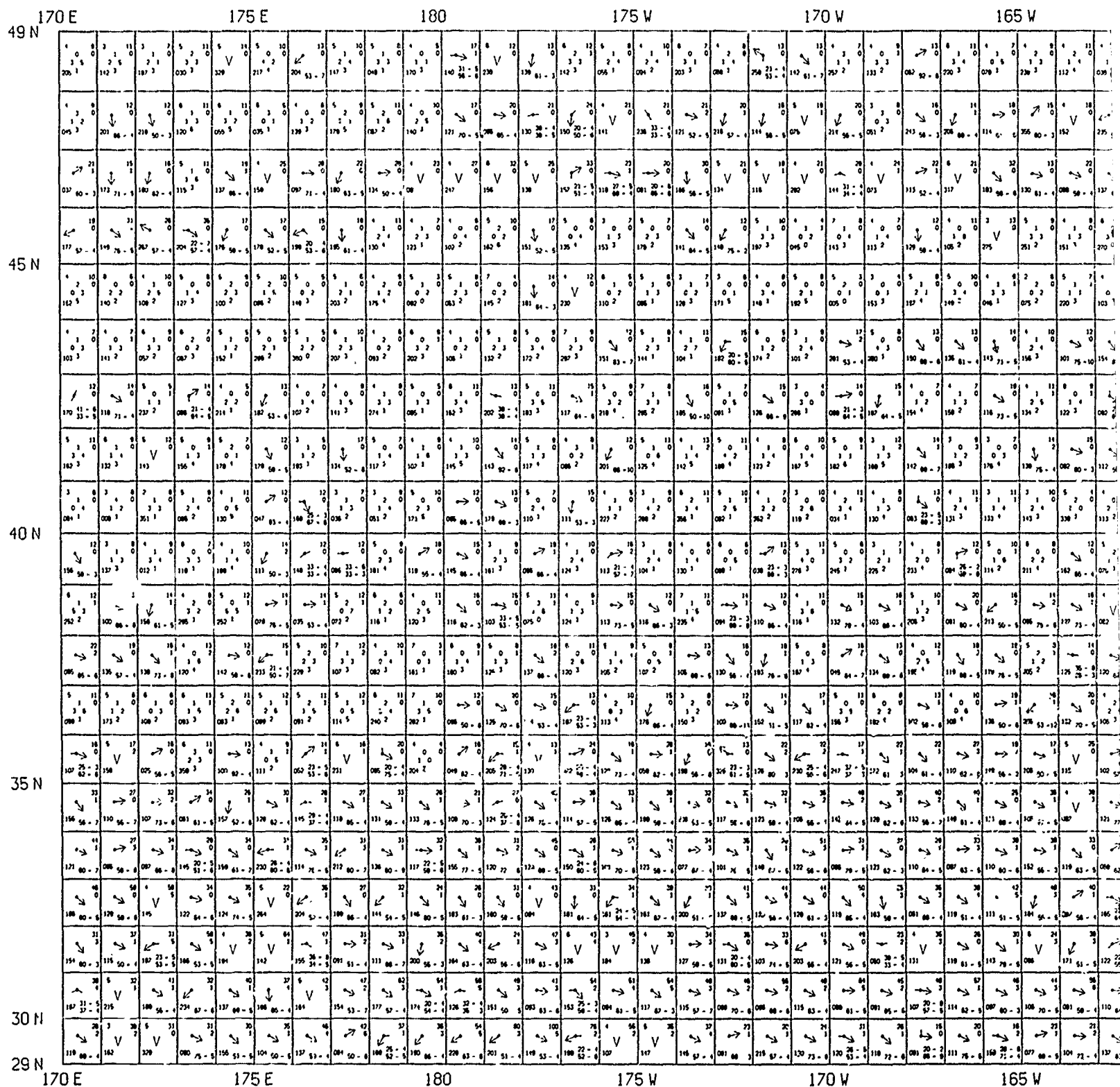
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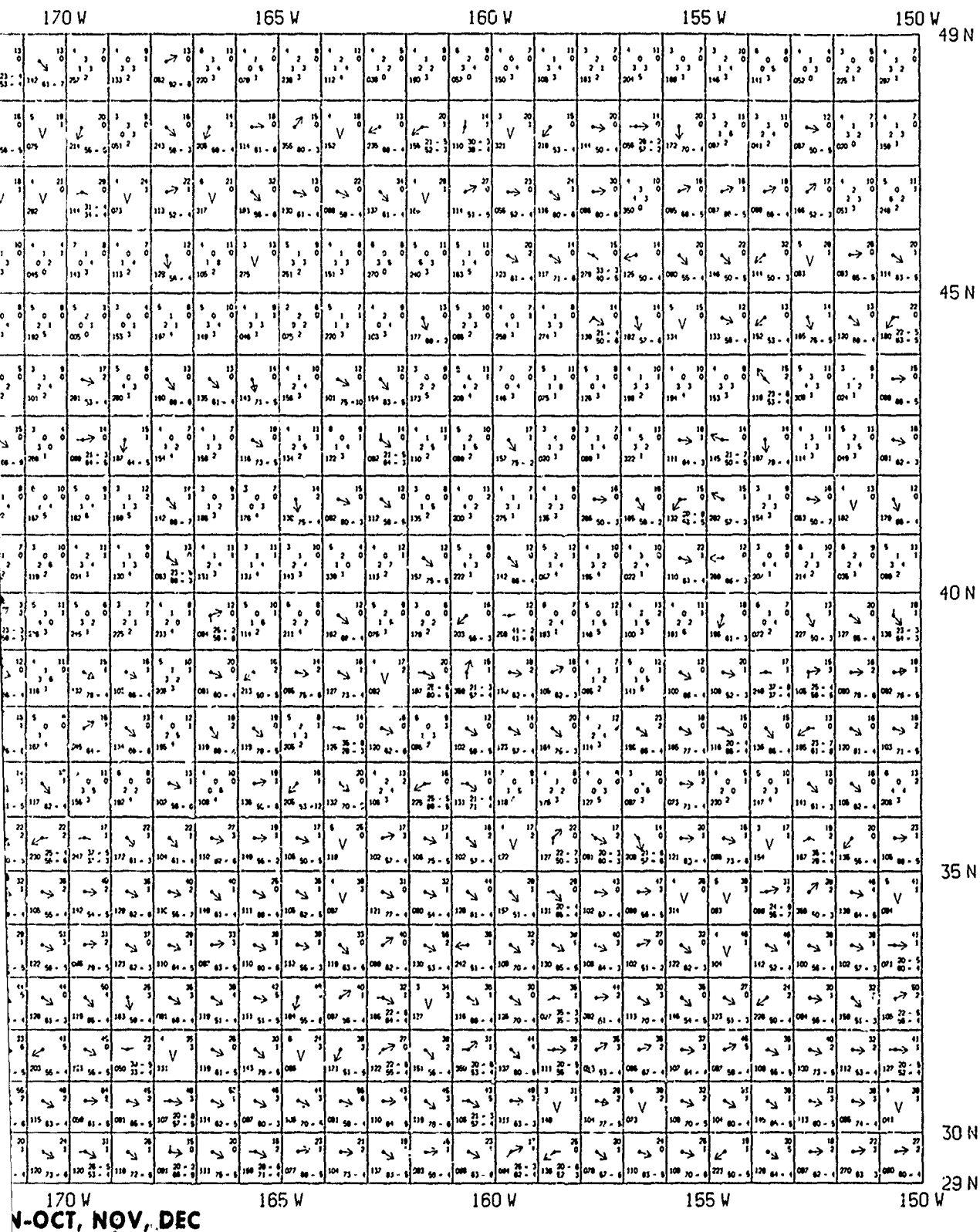


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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This atlas, and the series of which it is a part, is computer generated and automatically plotted. It makes available to the most recent surface current data collected and will be updated whenever sufficient amounts of data are added to the data file. This and the other atlases are based on a vast quantity of data as compared to the previous manually-compiled editions printed in the mid-thirties.		

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Surface current information is based mainly on ship drift, which is the difference between the dead reckoning position and the position determined by any type of navigational fix. This difference describes the direction and speed of the current.

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