Use of the OGO-4 Quiet Time Cutoff Data

by

F. L. Fanselow

This report documents, by means of an example, the use of the tape containing OGO-4 cosmic ray proton cutoffs. The data on this tape are the data used for the paper:

"Geomagnetic Cutoffs for Cosmic Ray Protons
For Seven Energy Intervals Between 1.2 and 39 Mev"
by J. L. Fanselow and E. C. Stone

which is to be published in JGR.

The tape contains 2260 logical records, is a 9 track, 800 bpi tape and has the following DCB parameter for the IBM 360 O/S system:

DCB=(RECFM=VSB,LRECL=304,BLKSIZE=3044,DEN=2)

Two copies of these data, CUTOFF1 and CUTOFF2, have been filed in the tape library at Downs.

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C******************        SET MAXIMUM NUMBER OF RECORDS TO BE READ
C******************        IF MAXREC=-1, TERMINATION OF READING ONLY ON EOF.
C******************        SET NUMBER OF LOGICAL RECORDS TO BE SKIPPED.
C******************        IF NSKIP <0, TAPE WILL BE READ TO END OF FILE
0001          DATA MAXREC/3/,NSKIP/0/
C******************        LOGICAL UNIT NUMBERS FOR INPUT, PRINTER,OUTPUT.
C******************        OUTPUT CAN OF COURSE BE PRINTER.  SUGGEST THAT IT
C******************        NOT BE PUNCH THOUGH.  FORMAT PROBLEMS.
C******************        REMEMBER, TWO FILES WRITTEN ON OUTPUT TAPE.
0002          DATA INTAPE/10/,IPRTOT/6/,IOUTTP/6/
0003           DIMENSION INARAY(75)
0004           WRITE(IOUTTP,4003)
0005       4003 FORMAT('1THE OUTPUT OF THIS PROGRAM IS A LISTING OF THE A/O ARRAYS
              + USED IN THE CUTOFF PAPER:',//
              +     20X'GEOMAGNETIC CUTOFFS FOR COSMIC RAY PROTONS FOR SEVEN',/
              +  30X'ENERGY INTERVALS BETWEEN 1.2, AND 39 MEV',/
              +     30X'BY J.L. FANSELOW, AND E.C. STONE',/
              +     20X'J. GEOPH. RES., VOL=??,PP= ??-??,1972'//
              +' THEY ARE THE QUANTITIES SPECIFICALLY REFERRED TO AS THE DATA FOR
              +MAT USED FOR SUBSEQUENT ANALYSIS, SEE PAGE 7 OF PREPRINT.',/
              +     ' THESE QUANTITIES HAVE BEEN INTERPOLATED TO THE CUTOFF TIME
              +USING THE DATA AVAILABLE ON THE OGO 4 ATTITUDE ORBIT TAPE.',/
              +' MOST ELEMENTS ARE FROM TAPE. SOME HOWEVER REQUIRED FURTHER CALCU
              +LATION.',/
              +     ' FOR MORE DETAIL ON THE INDIVIDUAL QUANTITIES, SEE:',//
              +     ,20X'SRL INTERNAL REPORT #22, AND ABOVE PAPER',//
              +     ' EACH ARRAY OF 75 ELEMENTS CORRESPONDS TO ONE CHANNEL GROUPI
              +NG AT A GIVEN CUTOFF LOCATION (TIME),',/ ' ONLY THE FIRST 68 ELEME
              +NTS CONTAIN DATA.',//' UNLESS OTHERWISE STATED, ALL FIELD QUANTITI
              +ES ARE FOR THE FIELD USED ON THE A/O TAPES.',/ ' REMEMBER THE SIGN
              + REVERSAL PROBLEM IN THESE TAPES FOR  THE GEI TO GSE TRANSFORMATIO
              +N MATRIX')
0006           WRITE(IOUTTP,4005)
0007       4005 FORMAT(/' CHANNEL GROUP NUMBER REFERS TO ONE OF THE NINE CHANNEL G
              +ROUPS:',/
              +' 14-7, 8-12, 13-19, 20-27, 28-44 AND E<3.65 MEV, 45-72, 28-44 AND
              +E>6.73 MEV, 18-29 DEDX, 8-17 DEDX)',/
              +' UNLESS OTHERWISE STATED, ALL ANGLES ARE MEASURED IN DEGREES, ALL
              + TIMES (INCLUDING LOCAL TIMES) IN HOURS,',/
              +' DISTANCES IN KILOMETERS, VELOCITIES IN KILOMETERS/SEC, AND MAGNE
              +TIC FIELDS IN GAUSS.')
0008           NREC=0
0009           IF (IOUTTP.NE.IPRTOT) END FILE IOUTTP
0010       101 READ(INTAPE,END=1001) INARAY
0011           NREC=NREC+1
0012           IF (NSKIP.LT.0) GO TO 101
0013           IF (NREC.LT.NSKIP) GO TO 121
0014           WRITE(IOUTTP,4000) INARAY(1),NREC,(INARAY(I),I=2,39)
0015           WRITE(IOUTTP,4001) (INARAY(I),I=40,68)
0016       4000 FORMAT('1DAY #:',65XF20.1,7X'LOGICAL RECORD NUMBER:',I6,//
              +' TIME OF DAY (MILLISEC):',48XE20.6,//
              +' LOCAL APP. SOLAR TIME (HRS, MIN, 10THS OF MIN):',24X3E20.6,//
              +' RIGHT ASCENSION AND DECLINATION OF S/C:',32X2E20.6,//
              +' S/C POSITION VECTOR, GEI:',46X3E20.6,//
              +' S/C VELOCITY VECTOR, GEI:',46X3E20.6,//
              +' POSITION VECTOR OF SUN, GEI:',43X3E20.6,//
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     +' GEODETIC LATITUDE AND LONGITUDE OF S/C:',32X2E20.6,//
     +' S/C HEIGHT:', 60X E20.6,//
     +' TRUE ANOMOLY:', 58XE20.6,//
     +' SUN-EARTH-S/C ANGLE:',51XE20.6,//
     +' ACTUAL BODY ROLL, PITCH, YAW AXES:',37X3(3E20.6,/72X),/
     +' MAGNETIC RANGE (EARTH RADII), LATITUDE, L VALUE (EARTH RADII):',
     +                          9X3E20.6,//
     +' MAGNITUDE OF MAGNETIC FIELD, MAGNITUDE DIVIDED BY BZERO:', 15X
     +                          2E20.6,//
     +' INGRESS GEODETIC LATITUDE, LONGITUDE:',34X2E20.6,//
     +' EGRESS GEODETIC LATITUDE, LONGITUDE:',35X2E20.6//)
0017 4001 FORMAT(' MAGNETIC FIELD UNIT VECTOR, GEI:',39X3E20.6,//
     +' MAGNETIC FIELD UNIT VECTOR, BODY COORDINATE SYSTEM:',
     +                          20X3E20.6,//
     +' MAGNETIC FIELD UNIT VECTOR, GEODETIC COORDINATE SYSTEM:',
     +                          16X3E20.6,//
     +' TRANSFORMATION MATRIX FROM GEI COORDINATE SYSTEM TO GSE SYSTEM:'
     +                          , 8X3(3E20.6/72X),/
     +' REV NUMBER:',64XI16, //
     +' POLE NUMBER (ENTER NORTH=1,LEAVE N.=2,ENTER S.=3,LV S.=4):',17X
     +                          I16,//
     +' DATE (MONTH/DAY/YR):',63X,2(A2,'/'),A2,//
     +' MAGNETIC LOCAL TIME:',51XE20.6,//
     +' DIPOLE LONGITUDE:',54XE20.6,//
     +' INVARIANT LATITUDE:',52XE20.6,//
     +' CHANNEL GROUP NUMBER:',54XI16,//
     +' MAGNETIC EQUATORIAL TIME (GSFC 1966 INTERNAL +MEAD EXTERNAL FIEL
     +D):', 4XE20.6,//
     +' INVARIANT LATITUDE (GSFC 1966 INTERNAL + MEAD EXTERNAL FIELD):',
     +                                        9XE20.6)
0018       121 IF (MAXREC.EQ.-1) GO TO 101
0019           IF (NREC.LT.MAXREC) GO TO 101
0020           WRITE(IPRTOT,4002) NREC
0021      4002 FORMAT('1QUIT AS REQUESTED AFTER', I6,' LOGICAL RECORDS')
0022           STOP
0023       101 WRITE(IPRTOT,4004) NREC
0024      4004 FORMAT('1END OF FILE AFTER', I6,' LOGICAL RECORDS')
0025           STOP
0026           END
```

SUBPROGRAMS CALLED

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
IBCOM#	C4								

SCALAR MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
MAXREC	C8	NSKIP	CC	INTAPE	D0	IPRTOT	D4	IOUTTP	D8
NREC	DC	I	EC						

ARRAY MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
INARAY	E4								

FORMAT STATEMENT MAP

SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION	SYMBOL	LOCATION
4003	210	4005	60E	4000	770	4001	A48	4002	CCE
4004	CFE								

STATEMENT NUMBER MAP

STATEMENT	LOCATION	STATEMENT	LOCATION	STATEMENT	LOCATION	STATEMENT	LOCATION	STATEMENT	LOCATION
1	D90	2	D9C	4	D90	6	DA4	8	DB8
9	DC0	10	DDC	11	DFC	12	E08	13	E16
14	E24	15	E74	18	E84	19	EC2	20	ED0
22	EEC	23	EFA	25	F18				

OPTIONS IN EFFECT ID,EBCDIC,SOURCE,NOLIST,NODECK,LOAD,MAP
OPTIONS IN EFFECT NAME = MAIN , LINECNT = 58
STATISTICS SOURCE STATEMENTS = 26,PROGRAM SIZE = 3878
STATISTICS NO DIAGNOSTICS GENERATED

NAME	TYPE	ADR	NAME	TYPE	ADR	NAME	TYPE	ADR	NAME	TYPE	ADR
MAIN	SD	092460	IHCECOMH	* SD	093388	IBCOM#	* LR	093388	FDIOCS#	* LR	093444
INTSWTCH	* LR	0942B6	IHCCOMH2	* SD	0942D8	SEQDASD	* LR	094644	IHCFCVTH	* SD	094930
ADCON#	* LR	094930	INT6SWCH	* LR	095968	FCVEUOTP	* LR	09546A	FCVLOUTP	* LR	094A6A
FCVIOUTP	* LR	094F68	FCVCOUTP	* LR	095634	FCVAOUTP	* LR	09490A	FCVZOUTP	* LR	094BBA
IHCEFIOS	* SD	095AD0	FIOCS#	* LR	095ADC	FIOCSBEP	* LR	095AD6	IHCEFNTH	* SD	096E38
ARITH#	* LR	096E38	ADJSWTCH	* LR	0971A4	IHCUOPT	* SD	097350	IHCERRM	* SD	097650
ERRMON	* LR	097650	IHCERRE	* LR	097668	IHCUATBL	* SD	097C10	IHCETRCH	* SD	098248
IHCTRCH	* LR	098248	ERRTRA	* LR	098250						

ENTRY ADDRESS 092460
TOTAL LENGTH 006078 HEX 24696 DEC

THE OUTPUT OF THIS PROGRAM IS A LISTING OF THE A/O ARRAYS USED IN THE CUTOFF PAPER:

GEOMAGNETIC CUTOFFS FOR COSMIC RAY PROTONS FOR SEVEN
ENERGY INTERVALS BETWEEN 1.2, AND 39 MEV
BY J.L. FANSELOW, AND E.C. STONE
J. GEOPH. RES., VOL=??,PP= ??-??,1972

THEY ARE THE QUANTITIES SPECIFICALLY REFERRED TO AS THE DATA FORMAT USED FOR SUBSEQUENT ANALYSIS, SEE PAGE 7 OF PREPRINT.
THESE QUANTITIES HAVE BEEN INTERPOLATED TO THE CUTOFF TIME USING THE DATA AVAILABLE ON THE OGO 4 ATTITUDE ORBIT TAPE.
MOST ELEMENTS ARE FROM TAPE, SOME HOWEVER REQUIRED FURTHER CALCULATION.
FOR MORE DETAIL ON THE INDIVIDUAL QUANTITIES, SEE:

SRL INTERNAL REPORT #22, AND ABOVE PAPER

EACH ARRAY OF 75 ELEMENTS CORRESPONDS TO ONE CHANNEL GROUPING AT A GIVEN CUTOFF LOCATION (TIME).
ONLY THE FIRST 68 ELEMENTS CONTAIN DATA.

UNLESS OTHERWISE STATED, ALL FIELD QUANTITIES ARE FOR THE FIELD USED ON THE A/O TAPES.
REMEMBER THE SIGN REVERSAL PROBLEM IN THESE TAPES FOR THE GEI TO GSE TRANSFORMATION MATRIX

CHANNEL GROUP NUMBER REFERS TO ONE OF THE NINE CHANNEL GROUPS:
(4-7, 8-12, 13-19, 20-27, 28-44 AND E<3.65 MEV, 45-72, 28-44 ANDE>6.73 MEV, 18-29 DEDX, 8-17 DEDX)
UNLESS OTHERWISE STATED, ALL ANGLES ARE MEASURED IN DEGREES, ALL TIMES (INCLUDING LOCAL TIMES) IN HOURS,
DISTANCES IN KILOMETERS, VELOCITIES IN KILOMETERS/SEC, AND MAGNETIC FIELDS IN GAUSS.

DAY #:	213.0	LOGICAL RECORD NUMBER:	1
TIME OF DAY (MILLISEC):	0.282930E 08		
LOCAL APP. SOLAR TIME (HRS, MIN, 10THS OF MIN):	0.190000E 02	0.100000E 01	0.406997E 01
RIGHT ASCENSION AND DECLINATION OF S/C:	0.236159E 03	0.737508E 02	
S/C POSITION VECTOR, GEI:	-0.107999E 04	-0.161078E 04	0.665369E 04
S/C VELOCITY VECTOR, GEI:	0.556698E 01	0.489049E 01	0.183088E 01
POSITION VECTOR OF SUN, GEI:	-0.943309E 08	0.109251E 09	0.473757E 08
GEODETIC LATITUDE AND LONGITUDE OF S/C:	0.738453E 02	0.169034E 03	
S/C HEIGHT:	0.572101E 03		
TRUE ANOMOLY:	0.292107E 03		
SUN-EARTH-S/C ANGLE:	0.767608E 02		
ACTUAL BODY ROLL, PITCH, YAW AXES:	0.787387E 00 0.594682E 00 0.161950E 00	0.557109E 00 -0.799207E 00 0.225733E 00	0.263692E 00 -0.875564E-01 -0.960580E 00
MAGNETIC RANGE (EARTH RADII), LATITUDE, L VALUE (EARTH RADII):	0.128747E 01	0.659471E 02	0.768595E 01
MAGNITUDE OF MAGNETIC FIELD, MAGNITUDE DIVIDED BY BZERO:	0.446109E 05	0.649921E 03	
INGRESS GEODETIC LATITUDE, LONGITUDE:	0.745707E 02	0.169715E 03	
EGRESS GEODETIC LATITUDE, LONGITUDE:	-0.572918E 02	0.141264E 03	
MAGNETIC FIELD UNIT VECTOR, GEI:	0.258902E 00	0.344816E 00	-0.902230E 00
MAGNETIC FIELD UNIT VECTOR, BODY COORDINATE SYSTEM:	0.158292E 00	-0.424848E-01	0.986504E 00
MAGNETIC FIELD UNIT VECTOR, GEODETIC COORDINATE SYSTEM:	0.103329E 04	0.713177E 04	0.440363E 05
TRANSFORMATION MATRIX FROM GEI COORDINATE SYSTEM TO GSE SYSTEM:	-0.620941E 00 -0.783857E 00 0.0	0.719151E 00 -0.569683E 00 -0.397848E 00	0.311856E 00 -0.247040E 00 0.917451E 00
REV NUMBER:	55		
POLE NUMBER (ENTER NORTH=1,LEAVE N.=2,ENTER S.=3,LV S.=4):	1		
DATE (MONTH/DAY/YR):	08/01/67		
MAGNETIC LOCAL TIME:	0.174335E 02		
DIPOLE LONGITUDE:	0.215843E 03		
INVARIANT LATITUDE:	0.688565E 02		
CHANNEL GROUP NUMBER:	1		
MAGNETIC EQUATORIAL TIME (GSFC 1966 INTERNAL +MEAD EXTERNAL FIELD):	0.178840E 02		
INVARIANT LATITUDE (GSFC 1966 INTERNAL + MEAD EXTERNAL FIELD):	0.680957E 02		

DAY #:	213.0	LOGICAL RECORD NUMBER: 2	
TIME OF DAY (MILLISEC):	0.282870E 08		
LOCAL APP. SOLAR TIME (HRS, MIN, 10THS OF MIN):	0.190000E 02	0.0	0.933838E 00
RIGHT ASCENSION AND DECLINATION OF S/C:	0.235830E 03	0.733838E 02	
S/C POSITION VECTOR, GEI:	-0.111337E 04	-0.164009E 04	0.664256E 04
S/C VELOCITY VECTOR, GEI:	0.555914E 01	0.487687E 01	0.187852E 01
POSITION VECTOR OF SUN, GEI:	-0.943307E 08	0.109251E 09	0.473758E 08
GEODETIC LATITUDE AND LONGITUDE OF S/C:	0.734802E 02	0.168730E 03	
S/C HEIGHT:	0.573508E 03		
TRUE ANOMOLY:	0.291738E 03		
SUN-EARTH-S/C ANGLE:	0.767962E 02		
ACTUAL BODY ROLL, PITCH, YAW AXES:	0.787250E 00	0.554236E 00	0.275053E 00
	0.593370E 00	-0.800137E 00	-0.863517E-01
	0.167254E 00	0.229536E 00	-0.953764E 00
MAGNETIC RANGE (EARTH RADII), LATITUDE, L VALUE (EARTH RADII):	0.128101E 01	0.654795E 02	0.743351E 01
MAGNITUDE OF MAGNETIC FIELD, MAGNITUDE DIVIDED BY BZERO:	0.445431E 05	0.587067E 03	
INGRESS GEODETIC LATITUDE, LONGITUDE:	0.742299E 02	0.169380E 03	
EGRESS GEODETIC LATITUDE, LONGITUDE:	-0.569766E 02	0.141498E 03	
MAGNETIC FIELD UNIT VECTOR, GEI:	0.265654E 00	0.351933E 00	-0.897506E 00
MAGNETIC FIELD UNIT VECTOR, BODY COORDINATE SYSTEM:	0.162182E 00	-0.447286E-01	0.985789E 00
MAGNETIC FIELD UNIT VECTOR, GEODETIC COORDINATE SYSTEM:	0.992361E 03	0.731710E 04	0.439388E 05
TRANSFORMATION MATRIX FROM GEI COORDINATE SYSTEM TO GSE SYSTEM:	-0.620940E 00	0.719152E 00	0.311856E 00
	-0.783858E 00	-0.569682E 00	-0.247740E 00
	0.0	-0.397848E 00	0.917451E 00
REV NUMBER:	55		
POLE NUMBER (ENTER NORTH=1, LEAVE N.=2, ENTER S.=3, LV S.=4):	1		
DATE (MONTH/DAY/YR):	08/01/67		
MAGNETIC LOCAL TIME:	0.174439E 02		
DIPOLE LONGITUDE:	0.216023E 03		
INVARIANT LATITUDE:	0.684829E 02		
CHANNEL GROUP NUMBER:	2		
MAGNETIC EQUATORIAL TIME (GSFC 1966 INTERNAL +MEAD EXTERNAL FIELD):	0.178881E 02		
INVARIANT LATITUDE (GSFC 1966 INTERNAL + MEAD EXTERNAL FIELD):	0.677814E 02		

DAY #:	213.0	LOGICAL RECORD NUMBER:	3
TIME OF DAY (MILLISEC):	0.282810E 08		
LOCAL APP. SOLAR TIME (HRS, MIN, 10THS OF MIN):	0.180000E 02	0.580000E 02	0.829958E 01
RIGHT ASCENSION AND DECLINATION OF S/C:	0.235514E 03	0.730192E 02	
S/C POSITION VECTOR, GEI:	-0.114670E 04	-0.166933E 04	0.663114E 04
S/C VELOCITY VECTOR, GEI:	0.555107E 01	0.486705E 01	0.192606E 01
POSITION VECTOR OF SUN, GEI:	-0.943306E 08	0.109251E 09	0.473758E 08
GEODETIC LATITUDE AND LONGITUDE OF S/C:	0.731175E 02	0.168439E 03	
S/C HEIGHT:	0.574917E 03		
TRUE ANOMOLY:	0.291371E 03		
SUN-EARTH-S/C ANGLE:	0.768320E 02		
ACTUAL BODY ROLL, PITCH, YAW AXES:	0.787071E 00	0.551321E 00	0.276449E 00
	0.592049E 00	-0.801073E 00	-0.985020E-01
	0.172637E 00	0.233308E 00	-0.956898E 00
MAGNETIC RANGE (EARTH RADII), LATITUDE, L VALUE (EARTH RADII):	0.127480E 01	0.651118E 02	0.719430E 01
MAGNITUDE OF MAGNETIC FIELD, MAGNITUDE DIVIDED BY BZERO:	0.444732E 05	0.531362E 03	
INGRESS GEODETIC LATITUDE, LONGITUDE:	0.738891E 02	0.169061E 03	
EGRESS GEODETIC LATITUDE, LONGITUDE:	-0.566712E 02	0.141729E 03	
MAGNETIC FIELD UNIT VECTOR, GEI:	0.272396E 00	0.359020E 00	-0.892668E 00
MAGNETIC FIELD UNIT VECTOR, BODY COORDINATE SYSTEM:	0.166025E 00	-0.470484E-01	0.985056E 00
MAGNETIC FIELD UNIT VECTOR, GEODETIC COORDINATE SYSTEM:	0.951713E 03	0.750183E 04	0.438384E 05
TRANSFORMATION MATRIX FROM GEI COORDINATE SYSTEM TO GSE SYSTEM:	-0.620939E 00	0.719152E 00	0.311857E 00
	-0.783859E 00	-0.569681E 00	-0.247039E 00
	0.0	-0.397848E 00	0.917451E 00
REV NUMBER:	55		
POLE NUMBER (ENTER NORTH=1,LEAVE N.=2,ENTER S.=3,LV S.=4):	1		
DATE (MONTH/DAY/YR):	08/01/67		
MAGNETIC LOCAL TIME:	0.174538E 02		
DIPOLE LONGITUDE:	0.216195E 03		
INVARIANT LATITUDE:	0.681100E 02		
CHANNEL GROUP NUMBER:	3		
MAGNETIC EQUATORIAL TIME (GSFC 1966 INTERNAL +MEAD EXTERNAL FIELD):	0.178902E 02		
INVARIANT LATITUDE (GSFC 1966 INTERNAL + MEAD EXTERNAL FIELD):	0.674595E 02		

QUIT AS REQUESTED AFTER 3 LOGICAL RECORDS