

AD-A086 714

MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB

F/G 20/14

A PREDICTOR MODEL FOR SHF AND EHF MILSATCOM SYSTEM AVAILABILITY--ETC(U)

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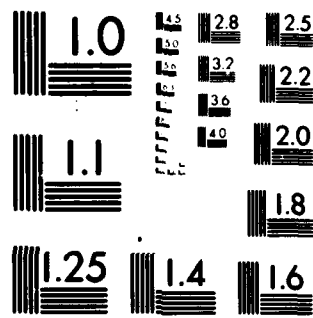
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85      F3=F1223
        F4=F1224
        APFA=1-BEXP(.11152F1-2.022F2-1.012F3)
        BETA=0.97(1+3.8402F1-21.812F2+48.22F3-39.72F4)

C
C
C      READ SAMPLE POINT LATITUDE AND LONGITUDE FOR EACH OF THE 8 REGION A-H
C
      IREG=30
      DO(NP=1,8)
C      WRITE(IU,333)IREG(NP)
333     FORMAT(/2X,'REGION',3X,A1)
C      WRITE(IU,444)
444     FORMAT(/4X,'J',5X,'RLON',4X,'RLAT',4X,'SYSAU')
      IREG=IREG+1
      NJ=NSP(NP)
C      WRITE(IU,505)NJ
505     FORMAT(2X,'NJ-',I4)
      READ(IPES,111)(RLAT(J),J=1,NJ)
      READ(IREG,111)(RLON(J),J=1,NJ)
111     FORMAT(1X,55(10F7.0))
C
      DO(KK=1,12)
        R(KK)=RP(KK,NP)
C      WRITE(IU,100)KK,R(KK)
100     FORMAT(2X,'KK-',I3,3X,'R(KK)=' ,F5.1)
      END DO

C
C      DETERMINE RAIN ATTENUATION FOR EACH (LAT,LOH)
C
      DO(J=1,NJ)
        RABS=BABS(RLON(J)-SATSUB)
        IF(RABS.EQ.0.0)
          ELEV=RPD490
          END IF
        IF(RABS.LE.71.43.AND.RABS.NE.0.0)
          COSCOS=BCOS(RLAT(J)*RPD)*XDCOS((RLON(J)-SATSUB)*RPD)
          XX=DSORT(1+6.80222-13.2163COSCOS)
          ANGSAT=BARCOS((6.802-2COSCOS)/XX)
          ELEV=(RPD490-ANGSAT-BARSIN(XCDSINANGSAT))/RPD
C      WRITE(IU,501)J,ELEV
501     FORMAT(2X,'J-',I3,3X,'ELEV=' ,F5.1)
          IF(ELEV.GE.10.0)
            CCOSA=6.802/5.802XDCOS(ANGSAT)
            DIFF=CCOSA22-7.802/5.802
            IF(DIFF.LT.0.0)
              DIFF=0.0
            END IF
C      WRITE(IU,505)COSCOS,XX,CCOSA
505     FORMAT(2X,'COSCOS=' ,E10.11,3X,'XX=' ,E10.11,3X,'CCOSA=' ,E10.11)
            SLANT=90.XDLOG10(CCOSA-DSORT(DIFF))
            ATTN=DSINH-SLANT
C      WRITE(IU,506)SLANT,ATTN,APFA,BETA
506     FORMAT(2X,'SLANT=' ,E10.6,4X,'ATTN=' ,F5.1,2X,2F5.3)
C
C

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1 55
C COMPUTE MELTING LAYER HEIGHT. HT
C
  IF(NR.LE 4)
    C2=0.1549883113
    C4=-1.547883877
    C6=-0.871844820
    C8=1.4784184177
  ELSE
    C2=-0.87000
    C4=3.708036
    C6=-14.818189
    C8=12.032159
  END IF

C SINLAT=DSIN(RLAT(J)*SRPD)
HT=4.82*(1+C2SSINLAT22+C4SSINLAT24+C6SSINLAT26+C8SSINLAT28)

C
C
C COMPUTE D.DELTA(D).GAMMA(D)
C
  IF(ELEV.EQ 90.0)
    GAMMA=1.0
    DELTA=0.0
  ELSE
    D=HT/DTAN(ELEV*SRPD)
    IF(D.GT. 22.5)
      D=22.5
    END IF
    SCL=D/4.5
    SCL=D/21.5
    GAMMA=1+SCL-0.23984122+0.0215333133
    DELTA=SCL-0.083331322+0.443331323
  END IF

C
C
C COMPUTE RAIN RATE. RR. FOR EACH POINT
C
  WRITE(IU,200)J,HT,DELTA,GAMMA
200 FORMAT(2X,'J=',I3,'HT=',F5.1,3X,'DELTA=',F5.3,3X,'GAMMA=',F5.3)
RR=DEXP(DLOG(ATN(DSSIN(ELEV*SRPD))/(HT*SRPD*GAMMA)))/(DELTA-DELTA))

C
C FIND % OF YEAR EXCEEDANCE. PROB.VIA CURVE FITTING
C
  CALL POPRR(R,RR,PROB,IU)
  END IF
  END IF

C
C FIND SAMPLE POINT INDICES (MLAT,MLON) FROM (RLAT,RLON)
C
  LAT=RLAT(J)
  LON=RLON(J)
  MLAT=15+IFIX(LAT/5.)
  MLON=37+IFIX(LON/5.)
  WRITE(IU,300)MLAT,MLON
300 FORMAT(2X,'MLAT=',I4,4X,'MLON=',I4)

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APPENDIX C

HPL LISTING OF MAIN PROGRAM
(HP-9825)

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0: dim C[8,12],R[8,9,4],N[520],O[2,725]:sf=14:ldf 9,R[*]
1: .0001+C[1,1]:.0001+C[2,1]:.0001+C[3,1]:.0001+C[4,1]:.0001+C[5,1]
2: .0001+C[6,1]:.0001+C[7,1]:.0001+C[8,1]
3: 1.1+C[1,2]:1.2+C[2,2]:1.2+C[3,2]:1.8+C[4,2]:2+C[5,2]:.4+C[6,2]
4: 1.7+C[1,3]:1.8+C[2,3]:1.9+C[3,3]:3+C[4,3]:4+C[5,3]:.8+C[6,3]
5: 2.5+C[1,4]:2.7+C[2,4]:2.8+C[3,4]:5.2+C[4,4]:8.5+C[5,4]:1.2+C[6,4]
6: 4+C[1,5]:4.8+C[2,5]:4.8+C[3,5]:9.5+C[4,5]:21+C[5,5]:3.2+C[6,5]
7: 6.5+C[1,6]:6.8+C[2,6]:7.2+C[3,6]:15+C[4,6]:35+C[5,6]:5.5+C[6,6]
8: 8+C[1,7]:9.5+C[2,7]:11+C[3,7]:22+C[4,7]:52+C[5,7]:8+C[6,7]
9: 12+C[1,8]:14+C[2,8]:18+C[3,8]:35+C[4,8]:77+C[5,8]:14+C[6,8]
10: 15+C[1,9]:19+C[2,9]:28+C[3,9]:49+C[4,9]:98+C[5,9]:23+C[6,9]
11: 19+C[1,10]:26+C[2,10]:41+C[3,10]:64+C[4,10]:117+C[5,10]:34+C[6,10]
12: 24+C[1,11]:40+C[2,11]:62+C[3,11]:86+C[4,11]:144+C[5,11]:51+C[6,11]
13: 28+C[1,12]:54+C[2,12]:80+C[3,12]:102+C[4,12]:164+C[5,12]:66+C[6,12]
14: 1.6+C[7,2]:2.8+C[8,2]:3.7+C[7,3]:6.4+C[8,3]
15: 7+C[7,4]:13+C[8,4]:14+C[7,5]:31+C[8,5]:22+C[7,6]:51+C[8,6]
16: 33+C[7,7]:77+C[8,7]:51+C[7,8]:115+C[8,8]:67+C[7,9]:147+C[8,9]
17: 85+C[7,10]:178+C[8,10]:109+C[7,11]:220+C[8,11]:129+C[7,12]:251+C[8,12]
18: ent "LINK MARGIN PARAMETER in dB=?":m
19: ent "FREQUENCY in GHz(<50)=?":r0
20: ent "SUBPOINT in degr.(+=E,-=W)=?":s
21: ent "SATELLITE AVAIL.(0.xxx)=?":r2
22: ent "TERMINAL AVAIL.(0.xxx)=?":r3
23: 0+r27
24: 1+r28
25: r0/100+r0
26: 1-exp(.1115r0-2.02r0r0-1.01r0t3)+r4
27: .9(1+3.8408r0-21.81r0t2+48.8r0t3-39.7r0t4)+r5
28: r27+1+r27
29: if r27>8:sto "end"
30: ldf r27,N[*]
31: for I=1 to 520
32: if N[I]=0:sto "next"
33: 70-5int((N[I]-1)/72)+r6
34: ((N[I]-1)mod72)+r7
35: if r7>180:r7-360+r7
36: r((r7-S)(r7-S))+r30
37: if r30>180:360-r30+r30
38: if r30>71.43:sto "next point"
39: r(44.665664-13.216cos(r6)cos(r7-S))+r8
40: acs((6.608-cos(r6)cos(r7-S))/r8)+r9

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41: 1.178317cos(r9)+r10
42: 20log(r10-r(r10r10-1.356633))+r11
43: 90-r9-asn(r8sin(r9))+r12
44: if r12<10 goto "next point"
45: if r0>.22 jmp 3
46: exp(-.617564r0+43.2368r0+2-444.45r0+3+1358r0+4)-1+r29
47: jmp 2
48: exp(13.03032r0-81.6987r0+2+156.48r0+3-74r0+4)-1+r29
49: r29/sin(r12)+r29
50: sin(r6)+r13
51: if r27>41 goto +3
52: 4.8(1+.154989r13-1.547593*r13+2-.871944*r13+3+1.472412*r13+4)+r14
53: goto +2
54: 4.8(1-.276r13+3.785036r13r13-14.212189r13+3+12.032159r13+4)+r14
55: r14/tan(r12)+r15
56: r15/4.5+r16
57: r15/21.5+r17
58: 1+r16-.23r16r16+.0215r16+3+r18
59: r17-.98r17r17+.446r17+3+r19
60: M-r11-r29+r20
61: exp(ln(r20sin(r12))/(r14*r4*r18))/(r5-r19)+r21
62: 3+r22
63: if r21<0[r27,r22] goto 67
64: r22+1+r22
65: if r22>121.00001+r26 goto 71
66: goto 63
67: r22-2+r22
68: if r22>919+r22
69: R[r27,r22,1]+R[r27,r22,2]r21+R[r27,r22,3]*r21+2+R[r27,r22,4]*r21+3+r23
70: exp(r23)+r26
71: 1-r26+r24
72: r2*r3*r24+r25
73: N[I]+0[1,r28]
74: r25+0[2,r28]
75: 1+r28+r28
76: "next point":next I
77: "next":goto 28
78: goto "next point"
79: "end":rcf 10,0[*]
80: endista
*15505

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