Федеральное государственное бюджетное учреждение
"Всероссийский научно-исследовательский институт
сельскохозяйственной метеорологии"
(ФГБУ "ВНИИСХМ")

ПРОГРАММА ДЛЯ ЭВМ

Расчет индексов (показателей) для оценки агроклиматических ресурсов территории при изменении климата

Фрагменты исходного текста программы

Листов 10

Автор: Павлова В.Н.

2017 год

```
C     данные сценария GGO ANS12 1980-1999,2041-2050,2091-2100

      COMMON/GGMET/TG(366),RG(366),SG(366),DG(366),TKLM(366),
     *SKLM9(366),TPKL19(366),TPKL89(366),t9(365)
      dimension t(13),st(2)
      dimension tkl(13),rkl(12),ts(12),rjs(12),ts13(13)
      DIMENSION NOM13(12),AM(12),NR(12),AK(12),BK(12),P(12,2),X(12,2)
      DIMENSION ALL(12),BTT(12),PRESIP(31),PRESIP_0(31)
      DIMENSION MDATS(12),yr(181),yr1(181),rk(94),rk1(94)
      REAL KJS(366),KJD(366),KJT(366)
      CHARACTER*8 stname(181)
      CHARACTER*32 name_scen
      CHARACTER*80 rez,input,outt,outt1,kj_tsd,f_alb
      DOUBLE PRECISION DSEED
      DATA MDATS/0,31,59,90,120,151,181,212,243,273,304,334/
      DATA NR /31,28,31,30,31,30,31,31,30,31,30,31/
      DATA NOM13/11,12,1,2,3,4,5,6,7,8,9,10/
      DATA AK /3*.177,3*.104,3*.124,3*.206/
      DATA BK /3*7.30,3*7.20,3*3.41,3*2.16/
      DATA P/1.01,1.06,0.99,0.94,0.88,0.83,0.85,0.86,0.89,0.87,0.93,
     *1.0 ,1.68,1.78,3.25,3.55,4.39,4.52,5.69,4.63,4.20,3.59,2.68,1.94/
      DATA X/1.87,1.84,2.35,2.92,4.60,6.11,6.72,6.00,4.64,3.65,2.89,
     *2.19,0.88,0.90,0.95,0.84,0.83,0.87,0.74,0.88,0.87,0.88,0.80,0.86/
C     ****************************
      read(5,*) outt
      read(5,*) outt1
      read(5,100) name_scen
      read(5,*) input
      READ(5,*) KJ_TSD
      READ(5,*) F_ALB
C*****************************
C     OPEN(9, FILE=outt)
      OPEN(9, FILE='rez_16.dat')
      OPEN(17, FILE='rez1_16.dat')
C      OPEN(11, FILE=input)
      OPEN(11, FILE='ans_90.dat')
      OPEN(15, FILE='tr_rus.klm')
      OPEN(26,FILE=KJ_TSD)
      OPEN(12,FILE=F_ALB)
C*****************************
      READ(26,113) KJT
      READ(26,113) KJS
      READ(26,113) KJD
100   format(a16)
101   format(4x,13f5.1)
102   format(8x,10f7.1)
103   format(24f6.2,2x,a8)
104   format(12(f6.1,3x))
112   FORMAT(24F5.2)
113   FORMAT(20F5.1)
114   FORMAT(8x,2i2,1x,2i2)
116   format(a8,1x,12f7.1)
117   format(6i6)
118   format(6(2i2,1x))
119   format(24f5.1,2x,a8)
120   format('сценарий  ',a16)
121   format('stname    d5   d10  l10 v15 o15   t1    t7  t7-t1 r_co r_
     *wa  gtk  bud chir')
122   format('   1    2    3    4    5    6    7    8    9   10   11
     *12    RJ ')
129   format(i10)

      DSEED=126704332
```

```
C*****************************************
c счет  10 лет + klimat
      do iii=1,1
      read(11,*)
      iy=iii
      write(9,120) name_scen
      write(9,129) iy
      write(9,121)
      write(17,120) name_scen
      write(17,129) iy
      write(17,122)
      do ii=1,181
      READ(12,112) ALL,BTT
C     tkl -     январь-декабрь
      read(15,103) (tkl(i),i=1,12),rkl,stname(ii)
      read(11,103) ts,rjs
      do j=1,12
      ts(j)=ts(j)+tkl(j)
      rjs(j)=rkl(j)*(1+rjs(j)/100.)
      end do
c      do j=1,12
c      ts(j)=tkl(j)
c      rjs(j)=rkl(j)
c      end do
c     -печать температуры и месячных сумм осадков
      write(17,119) ts,rjs,stname(ii)
222   continue
C     mart-mart for FUR
      do i=1,10
      ts13(i)=ts(i+2)
      end do
      ts13(11)=ts(1)
      ts13(12)=ts(2)
      do i=1,13
      t(i)=ts13(i)
      end do
C     ------ осадки сутки ------
  63  L=0
      CALL LAMO(KJT,KJS,KJD)
      DO JJ=1,12
c      RII - осадки  климат или сценарий  задать !!!!!!
      RII=RJS(JJ)
      IF(RII.EQ.0) RII=1.
      ALF=ALL(JJ)
      BET=BTT(JJ)
      IF(II.GT.94.AND.II.LE.146) ALF=P(JJ,1)
      IF(II.GT.94.AND.II.LE.146) BET=X(JJ,1)
      IF(II.GT.146) ALF=P(JJ,2)
      IF(II.GT.146) BET=X(JJ,2)
      NRJ=RII/(ALF*BET)+0.5
      IF(NRJ.EQ.0) NRJ=1
      CALL A6RJAB(ALF,BET,RII,PRESIP,DSEED,JJ,NRJ)
C     ------- контроль по месяцам ----------
      RP=0.
      NDM=NR(JJ)
      DO I=1,NDM
      RP=RP+PRESIP(I)
      END DO
      DRP=RII-RP
      DO I=1,NDM
      RG(I+L)=PRESIP(I)
      END DO
      L=L+NDM
      END DO
```

```
      RG(366)=0.

C     определение дат перехода 5 град и суммы  осадков
C     осень предшествующего  года, весна текущего года
      tp=5.
      CALL FUR (T,TG)
      do i=1,365
      t9(i)=tg(i)
      end do
      CALL day_new(NDPR1,NDPR2,SUMTWR,TP,T9)
      noo=ndpr2
      nbb=ndpr1
      call akdat(iv5,ivm5,nbb)
      call akdat(io5,iom5,noo)
c      write(9,109) nbb,noo,iv5,ivm5,io5,iom5
      tp=10.
      CALL day_new(NDPR1,NDPR2,SUMTWR,TP,T9)
      noo10=ndpr2
      nbb10=ndpr1
      call akdat(iv10,ivm10,nbb10)
      call akdat(io10,iom10,noo10)

      len10=ndpr2-ndpr1+1
      s1=0.
      s2=0.
      do i=ndpr1,ndpr2
      s1=s1+rg(i)
      s2=s2+tg(i)
      end do
      gtk=s1/(0.1*s2)
      sumt10=s2
c     -----   переход через 15 град,
      tp=15.
      CALL day_new(NDPR1,NDPR2,SUMTWR,TP,T9)
      noo15=ndpr2
      nbb15=ndpr1
      call akdat(iv15,ivm15,nbb15)
      call akdat(io15,iom15,noo15)
      lv=nbb15-nbb
      lo=noo-noo15
c     amplituda T
      at=ts(7)-ts(1)

c     суммы осадков зима, лето, теплый, холодный период
      s_win=rjs(12)+rjs(1)+rjs(2)
      s_sum=rjs(6)+rjs(7)+rjs(8)
      s_col=rjs(10)+rjs(11)+rjs(12)+rjs(1)+rjs(2)+rjs(3)
      s_war=rjs(4)+rjs(5)+rjs(6)+rjs(7)+rjs(8)
      s_year=s_col+s_war

c     увлажнение по  Будыко
      wbud=s_year/(0.18*sumt10)
c     увлажнение по  Чиркову
      sumt=0.
      do i=91,243
      sumt=sumt+tg(i)
      end do
      wchir=(0.5*s_col+s_war)/(0.18*sumt)

      write(9,115) stname(ii),iv5,ivm5,iv10,ivm10,len10,lv,lo,ts(1),
     *ts(7),at,s_col,s_war,gtk,wbud,wchir,sumt10
115   format(a8,1x,2(2i2,1x),3i4,3f6.1,2f5.0,1x,3f5.2,f7.1)
111   continue
      end do
```

```
      END DO
      stop
      end
C
      FUNCTION  AKV (L,T,TKL,DKL,SKL,R,RKL,MES)
      DIMENSION VV1(12),VV2(12),VV3(12),VV4(12)
      DATA VV1/-0.028,-0.028,3*0.243,3*0.199,3*0.333,-0.028/
      DATA VV2/-0.022,-0.022,3*-0.032,3*-0.022,3*-0.020,-0.022/
      DATA VV3/2*0.041,3*0.369,3*0.794,3*0.307,0.041/
      DATA VV4/2*-0.003,3*-0.028,3*-0.026,3*-0.016,-0.003/
      DT=T-TKL
      DR=R-RKL
      IF(L.NE.1) GOTO 10
      A=VV1(MES)
      B=VV2(MES)
      SS=A*DT+B*DR
      AKV=SKL+SS
      GOTO 11
  10  A=VV3(MES)
      B=VV4(MES)
      SD=A*DT+B*DR
      AKV=DKL+SD
  11  IF(AKV.LT.0.) AKV=0.
      RETURN
      END
      SUBROUTINE AKDAT (LDAT,LMEC,NC)
      DIMENSION MDATS(13)
      DATA MDATS/0,31,59,90,120,151,181,212,243,273,304,334,365/
        DO 61 I=2,13
      IF(MDATS(i).LT.NC)GO TO 61
      LMEC=i-1
      LDAT=NC-MDATS(i-1)
      GO TO 70
   61 CONTINUE
   70 CONTINUE
      RETURN
      END

      SUBROUTINE A6GAM (GAMMAD,ALF,BET,DSEED)
      DOUBLE PRECISION   DSEED
      Z=0.0
      K=ALF
      F=K
      IF(K)303,303,301
 301  PROD=1.0
      DO 302 I=1,K
      CALL GGUBS(DSEED,U)
 302  PROD=PROD*U
      Z=-ALOG(PROD)
 303  D=ALF-F
      IF(D)308,308,304
 304  A=1./D
      B=1.0/(1.0-D)
      L=1
 305  CALL GGUBS(DSEED,U)
      UA=-50/ALOG10(U)
      X=0.
      IF(A.LT.UA)X=U**A
      CALL GGUBS(DSEED,U)
      UB=-50/ALOG10(U)
      Y=X
      IF(B.LT.UB)Y=U**B+X
      IF(Y-1.)307,307,306
 306  L=L+2
```

```
      GOTO 305
 307  W=X/Y
      CALL GGUBS(DSEED,U)
      Y=-ALOG(U)
      GAMMAD=(Z+W*Y)*BET
      RETURN
 308  GAMMAD=Z*BET
      RETURN
      END
      SUBROUTINE A6RJAB(ALF,BET,RI,PRESIP,DSEED,JJ,NRJ)
      DIMENSION PRESIP(31),PR(31),A(31),N(31),NR(12)
      COMMON /THREE/ NO,NNN
      INTEGER*2 NO(31,12)
      DOUBLE PRECISION   DSEED
      DATA NR/31,28,31,30,31,30,31,31,30,31,30,31/
      NEO=NR(JJ)
      RMIN=0.1
C
      RMAX=35.0
      if(bet.le.3.5)BET=3.5
      IF(RI.GT.100) RMAX=50.
      IF(RI.GT.100) ALF=2.
      IF(RI.GE.100) BET=8.
      IF((RI/NRJ).LE.4.) BET=4.
      NN=RI/(ALF*BET)
      NN=NRJ
      IF(NN.GT.NEO) NN=NEO
      DO 10 I=1,31
 10   PRESIP(I)=0.
C     разброс осадков
      DO 7 LL=1,100
      DO 11 I=1,31
 11   PR(I)=0.
      TOR=0.
      K=0
      DO 2 I=1,NEO
 60   CALL A6GAM(GAMMAD,ALF,BET,DSEED)
      PR(I)=GAMMAD
      IF(PR(I).LT.RMIN)GOTO 60
      IF(PR(I).GT.RMAX)GOTO 60
      TOR=TOR+PR(I)
      K=K+1
      IF(TOR.LT.RI) GOTO 2
      PR(I)=RI-(TOR-PR(I))
      TOR=RI
      GOTO 3
   2  CONTINUE
   3  CONTINUE
      NNN=K
C
      IF(TOR.LT.RI) GO TO 7
      IF(K.EQ.NN)GOTO 8
  7   CONTINUE
  8   CONTINUE

100  format(4i6,2F7.1)
      IF(RI.EQ.TOR) GO TO 41
      ROR=PR(K)
      PR(K)=PR(K)+(RI-TOR)
      PRINT 719,JJ,RI,TOR,ROR,PR(K)
  719 FORMAT(1X,'MEC',I2,1X,
     *'ВВЕДЕНО-',F5.1,1X,'Сумма -',F5.1,1X,'Последняя развертка:'
     *,'до исправления',F5.1,1X,'после исправления',F5.1)
   41 CONTINUE
```

```
C     OT MAX K MIN
      M=NEO
      M1=M-1
      DO 5 I=1,NEO
    5 N(I)=I
      DO 4 I=1,NEO
  4   A(I)=PR(I)
      DO 12 I=1,M1
      J=I
  33  IF(A(J).LE.A(J+1)) GOTO 12
      TEMP=A(J)
      NT=N(J)
       A(J)=A(J+1)
       N(J)=N(J+1)
       A(J+1)=TEMP
       N(J+1)=NT
       J=J-1
      IF(J.GE.1) GOTO 33
  12  CONTINUE
      DO 6 I=1,NEO
  6   PR(I)=A((NEO+1)-I)
      DO 1 I=1,K
      L=NO(I,JJ)
      PRESIP(L)=PR(I)
  1   CONTINUE
      RETURN
      END
      SUBROUTINE day_new(NDPR1,NDPR2,SUMTWR,TP,T9)
C
      DIMENSION T9(365),MDATS(12),jp(50),jo(50),SUMp(50),SUMo(50)
      DATA MDATS/31,59,90,120,151,181,212,243,273,304,334,365/

C        TP - temperature limit  (0, 5, 10, 15 grad)
       DO 22 i=1,50
      jp(i)=0
      jo(i)=0
      SUMp(i)=0.
      SUMo(i)=0.
   22 CONTINUE
C
      jks=0
      jkso=0
      k=1
      kp=1
      jTvi=0
C
      DO 1 j=2,365
C
      IF(T9(j-1).GE.TP.AND.j.EQ.2)jp(kp)=1
      IF(j.EQ.365)GO TO 603
      IF(T9(j-1).LT.TP.AND.T9(j).GE.TP)jp(kp)=j
      GO TO 605
  603 IF(T9(j-1).LT.TP.AND.T9(j).GE.TP)jp(kp)=0
C
  605 IF(T9(j-1).GE.TP.AND.T9(j).LT.TP)jo(k)=j
      IF(T9(j-1).GE.TP.AND.j.EQ.365)jo(k)=366

      IF(T9(j-1).GE.TP.AND.j.EQ.2)kp=kp+1
      IF(T9(j-1).LT.TP.AND.T9(j).GE.TP)kp=kp+1
      IF(T9(j-1).GE.TP.AND.T9(j).LT.TP)k=k+1
C
      IF(T9(j-1).GT.TP)jks=j
      IF(T9(j-1).GT.TP)jTvi=jTvi+1
      IF(T9(j-1).LT.TP)jkso=j
```

```
    1 CONTINUE
      IF(T9(365).GT.TP)jks=365
      IF(T9(365).LT.TP)jkso=365
C
      IF(jp(1).EQ.0.AND.jks.NE.0)GO TO 100
      IF(jo(1).EQ.0.AND.jkso.NE.0)GO TO 200
C
      ii=k-1
C
      DO 2 i=1,ii
      j1=jp(i)
      j2=jo(i)-1
      SUMp(i)=0.
      DO 3 j=j1,j2
      SUMp(i)=SUMp(i)+(T9(j)-TP)
    3 CONTINUE
      jj1=jp(i+1)-1
      IF(jp(i+1).EQ.0)jj1=365
      jj2=jo(i)
      SUMo(i)=0.
C
      DO 4 j=jj2,jj1
      SUMo(i)=SUMo(i)-(T9(j)-TP)
    4 CONTINUE
    2 CONTINUE
      ijo=ii
      ijp=1
      SUMpm=SUMp(1)
      DO 5 i=1,ii
      IF(SUMpm.GE.SUMp(i))GO TO 5
      SUMpm=SUMp(i)
      ijp=i
    5 CONTINUE
      i1=ijp-1
      ip=1
      Sp=SUMp(1)
      DO 6 i=1,i1
      IF(Sp.LT.SUMo(i))GO TO 7
      IF(Sp.GE.SUMo(i))GO TO 6
    7 Sp=SUMp(i+1)
      ip=i+1
    6 CONTINUE
      NDPR1=jp(ip)
C
      i2=ijo-1
      io=ijp
      So=SUMo(ijp)
      DO 8 i=ijp,i2
      IF(So.LT.SUMp(i+1))GO TO 9
      IF(So.GE.SUMp(i+1))GO TO 8
    9 So=SUMo(i+1)
      io=i+1
    8 CONTINUE
      NDPR2=jo(io)
      GO TO 300
  200 CONTINUE
      NDPR1=365
      NDPR2=365
      GO TO 300
  100 CONTINUE
      NDPR1=1
      NDPR2=365
  300 CONTINUE
      SUMTWR=0.
```

```
C
      IF(NDPR1.LE.0) NDPR1=1
C      NDPR2.LE.NDP
      IF(NDPR1.GE.250..AND.NDPR1.NE.365)NDPR1=1
      IF(NDPR2.LE.NDPR1)NDPR2=365
      IF(NDPR1.EQ.365.AND.jTvi.GE.200)NDPR1=1
C
      IF(NDPR2.GT.365)NDPR2=365
      IF(NDPR1.GT.365)NDPR1=365
C
      IF(NDPR1.EQ.365.AND.NDPR2.EQ.365)GO TO 401
      DO 400 i=NDPR1,NDPR2
C      IF(T9(i).GT.TP)SUMTWR=SUMTWR+(T9(i)-TP)
      IF(T9(i).GE.TP)SUMTWR=SUMTWR+T9(i)
  400 CONTINUE
      GO TO 405
  401 CONTINUE
      IF(NDPR1.EQ.365.AND.NDPR2.EQ.365)NDPR1=0
      IF(NDPR1.EQ.365.AND.NDPR2.EQ.365)NDPR2=0
  405 CONTINUE
      RETURN
      END
      SUBROUTINE   FUR(Y,YY)
      DIMENSION Y(13),YY(366),AK(6),BK(6),B(13)
      A=Y(1)
      B(1)=0.
      B(13)=0.
      S4=.5235988
      S5=.01721421
      S=0.
      DO 2 K=2,12
      B(K)=Y(K)-A
    2 S=S+B(K)
      A0=S/12
      DO 3 I=1,6
      S=0.
      S1=0.
      S2=S4*I
      DO 4 K=2,12
      S3=(K-1)*S2
      S=S+B(K)*COS(S3)
    4 S1=S1+B(K)*SIN(S3)
      AK(I)=S/6.
   3  BK(I)=S1/6.
      AK(6)=AK(6)/2.
      DO 6 I=1,365
      S=0.
      S1=S5*(I-1)
      DO 7 K=1,6
      S3=K*S1
    7 S=S+AK(K)*COS(S3)+BK(K)*SIN(S3)
    6 YY(I)=S+A0+A
      DO 13 K=1,74
      A=YY(K+291)
      DO 11 I=1,291
      J=291+K-I
   11 YY(J+1)=YY(J)
   13 YY(K)=A
      YY(366)=0.
      RETURN
      END
      SUBROUTINE GGUBS (DSEED,REA)
      DOUBLE PRECISION   DSEED
      DOUBLE PRECISION   D2P31M,D2P31
```

```
      DATA               D2P31M/2147483647.D0/
      DATA               D2P31/2147483775.D0/
      DSEED = DMOD(16807.D0*DSEED,D2P31M)
      REA = DSEED / D2P31
      RETURN
      END
      SUBROUTINE LAMO(KJT,KJS,KJD)
      REAL KJT(366),KJS(366),KJD(366),LAM(366)
      DIMENSION A(31),N(31),NR(12)
      COMMON /THREE/ NO ,NNN
      INTEGER*2 NO(31,12)
      DATA NR/31,28,31,30,31,30,31,31,30,31,30,31/
      RF(Y1,Y2,Y3,X1,X2,X3)=
     * (Y1-X1)*((Y1-X1)*0.1710+(Y2-X2)*0.013+(Y3-X3)*(-0.092))+
     * (Y2-X2)*((Y1-X1)*0.013+(Y2-X2)*0.072+(Y3-X3)*(-0.023))+
     * (Y3-X3)*((Y1-X1)*(-.092)+(Y2-X2)*(-.023)+(Y3-X3)*0.076)
      X1D=-1.35
      X2D=-2.89
      X3D=-2.58
      X1N=0.73
      X2N=1.02
      X3N=2.81
      N1=795
      N2=2057
      L=1
      DO 25 I=1,365
      X1=KJT(I)
      X2=KJS(I)
      X3=KJD(I)
      RN1=RF(X1D,X2D,X3D,X1,X2,X3)
      RN2=RF(X1N,X2N,X3N,X1,X2,X3)
      LAM(I)=(1.+(N2/(N1+1.))*RN2)/
     *       (1.+(N1/(N1+1.))*RN1)
   25 CONTINUE
      L=0
      DO 222 I30=1,12
      NN=NR(I30)
      M=NN
      M1=M-1
      DO 5 I=1,NN
      N(I)=I
    5 A(I)=LAM(I+L)
      DO 1 I=1,M1
      J=I
    3 IF(A(J).LE.A(J+1))GOTO 1
      TEMP=A(J)
      NT=N(J)
      A(J)=A(J+1)
      N(J)=N(J+1)
      A(J+1)=TEMP
      N(J+1)=NT
      J=J-1
      IF(J.GE.1) GOTO 3
    1 CONTINUE
      L=L+NN
      DO 6 I=1,NN
      NO(I,I30)=N(NN-I+1)
    6 CONTINUE
  222 CONTINUE
      RETURN
      END
```