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subroutine oi(mobs,nbox,nmax,nmin,npar,iy,im,id,ih,exper,
2      idim,jdim,gscale,rmax,sdevfg,sdevob,
3      tolera1,tolera2,
4      lunobs,lunfgs,lunana,
5      latm,lonm,dlat,dlon,clat,lfgs)
c
c +-----+
c + A simple analysis program for OI +
c + 1. variable declaration +
c + 1.1 dimension +
c + 1.2 namelist +
c + 1.3 grid parameters +
c + 1.4 observational data fields +
c + 1.5 observations selected for analysis +
c + 1.6 information about rejected data +
c + 1.7 covariance matrix fields +
c + 1.8 working arrays +
c + 1.9 administrative parameters +
c + 2. derived parameters and check +
c + 3. write some input parameters +
c + 4. open input and output files +
c + 4.1 observation file +
c + 4.2 firstguess file +
c + 4.3 result file +
c + 4.4 check file +
c + 5. read and (gross) check observations +
c + 6. analysis loop over all parameters +
c + 6.1 read firstguess +
c + 6.2 OI analysis +
c + --- loop for box's [1 or 9 (latter with fixed dims)]-- +
c + 6.2.1 select influencing observations +
c + 6.2.2 construct and convert covariance matrix +
c + 6.2.3 check obs (bad ob is only flagged ??) +
c + 6.2.4 transform fgs to observation locations +
c + 6.2.5 analysis of parameter at position (lat,lon) +
c + 6.2.6 restore analysis data +
c + ----- end of loop for box's ----- +
c + 6.2.7 add all values from related boxes +
c + 7. derived variables +
c + 8. statistics +
c + 9. store analyses and observations +
c + 10. close obs, ana and chk files +
c + end of the analysis +
c + A1. write format +
c +-----+
c 1 ===== variable declaration =
c implicit none
c 1.1 ----- dimension -
c integer mobs,npar,idim,jdim,nmin,nmax,nhor,nho2
c 1.2 ----- namelist -
c integer nbox,iy,im,id,ih
c real latm,lonm,dlat,dlon,rmax
c real gscale(npar),sdevfg(npar),sdevob(npar)
c real tolera1(npar),tolera2(npar)
c character exper*3
c logical lfgs
c 1.3 ----- grid -
c integer iana,jana
c real lats,lonw,dlatfgs,dlonfgs
c real ana(idim,jdim),fgs(idim,jdim)
c real p_ana(idim,jdim),t_ana(idim,jdim),u_ana(idim,jdim)
c real v_ana(idim,jdim),d_ana(idim,jdim)
c real zana(idim,jdim)
c real grad_o(idim,jdim),grad_b(idim,jdim),grad(idim,jdim)
c real zgrad_o(idim,jdim)
c real box(11,11,3,3) ! for nbox=9
c 1.4 ----- observational data fields -
c integer nobs,iiobs(mobs),nrobs(mobs),flgobs(mobs,npar)
c real oriobs(mobs,npar),latobs(mobs),lonobs(mobs)
c character film*12
c 1.5 ----- observations selected for analysis -
c integer nana,iiival(nmax),nrval(nmax)
c real latval(nmax),lonval(nmax),valobs(nmax),valmean
c real valfgs(nmax),valinn(nmax),valana(nmax)
c real valinb(nmax)
c 1.6 ----- information about rejected data -
c integer nskip,lskip(nmax),flag(nmax),dev(nmax)
c logical skip(nmax)
c 1.7 ----- covariance matrix fields -
c real co(nmax*nmax),coi(nmax*nmax),coired(nmax*nmax)
c 1.8 ----- working arrays -
c real w1(nmax*nmax),w2(nmax*nmax),w3(nmax*nmax),w4(nmax*nmax)
c real lat,lon
c integer i,j,k,i1,i2,ibox,jbox
c 1.9 ----- administrative parameters -
c integer iloop,jloop,ipar,ios
c integer lunobs,lunfgs,lunana
c integer nro(3,3)
c real clat
c 2 ===== derived parameters and check =
c nhor=idim*jdim
c nho2=nhor*nhor
c if(nbox.eq.9) then
c if(lfgs) stop ' The 9-box setup has no fgs'
c if(idim.ne.21 .or. jdim.ne.21)
c + stop ' The 9-box setup is hard-coded for 21x21 '
c ibox = 3
c jbox = 3
c else if(nbox.eq.1) then
c ibox = 1
c jbox = 1
c
c else
c write(6,*) 'The number of analysis box can only be 1 or 9'
c stop
c endif
c 3 ===== write some input parameters =
c write(6,1001)
c write(6,*) 'exp : ',exper
c write(6,*) '(a,4(1x,i2.2))' date:',iy-1900,im,id,ih
c write(6,1001)
c write(6,*) 'parameter pressure temperature'
c write(6,1002)
c write(6,*) 'sdev of fg ',sdevfg
c write(6,*) 'sdev of obs ',sdevob
c write(6,*) 'tolerance 1 ',tolera1
c write(6,*) 'tolerance 2 ',tolera2
c write(6,*) 'Gaussian parameters ',gscale
c write(6,1001)
c 4 ===== open input and output files =
c 4.1 ----- observation file -
c write(filnm(1:12),'(4i2.2,a4)') mod(iy,100),im,id,ih,'.obs'
c open(lunobs,file=filnm,iostat=ios,status='old')
c 4.2 ----- firstguess file -
c if(lfgs) then
c write(filnm(1:12),'(4i2.2,a4)') mod(iy,100),im,id,ih,'.fgs'
c open(lunfgs,file=filnm,iostat=ios,status='old')
c read(lunfgs,*) iana,jana,lats,lonw,dlatfgs,dlonfgs
c if(dlatfgs.ne.dlat.or.dlonfgs.ne.dlon) then
c write(6,*) 'from fgs, dlon and dlat =',dlonfgs,dlatfgs
c write(6,*) 'namelist, dlon and dlat =',dlon,dlat
c stop
c endif
c endif
c 4.3 ----- result file -
c write(filnm(1:12),'(4i2.2,a,a3)') mod(iy,100),im,id,ih,'.',exper
c open(lunana,file=filnm,iostat=ios,status='unknown')
c 5 ===== read and (gross) check observations =
c call getobs(lunobs,npar,mobs,nobs,
c + iioobs,nrobs,latobs,lonobs,oriobs,flgobs)
c 6 ===== analysis loop over all parameters =
c do ipar=1,2
c 6.1 ----- read firstguess -
c if(lfgs) call getfld(idim,jdim,fgs,lunfgs)
c 6.2 ----- OI analysis -
c ----- loops over all box's -
c do 626 jloop=1,jbox
c if(nbox.eq.9) then
c lat=latm+(jloop-2)*5.*dlat
c else
c lat=latm
c endif
c do 626 iloop=1,ibox
c if(nbox.eq.9) then
c lon=lonm+(iloop-2)*5.*dlon
c else
c lon=lonm
c endif
c 6.2.1 ----- select influencing observations .
c call choose_box(nbox,idim,jdim,0,0,
c + iioobs,latobs,lonobs,oriobs(1,ipar),
c + nrobs,nobs,lat,lon,dlat,dlon,rmax,nmax,nmin,
c + iiival,nrval,latval,lonval,valobs,nana)
c nro(iloop,jloop)=nana
c 6.2.2 ----- construct and invert covariance matrix .
c call covmat(lat,clat,sdevfg(ipar),sdevob(ipar),
c + gscale(ipar),nana,latval,lonval,co)
c call linds(nana,co,nana,coi,nana,w4)
c 6.2.3 ----- check observations, reduce coi for rejected data .
c call check(nana,co,coi,coired,valobs,nskip,lskip,skip,
c + dev,flag,w1,w2,w3,w4,
c + sdevob(ipar),sdevfg(ipar),tolera1(ipar),
c + tolera2(ipar),valmean,iiival)
c do k=1,nana
c if( skip(k) )
c + write(6,*) '(a,i1,a,f10.2,a,i6,a,f5.1,a,f5.1,a)'
c + ' par=',ipar,' with value=',valobs(k),
c + ' is rejected at station',iiival(k),
c + ' (',latval(k),',',lonval(k),')'
c enddo
c 6.2.4 ----- convert fgs to obs-grid .
c if(lfgs) then
c call H(idim,jdim,nana,latval,lonval,
c + lat,lon,dlat,dlon,fgs,valfgs)
c endif
c 6.2.5 ----- analysis of parameter at position (lat,lon) .
c call oibox(ipar,nbox,lfgs,
c + idim,jdim,ana,fgs,
c + lat,lon,dlat,dlon,clat,nana,latval,lonval,
c + valmean,valobs,skip,valfgs,w1,coired,
c + sdevfg(ipar),gscale(ipar),rmax)
c if(nbox.eq.9) then
c do i=1,11
c do j=1,11
c box(i,j,iloop,jloop) = ana(i,j)
c enddo
c enddo
c else
c if(ipar.eq.1) then
c call hcpa2b(idim*jdim,ana,p_ana)
c else
c call hcpa2b(idim*jdim,ana,t_ana)

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        endif
      endif
c 6.2.6 ..... restore analysis data .
      call saveres(mobs,npar,nana,ipar,nrval,flgobs,flag)
      626 continue
      write(6,'(3x,a,2x,3i5,/,23x,3i5,/,23x,3i5)')
      + ' nobs in each box:',(nro(il,i2),il=1,ibox),i2=jbox,1,-1)
      write(6,1001)
c 6.2.7 ..... add all values from related boxes .
      627 continue
      if(nbox.eq.9) then
        if(ipar.eq.2) then
          call addbox(box,idim,jdim,t_ana)

        else
          call addbox(box,idim,jdim,p_ana)
        endif
      endif
    enddo
c 7 ===== derived variables =
      call derivf(t_ana,p_ana,
      + u_ana,v_ana,d_ana,idim,jdim,latm,clat,dlat)
c 8 ===== statistics =
      write(6,*) ' statistics : '
      call statis(' p min/max = ',idim,jdim,p_ana)
      call statis(' t min/max = ',idim,jdim,t_ana)
      call statis(' u min/max = ',idim,jdim,u_ana)
      call statis(' v min/max = ',idim,jdim,v_ana)
      call statis(' dyn min/max = ',idim,jdim,d_ana)
      write(6,1001)
c 9 ===== store the analyses and observations =
      write(lunana,'(2i4,4f10.4)') idim,jdim,
      + latm-jdim/2*dlat,lonm-idim/2*dlon,dlat,dlon
      call putfld('p',lunana,idim,jdim,p_ana,idim,jdim)
      call putfld('t',lunana,idim,jdim,t_ana,idim,jdim)
cc   call putfld('u',lunana,idim,jdim,u_ana,idim,jdim)
cc   call putfld('v',lunana,idim,jdim,v_ana,idim,jdim)
      call putobs('obs',mobs,npar,nobs,lunana,
      x iiobs,latobs,lonobs,oriobs,flgobs)
c 10 ===== close obs, ana and chk files =
      close(lunobs)
      close(lunfgs)
      close(lunana)
c ===== end of the analysis =
      write(6,*) 'analysis finished without any error!'
      write(6,1001)
      return
c A1 ===== formats =
1001 format("=====")
1002 format("-----")
6211 format(1x,a,20(/,2x,10i7))
6212 format(1x,a,20(/,2x,10f7.1))
      end

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