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ccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c   This is the data-specific part of the method
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ccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c   int ioopenf(mc,nparams,ntotal)  Open data file at top level
c     Input:
c       character*80 mc(nparams)  parameters for method
c          first is filename
c       integer nparams
c     Output:
c       ntotal: total number of variables
c       ioopenf: number of levels (0..maxlevel)
ccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
      integer function ioopenf(mc,nparams,ntotal)
      character*80 mc(1)
      integer ntotal

      character*80 fileprefix,subfile
      character*40 nnames(30),v(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,v
      data nnames/'leg\0','station\0','cast\0','month\0',
     $     'day\0','year\0','lat\0','lon\0','time\0',
     $     'water_depth\0','type\0','comments\0','eventno\0',
     $      '','','','','','','','','','','','','','','','','/

      data n_group,n_total/13,0/
      character*80 s

      fileprefix=mc(1)
      open(unit=1,file=mc(1),err=100,status='old')
      read(1,*)index,k
      n_total=n_group+k
      do 20 i=n_group+1,n_total
         read(1,1)nnames(i)
 1       format(a)
         call fixstr(nnames(i))
         read(1,*)is(i-n_group)
 20   continue
      close(unit=1)
      fileflg=.false.
      s=mc(1)(1:istrlen(mc)-3)//'\0'
      call strcat(s,'stacast.doc\0')
      open(unit=1,file=s,err=100,status='old')
      ntotal=n_total
      ioopenf=1
      mc(1)(1:1)='\0'
   30   continue
c  for ctd, check for additional parameter in the form dp=nnn
c  which specifies the selection interval
        dd=1.0
        if(index.gt.1)goto 400
        do 401 i=2,nparams
          if(mc(i)(1:3).eq.'dp:')then
            do 410 j=1,39
              if(mc(i)(j:j).eq.'\0')goto 411
  410       continue
  411     read(mc(i)(4:j-1),*)dd
          mc(i)(1:1)='\0'
        endif
  401 continue
  400 continue
      return
  100  write(*,*)'&error bad filename\0'
      call exit(1)
      end

ccccccccccccccccccccccccccccccccccccccccc
c   subroutine ioname(vn,tmp)  Return name of vn'th variable
c   Input:
c       integer vn: variable (0..ntotal-1)
c   Output:
c       character*40 tmp: name (0 terminated)
ccccccccccccccccccccccccccccccccccccccccc
      subroutine ioname(vn,tmp)
      integer vn
      character*40 tmp
      character*80 fileprefix,subfile
      character*40 nnames(30),v(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,v
      tmp=nnames(vn+1)
      return
      end

ccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c   int iovarlevel(varnum)  level for a variable
c
c     Input:  varnum   index of variable
c     Output: integer  level
ccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
      integer function iovarlevel(vn)
      integer vn
      character*80 fileprefix,subfile
      character*40 nnames(30),values(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,values
      if(vn.ge.n_group)then
        iovarlevel=1
      else
        iovarlevel=0
      endif
      return
      end

ccccccccccccccccccccccccccccccccccccccccc
c     integer function ioattrout(vn,str)   Return attributes for
c                                           vn'th variable
c     Input:
c       integer vn: variable number (0..ntotal-1)
c     Output:
c       character*80 str string for attribute
c       return 1 if an attribute was returned
c       return 0 if no more attributes were found for that variable
ccccccccccccccccccccccccccccccccccccccccc
      integer function ioattrout(vn,str)
      integer vn
      character*80 str
      ioattrout=0
      return
      end
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ccccccccccccccccccccccccccccccccccccc
c     subroutine iovalreal(vn,f)  Return value as real number
c     Input:
c       integer vn: variable number (0..ntotal-1)
c     Output:
c       real f: value (-9999 for nd or bad data)
ccccccccccccccccccccccccccccccccccccc
      subroutine iovalreal(vn,f)
      integer vn
      real f
      character*80 fileprefix,subfile
      character*40 nnames(30),v(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,v
      character*1 test
      character*40 tmp
      tmp=v(vn+1)
 10   if(tmp(1:1).eq.' ')then
         tmp=tmp(2:40)
         goto 10
      endif
      test=tmp(1:1)
      if((test.ge.'0' .and. test.le.'9') .or. test.eq.'.' .or.
     $    test.eq.'+' .or. test.eq.'-')then
         read(tmp,*)f
      else
         f=-9999.0
      endif
      return
      end

ccccccccccccccccccccccccccccccccccccc
c     subroutine iovalstr(vn,tmp) Return value as string
c     Input:
c       integer vn: variable number (0..ntotal-1)
c     Output:
c       character*40 tmp: value
ccccccccccccccccccccccccccccccccccccc
      subroutine iovalstr(vn,tmp)
      integer vn
      character*40 tmp
      character*80 fileprefix,subfile
      character*40 nnames(30),v(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,v
      tmp=v(vn+1)
      call fixstr(tmp)
 10   if(tmp(1:1).eq.' ')then
         tmp=tmp(2:40)
         goto 10
      endif
      return
      end

ccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c   int ioreadrec(level)   Get next record of data in a particular level
c     Input:  level integer indicating which level in hierarchy
c             to be read.
c     Output: ioreadrec=1 ok, 0=eof at this level
ccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
      integer function ioreadrec(level)
      integer level
      character*80 fileprefix,subfile
      character*40 nnames(30),v(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,v

      integer latd,lond
      real latm,lonm,lat,lon
      character*1 latq,lonq
      character*20 flags
      character*80  s

      if(level.eq.0) then
 1331    read(1,1,end=1000)v(1),v(2),v(3),v(5),v(4),v(6),v(11),
     $     latd,latm,latq,lond,lonm,lonq,v(9),v(10),v(12),v(13),flags
 1       format(a5,a3,a2,a2,a2,a2,a3,i2,f4.1,a1,i3,f4.1,a1,a4,a4,a7,
     $        a6,2x,a)
         if(flags(index:index).ne.'x') goto 1331
         v(6)='19'//v(6)
         lat=latd+latm/60.0
         write(v(7),'(f8.3)')lat
         if(latq.eq.'S')lat=-lat
         lon=lond+lonm/60.0
         if(lonq.eq.'W')lon=-lon
         write(v(8),'(f8.3)')lon
         subfile=v(2)(1:3)//'.'//v(3)(1:2)
         do 88 i=1,6
 88         if(subfile(i:i).eq.' ')subfile(i:i)='0'
            do 89 i=1,n_group
               call fixstr(v(i))
 89         continue
       else
cccc
c  level 1
cccc
            if(.not. fileflg)then
              s=fileprefix
              call strcat(s,subfile)
              open(unit=2,file=s,err=1900,status='old')
              fileflg=.true.
            endif
 8999       read(unit=2,end=500,fmt=2)s
 2          format(a)
            if(index.eq.1 .and. dd.gt.2.0)then
               read(s(1:is(1)),*)p
               if(mod(p,dd).ne. 0.0) goto 8999
            endif
            j=1
            do 891 i=n_group+1,n_total
              v(i)=s(j:j+is(i-n_group)-1)
              j=j+is(i-n_group)
               if(v(i).eq.'      ')v(i)='nd'
               call fixstr(v(i))
 891        continue
         endif
         ioreadrec=1
         return

 500    continue
        close(unit=2)
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       fileflg=.false.
       ioreadrec=0
       return

 1000  continue
       ioreadrec=0
       return
 1900  continue
       write(*,*)'&error - files\0'
       call exit(1)
       end

ccccccccccccccccccccccccccccccccccccc
c     integer function iocommout(str)   Return next set of comments
c     Output:
c       character*80 str string for comments
c       return 1 if a comment was returned
c       return 0 if no more comments
ccccccccccccccccccccccccccccccccccccc
      integer function iocommout(str)
      character*80 str
      iocommout=0
      return
      end

cccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c   int ioclose()   Close all files
cccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
      subroutine ioclose()
       character*80 fileprefix,subfile
      character*40 nnames(30),v(30)
      integer is(20)
      logical fileflg
      common/method/fileprefix,subfile,fileflg,n_group,n_total,index,is
     $   ,dd,nnames,v
      if (fileflg) close(unit=2)
      close(unit=1)
      return
      end

       subroutine strcat(s1,s2)
       character*(*) s1,s2
       do 10 i=1,len(s1)
          if(s1(i:i).eq.'\0')goto 100
 10    continue
       return
 100   s1(i:len(s1))=s2
       return
       end

       integer function istrlen(s)
       character*(*) s
       do 10 i=1,len(s)
          if(s(i:i).eq.'\0')goto 100
 10    continue
 100   istrlen=i-1
       return
       end

       subroutine fixstr(t)
       character*(*)t
       character*80 s
       s=t
c       write(*,*)'>>',s,'<<'
       do 10 j=1,40
          if(s(j:j).ne.' ')goto 11
10     continue
       j=1
11     do 12 i=len(t),j+1,-1
          if(s(i:i).gt.' ')goto 13
12     continue
13     i=i+1
       s(i:i)='\0'
       t=s(j:i)
       return
       end
```