Datos Geoespaciales - 513376

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Abordando archivos NetCDF

Temario.

Abordando archivos NetCDF.

Pasos para entender un archivo NetCDF.

- Leer el Header.
  - ncks *archivo.nc* | head -*n*.
  - ncdump -h.
- Si el archivo es muy grande y tiene muchas variables, es conveniente guardar el header en un archivo de text simple.
  - ncks *archivo.nc* | head -*n* > *header.txt*.
  - ncdump -h *archivo.nc* > *header.txt*
- Analizar gráficamente el archivo.
  - ncview *archivo.nc*

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Header

- Utilizando ncdump -h *archivo.nc*

```
netcdf salidaCFSR {
dimensions:
        Time = UNLIMITED ; // (169 currently)
        DateStrLen = 19 ;
        south_north = 96 ;
        west_east = 99 ;
        bottom_top = 39 ;
        bottom_top_stag = 40 ;
        soil_layers_stag = 4 ;
        west_east_stag = 100 ;
        south_north_stag = 97 ;
variables:
        char Times(Time, DateStrLen) ;
        float XLAT(Time, south_north, west_east) ;
                XLAT:FieldType = 104 ;
                XLAT:MemoryOrder = "XY " ;
                XLAT:description = "LATITUDE, SOUTH IS NEGATIVE" ;
                XLAT:units = "degree_north" ;
                XLAT:stagger = "" ;
                XLAT:coordinates = "XLONG XLAT" ;
        float XLONG(Time, south_north, west_east) ;
                XLONG:FieldType = 104 ;
                XLONG:MemoryOrder = "XY " ;
                XLONG:description = "LONGITUDE, WEST IS NEGATIVE" ;
                XLONG:units = "degree_east" ;
                XLONG:stagger = "" ;
                XLONG:coordinates = "XLONG XLAT" ;
        float LU_INDEX(Time, south_north, west_east) ;
                LU_INDEX:FieldType = 104 ;
                LU_INDEX:MemoryOrder = "XY " ;
                LU_INDEX:description = "LAND USE CATEGORY" ;
                LU_INDEX:units = "" ;
                LU_INDEX:stagger = "" ;
                LU_INDEX:coordinates = "XLONG XLAT XTIME" ;
        float U(Time, bottom_top, south_north, west_east_stag) ;
                U:FieldType = 104 ;
                U:MemoryOrder = "XYZ" ;
                U:description = "x-wind component" ;
                U:units = "m s-1" ;
                U:stagger = "X" ;
                U:coordinates = "XLONG_U XLAT_U XTIME" ;
        float V(Time, bottom_top, south_north_stag, west_east) ;
                V:FieldType = 104 ;
```

- Utilizando ncks -h *archivo.nc* | head -n

```
Root record dimension 0: name = Time, size = 169

Global attributes:
Global attribute 0: TITLE, size = 31 NC_CHAR, value =  OUTPUT FROM WRF V3.9.1.1 MODEL
Global attribute 1: START_DATE, size = 19 NC_CHAR, value = 2017-07-01_00:00:00
Global attribute 2: SIMULATION_START_DATE, size = 19 NC_CHAR, value = 2017-07-01_00:00:00
Global attribute 3: WEST-EAST_GRID_DIMENSION, size = 1 NC_INT, value = 100
Global attribute 4: SOUTH-NORTH_GRID_DIMENSION, size = 1 NC_INT, value = 97
Global attribute 5: BOTTOM-TOP_GRID_DIMENSION, size = 1 NC_INT, value = 40
Global attribute 6: DX, size = 1 NC_FLOAT, value = 5900
Global attribute 7: DY, size = 1 NC_FLOAT, value = 5900
Global attribute 8: SKEBS_ON, size = 1 NC_INT, value = 0
Global attribute 9: SPEC_BDY_FINAL_MU, size = 1 NC_INT, value = 1
Global attribute 10: USE_Q_DIABATIC, size = 1 NC_INT, value = 0
Global attribute 11: GRIDTYPE, size = 1 NC_CHAR, value = C
Global attribute 12: DIFF_OPT, size = 1 NC_INT, value = 1
Global attribute 13: KM_OPT, size = 1 NC_INT, value = 4
Global attribute 14: DAMP_OPT, size = 1 NC_INT, value = 0
Global attribute 15: DAMPCOEF, size = 1 NC_FLOAT, value = 0.2
Global attribute 16: KHDIF, size = 1 NC_FLOAT, value = 0
Global attribute 17: KVDIF, size = 1 NC_FLOAT, value = 0
Global attribute 18: MP_PHYSICS, size = 1 NC_INT, value = 6
Global attribute 19: RA_LW_PHYSICS, size = 1 NC_INT, value = 1
Global attribute 20: RA_SW_PHYSICS, size = 1 NC_INT, value = 1
Global attribute 21: SF_SFCLAY_PHYSICS, size = 1 NC_INT, value = 1
Global attribute 22: SF_SURFACE_PHYSICS, size = 1 NC_INT, value = 2
Global attribute 23: BL_PBL_PHYSICS, size = 1 NC_INT, value = 1
Global attribute 24: CU_PHYSICS, size = 1 NC_INT, value = 0
Global attribute 25: SF_LAKE_PHYSICS, size = 1 NC_INT, value = 0
Global attribute 26: SURFACE_INPUT_SOURCE, size = 1 NC_INT, value = 1
Global attribute 27: SST_UPDATE, size = 1 NC_INT, value = 0
Global attribute 28: GRID_FDDA, size = 1 NC_INT, value = 0
Global attribute 29: GFDDA_INTERVAL_M, size = 1 NC_INT, value = 0
Global attribute 30: GFDDA_END_H, size = 1 NC_INT, value = 0
Global attribute 31: GRID_SFDDA, size = 1 NC_INT, value = 0
Global attribute 32: SGFDDA_INTERVAL_M, size = 1 NC_INT, value = 0
Global attribute 33: SGFDDA_END_H, size = 1 NC_INT, value = 0

W: type NC_FLOAT, 4 dimensions, 6 attributes, compressed? no, chunked? no, packed? no
W size (RAM) = 169*40*96*99*sizeof(NC_FLOAT) = 64247040*4 = 256988160 bytes
W dimension 0: Time, size = 169 (Record non-coordinate dimension)
W dimension 1: bottom_top_stag, size = 40 (Non-coordinate dimension)
W dimension 2: south_north, size = 96 (Non-coordinate dimension)
W dimension 3: west_east, size = 99 (Non-coordinate dimension)
W attribute 0: FieldType, size = 1 NC_INT, value = 104
W attribute 1: MemoryOrder, size = 3 NC_CHAR, value = XYZ
W attribute 2: description, size = 16 NC_CHAR, value = z-wind component
W attribute 3: units, size = 5 NC_CHAR, value = m s-1
W attribute 4: stagger, size = 1 NC_CHAR, value = Z
W attribute 5: coordinates, size = 16 NC_CHAR, value = XLONG XLAT XTIME

XICEM: type NC_FLOAT, 3 dimensions, 6 attributes, compressed? no, chunked? no, packed? no
XICEM size (RAM) = 169*96*99*sizeof(NC_FLOAT) = 1606176*4 = 6424704 bytes
XICEM dimension 0: Time, size = 169 (Record non-coordinate dimension)
XICEM dimension 1: south_north, size = 96 (Non-coordinate dimension)
XICEM dimension 2: west_east, size = 99 (Non-coordinate dimension)
XICEM attribute 0: FieldType, size = 1 NC_INT, value = 104
XICEM attribute 1: MemoryOrder, size = 3 NC_CHAR, value = XY
XICEM attribute 2: description, size = 28 NC_CHAR, value = SEA ICE FLAG (PREVIOUS STEP)
XICEM attribute 3: units, size = 1 NC_CHAR, value =
XICEM attribute 4: stagger, size = 1 NC_CHAR, value =
XICEM attribute 5: coordinates, size = 16 NC_CHAR, value = XLONG XLAT XTIME
```

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Paletas y NetCDF

- ¿Cómo crear una paleta para graficar un archivo NetCDF?.

Pasos:

- Buscar los límites de la variable a graficar.
  - more *header.txt* | grep "*variable*:actual_range".
- Utilizar estos límites para modificar una paleta existente.
  - makecpt -C*paleta_entrada.cpt* -TZ_{min}/Z_{max}/paso > paleta_salida.cpt

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NetCDF en otros lenguajes.

Otros lenguajes comunes.

- Matlab.
- Python.

Matlab

Comandos útiles.

- Header.
  - ncdisp('*archivo.nc*')
  - ncdisp('*archivo.nc*','*variable*')
- Leer Variables.
  - ncread('*archivo.nc*','*variable*')

Ejercicios.

- ¿Cuales son los mínimos máximos de las variables incluidas en los archivos NetCDF descargados?.
- Genere un mapa de temperatura superficial del mar para una semana específica y compare esa gráfica con lo mostrado en ncview para la misma semana.
- Cree un script que automatice el item anterior,tomando como variable de entrada la fecha requerida.
- Utilizando bash calcule promedios mensuales de la base de datos "*sst.wkmean.1990-present.nc*".
- Calcule las diferencias entre las medias mensuales calculadas y las entregadas en el archivo "*sst.mnmean.nc*".

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