ARPS/ADAS NetCDF file conventions

(Version 1, September 22, 2004)

(Sample data is available on ftp.caps.ou.edu/pub/users/ywang/ anonymously.)

NOTE: To visualize using IDV, users are required to set the following flags in namelist block *&output* for ARPS run or ARPSCVT run.

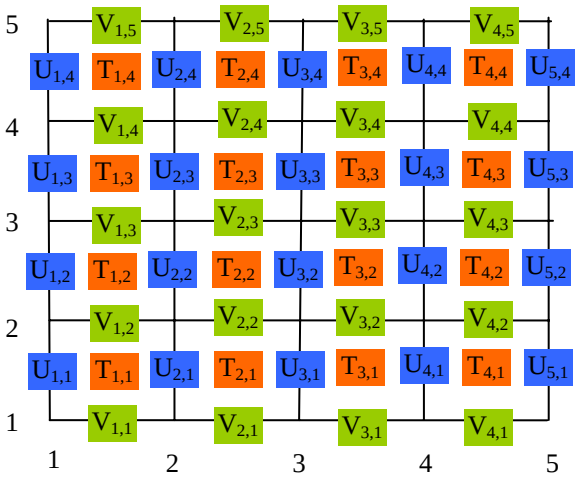
- totflg = 1 (totout = 1 in *arps.input* or *arpscvt.input*)
- grdflg = 1 (grdout = 1 in *arps.input* or *arpscvt.input*)

Users are also required to add a "*.nc*" extension manually to all of the NetCDF files before visualizing it.

Part I. ARPS/ADAS history dumps

Dimensions:

Time : Unlimited dimension, = 1, at present. We may add an option to write multiple time levels inside one file later;
x : Size in west-east direction of the unstagered grid;
y : Size in north-south direction of the unstagered grid;
z : Size in bottom-top direction of the unstagered grid;
x_stag : Size in X direction of the staggered grid which has one more point than *x*;
y_stag : Size in Y direction of the staggered grid which has one more point than *y*;
z_stag : Size in Z direction of the staggered grid which has one more point than *z*;



Horizontally C-grid

x = 4, *y= 4*
x_stag = 5, *y_stag = 5*

'X' stagger variables: U, UBAR, UPRT
'Y' stagger variables: V, VBAR, VPRT
'Z' stagger varaibles: W, WBAR, WPRT, ZP

zsoil : Number of soil layers;
nstyp : Number of soil types for each grid point;
nstyp_total : The fourth dimension size for variable *tsoil*, *qsoil*, *wetcanp*;

nstyp_total = 1	represents average of all the *nstyp* soil types
nstyp_total = 2	represents values for the 1st soil types (*nstyp*=1)
nstyp_total = 3	represents values for the 2nd soil types (*nstyp*=2)
… … etc.	

Coordinate variables: (grid variables in ARPS)

Will be presented in the file

Time(*Time*) :	float value, seconds since the model initial time (See global attribute INITIAL_TIME)
grdflg = 1 { *x_stag*(*x_stag*) :	Staggered coordinate in X direction of physical domain;
y_stag(*y_stag*) :	Staggered coordinate in Y direction of physical domain;
z_stag(*z_stag*) :	Staggered coordinates in vertical direction, which is the full vertical layers. *z_stag*(*z_stag*) is relative to the ground surface, *i.e.* *z_stag*(2) = 0 which is the ground surface.
ZP (*z_stag*, *y*, *x*) :	Vertical coordinates relative to MSL. That is *ZP*(*2*, *y*, *x*) is just the terrain height at grid point (*x*, *y*), and *ZP*(*k*, *j*, *i*) = *ZP*(*2*, *j*, *i*) + *z_stag*(*k*)
ZPSOIL (*zsoil*, *y*, *x*) :	Heights of soil layer relative to MSL.

Should be derived from the above variables

x(*x*) :	(*nx-1*) middle points for the above *nx* staggered points in X direction;
y(*y*) :	(*ny-1*) middle points for the above *ny* staggered points in Y direction;
z(*z*) :	(*nz-1*) middle points for the above *nz* staggered points in Z direction;

Variables:

Time dependent files:

Note: Usually *basflg == 0* for time dependent file.This means they will not appear in time dependent files.

```
float UBAR(z, y, x_stag) ;
        UBAR:long name = "Base state u-velocity" ;
        UBAR:units = "m/s" ;
        UBAR:stagger = "X" ;
```

basflg = 1

```
        float VBAR(z, y_stag, x) ;
                VBAR:long_name = "Base state v-velocity" ;
                VBAR:units = "m/s" ;
                VBAR:stagger = "Y" ;
        float WBAR(z_stag, y, x) ;
                WBAR:long_name = "Base state w-velocity" ;
                WBAR:units = "m/s" ;
                WBAR:stagger = "Z" ;
        float PTBAR(z, y, x) ;
                PTBAR:long_name = "Base state potential temperature" ;
                PTBAR:units = "K" ;
                PTBAR:stagger = " " ;
        float PBAR(z, y, x) ;
                PBAR:long_name = "Base state pressure" ;
                PBAR:units = "Pa" ;
                PBAR:stagger = " " ;
```

mstflg = 1

```
        float QVBAR(z, y, x) ;
                QVBAR:long_name = "Base state water vapor specific humidity" ;
                QVBAR:units = "kg/kg" ;
                QVBAR:stagger = " " ;
```

landflg = 1

```
        int SOILTYP(nstyp, y, x) ;
                SOILTYP:long_name = "Soil type" ;
                SOILTYP:units = "index" ;
                SOILTYP:stagger = " " ;
        float STYPFRCT(nstyp, y, x) ;
                STYPFRCT:long_name = "Soil type fractional coverage" ;
                STYPFRCT:units = "fraction" ;
                STYPFRCT:stagger = " " ;
        int VEGTYP(y, x) ;
                VEGTYP:long_name = "Vegetation type" ;
                VEGTYP:units = "index" ;
                VEGTYP:stagger = " " ;
        float LAI(y, x) ;
                LAI:long_name = "Leaf Area Index" ;
                LAI:units = "index" ;
                LAI:stagger = " " ;
        float ROUFNS(y, x) ;
                ROUFNS:long_name = "Surface roughness" ;
                ROUFNS:units = "" ;
                ROUFNS:stagger = " " ;
        float VEG(y, x) ;
                VEG:long_name = "Vegetation fraction" ;
                VEG:units = "fraction" ;
                VEG:stagger = " " ;
```

varflg = 1

```
    float U(Time, z, y, x_stag) ;
            U:long_name = "U-velocity" ;
            U:units = "m/s" ;
            U:stagger = "X" ;
    float V(Time, z, y_stag, x) ;
            V:long_name = "V-velocity" ;
            V:units = "m/s" ;
            V:stagger = "Y" ;
    float W(Time, z_stag, y, x) ;
            W:long_name = "W-velocity" ;
            W:units = "m/s" ;
            W:stagger = "Z" ;
    float PT(Time, z, y, x) ;
            PT:long_name = "Potential temperature" ;
            PT:units = "K" ;
            PT:stagger = " " ;
    float P(Time, z, y, x) ;
            P:long_name = "Pressure" ;
            P:units = "Pa" ;
            P:stagger = " " ;
```

mstflg = 1

```
float QV(Time, z, y, x) ;
        QV:long_name = "Water vapor specific humidity" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
float QC(Time, z, y, x) ;
        QC:long_name = "Cloud water mixing ratio" ;
        QC:units = "kg/kg" ;
        QC:stagger = " " ;
float QR(Time, z, y, x) ;
        QR:long_name = "Rain water mixing ratio" ;
        QR:units = "kg/kg" ;
        QR:stagger = " " ;
```

prcflg = 1

```
float PRCRATE1(Time, y, x) ;
        PRCRATE1:long_name = "Total precipitation rate" ;
        PRCRATE1:units = "kg m-2 s-1" ;
        PRCRATE1:stagger = " " ;
float PRCRATE2(Time, y, x) ;
        PRCRATE2:long_name = "Grid scale precipitation rate" ;
        PRCRATE2:units = "kg m-2 s-1" ;
        PRCRATE2:stagger = " " ;
float PRCRATE3(Time, y, x) ;
        PRCRATE3:long_name = "Cumulus precipitation rate" ;
        PRCRATE3:units = "kg m-2 s-1" ;
        PRCRATE3:stagger = " " ;
float PRCRATE4(Time, y, x) ;
        PRCRATE4:long_name = "Microphysics precipitation rate" ;
        PRCRATE4:units = "kg m-2 s-1" ;
        PRCRATE4:stagger = " " ;
```

iceflg = 1

```
float QI(Time, z, y, x) ;
        QI:long_name = "Cloud ice mixing ratio" ;
        QI:units = "kg/kg" ;
        QI:stagger = " " ;
float QS(Time, z, y, x) ;
        QS:long_name = "Snow mixing ratio" ;
        QS:units = "kg/kg" ;
        QS:stagger = " " ;
float QH(Time, z, y, x) ;
        QH:long_name = "Hail mixing ratio" ;
        QH:units = "kg/kg" ;
        QH:stagger = " " ;
```

tkeflg = 1

```
float TKE(Time, z, y, x) ;
        TKE:long_name = "Turbulent Kinetic Energy" ;
        TKE:units = "m2 s-2" ;
        TKE:stagger = " " ;
```

trbflg = 1

```
float KMH(Time, z, y, x) ;
        KMH:long_name = "Hori. turb. mixing coef. for momentum" ;
        KMH:units = "m2 s-1" ;
        KMH:stagger = " " ;
float KMV(Time, z, y, x) ;
        KMV:long_name = "Vert. turb. mixing coef. for momentum" ;
        KMV:units = "m2 s-1" ;
        KMV:stagger = " " ;
```

sfcflg = 1

```
float TSOIL(Time, nstyp_total, zsoil, y, x) ;
        TSOIL:long_name = "Soil temperature" ;
        TSOIL:units = "K" ;
        TSOIL:stagger = " " ;
float QSOIL(Time, nstyp_total, zsoil, y, x) ;
        QSOIL:long_name = "Soil moisture" ;
        QSOIL:units = "K" ;
        QSOIL:stagger = " " ;
float WETCANP(Time, nstyp_total, y, x) ;
        WETCANP:long_name = "Canopy water amount" ;
        WETCANP:units = "m" ;
        WETCANP:stagger = " " ;
```

snowflg = 1

```
float SNOWDPTH(Time, y, x) ;
        SNOWDPTH:long_name = "Snow depth" ;
        SNOWDPTH:units = "m" ;
        SNOWDPTH:stagger = " " ;
```

radflg = 1

```
float RADFRC(Time, z, y, x) ;
        RADFRC:long_name = "Radiation forcing" ;
        RADFRC:units = "K/s" ;
        RADFRC:stagger = " " ;
float RADSW(Time, y, x) ;
        RADSW:long_name = "Solar radiation reaching the surface" ;
        RADSW:units = "W m-2" ;
        RADSW:stagger = " " ;
float RNFLX(Time, y, x) ;
        RNFLX:long_name = "Net radiation flux absorbed by surface" ;
        RNFLX:units = "W m-2" ;
        RNFLX:stagger = " " ;
float RADSWNET(Time, y, x) ;
        RADSWNET:long_name = "Net solar radiation" ;
        RADSWNET:units = "W m-2" ;
        RADSWNET:stagger = " " ;
float RADLWIN(Time, y, x) ;
        RADLWIN:long_name = "Incoming longwave radiation" ;
        RADLWIN:units = "W m-2" ;
        RADLWIN:stagger = " " ;
```

flxflg = 1

```
float USFLX(Time, y, x) ;
        USFLX:long_name = "Surface flux of u-momentum" ;
        USFLX:units = "kg m-1 s-2" ;
        USFLX:stagger = " " ;
float VSFLX(Time, y, x) ;
        VSFLX:long_name = "Surface flux of v-momentum" ;
        VSFLX:units = "kg m-1 s-2" ;
        VSFLX:stagger = " " ;
float PTSFLX(Time, y, x) ;
        PTSFLX:long_name = "Surface heat flux" ;
        PTSFLX:units = "K kg m-1 s-2" ;
        PTSFLX:stagger = " " ;
float QVSFLX(Time, y, x) ;
        QVSFLX:long_name = "Surface moisture flux" ;
        QVSFLX:units = "kg m-2 s-1" ;
        QVSFLX:stagger = " " ;
```

Grid & base state file (time independent)

Note: *Presented only for the ARPS system, IDV does not need to take care of it.*
Usually basflg == 1 only for time independent file

basflg = 1

```
float UBAR(z, y, x_stag) ;
        UBAR:long_name = "Base state u-velocity" ;
        UBAR:units = "m/s" ;
        UBAR:stagger = "X" ;
float VBAR(z, y_stag, x) ;
        VBAR:long_name = "Base state v-velocity" ;
        VBAR:units = "m/s" ;
        VBAR:stagger = "Y" ;
float WBAR(z_stag, y, x) ;
        WBAR:long_name = "Base state w-velocity" ;
        WBAR:units = "m/s" ;
        WBAR:stagger = "Z" ;
float PTBAR(z, y, x) ;
        PTBAR:long_name = "Base state potential temperature" ;
        PTBAR:units = "K" ;
        PTBAR:stagger = " " ;
float PBAR(z, y, x) ;
        PBAR:long_name = "Base state pressure" ;
        PBAR:units = "Pa" ;
        PBAR:stagger = " " ;
```

mstflg = 1

```
float QVBAR(z, y, x) ;
    QVBAR:long_name = "Base state water vapor specific humidity" ;
    QVBAR:units = "kg/kg" ;
    QVBAR:stagger = " " ;
```

landflg = 1

```
int SOILTYP(nstyp, y, x) ;
        SOILTYP:long_name = "Soil type" ;
        SOILTYP:units = "index" ;
        SOILTYP:stagger = " " ;
float STYPFRCT(nstyp, y, x) ;
        STYPFRCT:long_name = "Soil type fractional coverage" ;
        STYPFRCT:units = "fraction" ;
        STYPFRCT:stagger = " " ;
int VEGTYP(y, x) ;
        VEGTYP:long_name = "Vegetation type" ;
        VEGTYP:units = "index" ;
        VEGTYP:stagger = " " ;
float LAI(y, x) ;
        LAI:long_name = "Leaf Area Index" ;
        LAI:units = "index" ;
        LAI:stagger = " " ;
float ROUFNS(y, x) ;
        ROUFNS:long_name = "Surface roughness" ;
        ROUFNS:units = "" ;
        ROUFNS:stagger = " " ;
float VEG(y, x) ;
        VEG:long_name = "Vegetation fraction" ;
        VEG:units = "fraction" ;
        VEG:stagger = " " ;
```

Global attributes:

```
:Title = "ARPS 5.1 grid & base (time independent) data" ;
:History = "Created from ARPS NetCDF API at 2004-09-07_13:28:44.976 -05" ;
:FMTVER = "005.10 NetCDF 3.0 Coded Data" ;
:PACKED = 0 ;
```

NOTE: *May support packed data type later*

```
:RUNNAME = "adas25may1998" ;
:nocmnt = 2 ;
:cmnt01 = "ARPS 5.1" ;
:cmnt02 = "Del City Storm Simulation" ;
:DX = 32000.f ;
:DY = 32000.f ;
:INITIAL_TIME = "1998-05-25_00:00:00" ;
:TSTOP = 7200.f ;
:THISDMP = 3600.f ;
:MAPPROJ = 2 ;
```

NOTE: *Map projection option.*
= 0, no map projection;
= 1, North polar projection (-1 South Pole);
= 2, Northern Lambert projection (-2 Southern);
= 3, Mercator projection.

```
:SCLFCT = 1.f ;
:TRUELAT1 = 30.f ;
:TRUELAT2 = 60.f ;
:TRUELON = -100.f ;
:LATITUD = 38.f ;
:CTRLAT = 38.f ;
:CTRLON = -98.f ;
:XGRDORG = 0.f ;
:YGRDORG = 0.f ;
:UMOVE = 0.f ;
:VMOVE = 0.f ;
```

Map scale factor (default is 1.0);
1st true latitude of map projection;
2nd true latitude of map projection (used only by mapproj = 2);
True longitude of map projection;

Latitude of the model physical domain center (deg. N);
Longitude of the model physical domain center (deg. E).

```
:GRDFLG = 1 ;
:BASFLG = 1 ;
:VARFLG = 0 ;
:MSTFLG = 1 ;
:ICEFLG = 0 ;
:TRBFLG = 0 ;
:SFCFLG = 0 ;
:RAINFLG = 0 ;
:LANDFLG = 1 ;
:TOTFLG = 1 ;
:TKEFLG = 0 ;
:PRCFLG = 1 ;
:RADFLG = 1 ;
:FLXFLG = 1 ;
:SNOWFLG = 1 ;
```

Note: By default, ARPS always set *totflag* = 1. If totflag = 0 for special testing cases, some of the above variables will be substituted by their perturbations, i.e.

uprt + ubar = u *vprt + vbar = v*

etc.

U	-> UPRT;	V	-> VPRT;	W	-> WPRT;
PT	-> PTPRT;	P	-> PPRT;	QV	-> QVPRT;

This will not occur in normal ARPS/ADAS runs.

Part II. ARPS Terrain data

Dimensions:

x : Size in west-east direction of the unstagered grid;
y : Size in north-south direction of the unstagered grid;

Variables:

```
float HTERAIN(y, x) ;
        HTERAIN:long_name = "Terrain height" ;
        HTERAIN:units = "m" ;
        HTERAIN:stagger = " " ;
```

Global attributes:

```
        :Title = "ARPS 5.1 terrain data (ARPSTRN)" ;
        :Conventions = "Unknow" ;
        :History = "Created from ARPS NetCDF API at 2004-09-10_13:37:22.369 -05" ;
        :FMTVER = "005.10 NetCDF 3.0 Terrain Data" ;
        :PACKED = 0 ;
        :DX = 32000.f ;
        :DY = 32000.f ;
        :MAPPROJ = 2 ;
        :SCLFCT = 1.f ;
        :TRUELAT1 = 30.f ;
        :TRUELAT2 = 60.f ;
        :TRUELON = -100.f ;
        :CTRLAT = 38.f ;
        :CTRLON = -98.f ;
```

NOTE: projection parameters are the same as above.

Part III. ARPS Soil variables

Dimensions:

x : Size in west-east direction of the unstagered grid;
y : Size in north-south direction of the unstagered grid;
zsoil : Number of soil layers;
nstyp : Number of soil types for each grid point;
nstyp_total : The fourth dimension size for variable *tsoil*, *qsoil*, *wetcanp*;

nstyp_total = 1	represents average of all the *nstyp* soil types
nstyp_total = 2	represents values for the 1st soil types (*nstyp*=1)
nstyp_total = 3	represents values for the 2nd soil types (*nstyp*=2)

… … etc.

Variables:

zpsoilflg = 1

```
float ZPSOIL(zsoil, y, x) ;
        ZPSOIL:long_name = "Soil level depth" ;
        ZPSOIL:units = "m" ;
        ZPSOIL:stagger = " " ;
```

tsoilflg = 1

```
float TSOIL(nstyp_total, zsoil, y, x) ;
        TSOIL:long_name = "Soil temperature" ;
        TSOIL:units = "K" ;
        TSOIL:stagger = " " ;
```

qsoilflg = 1

```
float QSOIL(nstyp_total, zsoil, y, x) ;
        QSOIL:long_name = "Soil moisture" ;
        QSOIL:units = "kg kg-1" ;
        QSOIL:stagger = " " ;
```

wcanpflg = 1

```
float WETCANP(nstyp_total, y, x) ;
        WETCANP:long_name = "Canopy water amount" ;
        WETCANP:units = "m" ;
        WETCANP:stagger = " " ;
```

snowdflg = 1

```
float SNOWDPTH(y, x) ;
        SNOWDPTH:long_name = "Snow depth" ;
        SNOWDPTH:units = "m" ;
        SNOWDPTH:stagger = " " ;
```

stypflg = 1

```
int SOILTYP(nstyp, y, x) ;
        SOILTYP:long_name = "Soil type" ;
        SOILTYP:units = "index" ;
        SOILTYP:stagger = " " ;
```

Global attributes:

```
:Title = "ARPS 5.1 Soil data" ;
:History = "Created from ARPS NetCDF API at 2004-09-10_13:38:02.278 -05" ;
:FMTVER = "005.10 NetCDF 3.0 Soil Data" ;
:PACKED = 0 ;
:DX = 32000.f ;
:DY = 32000.f ;
:MAPPROJ = 2 ;
:SCLFCT = 1.f ;
:TRUELAT1 = 30.f ;
:TRUELAT2 = 60.f ;
:TRUELON = -100.f ;
:CTRLAT = 38.f ;
:CTRLON = -98.f ;
:ZPSOILFLG = 1 ;
:TSOILFLG = 1 ;
:QSOILFLG = 1 ;
:WCANPFLG = 1 ;
:SNOWDFLG = 1 ;
:STYPFLG = 1 ;
```

Part IV. ARPS surface characteristics data

Dimensions:

x : Size in west-east direction of the unstagered grid;
y : Size in north-south direction of the unstagered grid;
nstyp : Number of soil types for each grid point;

Variables:

stypflg = 1

```
int SOILTYP(nstyp, y, x) ;
        SOILTYP:long_name = "Soil type" ;
        SOILTYP:units = "index" ;
        SOILTYP:stagger = " " ;
float STYPFRCT(nstyp, y, x) ;
        STYPFRCT:long_name = "Soil type fractional coverage" ;
        STYPFRCT:units = "fraction" ;
        STYPFRCT:stagger = " " ;
```

vtypflg = 1

```
int VEGTYP(y, x) ;
        VEGTYP:long_name = "Vegetation type" ;
        VEGTYP:units = "index" ;
        VEGTYP:stagger = " " ;
```

laiflg = 1

```
float LAI(y, x) ;
        LAI:long_name = "Leaf Area Index" ;
        LAI:units = "index" ;
        LAI:stagger = " " ;
```

rfnsflg = 1

```
float ROUFNS(y, x) ;
        ROUFNS:long_name = "Surface roughness" ;
        ROUFNS:units = "0-1" ;
        ROUFNS:stagger = " " ;
```

vegflg = 1

```
float VEG(y, x) ;
        VEG:long_name = "Vegetation fraction" ;
        VEG:units = "fraction" ;
        VEG:stagger = " " ;
```

ndviflg = 1

```
float NDVI(y, x) ;
        NDVI:long_name = "Normalized differential vegetation index" ;
        NDVI:units = "index" ;
        NDVI:stagger = " " ;
```

Global attributes:

```
:Title = "ARPS 5.1 surface characteristics data (ARPSSFC)" ;
:History = "Created from ARPS NetCDF API at 2004-09-10_13:42:15.073 -05" ;
:FMTVER = "005.10 NetCDF 3.0 Surface Data" ;
:PACKED = 0 ;
:DX = 32000.f ;
:DY = 32000.f ;
:MAPPROJ = 2 ;
:SCLFCT = 1.f ;
:TRUELAT1 = 30.f ;
:TRUELAT2 = 60.f ;
:TRUELON = -100.f ;
```

```
:CTRLAT = 38.f ;
:CTRLON = -98.f ;
:STYPFLG = 1 ;
:VTYPFLG = 1 ;
:LAIFLG = 1 ;
:RFNSFLG = 1 ;
:VEGFLG = 1 ;
:NDVIFLG = 1 ;
```

Part V. ARPS external boundary data

Dimensions:

Time : Unlimited dimension, = 1, at present. We may add an option to write multiple time levels inside one file later;
x : Size in west-east direction of the unstagered grid;
y : Size in north-south direction of the unstagered grid;
z : Size in bottom-top direction of the unstagered grid;
x_stag: Size in X direction of the staggered grid which has one more point than *x*;
y_stag: Size in Y direction of the staggered grid which has one more point than *y*;
z_stag : Size in Z direction of the staggered grid which has one more point than *z*;
CtimeStrLen :Times is a character string in this file

Variables:

```
char CTIME(Time, CtimeStrLen) ;
        CTIME:long_name = "Data valid time" ;
        CTIME:units = "YYYYMMDD.HHMMSS" ;
        CTIME:stagger = " " ;
```

ubcflg = 1

```
float U(Time, z, y, x_stag) ;
        U:long_name = "U-velocity" ;
        U:units = "m/s" ;
        U:stagger = "X" ;
```

vbcflg = 1

```
float V(Time, z, y_stag, x) ;
        V:long_name = "V-velocity" ;
        V:units = "m/s" ;
        V:stagger = "Y" ;
```

wbcflg = 1

```
float W(Time, z_stag, y, x) ;
        W:long_name = "W-velocity" ;
        W:units = "m/s" ;
        W:stagger = "Z" ;
```

ptbcflg = 1

```
float PT(Time, z, y, x) ;
        PT:long_name = "Potential temperature" ;
        PT:units = "K" ;
        PT:stagger = " " ;
```

pbcflg = 1

```
float P(Time, z, y, x) ;
        P:long_name = "Pressure" ;
        P:units = "Pa" ;
        P:stagger = " " ;
```

qvbcflg = 1

```
float QV(Time, z, y, x) ;
        QV:long_name = "Water vapor specific humidity" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
```

qcbcflg = 1

```
float QC(Time, z, y, x) ;
        QV:long_name = "Cloud water mixing ratio" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
```

qrbcflg = 1

```
float QR(Time, z, y, x) ;
        QV:long_name = "Rain water mixing ratio" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
```

qibcflg = 1

```
float QI(Time, z, y, x) ;
        QV:long_name = "Ice water mixing ratio" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
```

qsbcflg = 1

```
float QS(Time, z, y, x) ;
        QV:long_name = "Snow water mixing ratio" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
```

qhbcflg = 1

```
float QH(Time, z, y, x) ;
        QV:long_name = "Hail mixing ratio" ;
        QV:units = "kg/kg" ;
        QV:stagger = " " ;
```

Global attributes:

```
:Title = "ARPS 5.1 surface characteristics data (ARPSSFC)" ;
:History = "Created from ARPS NetCDF API at 2004-09-10_13:42:15.073 -05" ;
:FMTVER = "005.10 NetCDF 3.0 Surface Data" ;
:PACKED = 0 ;
:DX = 32000.f ;
:DY = 32000.f ;
:MAPPROJ = 2 ;
:SCLFCT = 1.f ;
:TRUELAT1 = 30.f ;
:TRUELAT2 = 60.f ;
:TRUELON = -100.f ;
:STRHOPT = 2 ;
:MAPPROJ = 2 ;
:SCLFCT = 1.f ;
:TRUELAT1 = 30.f ;
:TRUELAT2 = 60.f ;
:TRUELON = -100.f ;
:CTRLAT = 38.f ;
:CTRLON = -98.f ;
:UBCFLG = 1 ;
:VBCFLG = 1 ;
:WBCFLG = 1 ;
:PTBCFLG = 1 ;
:PRBCFLG = 1 ;
:QVBCFLG = 1 ;
:QCBCFLG = 0 ;
:QRBCFLG = 0 ;
:QIBCFLG = 0 ;
:QSBCFLG = 0 ;
:QHBCFLG = 0 ;
```