nids2arps User's Guide

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Updated 9 Jan 2002

1. Introduction

The ARPS nids2arps program takes WSR-88D level-III base-data (raw velocity and reflectivity data, as distributed by the NIDS vendors) and remaps the data onto a sigma-z Cartesian grid, the type of grid used for the ARPS model. Valid radar data located in each ARPS scalar grid-volume is averaged to obtain the remapped fields. The velocity data are weighted by a function that decreases with increasing angular difference between azimuth to the center of the grid volume and the azimuth of the data. This helps preserve the radial velocities appropriate for the grid-volume location.

Each set of remapped data (typically one radar volume) is written as "columns" of data in a output file named:

Kxxx.yymmdd.hhmm

Where Kxxx is the radar name
yy is the 2-digit year
mm is the month
dd is the day of the month
hh is the hour of the day
mm is the minutes

The file is put into the directory specified by the environment variable, REMAP_DIR. If REMAP_DIR is undefined, the output file is written to the local directory. To define REMAP_DIR:

```
setenv REMAP_DIR /data/directory/
```

To save space, only non-missing points are written to the file. Each column is identified by its latitude and longitude on the earth so that it may be used in ARPS analyses which do not share the same grid as nids2arps.

nids2arps processes data from one radar at a time, as specified on the command line. The radar data to be read are specified by two list-files, one for reflectivity and one for velocity. Each file contains a list of the files to be combined in the remapping process (may include more than one volume, for example). The names of the files may vary

according to their source, but the list file allows you to separately build a list of the desired NIDS files.

The grid used for the nids2arps remapping is specified via parameters in the arps.input file. namelist blocks concerning grid and terrain specifications (blocks &terrain, &grid, &projection) are the only ones used by nids2arps. However, for modularity, the code calls a routine that reads in all namelist blocks, so it may be necessary to update arps.input if you recompile with a later version of the ARPS software.

If the data are to be used in an ARPS model run it is a good idea of to try to match the horizontal spacing of the remapping grid and the model grid. Generally, much less vertical stretching can be used in the radar grid than in the model runs, however. Try to make the grid stretching conform to the set of elevation angles in the scan strategy and the distance of the target area from the radar.

2. Using the nids2arps Software

The nids2arps program uses several subroutines from the general ARPS distribution. If you don't already have the ARPS distribution, copy the ARPS software from the CAPS anonymous ftp directory.

```
ftp ftp.caps.ou.edu
user anonymous
bin
cd pub/ARPS
get arps_current.tar.Z
quit

uncompress arps_current.tar.Z
tar xvf arps_current.tar
```

Edit dims.inc in the `include` directory to set desired grid dimensions.

Build the nids2arps executable:

```
makearps nids2arps
```

Edit the two list files, putting one filename per line. The reflectivity data files in one, velocity in another. See the sample files KINXref.list and KINXvel.list.

Run nids2arps

```
nids2arps KINX KINXref.list KINXvel.list < EOKrad.input
```

KINX is a radar name (here, Tulsa, OK)
KINXref.list is a file containing a list of reflectivity files
KINXvel.list is a file containing a list of velocity files

EOKrad.input is an "arps.input" file

The sample command above should work with the sample files included in the nids2arps.tar distribution.

3. Advanced Features

In addition to writing the file to a local directory, the file can be transmitted to another machine using the remote-copy command (rcp). To use this function, a number of envoronment variables must be set, as shown below:

```
setenv REMAP_USER user
setenv REMAP_HOST host.domain.ext
setenv REMAP_DEST /destination/directory
```

With this environent variable set, the program will copy data to the machine "host.domain.ext" and put the file in the directory "/destination/directory" using account "user".

4. Understanding the Diagnostic Output

First the program will print the ARPS input variables as read.

The program will notify the user about how it interpreted the the environment variables.

```
REMAP environment variables which specify file transfer
options not set.
Will assume no file transferring desired.

Evaluated dir name as ./  Length: 2
```

The program will confirm the values specified on the command line and indicate that it found the radar in its location table file (radarinfo.dat):

```
Radar name KINX
Reflectivity list file: KINXref.list
Radial veloc list file: KINXvel.list

Radar altitude (m): 228.000000
Radar latitude (degrees): 36.174721
Radar longitude (degrees): -95.564438
```

Some diagnositcs will be printed as the data are read, such as the azim every few radials.

Statistics about the about file will be printed last:

```
Reflectivity:    3564 good points
                 2459 rejected for coverage
                  140 rejected for variance

Velocity:        1144 good points
                 4260 rejected for coverage
                  761 rejected for variance
Fortran I/O unit  39 picked from the free list.
Fortran I/O unit  39 returned to the free list.


Output statistics for time 970502 06:01
There were    549 columns written
of a total   4489 possible.

Filename for this volume: ./KINX.970502.0602
```

Where:

"rejected for coverage" means there was either no non-missing data located in each of those grid volumes or there were a large number of missing data compared to valid data -- this prevents a couple of data points on the fringe of a grid volume from creating a potentially biased output value there.

"rejected for variance" means the data that went into the averaging process for those grid volumes had a large variance, so the average was judged to be invalid.

There are parameters in the source code that can be modified to "tune" the variance threshold, etc.

A "column" is a psuedo-sounding of averaged radar data. The total number of possible volumes is related to the grid size, nx-times-ny. A column is only written if there is one or more good averages in it.

5. Performance Note

The program calculates a look-up table of based on expected radar elevation angles. This is done for compatibility with the real-time level-II data remapper. In the case of that remapper this set saves CPU time over the long-term, but for nids2arps, this step may be speeded sped-up by reducing the number of pre-calculated elevation angle to those that are to be included in the level-II datastream. Future versions might include an option to read-in the lookup table rather than calculate each time.

6. Plotting the Output

Included in the nids2arps.tar file is a program to plot the remapped radar data. The program, as distributed, requires NCARgraphics libraries to do the plotting, but, with some modification to the source-code could be adapted to any other graphic plotting package that has utilities for plotting lines and characters. The program is called pltradcol.

Make the executable:

```
makearps pltradcol
```

Run the executable:

```
pltradcol
```