Description of NEXRAD Extraction IDL Script

Purpose

This script is intended to create a sequence of ARC-ASCII files containing NEXRAD radar accumulation scans in a format suitable for ingestion by the tRIBS Distributed Hydrological Model. **Note:** The data is given in mm/hr in hourly intervals. As a result, tRIBS should be run with RAINSOURCE option equal to 2.

The *National Weather Service -NHDS - NOAA HYDROLOGIC DATA SYSTEMS GROUP* provides the raw data used by the script. The website to obtain the raw data is:

http://dipper.nws.noaa.gov/hdsb/data/nexrad/nexrad.html

The data is divided according to the River Forecast Center (RFC, Figure 1) where the basin of interest lies in. In addition, there are several products available over different periods. These products are called Stage I, Stage III and MPE. The user should familiarize themselves with the various products by consulting the NWS webpage and available literature.

Figure 1. River Forecasting Center (RFC) in the United States for distribution of NEXRAD data sets.

The output sequence from the script is labeled *pMMDDYYYYHHmm.txt*, where *MM* is the month, *DD* is the day, *YYYY* is the year, *HH* is the hour and *mm* is the minute corresponding to this scan. This corresponds to the tRIBS radar format.

The script has a dual purpose. First, it decompresses the raw data obtained from the NHDC-NOAA website and then it reads the files and produces a series of ARC-ASCII files for a specific region and a specific period of time.

Usage

The *extract_nexrad.pro* script resides on the IDL routines library on the NMT cluster (riogrande.nmt.edu). It is also available for distribution through the tRIBS website. Other users who do not have access to the NMT cluster, can run this script in IDL and make the appropriate modifications to the pathnames. **Note:** This script can only be executed if accessing the cluster from a Linux machine or an X-enabled client.

Before using the script, all the necessary raw datasets from the website need to be downloaded. The script requires that the raw data be organized hierarchically in the following structure:

/River Forecast Center/Product Type/YYYY-MM/

Go to the */model-out/rawData/hourlyNexradData/* directory on the cluster and determine if the data that you need has already been acquired. If not, please go to the Acquiring and Organizing Raw Data section of this document before continuing.

Currently, there are two products ready to be used:

For the Colorado Basin River Forecast Center:

CBRFC/stageIII/1996-09/ to CBRFC/stageIII/2002-03/
CBRFC/mped/2002-02/ to CBRFC/mped/2005-09/

For the West Gulf River Forecast Center:

WGRFC/stageIII/2003-09/
WGRFC/mped/2004-01/ to WGRFC/mped/2005-09/

If the region and time period of interest are contained in this dataset, execute in the shell the command:

```
# idl
```

This will open an IDL session where you can execute the script:

IDL> *extract_nexrad, "/input/directory/", "/output/directory/", timeWildCard , [minX, maxX, minY, maxY], utmZone, timeZone, decompress=0*

The parameters required by the script are the following:

- *"/input/directory/":* A string with the location of the directory where data resides.
- *"/output/directory/":* A string with the name of the directory where the sequence of files should be written.
- *timeWildCard*: A regex string describing the directories (e.g. time periods) to read. For example, the string '200*-07' indicates to the script to read all of the Julys from 2000 to 2009, while '2000-0[4567]' indicates to read the directories 2000-04, 2000-05, 2000-06 and 2000-07. To learn more about regex codes, visit http://www.dreambank.net/regex.html#tutorial.
- *[minX, maxX, minY, maxY]:* An array with the bounding box limits in UTM coordinates.
- *utmZone*: The UTM zone for the output (must be consistent with bounding box).
- *timeZone*: The local time zone. By default Nexrad data is distributed in GMT.
- *decompress=0*: A keyword indicating if data must be decompressed before reading (see Acquiring and Organizing Raw Data section).

For example,e the following command will extract NEXRAD fields for a region containing the Mogollon Creek basin for the period July 1999 to September 1999 to the */tmp/outputRain/* directory:

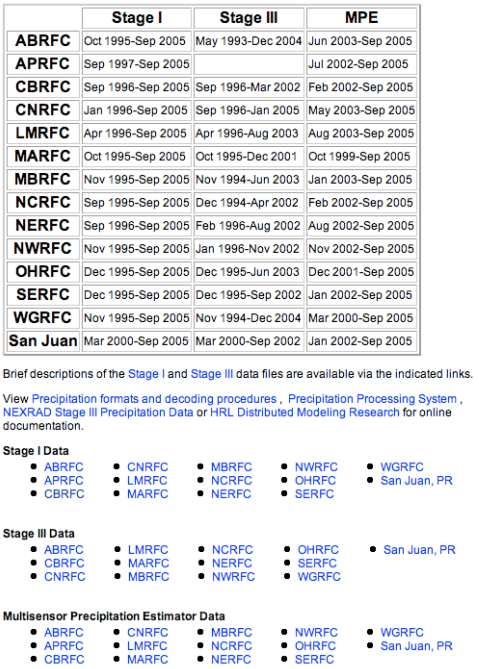
IDL> *extract_nexrad, '/model-out/rawData/hourlyNexradData/CBRFC/stageIII/', '/tmp/outputRain/', '1999-0[789]', [595887.5, 3592657, 871943.5, 3818251.0], 12, -6, decompress=0*

Acquiring and Organizing Raw Data

If this is the first time that the desired dataset will be used, the user will need to go to the NWS-NHDS website:

http://dipper.nws.noaa.gov/hdsb/data/nexrad/nexrad.html

to obtain the appropriate dataset. A table describing the time extent of the products is available on the website and shown in Figure 2 for illustration.



	Stage I	Stage III	MPE
ABRFC	Oct 1995-Sep 2005	May 1993-Dec 2004	Jun 2003-Sep 2005
APRFC	Sep 1997-Sep 2005		Jul 2002-Sep 2005
CBRFC	Sep 1996-Sep 2005	Sep 1996-Mar 2002	Feb 2002-Sep 2005
CNRFC	Jan 1996-Sep 2005	Sep 1996-Jan 2005	May 2003-Sep 2005
LMRFC	Apr 1996-Sep 2005	Apr 1996-Aug 2003	Aug 2003-Sep 2005
MARFC	Oct 1995-Sep 2005	Oct 1995-Dec 2001	Oct 1999-Sep 2005
MBRFC	Nov 1995-Sep 2005	Nov 1994-Jun 2003	Jan 2003-Sep 2005
NCRFC	Sep 1995-Sep 2005	Dec 1994-Apr 2002	Feb 2002-Sep 2005
NERFC	Sep 1996-Sep 2005	Feb 1996-Aug 2002	Aug 2002-Sep 2005
NWRFC	Nov 1995-Sep 2005	Jan 1996-Nov 2002	Nov 2002-Sep 2005
OHRFC	Dec 1995-Sep 2005	Dec 1995-Jun 2003	Dec 2001-Sep 2005
SERFC	Dec 1995-Sep 2005	Dec 1995-Sep 2002	Jan 2002-Sep 2005
WGRFC	Nov 1995-Sep 2005	Nov 1994-Dec 2004	Mar 2000-Sep 2005
San Juan	Mar 2000-Sep 2005	Mar 2000-Sep 2002	Jan 2002-Sep 2005

Brief descriptions of the Stage I and Stage III data files are available via the indicated links.

View Precipitation formats and decoding procedures , Precipitation Processing System , NEXRAD Stage III Precipitation Data or HRL Distributed Modeling Research for online documentation.

Stage I Data

ABRFC · APRFC · CBRFC · CNRFC · LMRFC · MARFC · MBRFC · NCRFC · NERFC · NWRFC · OHRFC · SERFC · WGRFC · San Juan, PR

Stage III Data

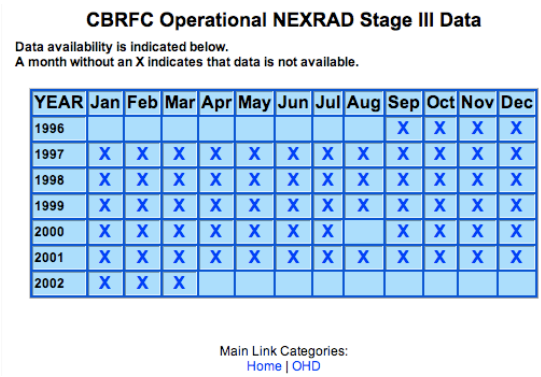
ABRFC · CBRFC · CNRFC · LMRFC · MARFC · MBRFC · NCRFC · NERFC · NWRFC · OHRFC · SERFC · WGRFC · San Juan, PR

Multisensor Precipitation Estimator Data

ABRFC · APRFC · CBRFC · CNRFC · LMRFC · MARFC · MBRFC · NCRFC · NERFC · NWRFC · OHRFC · SERFC · WGRFC · San Juan, PR

Figure 2. NEXRAD data availability for different products (Stage I, Stage III and MPE) and time periods.

By clicking on the link corresponding to one of the River Forecast Center, the user will encounter a new table, similar to the one shown in Figure 3.



CBRFC Operational NEXRAD Stage III Data

Data availability is indicated below.
A month without an X indicates that data is not available.

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996									X	X	X	X
1997	X	X	X	X	X	X	X	X	X	X	X	X
1998	X	X	X	X	X	X	X	X	X	X	X	X
1999	X	X	X	X	X	X	X	X	X	X	X	X
2000	X	X	X	X	X	X	X		X	X	X	X
2001	X	X	X	X	X	X	X	X	X	X	X	X
2002	X	X	X									

Main Link Categories:
Home | OHD

Figure 3. NEXRAD data availability for a particular RFC.

Before downloading the data, prepare the directory structure to accommodate it: (1) Create a directory named after the RFC (e.g. CBRFC). If the directory exists, *cd* into it; (2) Create a directory with the product name (e.g. stageIII, mpe), and *cd* into it; (3) Create one directory for each year-month combination to be acquired.

Download each file (by clicking on the X) to the corresponding year-month directory. When completing this operation, run the *extract_nexrad* script using the option decompress=1 and the appropriate parameter values (see section Usage).