

4. Utilities

4.1 Productx

The **productx** utility, or “product examiner,” displays the information contained in a specified product file.

For all product types, **productx** displays the product header, including information such as the site where the ingest data came from, the date and time when the ingest data was gathered, and its size.

For the following types of products, **productx** also displays product-specific data:

- RAW
- SLINE
- STAT
- TDWR
- TRACK
- VVP
- WARN
- WIND

Productx does not display the data portion of most pixel based products.

4.1.1 Invoking Productx

Command

productx *filename*

filename is the name of a product file stored in **/usr/iris_data/product**. Raw products are stored in a separate directory — **/usr/iris_data/product_raw**.

Each product file has a unique name based on the site ID, date, and a randomize algorithm. The first three letters of the file extension state the kind of product stored in the file:

Abbreviation	Product Type	Abbreviation	Product Type
BEA	BEAM product	SLI	SLINE product
CAP	CAPPI product	STA	STAT product
FCA	FCAST product	TDW	TDWR product
IMG	IMAGE product	TOP	TOPS product
MAX	MAX product	TRA	TRACK product
OTH	OTHER product	TXT	TEXT product
PPI	PPI product	USE	USER product
RAW	RAW product	VUS	VUSER product
RN1	RAIN1 product	VIL	VIL product
RNN	RAINN product	VVP	VVP product
RHI	RHI product	WND	WIND product
RTI	RTI product	WRN	WARN product
SHE	Shear product	XSE	XSECT product

4.1.2 Productx Examples

A Status product shows the status of the IRIS processes at a particular site:

```
$ productx HOT000602152122.STAZ0GN
```

```
----- Product Summary for HOT000602152122.STAZ0GN -----
Ingest site name      : 'SIGMET, HOT', Version: 7.17
Ingest hardware name: 'SIGMET, HOT'
Product site name     : 'SIGMET, HOT', Version: 7.17
File size: 2340 bytes (Disk space: 2340 bytes)
Product type is: Status
PCO name: SIGMET, HOT
PRF: 0Hz, Wavelength: 0.00cm, Nyquist: 0.00m/s(V), 0.00m/s(W)
Polarization: Horizontal
Radar Height: 600 meters, Ground Height: 100 meters MSL

Size is: 0x0x0 pixels
Center Location: 42°33.0'N, 71°25.8'W, ref: 600 meters
Projection type is: Azimuthal Equidistant
Projection Reference Point: 42°33.0'N, 71°25.8'W
Radar position is: 0.0, 0.0 pixels
Scale is: 0.000 x 0.000 x 0.000 km/pixel
Product data type is Xhdr (0)
Maximum range: 0.0 km
      Ingest time: 15:21:22  2 JUN 2000
Volume scan time: 15:21:22  2 JUN 2000

Site style is: RADAR
Overall status is: FAULT
Status of IRIS_INGEST  ON/IDLE
Status of IRIS_INGFIO  ON/NA
Status of IRIS_RTDISP  OFF/STOPPED
Status of IRIS_OUTPUT  ON/NA
```

```
Status of IRIS_PRODUCT  ON/IDLE
Status of IRIS_WATCHDOG ON/RUNNING
Status of IRIS_REINGEST  ON/IDLE
Status of IRIS_NETWORK  ON/IDLE
Status of IRIS_NORDRAD   OFF/STOPPED
Status of IRIS_SERVER    ON/IDLE
Status of IRIS_RIBBON    OFF/STOPPED
```

```
RST mode: 'DEFAULT'
TSC mode: 'DEFAULT'
PSC mode: 'DEFAULT'
POM mode: 'DEFAULT'
Active task: ''
Active product: ''
```

```
Antenna Position, azimuth: 20.00, elevation: -0.99
Bite fault summary shows 2
Low Airflow: OK
  Interlock: OK
  Waveguide: OK
```

```
Top message #9,  Repeats: 1
Problem starting scan at EL=6 (AZ velocity out of range)
Process: IRIS_INGEST, Name: F:202 M:3
Time: 16:34:36 30 MAY 2000
```

A PPI product shows useful header information:

\$ productx XXX990211174922.PPICHG6

```
----- Product Summary for XXX990211174922.PPICHG6 -----
Ingest site name      : 'KL Radar', Version: 6.12
Ingest hardware name: ''
Product site name     : 'SIGMET, cyclone', Version: 7.11
File size: 519040 bytes (Disk space: 519040 bytes)
Product type is: PPI
PCO name: SLINE
PRF: 1000Hz, Wavelength: 10.43cm, Nyquist: 26.08m/s(V), 26.08m/s(W)
Polarization: Horizontal
Radar Height: 117 meters, Ground Height: 100 meters MSL
```

```
Size is: 720x720x0 pixels
Center Location:  2°50.8'N, 101°40.3'E, ref: 117 meters
Projection type is: Azimuthal Equidistant
Projection Reference Point:  2°50.8'N, 101°40.3'E
Radar position is: 360.0, 360.0 pixels
Scale is: 0.208 x 0.208 x 0.000 km/pixel
Product data type is V (3)
Maximum range: 75.0 km
PPI elevation angle: 1.00 degrees
  Ingest time: 17:49:22 11 FEB 1999
Volume scan time: 17:49:12 11 FEB 1999
```

PRODUCTX does not display data from this type of product.

4.2 Rays

The **rays** utility gives information about ingest files. You can choose to display information about various parameters of the ingest data.

4.2.1 Invoking Rays

Command

```
rays [options] filename
```

filename is the name of an ingest header file stored in the directory **/usr/iris_data/ingest**. Ingest files are named for the date and time when the data were gathered. For example, ingest data gathered at 10:17:30 on December 2, 1994 would be stored in a file named **941202101730**.

Options

-help	Prints the list of options.
-data:dtype	Specify which data type to display.
[-if:]filename	Specify which ingest header file to read.
-inter	Run in interactive mode. This is the old style, rays will then prompt for some of the options.
-perf	Performance test, display ray headers only.
-range:#	Specify starting range in km.
-sweep:#	Specify sweep number, origin 1.
-terse	Skip showing ingest header info.
-width:#	Specify maximum line width for data display.

To make it easier to enter the names of the ingest files, change your default directory to the ingest directory and get a listing of all the header files (with "ls *."). Then select the name of a file with the mouse and paste it into the command line.

4.2.2 Rays Examples

4.2.2.1 Headers only Example

In the following example, **rays** uses the **-perf** option to display the ray header information only. This format lets you evaluate the speed of IRIS or the signal processor and look for missing rays. Note that there are two azimuth and elevation angles recorded with each ray. These are angles at the beginning and ending of each ray.

```
$ rays -perf -terse DRY020418160516. | more
Reading file: /usr/iris_data/ingest/DRY020418160516.01dBT
# 0 Az: 359.80, 0.99 El: 0.48, 0.48 Size: 967 16:05:33
# 1 Missing

# 2 Az: 0.99, 2.20 El: 0.48, 0.48 Size: 967 16:05:33
# 3 Az: 2.20, 3.38 El: 0.48, 0.48 Size: 967 16:05:33
# 4 Az: 3.38, 4.59 El: 0.48, 0.48 Size: 967 16:05:33
# 5 Az: 4.59, 5.78 El: 0.48, 0.48 Size: 967 16:05:34
# 6 Az: 5.78, 6.99 El: 0.48, 0.48 Size: 967 16:05:34
# 7 Missing

# 8 Az: 6.99, 8.17 El: 0.48, 0.48 Size: 967 16:05:34
# 9 Az: 9.38, 9.38 El: 0.48, 0.48 Size: 967 16:05:34
# 10 Az: 9.38, 10.57 El: 0.48, 0.48 Size: 967 16:05:34
# 11 Az: 10.57, 11.78 El: 0.48, 0.48 Size: 967 16:05:34
# 12 Az: 11.78, 12.96 El: 0.48, 0.48 Size: 967 16:05:34
# 13 Missing

# 14 Az: 14.17, 14.17 El: 0.48, 0.48 Size: 967 16:05:34
# 15 Az: 14.17, 15.36 El: 0.48, 0.48 Size: 967 16:05:34
# 16 Az: 15.36, 16.57 El: 0.48, 0.48 Size: 967 16:05:34
# 17 Az: 16.57, 17.75 El: 0.48, 0.48 Size: 967 16:05:34
# 18 Az: 17.75, 18.96 El: 0.48, 0.48 Size: 967 16:05:34
# 19 Az: 18.96, 18.96 El: 0.48, 0.48 Size: 967 16:05:34
# 20 Az: 18.96, 20.15 El: 0.48, 0.48 Size: 967 16:05:34
# 21 Az: 20.15, 21.36 El: 0.48, 0.48 Size: 967 16:05:34
# 22 Az: 21.36, 22.54 El: 0.48, 0.48 Size: 967 16:05:34
# 23 Az: 22.54, 23.75 El: 0.48, 0.48 Size: 967 16:05:34
# 24 Az: 23.75, 24.94 El: 0.48, 0.48 Size: 967 16:05:34
```

4.2.2.2 Velocity Example

You can choose any of the data parameters — V in this example — and rays then displays the header, followed by range bins starting from the specified bin.

```
$ rays -data:v DRY020418160516. | more
Task Summary for: DRY020418160516.
Site name: 'SIGMET, dry'
Task name: 'DEFAULT' Scan: PPI Full Speed: 24.00 deg/sec
Description: 'Default'
Location: 43° 0.0'N 70° 0.0'W
Time: 16:05:16 18 APR 2002 300 min. west of UTC
Altitude: 250 meters, Melting height: 2000 meters
Flags: spt, spv, 3lag, ship, unfold, fall, block, attn
PRF: 500Hz, PulseWidth: 2.00 usec (0)
BeamWidth: 1.00/1.00 deg.
LOG-Noise: 0.0000, Lin-Noise: 0.0000, I-Off: 0.0000, Q-Off: 0.0000
SOPRM Flags: 0x0000, LOG Slope: 0.000, Z-Cal: 0.00dBZ, H/V: 0.00 dB
Filters: Dop:0, Log:3; Processing Mode: PPP, Samples: 32
Zdr Threshold: LOG GDR = 0.00 dB, XDR = 0.00 dB
T Threshold: LOG LOG = 0.8 dB
Z Threshold: LOG & CSR SIG = 5.0 dB
V Threshold: SQI & CSR CSR = 18.0 dB
W Threshold: SQI & CSR SQI = 0.40
```

```

Available moments are: Xhdr dBT dBZ V W
Starting range 0.000 km, range bin spacing 300 meters
There are 13 sweeps, each having 360 rays and 967 bins
Angle list: 0.5 1.0 2.0 3.0 4.0 5.5 7.0 8.5 10.0 12.5 15.0 20.0 30.0

Reading file: /usr/iris_data/ingest/DRY020418160516.01V
Starting at range 0.00 km (bin 1), bin step: 0.30 km
# 0 Az: 359.80, 0.99 El: 0.48, 0.48 Size: 967 16:05:33
  1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0 -0.0 -0.1 -0.2

# 1 Missing

# 2 Az: 0.99, 2.20 El: 0.48, 0.48 Size: 967 16:05:33
  1.1 1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0 -0.0 -0.1

# 3 Az: 2.20, 3.38 El: 0.48, 0.48 Size: 967 16:05:33
  1.2 1.1 1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0 0.0

# 4 Az: 3.38, 4.59 El: 0.48, 0.48 Size: 967 16:05:33
  1.3 1.2 1.1 1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.3 0.2 0.1

# 5 Az: 4.59, 5.78 El: 0.48, 0.48 Size: 967 16:05:34
  1.4 1.3 1.2 1.1 --. --. 0.8 0.7 0.6 0.6 0.5 0.4 0.3 0.2

# 6 Az: 5.78, 6.99 El: 0.48, 0.48 Size: 967 16:05:34
  1.5 1.4 1.3 1.2 1.1 --. 0.9 0.8 0.8 0.7 0.6 0.5 0.4 0.3

# 7 Missing

# 8 Az: 6.99, 8.17 El: 0.48, 0.48 Size: 967 16:05:34
  1.6 1.5 1.4 1.3 1.2 1.1 1.0 1.0 --. 0.8 0.7 0.6 0.5 0.4

```

Where no data is available for a ray, it displays “Missing.” When no data is available for a range bin within the ray, it displays a series of dashes.

4.2.2.3 Extended Header Example

On shipboard systems, additional housekeeping information can be stored for each ray in what is called an “extended header”. If your ingest file has this, you can display it with the option “-data:xhdr”. Notice that the extended header includes time recorded to the nearest millisecond.

```

$ rays -data:xhdr -terse -if:DRY020418160516. | more
Reading file: /usr/iris_data/ingest/DRY020418041055.01Xhdr
Starting at range 0.00 km (bin 1), bin step: 0.30 km
# 0 Az: 359.80, 0.55 El: 0.42, 0.42 Size: 1 4:11:08.055
  Az: 350.95 El: 0.40 Pitch: -0.13 Roll: -1.10 Head: 346.79
  Vel: 18.72 deg/s 0.04 0.70 359.82 359.82
    Tr: 2.29 El_or: 0.31 Lat: 1$45.5'N
Long:138$ 2.8'E Alt: 14
  Cor: 3.59 Age: 291 Vel: 3.69 m/s 0.00 -0.17

```

Here are details, see also the `extended_header_v1` structure in the *IRIS Programmer's Manual*.

```

  Az: 350.95 El: 0.40 Pitch: -0.13 Roll: -1.10 Head: 346.79
  Vel: 18.72 deg/s 0.04 0.70 359.82 359.82

```

This shows the azimuth and elevation of the antenna, as well as the pitch, roll, and heading of the platform. Also shown are the derivatives of those five numbers in degrees/second. The extended header information is recorded from a serial data stream transmitted from the RCP. Typically this is configured to transmit updates at the maximum possible speed of about 20 times per second. Because rays can be recorded at up to 40 rays per second, and because of pipeline delays in the serial data, it is possible for the extended header azimuth to lag the actual azimuth by up to several degrees. Normally the platform motion period is far slower.

```

                Tr:      2.29   El_or:      0.31      Lat:   1845.5'N
Long:1388      2.8'E      Alt:              14
Cor:   3.59   Age:    291   Vel:      3.69 m/s      0.00      -0.17

```

“Tr” is the training angle, which is the pedestal relative azimuth of the pedestal. Similarly “El_or” is the pedestal relative elevation angle. “Cor” is the velocity correction in meters/second applied to the velocity data to correct for platform motion. “Age” is the time in milliseconds since this update arrived from the RCP. Finally the position and motion of the platform is recorded. Altitude is in meters, and motions are in meters/second.