

# A. Glossary of Terms and Abbreviations

## AGC

Abbreviation for Automatic Gain Control. This is a feature in which the gain of the linear channel video signals is adjusted based on an estimate of what the signal level will be. For example using the average power of the last few pulses at that range.

## Archive menu

IRIS menu for controlling the recording of product output files to archive media and retrieving them from archive media. The media can be either tape or MO disk.

## Associated TASK

The TASK that is associated with a product generation. The associated TASK is assigned in the Product Configuration menu. For example, a PPI product requires an associated TASK that uses the PPI scan mode (Full or Sector).

## BEAM product

Abbreviation for a cartesian product similar to the Cross Section perpendicular to the radar which displays data at a fixed range (or averaged over a range interval) on an azimuth vs. elevation grid. This is useful for testing the antenna beam pattern when used with a reference transmitter.

## CAPPI product

Abbreviation for constant altitude plan position indicator. A CAPPI product is a horizontal slice through the atmosphere at a given height. The positioning and orientation of the cross section is arbitrary.

## COMP product

This is the composite product. It compines a group of CAPPI, VIL, PPI, or TOPS products from different radars together into one larger image.

## dBZ or Z and dBT or T

$10 \times \text{LOG}$  (Base 10) of the equivalent radar reflectivity factor in units of  $\text{mm}^6 \text{m}^{-3}$ . *See also* Reflectivity. In IRIS, Z or dBZ is used to denote that this is corrected by the signal processor for ground clutter. T or dBT are used to denote the reflectivity without clutter correction.

## dBZc

$10 \times \text{LOG}$  (Base 10) of the equivalent radar reflectivity factor in units of  $\text{mm}^6 \text{m}^{-3}$ . *See also* Reflectivity. This is the same as dBZ but with additional corrections performed by IRIS such as attenuation and beam blockage. These are selected in the TASK Configuration Menu.

### **Doppler velocity spectrum (or Doppler spectrum)**

The spectrum of the power returned as a function of the Doppler velocity (towards or away from the radar). The mean of the Doppler velocity spectrum is the mean velocity computed by the signal processor. The standard deviation of the Doppler spectrum is the spectrum width (in m/s)

### **Doppler mean velocity (*see* Velocity)**

### **Doppler spectrum width (*see also* Doppler velocity spectrum)**

The standard deviation of the Doppler spectrum in m/s. The spectrum width is a measure of the shear and turbulence in the radar pulse volume at a given range.

### **Hybrid Task**

A group of up to three tasks with the same scan type which are scheduled together and used together to make products. This allows considerable flexibility of volume scanning schemes.

### **Ingest file**

A disk file of raw polar coordinate data that is collected during the execution of a TASK. Ingest files are used for subsequent product generation. (*see also* RAW product).

### **Ingest Summary menu**

Shows the current ingest files that are on disk. Allows files to be tagged for keeping so they are not deleted by the Watchdog process when more disk space is needed. Files can also be tagged for deletion.

### **INU**

Abbreviation for Inertial Navigation Unit. This is required on a shipboard system to accurately report the radar's position and orientation.

### **IRIS**

Abbreviation for SIGMET's Interactive Radar Information System.

### **IRIS menu bar**

The first menu that appears on the screen after starting up IRIS. The IRIS menu bar provides access to all of the IRIS menus and is used to exit the menus and return to the operating system prompt.

### **KDP or Specific Differential Phase (*see also* PhiDP)**

This is the range derivative of the differential phase (PhiDP) expressed in degrees per km. It is nearly linearly proportional to the rainfall rate.

### **Manual scan**

This is an IRIS task scan mode in which data is recorded while the antenna is controlled manually or via a separate program. Feedback is provided by the real time display.

### **MAX product**

Shows the horizontal projection and the E-W and N-S vertical projections (in display side panels) of the maximum reflectivity in a user defined layer.

### **NDOP product**

Dual-Doppler velocity product. Combines the velocity measurements from two or three radars together to get the actual wind direction and speed.

### **PhiDP or Differential Phase (*see also* KDP)**

This is the phase difference between the HH and VV (co-polarized) channels of a polarization radar. It is calculated by taking the argument of the covariance of these two channels. The differential phase increases with range more rapidly in regions of heavy rain.

### **PhiH or PHIV**

The average phase difference between the co- and cross-polar channels for a dual channel polarization radar operating in fixed or switching mode. Primarily of research interest. The H and V notation indicates the transmit polarization.

### **PP02 (Pulse Pair Processor)**

The PP02 Pulse Pair Processor is eight times faster than the RVP5. It is preferred for wind shear applications where high-speed, high-resolution sampling is required.

### **PPI product**

Abbreviation for plan position indicator. This is the classic radar scan geometry where the elevation angle is held constant and the antenna is scanned in azimuth. The resulting display is a two-dimensional image (looking down) at a constant elevation angle.

### **PPI Full**

An IRIS scan geometry during which the antenna scans continuously in PPI mode without stopping between elevation angles.

### **PPI Sector**

An IRIS scan geometry where the radar scans in PPI mode between two azimuths.

## **PRF**

Abbreviation for pulse repetition frequency.

## **Product**

Products are calculated from ingest files that are collected during the execution of a TASK. Products may be pictures, data or text. Examples of products are PPI and RHI.

## **Product Configuration menu**

Menu for configuring the parameters required for product generation. For example, a PPI product configuration requires the user to specify the data parameter, elevation angle, maximum range, output display levels, and the associated TASK.

## **Product Output menu**

Menu for requesting that a product be sent to an output device. Typically, the output device is a color display, but it may also be a printer or a tape drive (for recording).

## **Product Scheduler menu**

Menu to schedule which products are generated the next time the associated TASK runs.

## **Protected areas**

Regions around the radar (such as runway locations) for which special alerts are required based on detected radar data.

## **PRT**

Abbreviation for pulse repetition time.

## **RAW product**

Spherical coordinate data product obtained directly from the raw ingest data. The data are stored in compressed format so they can be recorded on tape or sent to a workstation for further processing.

## **Radar Status menu**

IRIS operator menu to monitor and control the IRIS hardware and software systems.

## **Rainfall Rate or R**

The rate of accumulation of precipitation in units of mm/hour. In the case of snow this is usually referring to the liquid equivalent.

## Real time display

Denotes the image that is created for each scan of the radar. Sometimes this term is used to refer to the software process that creates these images.

## Reflectivity (*see also* dBZ)

Most properly this is the equivalent radar reflectivity factor abbreviated as Z and usually expressed in units of  $\text{mm}^6$  per  $\text{m}^{-3}$ . For example, a rainfall density of (on average) a single 1 mm diameter drop per cubic meter of air would have an equivalent radar reflectivity factor of  $1 \text{ mm}^6 \text{ m}^{-3}$ . Usually, Z is expressed in dB units (dBZ) by taking  $10 \cdot \text{LOG}$  (base 10). For example:

Z	dBZ
0.1	-10
1	0
10	10
100	20
1000	30

## RHI product

Abbreviation for range height indicator. This is a classic radar scan geometry used in IRIS where the azimuth is held constant and the antenna is scanned in elevation. The resulting picture is a two-dimensional vertical slice through the atmosphere.

## RhoHV

The magnitude of the correlation between the HH and VV channels of a dual polarization radar operating in STAR mode or switching mode. It is in the range [0,1]. Rain will have values typically  $>0.98$ . Wet tumbling hail will have smaller values. Therefore it is useful in helping to identify the particle type.

## RhoH or RhoV

The magnitude of the correlation between the co-and cross-polarized channels in a dual channel receiver polarization radar operating in fixed or alternating H and V transmit mode. Primarily of research interest.

## RVP6 (Radar Video Processor)

The RVP6 is a floating-point programmable signal processor which can be expanded with additional processing cards. It uses 12-bit A/D converters on the I, Q, and Log video signals, and can be programmed to perform virtually any radar signal processing task.

## **RVP7**

The RVP7 is a floating-point programmable signal processor which directly samples the IF signal from a radar. This bypasses the need for many of the traditional video frequency components.

## **SHEAR product**

Product used for identifying microburst, gust fronts, cold fronts and atmospheric waves. It calculates the radial wind shear in the radial direction and is sensitive to atmospheric convergence and divergence.

## **SLINE product**

Short for “Shearline”. Product used for identifying a front and fitting a line to it. It looks for elongated regions of high shear and connects them to make a line.

## **Signal processor**

*Also* Doppler signal processor. A dedicated programmable device for digitizing and processing the video signals from the radar receiver. For IRIS, Models RVP6 or RVP7 (manufactured by SIGMET, Inc.) may be used.

## **SQI or Signal Quality Index**

The autocorrelation of the received signal at lag 1 divided by lag zero. This is a number in the range [0,1] where 1 is the perfect Doppler point target and 0 is white noise. Typically used for thresholding velocity and width at a level of ~0.3–0.4.

## **TASK**

*Also* radar TASK. A set of instructions to the radar and signal processing systems including, but not limited to, the scan type (PPI or RHI), PRF, pulse width, signal processing data types, time and range averaging criteria. For example, a PPI volume scan at multiple elevation angles or an RHI at a single azimuth.

## **TASK Configuration menu**

IRIS menu for configuring all of the antenna scanning, radar control and signal processing parameters required to specify a TASK.

## **TASK Scheduler menu**

IRIS menu for scheduling which TASKS should run and when. This menu is also used for controlling the real time display, its associated products and the RAW data product.

## **TOPS product**

PPI format display of the height of a selectable dBZ echo contour. The heights are color coded.

## **TRACK product**

An interactive tracking product that is made in the Quick Look menu. The operator tags echo features with the mouse. IRIS then inserts points into a track and extends the track to show the forecast echo motion for a selectable time.

## **Velocity (V, Doppler velocity, mean velocity, radial velocity)**

The average radial speed of motion (towards or away from the radar) of the scatterers in the radar pulse volume at a particular range.

## **Vc**

Same as velocity or V except corrected by IRIS for the effects of folding. Note that dual PRF velocity unfolding performed by the processor is stored simply as V rather than Vc. Vc is used primarily for dual Doppler wind field computation which requires unfolded velocities.

## **VVP product**

The velocity volume product calculates the vertical profile of the mean wind speed, direction, divergence and deformation. The algorithm assumes a linearly varying wind field and performs a least squares fit over a large volume surrounding the radar.

## **VIL product**

The vertically integrated liquid product allows the operator to specify a layer in the atmosphere, and integrates the total liquid contained within the layer. The point estimates of the liquid are based on a user-defined Z-W relationship.

## **WARN product**

The WARN product looks at other products to determine if significant weather is present. The operator can define the warning criteria and thresholds. The locations (centroids) of weather features are also calculated.

## **Width (W, spectrum width)**

The standard deviation of the Doppler spectrum displayed in m/s. Large width values indicate high turbulence and/or shear in the pulse volume. It is difficult to measure the spectrum width when the spectrum width is more than 1/3 of the total Nyquist interval because of uncertainty in the estimator for broad spectra.

## **WIND product**

Uses the velocity volume algorithm to calculate a 2-D horizontal profile of the horizontal wind speed and direction. The algorithm assumes zero vertical velocity and a fixed wind field over a sub-region of the area covered by the radar.

### **XSECT product**

A vertical slice through a volume scan. The product is similar to an RHI except that it is constructed from PPI data collected at multiple elevation angles.

### **Z or Zc (see dBZ or dBZc or reflectivity)**

### **ZDR**

Abbreviation for differential reflectivity. Expressed in dB, this is the ratio of the powers of the horizontal / vertical receiver channels of a dual polarization radar. Typically it is in the range of 0 to 6 dB.



### **IRIS Month Abbreviations**

January	Jan
February	Feb
March	Mar
April	Apr
May	May
June	Jun
July	Jul
August	Aug
September	Sep
October	Oct
November	Nov
December	Dec

### **IRIS Data Parameter Abbreviations: Standard Systems**

dB <sub>T</sub> or T	Uncorrected Reflectivity
dB <sub>Z</sub> or Z	Clutter Corrected Reflectivity
dB <sub>Z</sub> c or Z <sub>c</sub>	Reflectivity with corrections for attenuation, occultation, etc.
Vel or V	Mean Radial Velocity
V <sub>c</sub>	Radial velocity corrected for folding
Width or W	Doppler Spectrum Width
Rain or R	Rainfall Rate
Liq	Rainfall Depth
Tops	Echo Top Height
VIL	Vertically Integrated Liquid
Wind	Wind Speed and Direction
Shear	Wind Shear
SQI	Signal quality index for Doppler coherency [0 to 1]

### **IRIS Data Parameter Abbreviations: Polarization Systems**

ZDR	Differential Reflectivity
PhiDP	Correlation differential phase between HH and VV channels
KDP	Specific differential phase (degrees/km) between HH and VV channels. Based on derivative of PhiDP.
RhoHV	Correlation magnitude between HH and VV channels
LDRH(or V)	Linear depolarization ratio for H (or V) transmit cross-/co-polar.
RhoH(or V)	Correlation magnitude between H and V receive for H(or V) transmit
PhiH (or V)	Correlation phase between H and V receive for H(or V) transmit