

**Title:** VORTEX-SE 2018 UAH ARMOR Radar Data

Authors:

Preston Pangle [ptp0001@uah.edu](mailto:ptp0001@uah.edu)  
Kevin Knupp (PI) [kevin.knupp@uah.edu](mailto:kevin.knupp@uah.edu)

University of Alabama In Huntsville  
University of Alabama In Huntsville

## 1.0 Data Set Overview:

### UAH ARMOR Data

#### IOP 1

Time Period: 2018/03/19 1442Z to 2018/03/20 0105Z

#### IOP 2A

Time Period: Did Not Man. operated under normal VCP.

#### IOP 2B

Time Period: 2018/03/29 1648Z to 2018/03/28 1854Z

#### IOP 3

Time Period: 2018/04/03 2330Z to 2018/04/04 0405Z

#### IOP 4

Time Period: Did Not Man. Operated under normal VCP

#### UFO 1

Time Period: 2018/04/09 2058Z to 2018/04/10 0145Z

#### IOP 5

Time Period: 2018/04/13 1445Z to 2018/04/13 1830Z

## 2.0 Instrument Description

Before 2002, ARMOR was a National Weather Service C-Band radar (WSR-74C). In 2002, it was donated to The University of Alabama in Huntsville and is now located at the

Huntsville International Airport. ARMOR operates at a frequency of 5625 MHz and has a beam width of 1 degree. In 2004, UAH, NASA, and a local news station (WHNT Channel 19) helped convert ARMOR from single polarization to dual-polarization. Full

specification

for the radar can be found in table 1 below.

**Table 1 -Table of specifications for ARMOR**

<b>Location</b>	Huntsville International Airport: 34.646° N 86.771° W
<b>Altitude</b>	200 m
<b>Transmit Frequency</b>	5625 MHz
<b>Peak Power</b>	350 kW
<b>Pulse Width</b>	0.4 - 2.0 $\mu$ s
<b>Max PRF</b>	250 2000 $s^{-1}$
<b>Antenna Diameter</b>	3.7 m
<b>Antenna Beam Width</b>	1.1°
<b>First Side-Lobe</b>	-30 dB
<b>Max Rotation Rate</b>	24° $s^{-1}$
<b>Transmit Polarization</b>	Simultaneous H and V
<b>Receive Polarization</b>	Dual-Channel
<b>Variables</b>	Z, V, W, ZDR, Kdp, $\phi_{DP}$ , $\rho_{HV}$ , LDR

### 3.0 Data Collection and Processing

ARMOR collects data 24 hours a day, 7 days a week unless problems arise that prohibits normal operation. During all IOPs, ARMOR operated 24 hours a day unless otherwise noted. If ARMOR was manned during the IOPs, more details on data collection will be found in the field notes. General operating VCPs used when ARMOR was not manned include VCP 217 and 220. VCP information is listed in table 2. Radar data is provided in near raw format. No processing was done other than converting to CF/Radial.

**Table 2 - ARMOR VCPs**

VCP Name	VCP Number	Single or Dual PRF	Pulse Width (μs)	PRF	PRF 2	Bin Size (m)	# Bins	Rotation Rate (deg/s)	Max Range (km)	Nyquist (m/s)	El Angles
BL-1	201	Single	2	500		144	852	7	297.75	6.5	0.7, 1.3, 2.0, 2.7, 3.5
BL-2	202	Single	1	1000		144	1026	14	147.75	13	0.7, 1.2, 1.6, 2.0, 2.5, 3.0, 3.7, 4.5, 5.3
BL-3	203	Single	1	1000	500	144	1026	14	147.75	13	0.7, 1.2, 1.6, 2.0, 2.5, 3.0, 3.7, 4.5, 5.3
Con-1	210	Single	0.8	1200		144	852	16	122.75	15.6	0.7, 1.3, 2.0, 2.7, 3.5, 4.2, 5.2, 6.2, 7.5, 9
Con-2	211	Single	0.8	1200		144	852	21	122.75	15.6	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2, 11, 12.5, 14
Con-3	212	Single	0.8	1200		144	852	24	122.75	15.6	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2, 11, 12.5, 14, 16, 18.5
Con-4	213	Dual	0.8	1200	960	144	852	21	122.75	62.4	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2, 11, 12.5, 14
Con-5	214	Single	0.8	1200		144	833	22	122.75	15.6	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2, 10.5, 12
Con-6	215	Dual	0.8	1200	900	144	852	16	122.75	46.8	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.2, 8.2, 9.2, 11, 12.52
Con-7	216	Dual	0.8	1200	900	144	852	16	122.75	46.8	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.5, 9, 11
Con-8	217	Single	0.8	1200		144	852	16	122.75	15.6	0.7, 1.3, 2.0, 2.7, 3.4, 4.2, 5.2, 6.2, 7.5, 9, 11
Con-9	218	Single	0.8	1200		144	852	16	122.75	15.6	0.7, 1.3, 2.3, 3.4, 4.5, 5.7, 7, 8.5, 10, 12, 14
Con-10	219	Single	0.8	1200		144	852	20	122.75	15.6	0.7, 1.3, 2.3, 3.4, 4.5,

											5.7, 7, 8.5, 10, 12, 14, 16
Con-11	220	Single	0.8	1200		144	852	18	122.75	15.6	0.7, 1.3, 2.3, 3.4, 4.5, 5.7, 7.0, 8.5, 10, 12, 14, 16
Con-12	221	Dual	0.8	1200	960	144	852	18	122.75	62.4	0.7, 1.3, 2.3, 3.4, 4.5, 5.7, 7.0, 8.5, 10, 12, 14
Con-13	222	Dual	0.8	1200	800	144	868	18	125	31.2	0.7, 1.3, 2.3, 3.4, 4.5, 5.7, 7.0, 8.5, 10, 12, 14
Con-14	223	Dual	0.8	1200	900	144	868	18	122.75	46.8	0.7, 1.3, 2.3, 3.4, 4.5, 5.7, 7.0, 8.5, 10, 12, 14
Con-15	224	Dual	0.8	1200	960	144	868	18	122.75	62.4	0.7, 1.3, 2.3, 3.4, 4.5, 5.7, 7.0, 8.5, 10, 12, 14
Con-16	225	Single	0.4	1500		144	678	23	97.75	19.5	0.7, 1.3, 2.3, 3.4, 4.5, 5.2, 6.5, 7.2, 8.5, 10, 11.5, 13, 15, 17
Con-17	226	Single	0.8	1200		144	852	22	122.75	15.6	0.7, 1.3, 2.3, 3.4, 4.5, 5.2, 6.5, 7.2, 8.5, 10, 11.5, 13, 15, 17, 19, 21
Con-18	227	Single	0.8	1200		144	868	18	122.75	15.6	
Con-19	228	Single	0.4	1500		144	868	25	97.75	19.5	0.7, 1.3, 2.3, 3.4, 4.5, 5.2, 6.5, 7.2, 8.5, 10, 11.5, 13, 15, 17, 19, 21, 23
Con-20	229	Single	0.8	1200		144	852	22	122.75	15.6	0.7, 1.3, 2.3, 3.4, 4.5, 5.2, 6.5, 7.2, 8.5, 10, 11.5, 13, 15, 17, 19

#### 4.0 Data Format

ARMOR data was converted to CF/radial netCDF format using NCAR's Radx software library. An example of the file naming convention is below:

ARMR20180319000402.gz.nc

Where ARMOR indicates the radar name, 20180319 represent the date in the format YYYYMMDD, and 000402 represent the time in the format HHMMss.

## 5.0 Data Remarks

### Notes:

IOP 2B - ARMOR would not perform RHIs. ARMOR then went down at 1753Z and back online at 1804Z.

Access and view data with:

Radx

[http://www.ral.ucar.edu/projects/titan/docs/radial\\_formats/radx.html](http://www.ral.ucar.edu/projects/titan/docs/radial_formats/radx.html)

solo3

<https://www.eol.ucar.edu/software/solo3>