

Title: Meso 18-19 UAH ARMOR Radar Data

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1.0 Data Set Overview:

The ARMOR radar was operated 24/7 during Meso 18-19 and often did not have a dedicated operator. ARMOR was operated mostly in VCP 235. The VCP definition can be found in table 2 below. Each IOP contains full 24 hours of data. ARMOR failed due to hardware issues on 3/8/19 and was not repaired prior to the last IOP. Therefore, there is no ARMOR data available after 3/8/19.

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

Location	Huntsville International Airport: 34.646° N 86.771° W
Altitude	200 m
Transmit Frequency	5625 MHz
Peak Power	350 kW
Pulse Width	0.4 - 2.0 μ s
Max PRF	250 2000 s ⁻¹
Antenna Diameter	3.7 m
Antenna Beam Width	1.1°
First Side-Lobe	-30 dB
Max Rotation Rate	24° s ⁻¹

Transmit Polarization	Simultaneous H and V
Receive Polarization	Dual-Channel
Variables	Z, V, W, ZDR, Kdp, ϕ_{DP} , ρ_{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. VCP information is listed in table 2 for reference. Radar data is provided in near raw format. No processing was done.

Table 2 - ARMOR VCPs

VCP Name	VCP Number	Single or Dual PRF	Pulse Width (μ s)	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 is provided in NEXRAD level 2 format and can be converted to other formats using pyart. The file format is:

ARMRYYYYMMDDHHmmSS

Where ARMR indicates the radar name, YYYY is the year, MM is the month, DD is the day, HH is the hour, mm is the minute, and SS is the seconds all in UTC date and time.

5.0 Data Remarks

Again, due to hardware failure, ARMOR was not operable after 8 March 2019 (during IOP7). Therefore, IOP7 has limited data and there is no data for IOP 8 and 9.