

**Dataset Title**

Meteorological Data Obtained Using Small Unmanned Aircraft Systems (sUAS) during CHEESEHEAD

**Dataset Authors**

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**Time of Interest**

2019/07/08 00:00:00 to 2019/09/28 00:00:00

**Area of Interest**

45.93 to 45.96; -90.33 to -90.27

**Data Frequency**

See Appendix for information on the individual flights; flights were conducted multiple times per day during each CHEESEHEAD intensive observation period (IOP) at either the NCAR SW2 tower (45.940 N, 90.318 W) or at the WLEF tall tower (45.945 N, -90.273 W).

**Data Spatial Type**

Data are provided as text files.

**General Dataset Description**

The data files from the sUAS consist of either vertical profiles up to 700 feet (213 m) above ground level (AGL) or hovers at fixed altitudes for 10-15 minutes using the Meteomatics Severe Storms Edition (SSE) small unmanned aircraft system (sUAS). Data from these flights include air temperature, humidity, pressure, wind speed, and wind direction. The flights with the DJI S-1000 sUAS included either horizontal flights adjacent to the SW2 tower or WLEF tall tower; measurements included in-situ measurements of temperature, humidity, and pressure and land surface temperature derived from a downward-pointing FLIR infrared camera. Please see the Appendix for more information on the individual flights.

**Data restrictions**

No restrictions

## Appendix

### NOAA / ATDD Field Notes for IOP 1 (8-12 July 2019)

Site: SW2 (45.940 N, 90.318 W)

Pilot in command: Ed Dumas, Nicole Chappelle

Observers: Temple Lee, Michael Buban

Flight operations:

- DJI S-1000, outfitted with two iMet-XQ sensors to measure temperature, humidity, and pressure, downward-pointing GoPro camera and IR camera, flown in box-like pattern at 100 m AGL on 8 Jul and 200 m AGL on 9-12 Jul. Horizontal legs ~200 m x 200 m for flights on 8 Jul and ~ 400 x 400 m on 9-12 Jul
- Meteomatics Meteodrone SSE, used to measure temperature, humidity, and wind, flown in vertical profile up to 700 ft (213 m) AGL unless otherwise noted

Date	Platform	Flight Start Time (UTC)	Flight End Time (UTC)	Notes
8 Jul 2019	DJI	1530	1540	
8 Jul 2019	SSE	1606	1607	Test flight to < 10 m AGL
8 Jul 2019	SSE	1609	1609	Test flight to < 10 m AGL
8 Jul 2019	SSE	1620	1621	Test flight to < 10 m AGL
8 Jul 2019	SSE	1622	1624	Test flight to < 10 m AGL
8 Jul 2019	SSE	1627	1632	Test flight to < 10 m AGL
8 Jul 2019	SSE	1636	1641	
8 Jul 2019	DJI	1651	1705	
8 Jul 2019	SSE	1723	1728	
9 Jul 2019	SSE	1558	1602	
9 Jul 2019	DJI	1602	1622	
9 Jul 2019	DJI	1616	1530	
9 Jul 2019	SSE	1632	1636	
9 Jul 2019	DJI	2021	2034	

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9 Jul 2019	SSE	2040	2043
9 Jul 2019	DJI	2048	2100
9 Jul 2019	SSE	2108	2111
10 Jul 2019	DJI	1514	1526
10 Jul 2019	SSE	1533	1536
10 Jul 2019	DJI	1552	1606
10 Jul 2019	SSE	1611	1615
10 Jul 2019	DJI	1632	1643
10 Jul 2019	SSE	1649	1652
11 Jul 2019	SSE	1610	1613
11 Jul 2019	SSE	1626	1630
11 Jul 2019	SSE	1644	1647
11 Jul 2019	DJI	2104	2117
11 Jul 2019	SSE	2125	2128
11 Jul 2019	DJI	2134	2146
11 Jul 2019	SSE	2152	2155
11 Jul 2019	DJI	2159	2205
11 Jul 2019	SSE	2209	2212
11 Jul 2019	DJI	2218	2230
11 Jul 2019	SSE	2235	2238
12 Jul 2019	DJI	1504	1518
12 Jul 2019	SSE	1520	1524
12 Jul 2019	DJI	1529	1542
12 Jul 2019	SSE	1547	1550
12 Jul 2019	DJI	1553	1606
12 Jul 2019	SSE	1608	1612
12 Jul 2019	DJI	1614	1628
12 Jul 2019	SSE	1631	1635

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NOAA / ATDD Field Notes for IOP 2, Part 1 (18-21 July 2019)

Site: WLEF tall tower (45.945 N, -90.273 W)

Pilots: Ed Dumas, Nicole Chappelle

Observers: Temple Lee, Michael Buban

Flight operations: Unless otherwise noted, the sUAS hovered during all flights approximately 70 m NNE of WLEF

<b>Date</b>	<b>Platform</b>	<b>Pilot</b>	<b>Flight Start Time (UTC)</b>	<b>Flight End Time (UTC)</b>	<b>Flight strategy</b>
18 Aug 2019	SSE	Chappelle	2051	2107	30 m AGL hover
18 Aug 2019	SSE	Chappelle	2111	2127	122 m AGL hover
18 Aug 2019	SSE	Chappelle	2130	2146	396 m AGL hover
18 Aug 2019	SSE	Chappelle	2149	2205	396 m AGL hover
19 Aug 2019	SSE	Chappelle	1612	1626	122 m AGL hover
19 Aug 2019	SSE	Chappelle	1640	1652	30 m AGL hover
19 Aug 2019	DJI	Dumas	1701	1719	30 m AGL hover ~ 200 m north of WLEF
19 Aug 2019	SSE	Chappelle	1952	2006	396 m AGL hover
19 Aug 2019	SSE	Chappelle	2012	2024	30 m AGL hover
19 Aug 2019	SSE	Chappelle	2030	2042	122 m AGL hover
19 Aug 2019	SSE	Chappelle	2047	2100	396 m AGL hover
19 Aug 2019	DJI	Dumas	2104	2118	30 m AGL hover ~ 200 m north of WLEF
19 Aug 2019	SSE	Chappelle	2123	2138	30 m AGL hover
19 Aug 2019	SSE	Chappelle	2142	2157	122 m AGL hover
19 Aug 2019	SSE	Chappelle	2204	2217	396 m AGL hover
19 Aug 2019	DJI	Dumas	2223	2238	30 m AGL hover ~ 200 m north of WLEF
20 Aug 2019	SSE	Chappelle	1433	1447	30 m AGL hover
20 Aug 2019	SSE	Chappelle	1555	1607	122 m AGL hover
20 Aug 2019	SSE	Chappelle	1615	1627	396 m AGL hover

21 Aug 2019	DJI	Dumas	1411	1427	30 m AGL hover ~ 200 m north of WLEF
21 Aug 2019	SSE	Chappelle	1431	1443	30 m AGL hover
21 Aug 2019	SSE	Chappelle	1448	1500	122 m AGL hover
21 Aug 2019	SSE	Chappelle	1536	1549	396 m AGL hover
21 Aug 2019	DJI	Dumas	1558	1613	30 m AGL hover ~ 200 m north of WLEF
21 Aug 2019	SSE	Chappelle	1616	1629	30 m AGL hover
21 Aug 2019	SSE	Chappelle	1634	1649	122 m AGL hover
21 Aug 2019	SSE	Chappelle	1654	1708	396 m AGL hover
21 Aug 2019	DJI	Dumas	1712	1730	30 m AGL hover ~ 200 m north of WLEF
21 Aug 2019	DJI	Dumas	1902	1919	30 m AGL hover ~ 200 m north of WLEF
21 Aug 2019	SSE	Chappelle	1905	1917	30 m AGL hover, coincident with DJI flight
21 Aug 2019	SSE	Chappelle	1928	1942	122 m AGL hover
21 Aug 2019	SSE	Chappelle	1947	2001	396 m AGL hover
21 Aug 2019	DJI	Dumas	2042	2059	30 m AGL hover ~ 200 m north of WLEF
21 Aug 2019	SSE	Chappelle	2045	2057	30 m AGL hover, coincident with DJI flight
21 Aug 2019	SSE	Chappelle	2104	2118	122 m AGL hover
21 Aug 2019	SSE	Chappelle	2122	2137	396 m AGL hover
21 Aug 2019	DJI	Dumas	2141	2144	30 m AGL hover ~ 200 m north of WLEF

NOAA / ATDD Field Notes for IOP 2 Part 2 (23-24 July 2019)

Site: SW2 (45.940 N, 90.318 W)

Pilots: Edward Dumas, Nicole Chappelle

Observers: Temple Lee, Michael Buban

Flight operations: Combination of hovers and vertical profiles adjacent to NCAR SW2 tower;  
details for each flight noted below

<b>Date</b>	<b>Platform</b>	<b>Pilot</b>	<b>Flight Start Time (UTC)</b>	<b>Flight End Time (UTC)</b>	<b>Notes</b>
23 Aug 2019	SSE	Chappelle	1625	1638	30 m AGL hover, ~30 m south of SW2
23 Aug 2019	SSE	Chappelle	1644	1656	30 m AGL hover, ~30 m east of SW2
23 Aug 2019	SSE	Chappelle	1702	1715	Ascent to 213 m
23 Aug 2019	SSE	Chappelle	1719	1731	30 m AGL hover, ~30 m east of SW2
23 Aug 2019	SSE	Chappelle	1736	1747	30 m AGL hover, ~30 m north of SW2
23 Aug 2019	SSE	Chappelle	1752	1806	Ascent to 213 m
23 Aug 2019	SSE	Chappelle	2029	2043	Ascent to 213 m
23 Aug 2019	SSE	Chappelle	2048	2100	30 m AGL hover, ~30 m AGL of SW2
23 Aug 2019	SSE	Chappelle	2104	2116	30 m AGL hover, ~30 m east of SW2
23 Aug 2019	SSE	Chappelle	2119	2132	30 m AGL hover, ~30 m west of SW2
24 Aug 2019	SSE	Dumas	1423	1436	Ascent to 213 m
24 Aug 2019	SSE	Dumas	1440	1453	30 m AGL hover, ~30 m south of SW2
24 Aug 2019	SSE	Dumas	1456	1508	30 m AGL hover, ~30 m west of SW2

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24 Aug 2019	SSE	Dumas	1511	1526	30 m AGL hover, ~30 m east of SW2
24 Aug 2019	SSE	Dumas	1529	1543	30 m AGL hover, ~30 m north of SW2
24 Aug 2019	SSE	Dumas	1546	1558	30 m AGL hover, ~30 m west of SW2
24 Aug 2019	SSE	Dumas	1600	1613	30 m AGL hover, ~30 m east of SW2
24 Aug 2019	SSE	Dumas	1617	1630	30 m AGL hover, ~30 m north of SW2

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NOAA / ATDD Field Notes for IOP 3 (23-28 Sep 2019)

Site: SW2 (45.940 N, 90.318 W)

Pilot: Edward Dumas

Observer: Temple Lee

Flight operations: Combination of hovers and vertical profiles adjacent to NCAR SW2 tower using Meteomatics Meteodrone SSE; details for each flight noted below

<b>Date</b>	<b>Flight Start Time (UTC)</b>	<b>Flight End Time (UTC)</b>	<b>Notes</b>
23-Sep-19	1605	1618	213 m profile and hover at SW2
23-Sep-19	1622	1635	25 m profile and hover to west of SW2
23-Sep-19	1642	1655	25 m profile and hover to east of SW2
23-Sep-19	1658	1711	25 m profile and hover to north of SW2
23-Sep-19	1714	1727	213 m profile and hover at SW2
23-Sep-19	1904	1918	25 m profile and hover to west of SW2
23-Sep-19	1928	1941	25 m profile and hover to east of SW2
23-Sep-19	1944	1958	25 m profile and hover to north of SW2
23-Sep-19	2003	2016	25 m profile and hover to south of SW2
23-Sep-19	2019	2034	25 m profile and hover to west of SW2
23-Sep-19	2039	2053	25 m profile and hover to east of SW2
23-Sep-19	2057	2110	213 m profile and hover at SW2
24-Sep-19	1417	1430	213 m profile and hover at SW2
24-Sep-19	1503	1513	25 m profile and hover to west of SW2
24-Sep-19	1518	1531	25 m profile and hover to east of SW2
24-Sep-19	1535	1547	25 m profile and hover to north of SW2
24-Sep-19	1551	1606	213 m profile and hover at SW2
24-Sep-19	1609	1623	25 m profile and hover to west of SW2
24-Sep-19	1625	1639	25 m profile and hover to east of SW2
24-Sep-19	1642	1656	25 m profile and hover to north of SW2
24-Sep-19	1901	1916	213 m profile and hover at SW2

24-Sep-19	2009	2024	25 m profile and hover to west of SW2
24-Sep-19	2027	2042	25 m profile and hover to east of SW2
24-Sep-19	2045	2059	25 m profile and hover to north of SW2
24-Sep-19	2103	2117	25 m profile and hover to south of SW2
24-Sep-19	2130	2135	213 m profile and hover at SW2
25-Sep 19	1542	1555	213 m profile and hover at SW2
25-Sep 19	1559	1611	25 m profile and hover to west of SW2
25-Sep 19	1614	1627	25 m profile and hover to east of SW2
25-Sep 19	1630	1641	25 m profile and hover to north of SW2
25-Sep 19	1644	1657	213 m profile and hover at SW2
25-Sep 19	1659	1711	25 m profile and hover to west of SW2
25-Sep 19	1718	1730	25 m profile and hover to east of SW2
25-Sep 19	1733	1745	25 m profile and hover to north of SW2
25-Sep 19	2056	2109	213 m profile and hover at SW2
25-Sep 19	2113	2125	25 m profile and hover to west of SW2
25-Sep 19	2128	2140	25 m profile and hover to east of SW2
25-Sep 19	2151	2202	25 m profile and hover to north of SW2
26-Sep 19	1513	1524	213 m profile and hover at SW2
26-Sep 19	1531	1542	25 m profile and hover to west of SW2
26-Sep 19	1545	1556	25 m profile and hover to east of SW2
26-Sep 19	1559	1610	25 m profile and hover to north of SW2
26-Sep 19	1613	1625	213 m profile and hover at SW2
26-Sep 19	1628	1640	25 m profile and hover to west of SW2
26-Sep 19	1643	1655	25 m profile and hover to east of SW2
26-Sep 19	1657	1709	25 m profile and hover to north of SW2
26-Sep 19	1947	2000	213 m profile and hover at SW2
26-Sep 19	2003	2015	25 m profile and hover to west of SW2
26-Sep 19	2017	2030	25 m profile and hover to east of SW2
26-Sep 19	2032	2044	25 m profile and hover to north of SW2