number	IOP	Date	Launch time (UTC)	Location (i.e., city)	Lat	Lon
1	n/a (outreach &	31 October 2018	1513	Cordoba city center	31.419	64.174
2	1	2 November 2018	NA	south of Hernando	-32.442188	-63.743408
3		2 November 2018	1901	south of Hernando	-32.442188	-63.743408
4		2 November 2018	2001	south of Hernando	-32.442188	-63.743408
5		2 November 2018	2103	south of Hernando	-32.442188	-63.743408
6		2 November 2018	2201	south of Hernando	-32.442188	-63.743408
7		2 November 2018	2300	south of Hernando	-32.442188	-63.743408
8	2	5 November 2018	858	west of Lozado	-31.648	-64.117
9		5 November 2018	1000	west of Lozado	-31.648	-64.117
10		5 November 2018	1100	west of Lozado	-31.648	-64.117
11	3	6 November 2018	1500	San Ignacio	-32.160873	-64.518013
12		6 November 2018	1600	San Ignacio	-32.160873	-64.518013
13		6 November 2018	1700	San Ignacio	-32.160873	-64.518013
14		6 November 2018	1800	San Ignacio	-32.160873	-64.518013
15		6 November 2018	1900	San Ignacio	-32.160873	-64.518013
16	4	10 November 2018	1500	just east of Despeñaderos	-31.816505	-64.284523
17		10 November 2018	1602	~20 km east of Despeñaderos	-31.774347	-64.129868
18		10 November 2018	1704	~20 km east of Despeñaderos	-31.774347	-64.129868
19		10 November 2018	1806	~20 km east of Despeñaderos	-31.774347	-64.129868
20		10 November 2018	2000	west of Monte Ralo	-31.91148	-64.342491
21		10 November 2018	2031	east of Monte Ralo	-31.911713	-64.317535
22		10 November 2018	2134	Off hwy 36 on road to Aniscate	-32.834652	-66.534879
23		10 November 2018	2259	DOW house parking field	-31.423626	-64.504105
24	5	12 November 2018	0	near Pilar	-31.680307	-63.880108
25		12 November 2018	100	near Pilar	-31.680307	-63.880108
26		12 November 2018	200	near Pilar	-31.680307	-63.880108
27		12 November 2018	300	near Pilar	-31.680307	-63.880108
28		12 November 2018	400	near Pilar	-31.680307	-63.880108
29		12 November 2018	501	near Pilar	-31.680307	-63.880108
30		12 November 2018	600	near Pilar	-31.680307	-63.880108
31	6	17 November 2018	900	Route 5, ~10 km north of Villa Gral Belgrano	-31.879921	-64.522484
32		17 November 2018	959	Route 5, ~10 km north of Villa Gral Belgrano	-31.879921	-64.522484
33		17 November 2018	1100	Route 5, ~10 km north of Villa Gral Belgrano	-31.879921	-64.522484
34		17 November 2018	1200	Route 5, ~10 km north of Villa Gral Belgrano	-31.879921	-64.522484
35		17 November 2018	1300	Route 5, ~10 km north of Villa Gral Belgrano	-31.879921	-64.522484
36		17 November 2018	1400	Route 5, ~10 km north of Villa Gral Belgrano	-31.879921	-64.522484
37	test	19 November 2018	2000	just east of Alta Gracia	-31.821764	-64.313424
38	7	21 November 2018	1500	just west of Despeñaderos	-31.8265652	-64.321648
39		21 November 2018	1600	just west of Despeñaderos	-31.8265652	-64.321648

Frequency		Launch notes
403		test launch at RELAMPAGO open house
N/A		Bad sonde -- temperature sensor failed checks
403.8		first launch of campaign! ascent rate a bit low (3.5 m/s) so terminated early to launch next sonde on time
404.1		
403.8		low ascent rate, terminated early for next launch
404.1		
400.8		final launch of IOP1 -- storms off to the south producing lightning
400.8		sunrise ballooning! first sonde of IOP2. Scattered storms forming north of incoming MCS; sonde entered these updrafts
403.8		Between the decaying convective line and the new convection to the NE. A wave/bore passed over us between this launch and the next one
404.1		Last launch of IOP2. In the stable air
		first launch of IOP3, CI mission near Sierras Chicas
		low clouds continuing, fog over the Chicas
		final launch of IOP3. Returned home to VCP and encountered major street flooding
		first launch of IOP4, severe mission with expected supercells. This one was launched fairly quickly as initial plan was first launch at 1600 UTC, but then an ea
		set up on a dirt road for several environmental soundings. very hot and dusty, several dust devils. over 4900 J/kg of MUCAPE, as low-level moisture increase
		CAPE reduced somewhat with BL mixing of moisture
		launched this one, then moved to our other mission of updraft soundings
		we drove south on 36, but then the storm of the day rapidly developed back just north of us. exited 36 and went east on road toward Monte Ralo. Thought we
		we continued east on the dirt road through Monte Ralo, but it became apparent we wouldn't catch the storm. There was an epic dust storm to our east and we
		another cold pool sounding farther north
		final sonde of the day from the DOW house. still sufficient elevated CAPE, and convection persisted to the south for several more hours even though the IOP
		IOP5 was an upscale growth mission with a nocturnal focus. We set up outside Pilar along with lots of frogs. Conditions nicely stayed calm through the missi
		we are skeptical of the surface station's RH sensor from this night -- it was continuously reading 91% even when conditions were changing in and out of drizzl
		53 mm of precipitable water; 2300 J/kg of MUCAPE; drizzle at the surface
		supercell-like storm to our southwest. we thought maybe sonde would hit updraft, but no
		final launch of IOP5, tracked it on the way back to VCP
		arrived in time to see Venus and the sun rise to the east; congestus over the Sierras to the west
		congestus continually forming to west, but immediately evaporate; midlevels drier than previous sounding
		downslope warming and drying continues, down to 15.7 mm of PW
		still ahead of the front/OFB
		now in the cooler air behind the OFB. Modest southerly winds at launch (other groups were in much stronger winds)
		was supposed to be final launch of IOP, but sonde failed humidity check. Tried to prepare another sonde but it also threw an error and we were unable to laun
		test launch for new CSU crew! This was with the sonde that had the unknown error during IOP6, but worked fine here.
403.8		small cumulus clouds, mostly clear
		same as above

rlier one was requested on short notice

d

e had a chance for the updraft, but we were apparently in outflow. We thought maybe we could continue east and still get to the updraft, so we terminated this one to try again

e were in good position to launch a cold pool sounding, so we did that. Cold pool was quite shallow

was complete

on, with mostly drizzle. But nice convection formed to our north and west, making an interesting and successful mission

e. Will look further at this.

ch inside the +/- 5 minute window in the NOTAM

40		21 November 2018	1700	just west of Despeñaderos	-31.8265652	-64.321648
41		21 November 2018	1800	just west of Despeñaderos	-31.8265652	-64.321648
42		21 November 2018	1900	just west of Despeñaderos	-31.8265652	-64.321648
43		21 November 2018	2000	just west of Despeñaderos	-31.8265652	-64.321648
44	8	22 November 2018	1322	just west of Despeñaderos	-31.8124729	-64.3150806
45		22 November 2018	1400	just west of Despeñaderos	-31.8124729	-64.3150806
46		22 November 2018	1500	just west of Despeñaderos	-31.8124729	-64.3150806
47		22 November 2018	1600	just west of Despeñaderos	-31.8124729	-64.3150806
48		22 November 2018	1700	just west of Despeñaderos	-31.8124729	-64.3150806
49		22 November 2018	1800	just west of Despeñaderos	-31.8124729	-64.3150806
50	9	25 November 2018	1400	NE of San Rafael on 153	-34.136501	-64.321648
51		25 November 2018	1500	NE of San Rafael on 153	-34.136501	-64.321648
52		25 November 2018	1600	NE of San Rafael on 153	-34.136501	-64.321648
53		25 November 2018	1700	NE of San Rafael on 153	-34.136501	-64.321648
54		25 November 2018	1800	NE of San Rafael on 153	-34.136501	-64.321648
55		25 November 2018	1900	NE of San Rafael on 153	-34.136501	-64.321648
56		25 November 2018	2000	NE of San Rafael on 153	-34.136501	-64.321648
57	10	26 November 2018	1300	Just north of El Nihuil	-35.00835	-68.684282
58		26 November 2018	1400	Just north of El Nihuil	-35.00835	-68.684282
59		26 November 2018	1500	Just north of El Nihuil	-35.00835	-68.684282
60		26 November 2018	1600	Just north of El Nihuil	-35.00835	-68.684282
61		26 November 2018	1700	Just north of El Nihuil	-35.00835	-68.684282
62		26 November 2018	1800	13 miles NE of El Nihuil on HW 144	-34.8213213	-68.6515431
63		26 November 2018	1900	13 miles NE of El Nihuil on HW 144	-34.8213213	-68.6515431
64	11	29 November 2018	1303	East of Villa Dolores, off of RN20; in the field next to road towards the Aeroclub	-31.950777	-65.150743
65		29 November 2018	1402	East of Villa Dolores, off of RN20; in the field next to road towards the Aeroclub	-31.950777	-65.150743
66		29 November 2018	1501	East of Villa Dolores, off of RN20; in the field next to road towards the Aeroclub	-31.950777	-65.150743
67		29 November 2018	1606	East of Villa Dolores, off of RN20; in the field next to road towards the Aeroclub	-31.950777	-65.150743
68		29 November 2018	1705	East of Villa Dolores, off of RN20; in the field next to road towards the Aeroclub	-31.950777	-65.150743
69		29 November 2018	1900	East of Villa Dolores, off of RN20; in the field next to road towards the Aeroclub	-31.950777	-65.150743
70	12	30 November 2018	1420	East of Copina, off of RN 34	-31.579479	-64.607025
71		30 November 2018	1503	East of Copina, off of RN 35	-31.579479	-64.607025
72		30 November 2018	1600	East of Copina, off of RN 36	-31.579479	-64.607025
73		30 November 2018	1702	East of Copina, off of RN 37	-31.579479	-64.607025
74		30 November 2018	1800	East of Copina, off of RN 38	-31.579479	-64.607025
75		30 November 2018	1900	East of Copina, off of RN 39	-31.579479	-64.607025
76		30 November 2018	2000	East of Copina, off of RN 40	-31.579479	-64.607025
77		30 November 2018	2056	East of Copina, off of RN 41	-31.579479	-64.607025
78		30 November 2018	2157	East of Copina, off of RN 42	-31.579479	-64.607025

		save as above, high values of CAPE						
		CAPE beginning to decrease						
		radiosonde lost signal at 400 mb. terminated at 400 mb						
404.1		final sonde of IOP						
		first launch of the day. launching off highway						
404.1		centered between two MCS. One to our NW and one to our E						
400.8		winds have died down as both MCSs are to our north now						
403.8		alto stratus deck with progressively lighter winds						
404.1		Sprinkling						
403.8		last sonde of IOP						
403.8		first sonde of IOP. Clear coniditions above						
404.1		clear conditions above. Cu fields far to north						
403.8		cumulus field has reached us, sign of the presence of the LLJ bringing in moisture						
404.1		cumulus field thickening						
		released sonde in light-moderate rain						
		inflow/outflow region of storm to our SE						
		Left mover to our SE. Launched in cold pool of it. Last sonde of IOP						
		First sonde of mission. Residual nocturnal bounday layer						
		Cloud streets and some cumulus						
		More cumulus overhead						
		Storm that went on to produce hour of hail initiates to our west, just north of another cell						
		Inflow sounding into storm mentioned above						
		Updraft sounding for massive hail producer mentioned earlier						
		Cold pool sounding after passing of above mentioned cell						
405.3		Frequency was not set to one of our two designated frequencies. Sky was mostly clear, sunny						
403.8		Sky was clear, a few cumulus near terrain to the north, becoming more numerous						
403.8		Cumulus building off of terrain to the north, increasing their horizontal extent; sunny and becoming windier						
403.8		First sonde failed ground check, prepped 2nd sonde and released 1 minute late; Deep cumulus growth to our east over terrain, sunny; had problem with Vaisa						
403.8		After restarting Vaisala system, it seems to be working just fine again. This sonde looks good now, EDT reports being automatically generated as well as manu						
403.8		clear conditions above, seeing deep cumulus growth over sierras grandes. winds are calm						
404.1		Clouds beginning to build, launced 20min after the hour due to needing to restart Vaisala system after station location not available error. Note about launch lo						
404.1		Sounding terminated at 450 due to what is now known to be telemetry error; automatic flight termination. Clouds continue to build						
404.1		Sounding again terminated at ~450 due to same error; sounding automatically terminated again						
404.1		Sounding terminates again at same place, telemetry error recognized, decision made to switch to lower frequency. Storms beginning to form						
400.8		Sounding reaches full trop with frequency change. Storms continue						
400.8		Sounding cuts off at same place (~450mb). It is realized that previous sondes are likely interfereing with subsequent launches. Storms continue						
400.2		Sounding skirts updraft and reaches full troposphere						
400.5		Sounding in updraft and reaches full troposphere;						
400.8		Cold pool in place, sounding reaches full troposphere						

ıla software -- automatic and manual EDTs were not being created, so we couldn't create a png past ~815mb. We restarted the software and the sounding system seems ok nov

ually.

ɔcation; applies to all launches: Launch location was on a hill overlooking a valley, any launch with a significant sountherly or easterly wind component carried the balloon immed

79	13	4 December 2018	1401	Same as IOP 12	-31.579464	-64.606989
80		4 December 2018	1500	Same as IOP 12	-31.579464	-64.606989
81		4 December 2018	1600	Same as IOP 12	-31.579464	-64.606989
82		4 December 2018	1704	Same as IOP 12	-31.579464	-64.606989
83		4 December 2018		Same as IOP 12	-31.579464	-64.606989
84		4 December 2018		Same as IOP 12	-31.579464	-64.606989
85		4 December 2018	1907	Same as IOP 12	-31.579464	-64.606989
86		4 December 2018	2002	Same as IOP 13	-31.579464	-64.606989
87	14	5 December 2018	1400	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
88		5 December 2018	1508	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
89		5 December 2018	1601	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
90		5 December 2018	1701	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
91		5 December 2018	1759	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
92		5 December 2018	1900	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
93		5 December 2018	2000	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
94		5 December 2018	2059	200m south of Rd 34 on entrance road to natl park	-31.61176	-64.828053
95	15	10 December 2018	1830	SW of Sampacho off Rout 8	-33.41576	-64.7603951
96		10 December 2018	1850	SW of Sampacho off Rout 8	-33.41576	-64.7603951
97		10 December 2018	2000	SW of Sampacho off Rout 8	-33.41576	-64.7603951
98	16	11 December 2018	1658	Between Monte Ralo and Corralito	-31.9743543	-64.224717
99		11 December 2018	1803	Between Monte Ralo and Corralito	-31.9743543	-64.224717
100		11 December 2018	1901	Between Monte Ralo and Corralito	-31.9743543	-64.224717
101		11 December 2018	2002	Between Monte Ralo and Corralito	-31.9743543	-64.224717
102	17	13 December 2018	1731	2 km south of Sanabria	-32.5342871	-63.2567044
103		13 December 2018	2200	17 km south of central Cordoba	-31.4806509	-64.0263432
104		13 December 2018	2300	17 km south of central Cordoba	-31.4806509	-64.0263432
105		13 December 2018	0000	17 km south of central Cordoba	-31.4806509	-64.0263432
106		13 December 2018	0100	17 km south of central Cordoba	-31.4806509	-64.0263432
107		13 December 2018	0200	17 km south of central Cordoba	-31.4806509	-64.0263432
108		13 December 2018	0239	17 km south of central Cordoba	-31.4806509	-64.0263432
109		13 December 2018	0305	17 km south of central Cordoba	-31.4806509	-64.0263432

403.8		Cu field starting to develop over mountains. Small cumulus wisps directly over lauch site
404.1		Cu field over mountains expanding east slightly. More vertical development as well (not much). A few fully develped Cu over lauch site
403.8		Small cell developed to the northwest, Anvil quickly developed and started downstream. as of 1612 storm appears fully mature
404.1		Updraft base of mature cell obvious and slowly moving closer. First thunder/lightning in last hour. Sounding did not make main updraft to due weak surface infl
403.8		Attempted an updraft sounding. Ballon began towards the south, before heading southwest. PTU lost about 700hpa; UHF not lost
404.1		Outflow sounding, first launch attempt failed when dereeler detached from baloon assembly. Sonde was deemed still good after inspecting before/after data. L
403.8		Launch to get back on the top of the hour. Temperature much warmer than previous launch, just barely after launch we felt a surface flow from the southeast i
404.1		Launch went north toward strongest cell in area. Virga visible in that direction and mass of dark clouds with no distingushable features above the ridgeline
403.8		Launch at 1400z; timestamps on computer off by 4min. deep cumulus moving north to south directly to our west during launch
404.1		Computer timestamps appear to have fixed themselves. Launch into mostly filled in Cu field, some darker cloud bases evident. Sonde gave error at end of gro
403.8		Cu field similar to last launch. Strong cow advection noted, as three moved within 300m of launch site. Still some good looking cloud bases in area.
404.1		Cell to east looks developed, visible on radar. Westword looks brighter. Completely overcast with Cu
403.8		Light sprinkles shortly after launch.. Many cells to the east, south and north. A bit of clearing around lauch time; closing up again after launch
404.1		Cells building to the west during launch. Large cell to the north with very dark, very low cloud base. Inflow to these storms/outflow from earlier storms rapidly fl
403.8		Cells due west popped up. Lots of precip/tiny hail in the last hour.
404.1		During previous hour sounding location became very foggy, followed by and abrupt lifting of the fog towards upslope. Visibility much better for ~2min, then dro
403.8		First launch of IOP. Sonde lost contact with GPS. Two balloons were used for this launch - the first one popped
404.1		Sonde was used for SPS and UHF system reboot and testing
403.8		Last launch of IOP. Two balloons were used - first balloon fill attempt popped
403.8		First launch of IOP 16
404.1		Launch in spotty cumulus. Storms to NE
403.8		1/8 or less sky cover. Convection still roaring far east
404.1		Last launch of IOP
403.8		Environmental sounding for severe convection portion of IOP
404.1		First launch of upscale growth protion of IOP
403.8		Storms beginning to initiate over terrain and south of location. Sunset sounding
404.1		Nocturnal boundary layer starting to form. Massive storms to south
403.8		Nocturnal boundary layer becoming more apparent. Huge storms to our south. Winds weakened considerably
404.1		Launched to the minute as the gust front came in from storms 220
403.8		Rapid cold pool soundings
404.1		Combination inflow, outflow, cold pool (?) right into new cell being generated infront of squall line

low at launch location. Miked up for Argentine newspaper!

.aunched again into cold pool, rain slightly lightened and temperatures slightly warmed before second successful attempt

nto the area that is reflected in the launches surface observations despite the launch occuring just before the flow came through. Cell to the WNW looks nice visually.

und check possibly related to attempt to change frequency at very end of ground check period. Sonde re-checked ok and was subsequently launched.

owing uphill

pped down again but not as low as the thickest fog. Stacey lauched sounding into a very cold light/moderate rain.