Second 2018 ILRS LARGE (Laser Ranging to GNSS s/c Experiment) Campaign

(August 01-October 31, 2018)

Summary Report

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26-Feb-2019

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(August 01-October 31, 2018)

The second LARGE campaign for 2018 ran from August 01 through October 31. An objective of the campaign was to obtain improved temporal and spatial coverage with a subset of satellites from each of the GNSS constellations, GLONASS, Galileo, and Beidou/Compass. For the Galileo and Compass/Beidou constellations, eight satellites were designated as high GNSS priority. Our Russian colleagues designated only four GLONASS satellites for higher priority tracking. The ILRS priority list was once again updated for this campaign to reflect the higher priorities for the selected satellites, interleaving them on the priority list in order to give each constellation an equal chance of tracking:

System	Primary	Secondary
GLONASS	GLONASS-131, -134, -136, -137	None
Galileo	Galileo-102, -202, -209, -210	Galileo-103, -203, -211, -213
Compass/Beidou	Compass-I3, -M3, -I5, -I6B	Beidou-3M2, -3M3, -3M9, -3M10

The ILRS Central Bureau requested that stations track two and if possible three segment (2 NP's each) spread out over the tracked arc for all of these satellites. Since only four satellites have been designated for GLONASS, stations were asked try to get as many passes on these satellites as possible. The providers continued to issue predictions for all of the other operational GNSS satellites; stations were asked to continue to track the other satellites on a non-interference basis with the LEO, LAGEOS, and GNSS satellites at higher priority. Stations were asked, as time allowed, to try to get a few passes with at least one segment, on these other GNSS satellites.

More information about LARGE and the 2018 campaigns (as well as previous activities) can be found on the ILRS website at:

https://ilrs.gsfc.nasa.gov/science/ILRS_LARGE_sg/index.html

Results from the campaign can be found in this report.

LARGE 2018 Campaign #2 Pass Report
August 01-October 31, 2018

as of November 04, 2018

Passes		GLONASS				Galileo								Compass				Beidou-3				Campaign Totals				Campaign NPTS/Pass			All Tracking Totals				No. Sats. Tracked	
Site Name	Sta.	-131	-134	-136	-137	-102	-202	-209	-210	-103	-203	-211	-213	-I3	-M3	-I5	-I6B	-M2	-M3	-M9	-M10	GLONASS	Galileo	npass/Bei	Total	GLONASS	Galileo	npass/Bei	GLONASS	Galileo	npass/Bei	Other	All	GNSS	All
Altay	1879	31	32	36	31	3	2	11	5	1	0	2	2	5	2	7	0	0	0	0	0	130	26	14	170	2.5	2.3	1.8	499	53	14	108	674	45	52
Arequipa	7403	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0	0	0	1,150	1,150	0	28
Arkhyz	1886	18	19	23	23	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	83	2	0	85	3.4	3.0	0.0	286	2	0	236	524	27	38
Badary	1890	13	5	12	17	0	0	0	8	0	0	1	1	0	0	0	0	2	0	0	0	47	10	2	59	3.2	3.0	3.0	75	10	2	481	568	14	26
Baikonur	1887	39	58	50	64	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	211	2	1	214	2.3	2.0	3.0	338	11	1	114	464	18	20
Beijing	7249	24	16	26	28	2	8	18	13	9	3	16	11	1	7	15	0	5	2	1	2	94	80	33	207	3.6	3.5	3.9	316	199	33	915	1,463	47	77
Borowiec	7811	4	7	2	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0	22	5.3	0.0	0.0	29	0	0	332	361	6	34
Brasilia	7407	8	10	14	0	9	1	0	1	11	1	4	0	0	1	0	0	0	0	0	0	32	27	1	60	1.9	2.3	3.0	157	50	1	253	461	34	48
Changchun	7237	36	54	46	50	14	19	32	31	24	14	30	28	13	13	31	4	23	18	11	14	186	192	127	505	2.7	3.3	2.9	798	570	172	3,567	5,107	57	95
Grasse	7845	28	12	24	19	22	9	20	13	22	13	9	6	0	8	11	5	8	4	14	16	83	114	66	263	2.8	2.8	2.7	83	114	66	242	505	19	29
Graz	7839	30	26	28	30	17	12	20	20	28	9	24	22	2	9	13	3	23	18	12	14	114	152	94	360	6.0	5.5	4.7	471	348	100	1,881	2,800	54	90
Greenbelt	7105	39	34	38	54	6	3	3	4	7	1	11	0	0	0	0	0	1	3	3	3	165	35	10	210	3.1	3.2	3.3	204	35	10	2,327	2,576	19	53
Haleakala	7119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0	0	0	570	570	0	30
Hartebeesthoek (HARL)	7501	23	26	24	26	11	13	7	5	14	6	6	4	0	0	0	0	0	3	3	5	99	66	11	176	2.7	2.5	2.3	264	66	11	1,179	1,520	19	50
Hartebeesthoek (HRTL)	7503	1	3	4	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	8	3	0	11	3.3	55.3	0.0	26	4	0	164	194	16	34
Herstmonceux	7840	44	51	49	51	34	21	33	35	38	25	37	36	0	27	23	19	32	25	24	26	195	259	176	630	3.7	3.8	3.1	743	595	176	2,515	4,029	55	89
Irkutsk	1891	26	12	15	12	7	6	2	0	9	2	1	4	0	2	0	0	0	0	0	0	65	31	2	98	2.0	2.1	1.5	192	57	2	539	790	31	52
Katzively	1893	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0	0	0	801	801	0	28
Kiev	1824	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0	0	0	278	278	0	20
Komsomolsk	1868	16	25	30	23	5	3	5	4	1	0	1	0	1	6	7	0	0	0	0	0	94	19	14	127	3.9	4.3	4.3	368	29	16	70	483	42	49
Kunming	7819	14	14	15	16	1	4	0	7	8	1	12	5	0	3	8	3	2	4	0	1	59	38	21	118	2.3	2.3	2.3	216	124	24	459	823	50	83
Matera	7941	84	83	63	47	94	33	40	40	26	35	30	0	0	57	21	16	29	19	32	25	277	298	199	774	3.4	3.3	3.0	371	305	199	2,243	3,118	24	57
McDonald	7080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0	0	0	53	53	0	13
Mendeleevo	1874	6	8	6	6	0	0	2	1	2	0	0	1	0	0	0	0	0	0	0	0	26	6	0	32	2.8	2.3	0.0	107	20	0	103	230	30	47
Monument Peak	7110	19	15	15	15	2	0	12	9	6	0	10	9	0	0	0	0	12	2	0	0	64	48	14	126	1.7	1.9	1.8	73	48	14	2,860	2,995	14	45
Mount Stromlo	7825	18	20	23	22	23	20	13	16	26	22	16	20	6	17	0	0	1	2	8	3	83	156	37	276	3.3	3.2	2.6	197	290	37	2,105	2,629	42	71
Potsdam	7841	24	15	19	21	2	3	11	9	13	3	11	10	1	1	2	1	3	3	3	3	79	62	17	158	3.5	3.4	4.3	239	197	17	1,817	2,270	51	83
Riga	1884	1	5	1	2	1	0	0	3	0	0	3	0	0	1	0	0	0	0	0	0	9	7	1	17	4.6	4.6	3.0	11	7	1	274	293	9	36
Sejong	7394	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	12.0	0.0	0.0	2	0	0	151	153	2	14
Shanghai	7821	38	31	38	0	22	9	20	23	22	7	27	21	19	14	41	11	13	4	5	5	107	151	112	370	4.6	4.5	4.6	491	357	129	1,321	2,298	48	80
Simeiz	1873	5	5	8	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	30	0	1	31	3.9	0.0	3.0	89	3	1	863	956	24	54
Simosato	7838	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	6.2	0.0	0.0	6	0	0	336	342	3	21
Svetloe	1888	6	7	5	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	18	4	0	22	2.6	2.5	0.0	35	6	0	268	309	14	33
Tahiti	7124	27	12	10	17	8	6	6	0	12	5	2	5	0	1	0	0	7	3	10	5	66	44	26	136	4.1	4.2	5.0	135	44	26	500	705	20	49
Wettzell (SOSW)	7827	31	36	32	39	16	19	15	26	18	12	25	16	0	15	5	6	12	14	11	8	138	147	71	356	4.1	3.0	2.6	640	371	71	1,178	2,260	53	80
Wettzell (WETL)	8834	73	79	78	80	49	46	40	42	50	40	42	45	4	38	14	17	45	0	38	45	310	354	201	865	4.7	4.4	4.4	434	624	201	2,238	3,497	38	75
Yarragadee	7090	161	166	203	191	128	60	54	42	103	96	39	37	77	119	23	124	42	42	68	69	721	559	564	1,844	2.8	2.6	2.8	1,172	673	579	8,242	10,666	44	86
Zelenchukskaya	1889	6	8	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	14	2	2	18	2.4	2.0	3.5	116	3	2	386	507	25	45
Zimmerwald	7810	30	47	0	0	45	0	50	56	56	50	48	50	0	39	28	22	0	31	0	0	77	355	120	552	2.8	5.1	3.3	849	819	120	4,114	5,902	37	68
Totals:	39	925	942	937	908	523	299	415	415	511	345	407	334	129	383	249	231	260	197	243	245	3,712	3,249	1,937	8,898	3.3	3.6	3.3	10,032	6,034	2,025	47,233	65,324		

Pass Summary by Network (Campaign Constellation vs. Total)

Network	Sta.	%GLO	%GAL	%COM	Tot.	GLO	GAL	COM	Tot.
Chinese Network	4	12%	14%	15%	13%	446	461	293	1,200
European Network	13	36%	54%	49%	45%	1,334	1,748	946	4,028
NASA Network	8	30%	23%	32%	28%	1,115	752	625	2,492
Russian Network	11	20%	4%	2%	10%	728	132	36	896
All Others	3	2%	5%	2%	3%	89	156	37	282
Totals:	39	42%	37%	22%	100%	3,712	3,249	1,937	8,898

Total passes/constellation>25	
Total passes/campaign>100	

LARGE 2018 Campaign #2 NPT Report
August 01-October 31, 2018

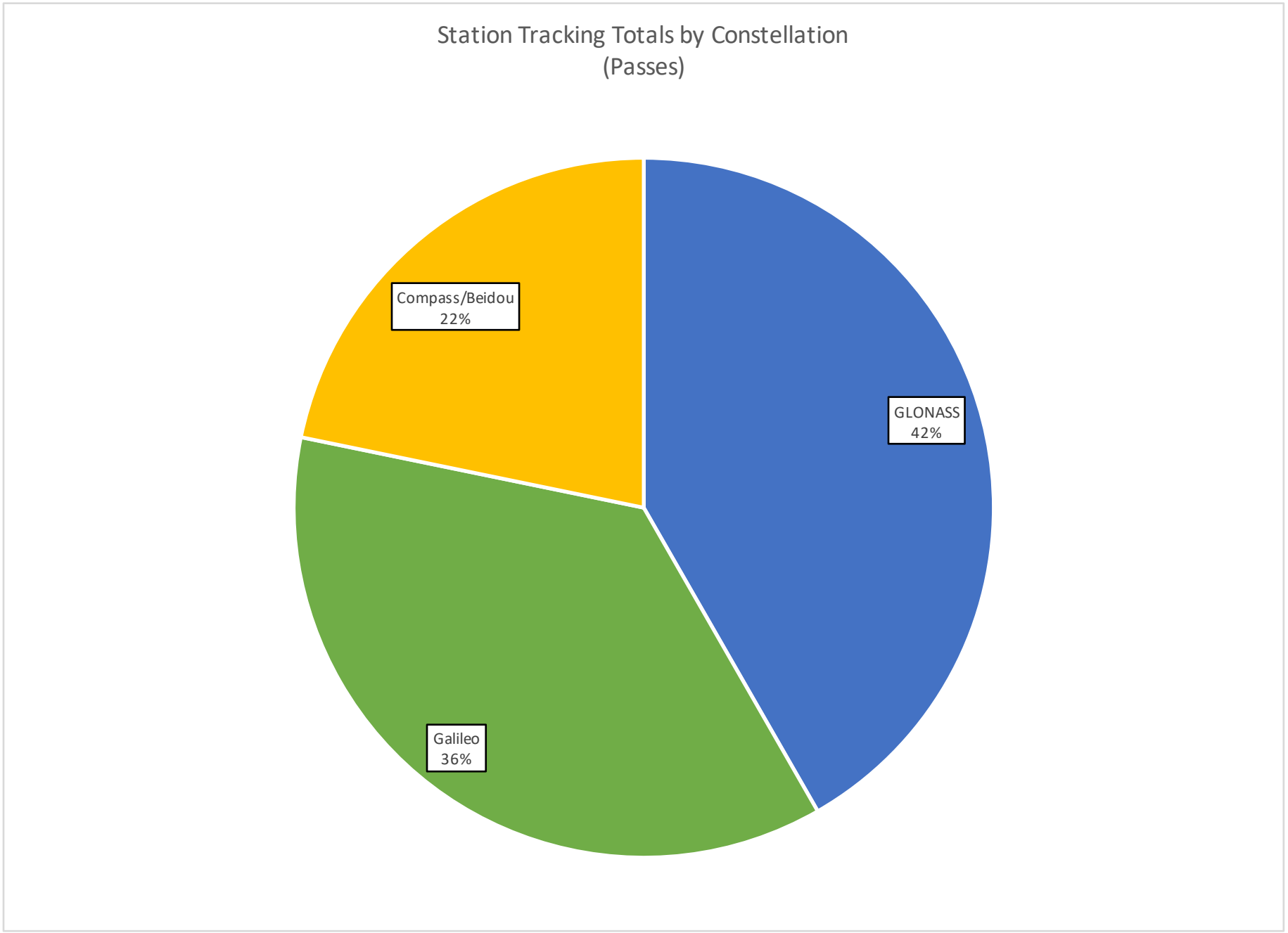
as of November 04, 2018

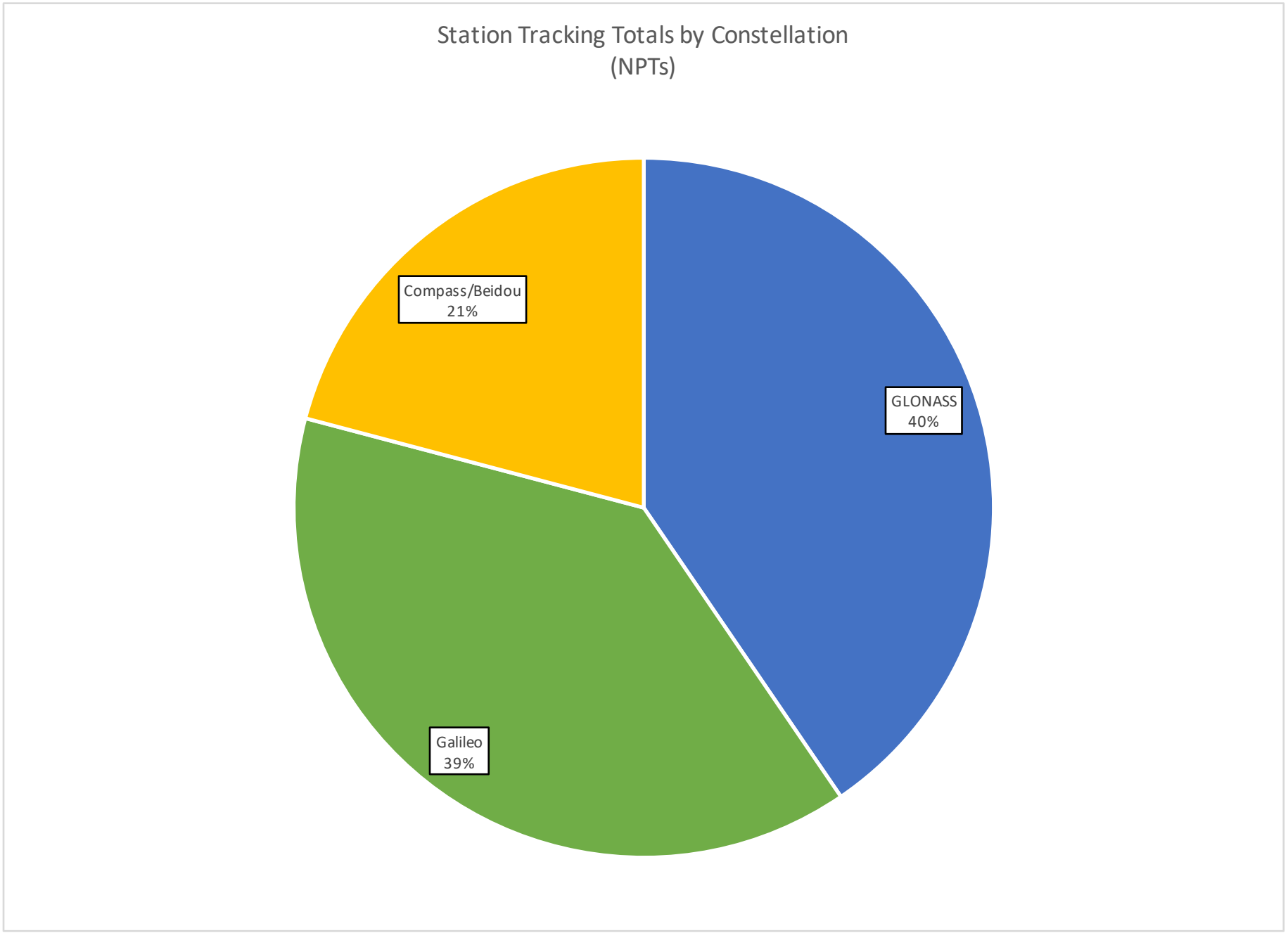
Number of NPTs		GLONASS				Galileo								Compass				Beidou-3				Campaign Totals				All Tracking Totals				
Site Name	Sta.	-131	-134	-136	-137	-102	-202	-209	-210	-103	-203	-211	-213	-I3	-M3	-I5	-I6B	-M2	-M3	-M9	-M10	GLONASS	Galileo	npass/Bei	Total	GLONASS	Galileo	npass/Bei	Other	All
Altay	1879	69	76	92	84	6	4	26	13	2	0	5	3	9	3	13	0	0	0	0	0	321	59	25	405	1,083	117	25	727	1,952
Arequipa	7403	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,346	11,346
Arkhyz	1886	64	60	80	81	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	285	6	0	291	930	6	0	1,571	2,507
Badary	1890	40	16	39	55	0	0	0	24	0	0	3	3	0	0	0	0	6	0	0	0	150	30	6	186	242	30	6	4,131	4,409
Baikonur	1887	98	137	110	147	0	2	0	0	2	0	0	0	0	3	0	0	0	0	0	0	492	4	3	499	788	25	3	467	1,283
Beijing	7249	88	65	88	94	9	22	63	46	36	6	57	41	5	19	72	0	14	9	3	7	335	280	129	744	1,119	736	129	7,569	9,553
Borowiec	7811	24	36	10	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0	0	117	154	0	0	5,735	5,889
Brasilia	7407	14	21	26	0	19	2	0	1	31	2	6	0	0	3	0	0	0	0	0	0	61	61	3	125	360	119	3	770	1,252
Changchun	7237	98	155	134	117	55	58	99	113	54	51	122	86	40	36	95	12	58	57	32	34	504	638	364	1,506	2,258	1,771	502	36,846	41,377
Grasse	7845	75	40	68	53	59	37	52	38	56	40	26	15	0	21	33	13	20	12	35	43	236	323	177	736	236	323	177	1,467	2,203
Graz	7839	164	154	166	202	113	35	136	109	137	44	158	100	4	33	45	10	118	119	52	61	686	832	442	1,960	1,970	1,669	474	32,220	36,333
Greenbelt	7105	133	98	124	152	23	14	6	19	17	3	29	0	0	0	0	0	4	11	9	9	507	111	33	651	624	111	33	37,299	38,067
Haleakala	7119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7,976	7,976
Hartebeesthoek (HARL)	7501	59	69	65	72	32	33	16	11	34	13	17	10	0	0	0	0	0	5	6	14	265	166	25	456	737	166	25	11,795	12,723
Hartebeesthoek (HRTL)	7503	4	10	12	0	0	0	0	4	6	0	0	0	0	0	0	0	0	0	0	0	26	10	0	36	80	12	0	2,147	2,239
Herstmonceux	7840	181	203	171	169	127	65	130	138	163	85	134	144	0	83	60	53	124	64	77	80	724	986	541	2,251	2,046	1,901	541	34,100	38,588
Irkutsk	1891	54	19	31	29	14	14	4	0	15	6	3	9	0	3	0	0	0	0	0	0	133	65	3	201	373	117	3	4,155	4,648
Katzively	1893	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8,023	8,023
Kiev	1824	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,813	2,813
Komsomolsk	1868	61	104	106	98	21	12	24	18	3	0	4	0	3	33	24	0	0	0	0	0	369	82	60	511	1,252	113	65	444	1,874
Kunming	7819	31	31	34	37	2	10	0	18	17	3	27	11	0	7	16	7	4	11	0	3	133	88	48	269	478	277	55	4,497	5,307
Matera	7941	309	274	214	140	302	122	145	127	86	124	83	0	0	194	66	46	85	53	92	64	937	989	600	2,526	1,224	1,010	600	21,262	24,096
McDonald	7080	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	403	403
Mendeleevo	1874	18	23	17	16	0	0	5	2	4	0	0	3	0	0	0	0	0	0	0	0	74	14	0	88	302	57	0	1,990	2,349
Monument Peak	7110	30	30	25	25	3	0	21	16	9	0	23	18	0	0	0	0	21	4	0	0	110	90	25	225	124	90	25	31,250	31,489
Mount Stromlo	7825	61	63	75	74	91	59	39	47	72	66	49	79	17	40	0	0	2	7	24	5	273	502	95	870	613	905	95	26,179	27,792
Potsdam	7841	85	46	72	71	6	7	36	38	41	9	42	32	3	10	6	5	16	15	11	7	274	211	73	558	798	684	73	23,774	25,329
Riga	1884	2	19	8	12	6	0	0	14	0	0	12	0	0	3	0	0	0	0	0	0	41	32	3	76	47	32	3	4,569	4,651
Sejong	7394	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	12	15	0	0	1,745	1,760
Shanghai	7821	167	147	176	0	107	37	87	104	104	26	114	96	90	63	204	46	55	17	19	20	490	675	514	1,679	2,212	1,618	587	11,084	15,501
Simeiz	1873	17	20	29	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	117	0	3	120	360	15	3	8,318	8,696
Simosato	7838	15	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0	0	31	35	0	0	4,856	4,891
Svetloe	1888	15	17	14	0	0	1	0	2	3	0	0	4	0	0	0	0	0	0	0	0	46	10	0	56	79	16	0	1,466	1,561
Tahiti	7124	123	40	35	73	31	35	27	0	51	16	5	18	0	5	0	0	38	18	52	17	271	183	130	584	553	183	130	6,814	7,680
Wettzell (SOSW)	7827	112	148	135	167	47	66	47	82	48	36	73	40	0	45	10	12	31	33	31	21	562	439	183	1,184	1,814	916	183	12,578	15,491
Wettzell (WETL)	8834	351	367	349	387	228	175	198	184	216	168	214	184	11	156	45	69	206	0	198	206	1,454	1,567	891	3,912	1,904	2,557	891	19,480	24,832
Yarragadee	7090	438	455	570	529	324	155	147	109	271	259	107	88	210	325	66	342	116	115	188	191	1,992	1,460	1,553	5,005	3,120	1,733	1,598	73,360	79,811
Zelenchukskaya	1889	16	17	0	0	2	0	2	0	0	0	0	0	0	7	0	0	0	0	0	0	33	4	7	44	300	7	7	2,872	3,186
Zimmerwald	7810	75	139	0	0	260	0	240	313	267	252	234	237	0	147	69	80	0	102	0	0	214	1,803	398	2,415	2,356	3,948	398	63,888	70,590
Totals:	39	3,091	3,111	3,075	2,998	1,890	965	1,550	1,590	1,748	1,209	1,547	1,221	392	1,239	824	695	918	652	829	785	12,275	11,720	6,334	30,329	30,586	21,264	6,634	531,986	590,470

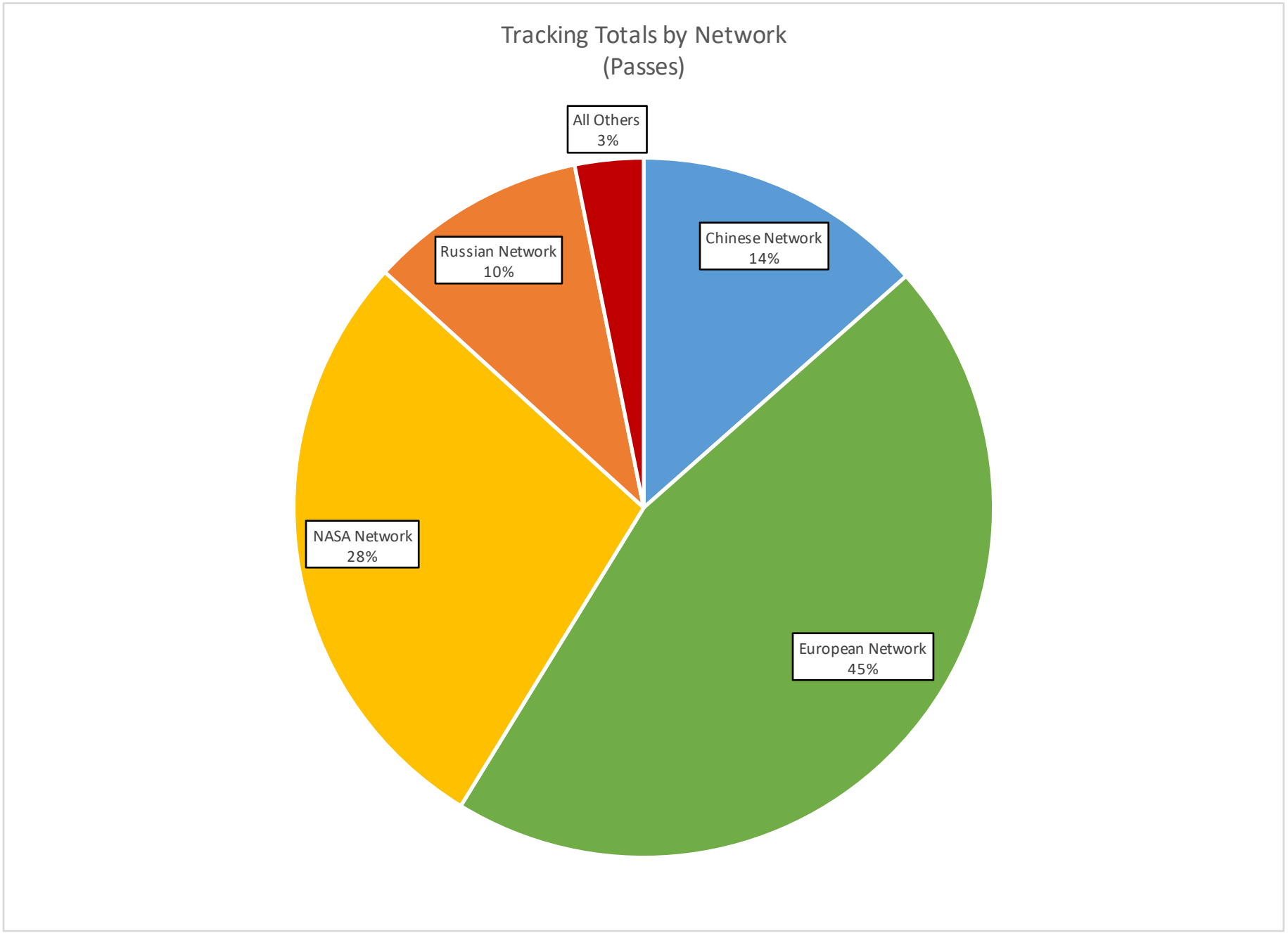
Pass Summary by Network (Campaign Constellation vs. Total)

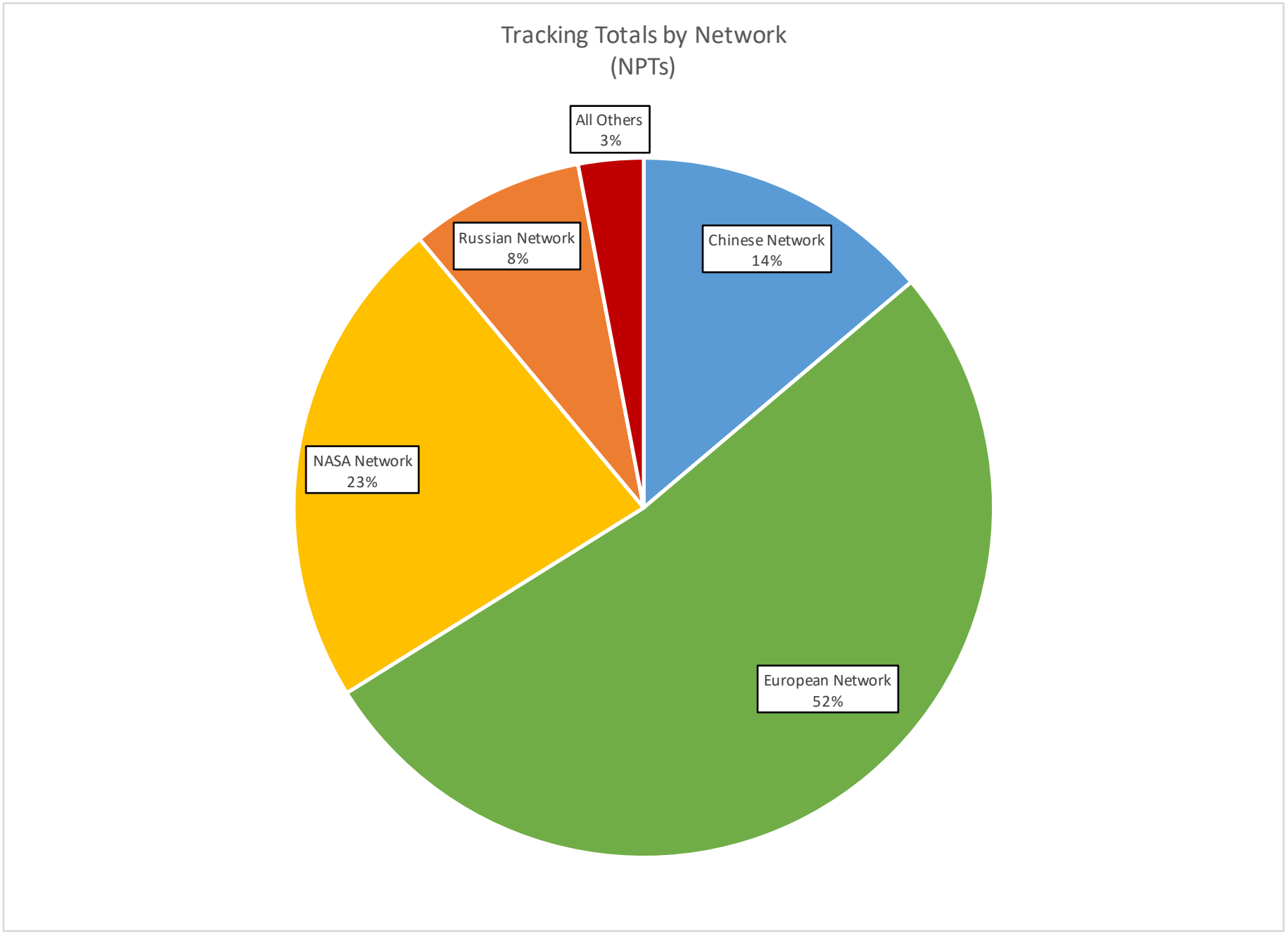
Network	Sta.	%GLO	%GAL	%COM	Tot.	GLO	GAL	COM	Tot.
Chinese Network	4	12%	14%	17%	14%	1,462	1,681	1,055	4,198
European Network	13	44%	61%	52%	52%	5,362	7,182	3,311	15,855
NASA Network	8	26%	17%	28%	23%	3,145	2,010	1,766	6,921
Russian Network	11	16%	3%	2%	8%	1,990	345	107	2,442
All Others	3	3%	4%	1%	3%	316	502	95	913
Totals:	39	40%	39%	21%	100%	12,275	11,720	6,334	30,329

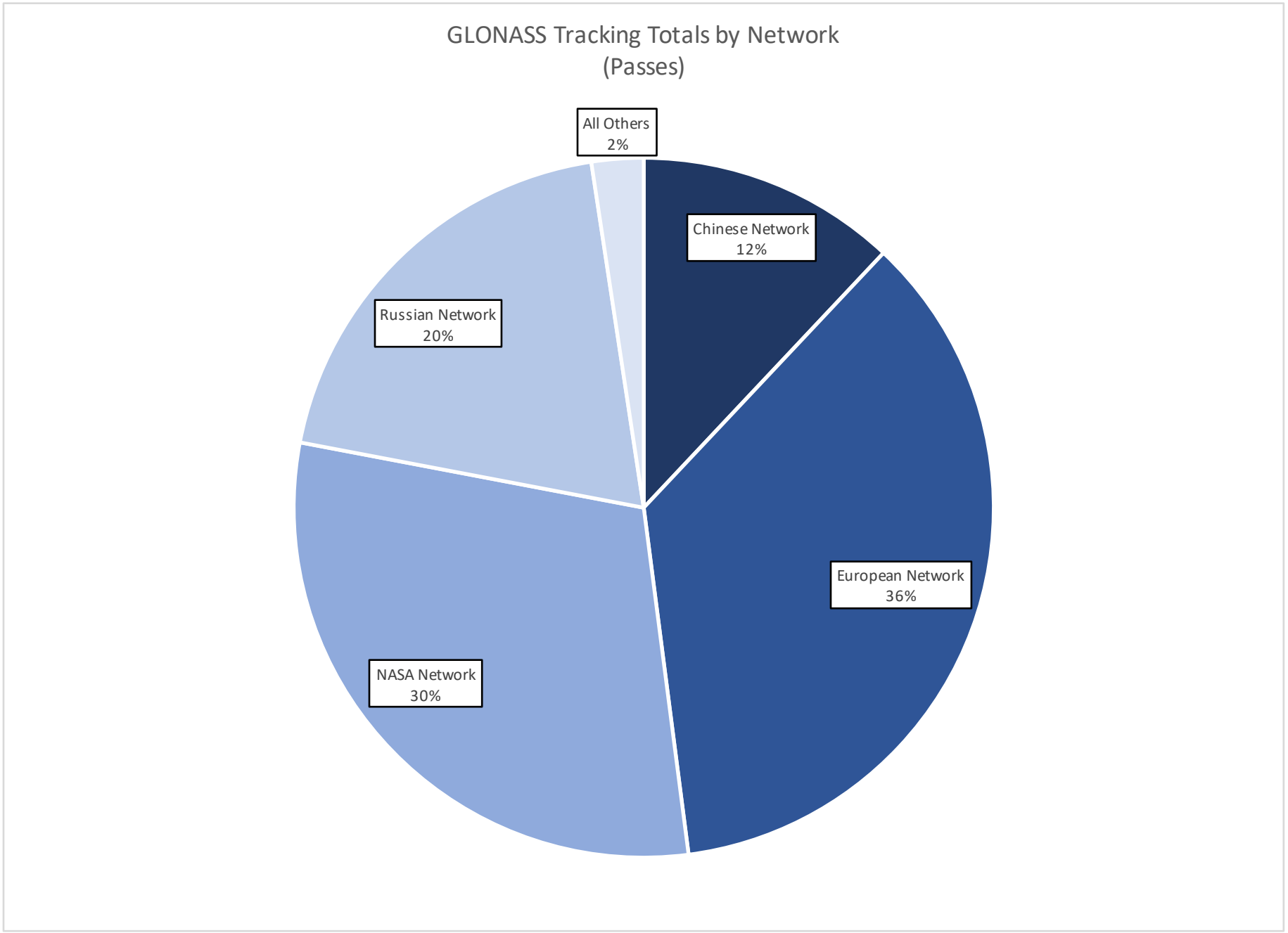
Total NPTs/constellation>100	
Total NPTs/campaign>250	

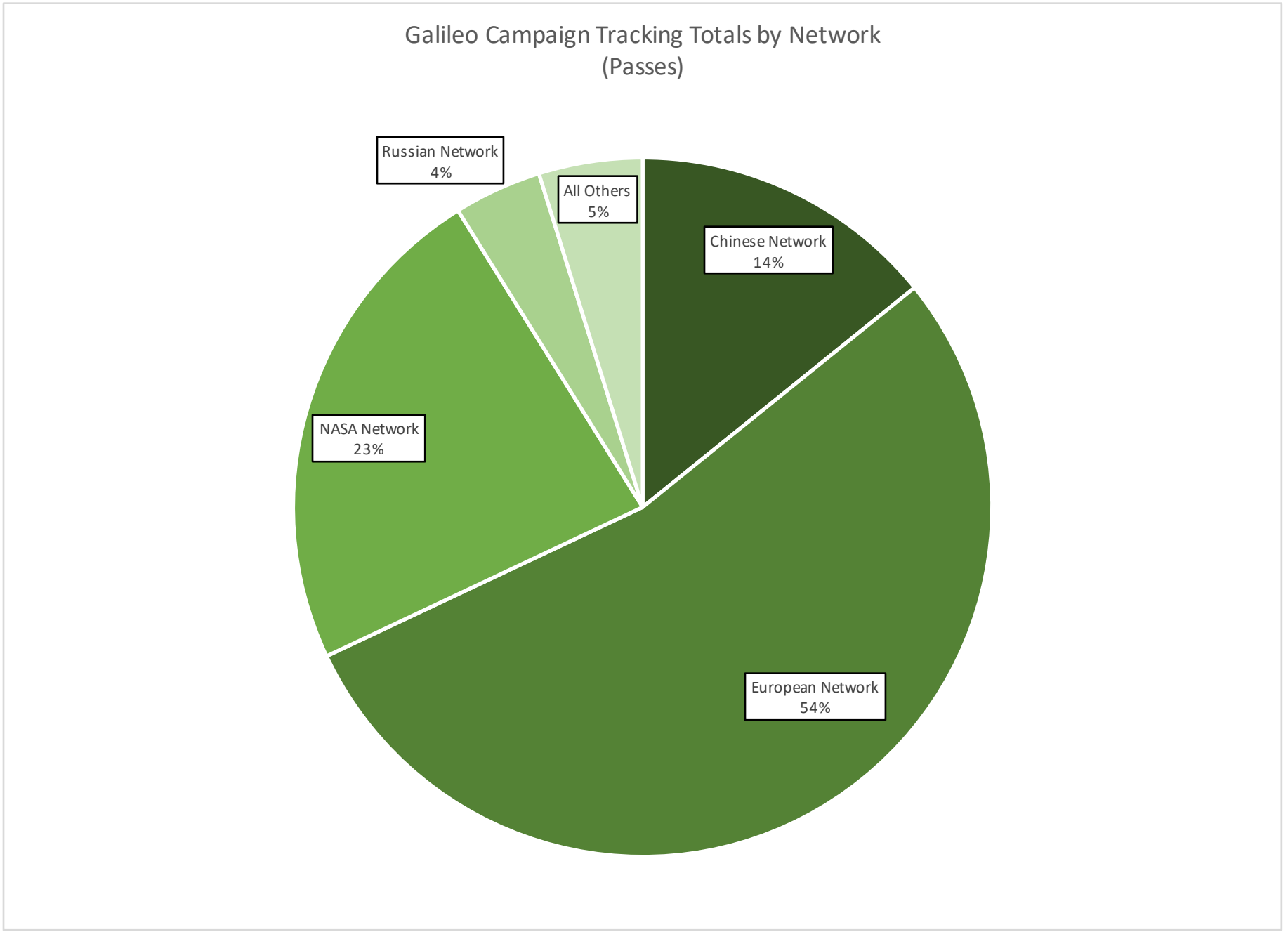

Station Tracking Totals by Constellation
(Passes)
Compass/Beidou
22%
GLONASS
42%
Galileo
36%

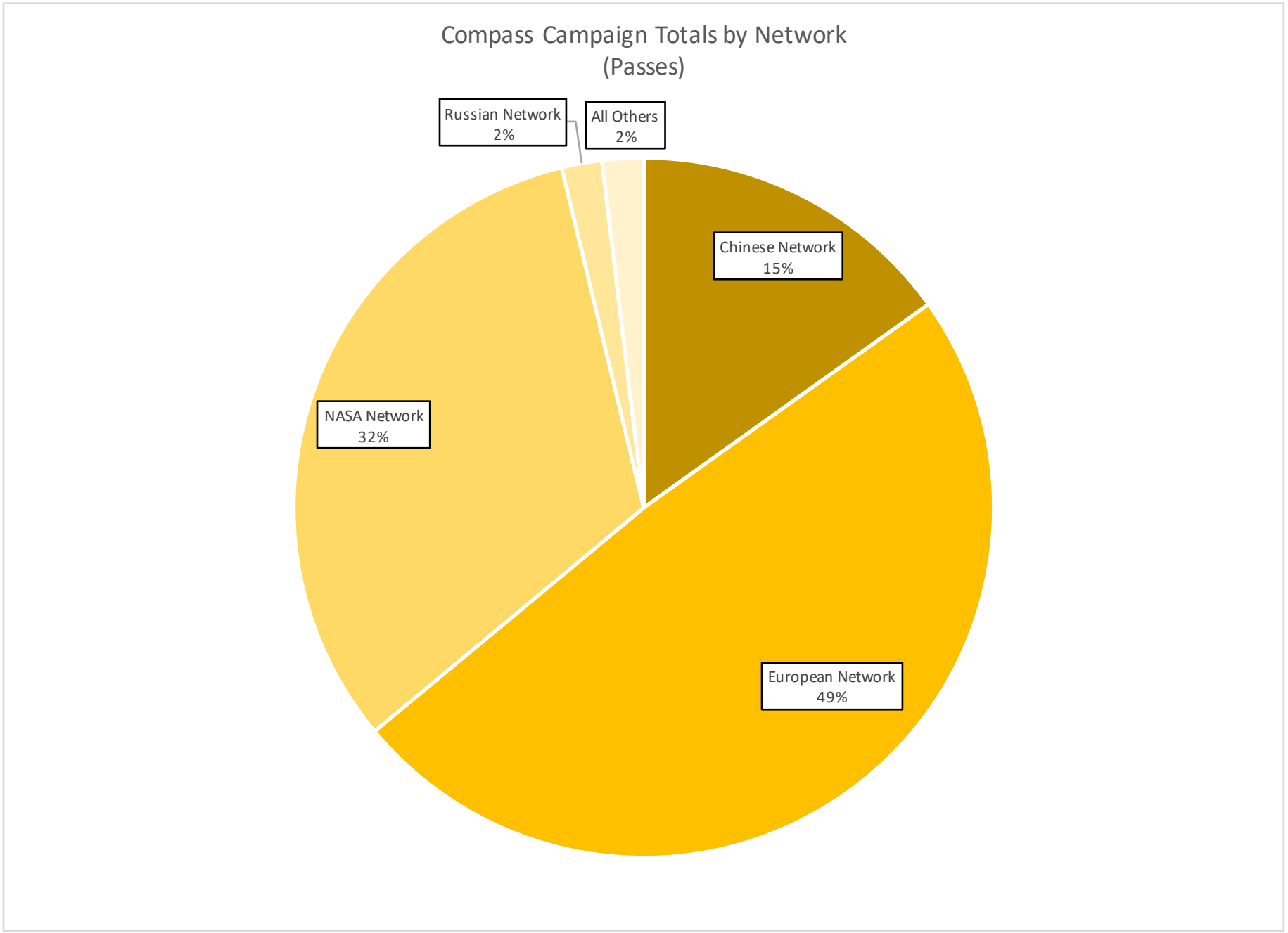

Station Tracking Totals by Constellation
(NPTs)
Compass/Beidou
21%
GLONASS
40%
Galileo
39%

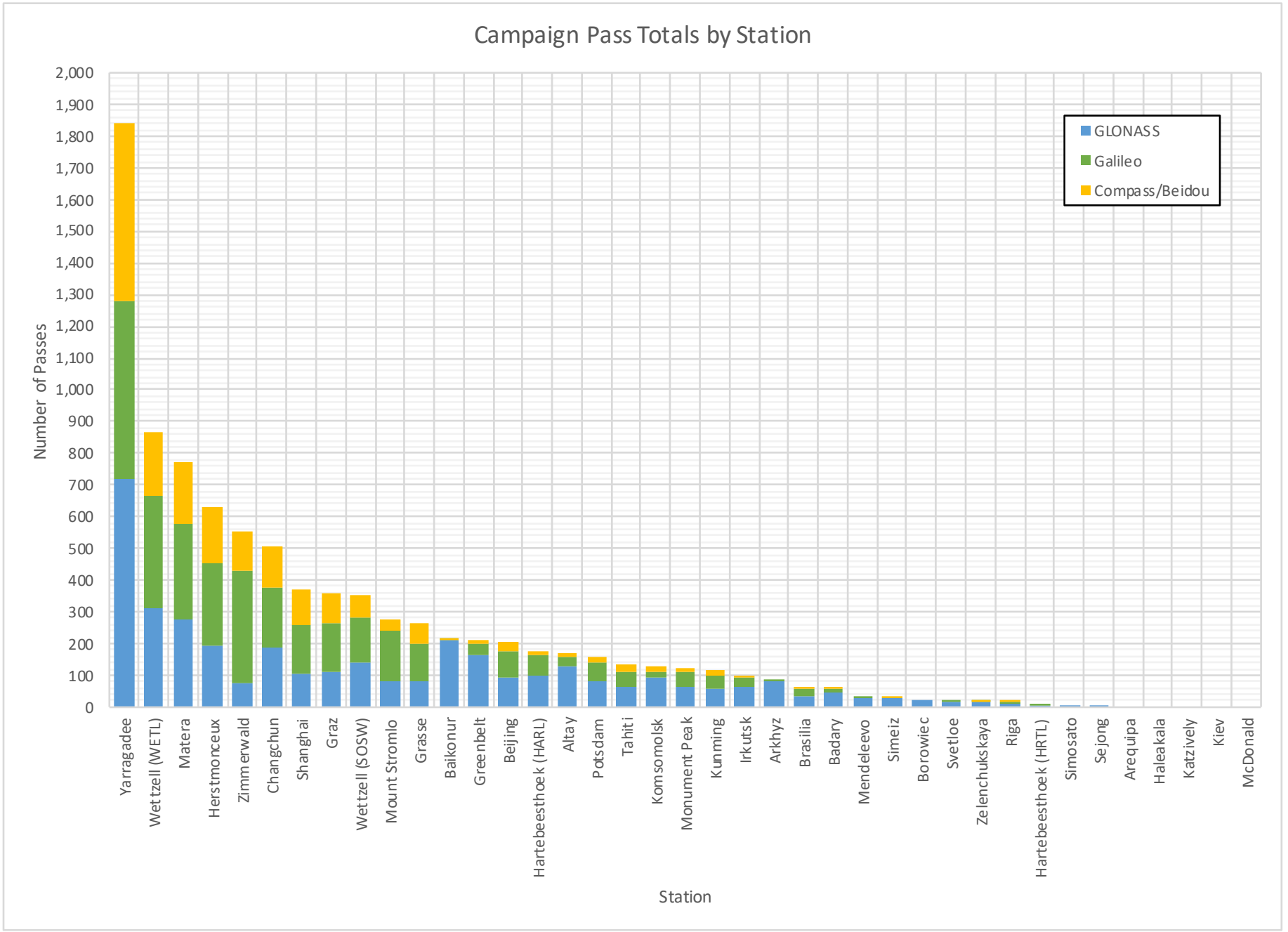

Tracking Totals by Network
(Passes)
All Others
3%
Chinese Network
14%
Russian Network
10%
NASA Network
28%
European Network
45%

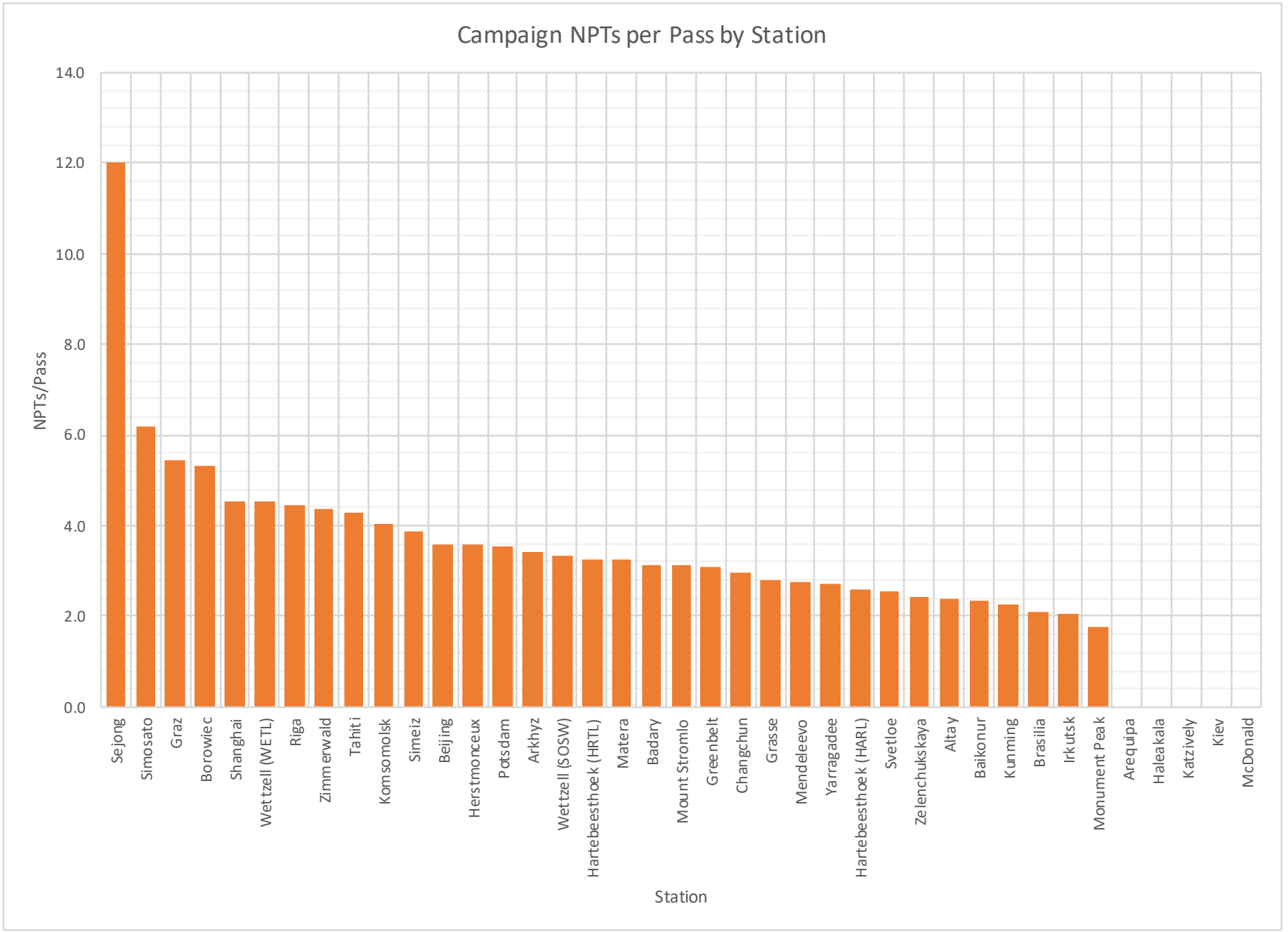

Tracking Totals by Network
(NPTs)
All Others
3%
Chinese Network
14%
Russian Network
8%
NASA Network
23%
European Network
52%


GLONASS Tracking Totals by Network
(Passes)
All Others
2%
Chinese Network
12%
Russian Network
20%
European Network
36%
NASA Network
30%

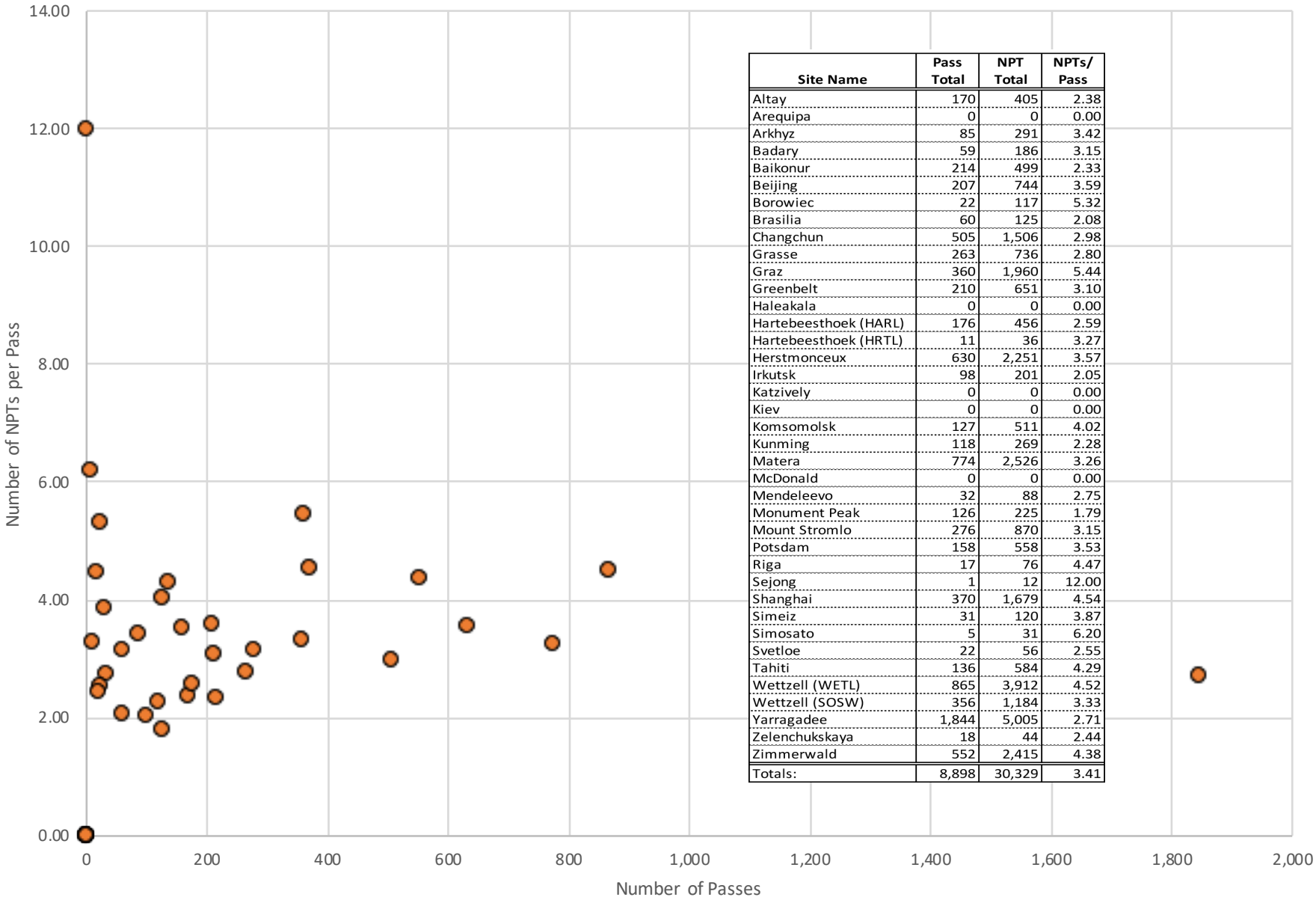

Galileo Campaign Tracking Totals by Network
(Passes)
Russian Network
4%
All Others
5%
Chinese Network
14%
NASA Network
23%
European Network
54%


Compass Campaign Totals by Network
(Passes)
Russian Network
2%
All Others
2%
Chinese Network
15%
NASA Network
32%
European Network
49%

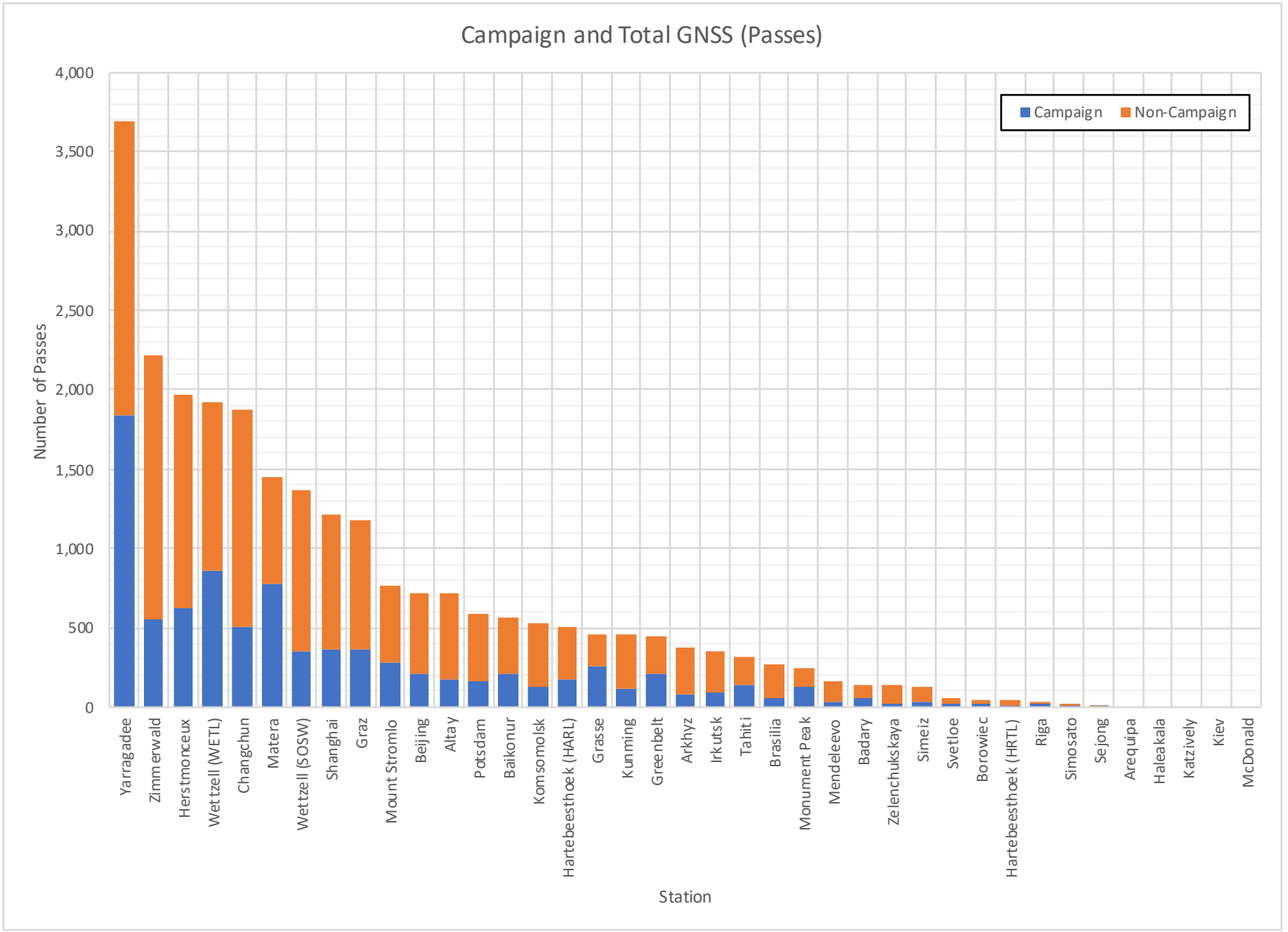

Campaign Pass Totals by Station
Number of Passes
2,000
1,900
1,800
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
GLONASS
Galileo
Compass/Beidou
Yarragadee
Wettzell (WETL)
Matera
Herstmonceux
Zimmerwald
Changchun
Shanghai
Graz
Wettzell (SOSW)
Mount Stromlo
Grasse
Baikonur
Greenbelt
Beijing
Hartebeesthoek (HARL)
Altay
Potsdam
Tahiti
Komsomolsk
Monument Peak
Kunming
Irkutsk
Arkhyz
Brasilia
Badary
Mendeleevo
Simeiz
Borowiec
Svetloe
Zelenchukskaya
Riga
Hartebeesthoek (HRTL)
Simosato
Sejong
Arequipa
Haleakala
Katzively
Kiev
McDonald
Station

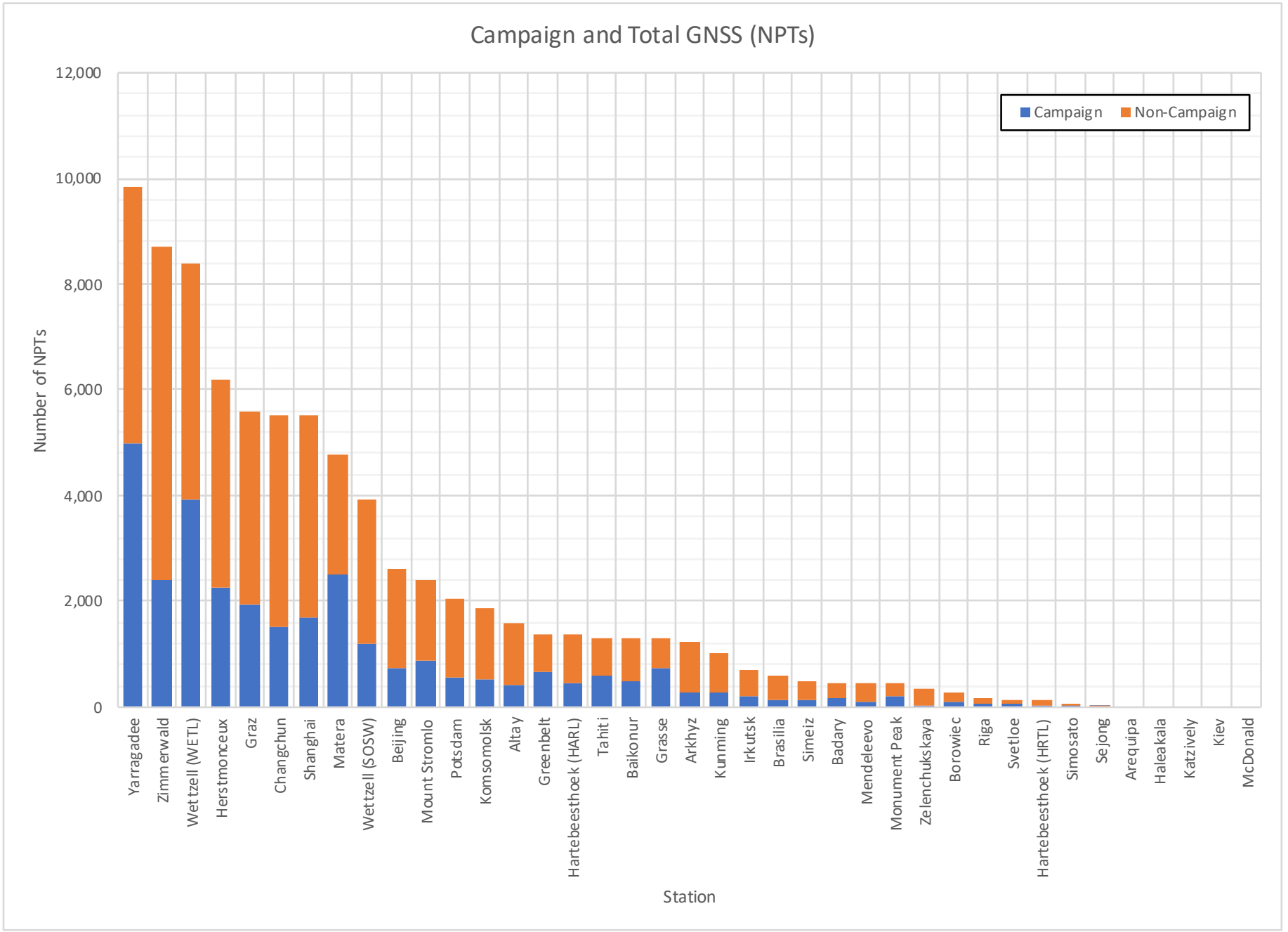

Campaign NPTs per Pass by Station
NPTs/Pass
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Sejong
Simosato
Graz
Borowiec
Shanghai
Wettzell (WETL)
Riga
Zimmerwald
Tahiti
Komsomolsk
Simeiz
Beijing
Herstmonceux
Potsdam
Arkhyz
Wettzell (SOSW)
Hartebeesthoek (HRTL)
Matera
Badary
Mount Stromlo
Greenbelt
Changchun
Grasse
Mendeleevo
Yarragadee
Hartebeesthoek (HARL)
Svetloe
Zelenchukskaya
Altay
Baikonur
Kunming
Brasilia
Irkutsk
Monument Peak
Arequipa
Haleakala
Katzively
Kiev
McDonald
Station

Station Performance: Campaign Normal Points per Pass



Site Name	Pass Total	NPT Total	NPTs/ Pass
Altay	170	405	2.38
Arequipa	0	0	0.00
Arkhyz	85	291	3.42
Badary	59	186	3.15
Baikonur	214	499	2.33
Beijing	207	744	3.59
Borowiec	22	117	5.32
Brasilia	60	125	2.08
Changchun	505	1,506	2.98
Grasse	263	736	2.80
Graz	360	1,960	5.44
Greenbelt	210	651	3.10
Haleakala	0	0	0.00
Hartebeesthoek (HARL)	176	456	2.59
Hartebeesthoek (HRTL)	11	36	3.27
Herstmonceux	630	2,251	3.57
Irkutsk	98	201	2.05
Katzively	0	0	0.00
Kiev	0	0	0.00
Komsomolsk	127	511	4.02
Kunming	118	269	2.28
Matera	774	2,526	3.26
McDonald	0	0	0.00
Mendeleevo	32	88	2.75
Monument Peak	126	225	1.79
Mount Stromlo	276	870	3.15
Potsdam	158	558	3.53
Riga	17	76	4.47
Sejong	1	12	12.00
Shanghai	370	1,679	4.54
Simeiz	31	120	3.87
Simosato	5	31	6.20
Svetloe	22	56	2.55
Tahiti	136	584	4.29
Wettzell (WETL)	865	3,912	4.52
Wettzell (SOSW)	356	1,184	3.33
Yarragadee	1,844	5,005	2.71
Zelenchukskaya	18	44	2.44
Zimmerwald	552	2,415	4.38
Totals:	8,898	30,329	3.41


Campaign and Total GNSS (Passes)
Campaign
Non-Campaign
Number of Passes
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Yarragadee
Zimmerwald
Herstmonceux
Wettzell (WETL)
Changchun
Matera
Wettzell (SOSW)
Shanghai
Graz
Mount Stromlo
Beijing
Altay
Potsdam
Baikonur
Komsomolsk
Hartebeesthoek (HARL)
Grasse
Kunming
Greenbelt
Arkhyz
Irkutsk
Tahiti
Brasilia
Monument Peak
Mendeleevo
Badary
Zelenchukskaya
Simeiz
Svetloe
Borowiec
Hartebeesthoek (HRTL)
Riga
Simosato
Sejong
Arequipa
Haleakala
Katzively
Kiev
McDonald
Station


Campaign and Total GNSS (NPTs)
Campaign
Non-Campaign
Number of NPTs
12,000
10,000
8,000
6,000
4,000
2,000
0
Yarragadee
Zimmerwald
Wettzell (WETL)
Herstmonceux
Graz
Changchun
Shanghai
Matera
Wettzell (SOSW)
Beijing
Mount Stromlo
Potsdam
Komsomolsk
Altay
Greenbelt
Hartebeesthoek (HARL)
Tahiti
Baikonur
Grasse
Arkhyz
Kunming
Irkutsk
Brasilia
Simeiz
Badary
Mendeleevo
Monument Peak
Zelenchukskaya
Borowiec
Riga
Svetloe
Hartebeesthoek (HRTL)
Simosato
Sejong
Arequipa
Haleakala
Katzively
Kiev
McDonald
Station

Observations from the Second 2018 LARGE Campaign

(August 1, 2018 – October 31, 2018)

- Once again, the Second 2018 LARGE Campaign lasted about 90 days. For reference, an average of one pass per constellation per day would amount to a total of 270 passes over the campaign. The table below gives a first look comparison between the two campaigns in 2019.

Overall 2018 Campaign Statistics		
	First Campaign	Second Campaign
Number Satellites	26	20
Number of Passes		
GLONASS	4,088	3,712
Galileo	2,098	3,249
Compass/Beidou	936	1,937
Total	7,122	8,898
Number of Stations (>270 Passes)	9	11
Number of Stations (>10 Passes)	15	21
Normal Points/Pass	4.38	3.41
Full GNSS Tracking Total		
Number of Passes	First Campaign	Second Campaign
GLONASS	6,867	10,032
Galileo	3,473	6,034
Compass/Beidou	936	2,025
Total	11,276	18,091

- Although we had fewer satellites in the second campaign, the network produced more data, a couple of more stations met the minimum data yield criteria (>270 passes), but the number of NP's per pass was reduced. The second campaign may have benefited from the experience factor or this data increase may just be a result of weather and/or system issues. We still have 8 to 10 stations that just do not have the capability for successful GNSS ranging.
  - Why did more than half the stations take so little data? What is limiting their performance?
- We have a much better distribution of passes among the constellations; in the second campaign considerably more data was taken on Galileo and Compass/Beidou.

- In the second campaign, the percentage of data from the European network increased significantly; not surprisingly the NASA network benefitted from the extraordinary performance of the Yarragadee station.
- With the Russian stations in Brasilia and Hartebeesthoek, and the planned stations in Mexico, Grand Canary, and Java we expect the Russian participation to grow significantly.
- More data was taken per pass on the intensive tracking targets, but there were very few cases where stations took the full three segments per pass; the ILRS needs to work with stations to increase the pass coverage.
- Since most of the GNSS satellites were not included in the campaign, but still tracked by the stations, many stations obtained more data on the non-campaign satellites than they did on the campaign satellites; one possibility is that our station performance evaluation scheme gives more "credit" for number of passes than it does for tracking intensity.
- The network was able to track 11,276 and 18,091 GNSS passes (campaign and non-campaign) over ~90 days in the first and second campaigns respectively. This amounts to 125 – 200 passes a day.
- Many of the stations that can track GNSS cannot track GNSS in daylight, restricting the tracking opportunities, stressing the need for system improvements.
- The final chart shows the performance of each station in terms of number of passes taken and average number of NP's per pass. Most of the high performing stations are falling into the 3 -5 NP range. We are not getting much 3-segment coverage.
- We need to recognize that stations operate under a wide range of different conditions and constraints; we hope that all stations will benefit from experience and improve their performance over time; SLR is unique and we need to keep improving our data products including those for our newer GNSS users.

26-Feb-2019

Planning for the Future ILRS Tracking Support of GNSS

A strategy under consideration for future GNSS tracking support is based on up to four high priority satellites chosen for intensive tracking by each constellation and a pool from the remaining GNSS satellites for sparse tracking on a random basis by the station, with perhaps some guidance to the stations to get the most useful mix of data.

The ILRS will with the GNSS constellations and the other interested groups (e.g., the International GNSS Service/IGS and the International Committee on GNSS/ICG) to design the best future tracking scenarios for GNSS
From the constellations, we will inquire:

- Does each constellation require an intensive tracking? If so, which satellites?
- Which of the other satellites in the constellation require SLR tracking?
- Are there other requirements that the ILRS should try to include?

There are presently about 61 active GNSS satellites in orbit. We need to agree on the number of the non-intensive tracked GNSS satellites should be put in the tracking pool.