

WP2 Report - Esteban Martinez

Date: 2/27/2024

GitHub Repository: [GitHub - Minimal88/JSNP7.0 at WP2](#)

Images and Code: [Google Drive - SERVUS_WP2_Esteban_Martinez.zip](#)

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T0. Preliminary

Folder structure:

```
1 (base) astro@MSI:-/git/JNSP7.0/src/SBPT/SERVUS/SERVUS_V1.0/SERVUS_WP2_IGP$ tree
2 .
3 └── SCN
4     └── EGNOS-SIS-GEO123-JAN19
5         ├── CFG
6         │   └── igpperformances.cfg
7         ├── INP
8         │   ├── ATX
9         │   │   └── igs14.atx
10        │   ├── CLK
11        │   │   ├── igs20361.clk
12        │   │   └── igs20361.clk_30s
13        │   ├── DCB
14        │   │   ├── P1C11901.DCB
15        │   │   └── P1P21901.DCB
16        │   ├── EMS
17        │   │   └── GE0123
18        │   │       └── 2019
19        │   │           └── DOY014
20        │   │               ├── DECODED_EMS_Y19D014_G123.dat
21        │   │               ├── h00.ems
22        │   │               ├── h01.ems
23        │   │               ├── h02.ems
24        │   │               ├── h03.ems
25        │   │               ├── h04.ems
26        │   │               ├── h05.ems
27        │   │               ├── h06.ems
28        │   │               ├── h07.ems
29        │   │               ├── h08.ems
30        │   │               ├── h09.ems
31        │   │               ├── h10.ems
32        │   │               ├── h11.ems
33        │   │               ├── h12.ems
34        │   │               ├── h13.ems
35        │   │               ├── h14.ems
36        │   │               ├── h15.ems
37        │   │               ├── h16.ems
38        │   │               ├── h17.ems
39        │   │               ├── h18.ems
40        │   │               ├── h19.ems
41        │   │               ├── h20.ems
42        │   │               ├── h21.ems
43        │   │               ├── h22.ems
44        │   │               └── h23.ems
45        ├── ION
46        │   └── igsg0140.19i
47        ├── NAV
48        │   └── brdc0140.19n
49        ├── RIMS
50        │   └── RIMS_REF_POSITIONS_2019.dat
51        ├── RNB
52        │   └── M1230140.19b
53        ├── SP3
54        │   └── igs20361.sp3
55        └── OUT
56            └── IGP
57                ├── IGP_INFO_Y19D014_G123_50s.dat
58                └── IGP_INFO_Y19D015_G123_50s.dat
```

```
59 |           └── IGP_INFO_Y19D016_G123_50s.dat
60 |
61 └── SRC
62     ├── COMMON
63         ├── Coordinates.py
64         ├── Dates.py
65         ├── GnssConstants.py
66         ├── Plots.py
67         ├── PlotsConstants.py
68         └── __init__.py
69     ├── IgpFunctions.py
70     └── IgpPerformances.py
71
72 21 directories, 47 files
```

T1. Implementation

T1.1 Configuration

T1.2 Coding

Created new files and re-used functions from WP1.

Example of Execution

```
1 -----  
2 --> RUNNING IGP-PERFORMANCE ANALYSIS:  
3 -----  
4  
5 *** Processing Day of Year: 14 ***
```

```

6 1. Processing file: EGNOS-SIS-GE0123-JAN19/OUT/IGP/IGP_INFO_Y19D014_G123_50s.dat
7 2. Created file: EGNOS-SIS-GE0123-JAN19/OUT/IGP/IGP_STAT_Y19D014_G123_50s.dat
8 3. Generating Figures...
9
10 Ploting: IGP Map: IGP Monitoring Percentage [%] Y19D014 G123 50s
11 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MON_MAP_Y19D014_G123_50s.png
12 Ploting: IGP Map: Minimum Number of IPPs Y19D014 G123 50s
13 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MIN_NIPPS_MAP_Y19D014_G123_50s.png
14 Ploting: IGP Map: Maximum Number of IPPs Y19D014 G123 50s
15 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_NIPPS_MAP_Y19D014_G123_50s.png
16 Ploting: IGP Map: Maximum VTEC [m] Y19D014 G123 50s
17 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_VTEC_MAP_Y19D014_G123_50s.png
18 Ploting: IGP Map: Maximum GIVD [m] Y19D014 G123 50s
19 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_GIVD_MAP_Y19D014_G123_50s.png
20 Ploting: IGP Map: RMS GIVD Error [m] Y19D014 G123 50s
21 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_RMS_GIVDE_MAP_Y19D014_G123_50s.png
22 Ploting: IGP Map: Maximum GIVE [m] Y19D014 G123 50s
23 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_GIVE_MAP_Y19D014_G123_50s.png
24 Ploting: IGP Map: Maximum GIVEi [m] Y19D014 G123 50s
25 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_GIVEi_MAP_Y19D014_G123_50s.png
26 Ploting: IGP Map: Maximum SI Y19D014 G123 50s
27 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_MAX_SI_MAP_Y19D014_G123_50s.png
28 Ploting: IGP Map: Number of Transitions MtoNM MtoDU Y19D014 G123 50s
29 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_NTRANS_MAP_Y19D014_G123_50s.png
30 Ploting: IGP Map: Number of MI Y19D014 G123 50s
31 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_NMI_MAP_Y19D014_G123_50s.png
32 Ploting: Number of IGP Monitored EGNOS SIS Y19D014
33 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_MON_Y19D014_G123_50s.png
34 Ploting: IGP CENTER [Lon|Lat]:[5:45] Y19D014
35 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_GIVE_GIVEI_CENTER_Y19D014_G123_50s.png
36 Ploting: IGP SW-1 [Lon|Lat]:[-20:20] Y19D014
37 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_GIVE_GIVEI_SW-1_Y19D014_G123_50s.png
38 Ploting: IGP SW-2 [Lon|Lat]:[35:20] Y19D014
39 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_GIVE_GIVEI_SW-2_Y19D014_G123_50s.png
40 Ploting: IGP NW-1 [Lon|Lat]:[-20:65] Y19D014
41 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_GIVE_GIVEI_NW-1_Y19D014_G123_50s.png
42 Ploting: IGP NW-2 [Lon|Lat]:[35:60] Y19D014
43 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_GIVE_GIVEI_NW-2_Y19D014_G123_50s.png
44 Ploting: IGP CENTER [Lon|Lat]:[5:45] Y19D014
45 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_VTEC_CENTER_Y19D014_G123_50s.png
46 Ploting: IGP SW-1 [Lon|Lat]:[-20:20] Y19D014
47 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_VTEC_SW-1_Y19D014_G123_50s.png
48 Ploting: IGP SW-2 [Lon|Lat]:[35:20] Y19D014
49 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_VTEC_SW-2_Y19D014_G123_50s.png
50 Ploting: IGP NW-1 [Lon|Lat]:[-20:65] Y19D014
51 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_VTEC_NW-1_Y19D014_G123_50s.png
52 Ploting: IGP NW-2 [Lon|Lat]:[35:60] Y19D014
53 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_GIVDE_VTEC_NW-2_Y19D014_G123_50s.png
54 Ploting: IGPs VTEC Evolution Y19D014
55 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_VTEC_All_Positions_Y19D014_G123_50s.png
56 Ploting: IGPs GIVDE/5.33*GIVE Y19D014
57 -> EGNOS-SIS-GE0123-JAN19/OUT/IGP/FIGURES/IGP_TIME_SI_All_Positions_Y19D014_G123_50s.png

```

T2. Statistics

Generated file

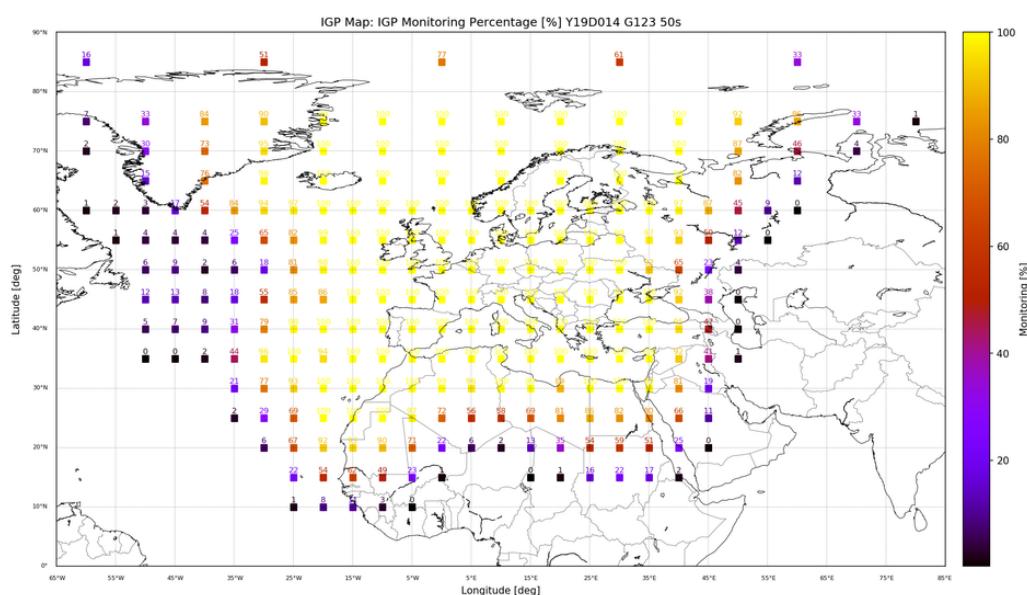
Name: IGP_STAT_Y19D014_G123_50s.dat

	src > SBPT > SERVUS > IGP > SCN > EGNO-SIS-GEO123-JAN19 > OUT > IGP > IGP_STAT_Y19D014_G123_50s.dat	ID	BAND	BIT	Lon	Lat	Mon	MINIPPs	MAXIPPs	NTRANS	RMSGIVDE	MAXGIVD	MAXGIVE	MAXGIVEI	MAXVTEC	MAXSI	NMI
1	1	3	50	-55.00	55.00	1.56	1	32	4	0.2234	1.000	13.678	14	1.207	0.0185	0	
2	2	3	72	-50.00	35.00	0.46	0	31	2	0.3095	1.125	13.678	14	1.957	0.0158	0	
3	3	73	-50.00	40.00	5.90	1	27	5	0.4754	1.375	13.678	14	1.851	0.0225	0		
4	4	3	74	-50.00	45.00	12.73	1	29	4	0.2316	1.500	13.678	14	1.657	0.0203	0	
5	5	3	75	-50.00	50.00	6.54	0	30	3	0.1924	1.250	13.678	14	1.407	0.0171	0	
6	6	3	76	-50.00	55.00	4.17	0	31	5	0.2135	0.875	13.678	14	1.194	0.0162	0	
7	9	3	97	-45.00	35.00	0.69	0	27	2	0.1130	1.375	13.678	14	1.879	0.0130	0	
8	10	3	98	-45.00	40.00	7.47	0	28	6	0.3214	1.250	13.678	14	1.790	0.0206	0	
11	11	3	99	-45.00	45.00	13.14	1	31	7	0.2443	1.250	13.678	14	1.673	0.0181	0	
12	12	3	100	-45.00	50.00	9.55	0	29	7	0.2116	1.125	13.678	14	1.429	0.0160	0	
13	13	3	101	-45.00	55.00	4.11	1	32	6	0.3384	1.500	13.678	14	1.180	0.0179	0	
17	17	3	122	-40.00	35.00	2.03	2	27	4	0.1650	1.500	13.678	14	1.859	0.0157	0	
18	18	3	123	-40.00	40.00	9.09	2	28	10	0.3436	1.125	13.678	14	1.738	0.0153	0	
19	19	3	124	-40.00	45.00	8.16	1	32	9	0.4225	1.125	13.678	14	1.641	0.0210	0	
20	20	3	125	-40.00	50.00	2.95	0	33	5	0.3519	1.375	13.678	14	1.445	0.0208	0	
21	21	3	126	-40.00	55.00	4.51	0	36	9	0.3177	1.750	13.678	14	1.169	0.0203	0	
24	24	3	145	-35.00	25.00	2.72	1	39	5	0.2666	3.000	13.678	14	2.704	0.0461	0	
25	25	3	146	-35.00	30.00	21.59	4	32	16	0.2412	2.250	13.678	14	2.232	0.0461	0	
26	26	3	147	-35.00	35.00	44.33	6	38	28	0.1734	1.875	13.678	14	1.878	0.2650	0	
27	27	3	148	-35.00	40.00	31.66	5	37	25	0.3036	1.625	4.559	13	1.690	0.2676	0	
28	28	3	149	-35.00	45.00	18.29	3	40	33	0.4675	1.625	13.678	14	1.611	0.1446	0	
29	29	3	150	-35.00	50.00	6.66	0	34	11	0.2779	1.500	13.678	14	1.426	0.0447	0	
30	30	3	151	-35.00	55.00	25.35	2	37	16	0.5245	2.875	13.678	14	1.159	0.0543	0	
32	32	3	169	-30.00	20.00	6.13	1	43	8	0.1258	3.750	13.678	14	3.443	0.0177	0	
33	33	3	170	-30.00	25.00	29.92	1	37	17	0.1943	3.375	13.678	14	2.929	0.0988	0	
34	34	3	171	-30.00	30.00	77.37	5	37	17	0.3126	2.125	13.678	14	2.355	0.2681	0	
35	35	3	172	-30.00	35.00	96.82	8	47	4	0.2132	1.750	4.559	13	1.900	0.3138	0	
36	36	3	173	-30.00	40.00	79.34	8	48	17	0.3043	1.625	13.678	14	1.683	0.3494	0	
37	37	3	174	-30.00	45.00	55.73	5	40	29	0.3487	1.500	13.678	14	1.581	0.2738	0	
38	38	3	175	-30.00	50.00	18.34	1	34	15	0.4900	2.125	13.678	14	1.437	0.1511	0	
39	39	3	176	-30.00	55.00	65.97	2	31	25	0.5075	2.875	13.678	14	1.180	0.1737	0	
40	40	3	192	-25.00	10.00	1.85	3	36	3	0.2622	3.000	13.678	14	3.524	0.0165	0	
41	41	3	193	-25.00	15.00	22.51	2	38	19	0.2437	3.875	13.678	14	3.768	0.2193	0	
42	42	3	194	-25.00	20.00	67.25	6	45	18	0.3125	4.250	13.678	14	3.670	0.2132	0	
43	43	3	195	-25.00	25.00	69.73	10	51	15	0.2280	3.500	4.559	13	3.153	0.2790	0	
44	44	3	196	-25.00	30.00	93.06	14	55	6	0.3815	2.125	1.368	11	2.485	0.4299	0	
45	45	3	197	-25.00	35.00	100.00	14	52	0	0.3650	1.625	1.368	11	1.922	0.3785	0	
46	46	3	198	-25.00	40.00	98.84	9	49	1	0.3565	1.500	4.559	13	1.678	0.3930	0	
47	47	3	199	-25.00	45.00	85.19	5	47	15	0.3145	1.750	13.678	14	1.551	0.3412	0	
48	48	3	200	-25.00	50.00	81.42	3	40	25	0.2885	1.750	13.678	14	1.462	0.2200	0	
49	49	3	201	-25.00	55.00	82.47	4	39	15	0.4199	2.375	13.678	14	1.202	0.2756	0	

T2. Plots Statistics

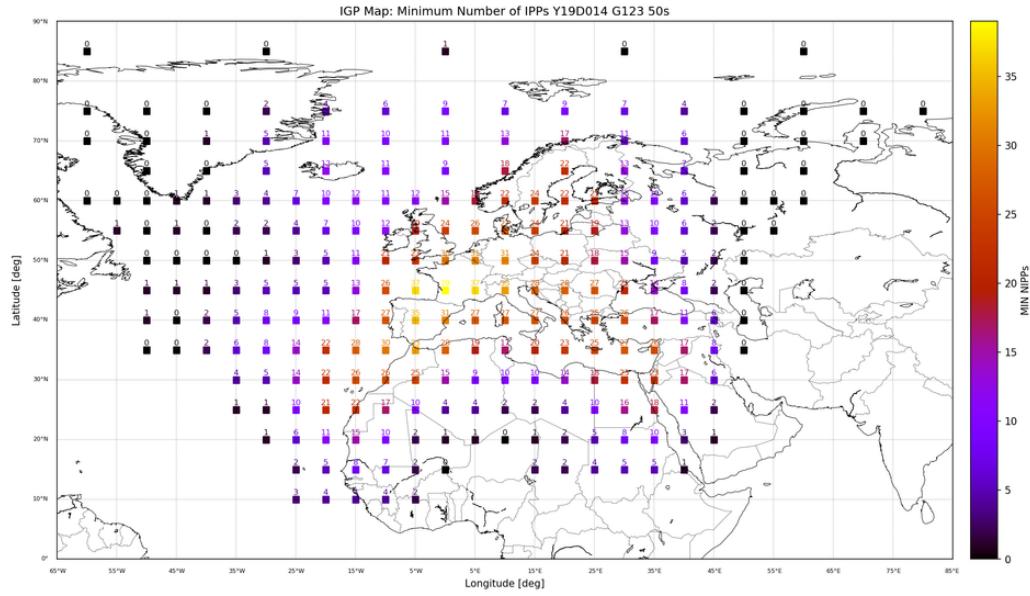
Monitoring

Name: IGP_MON_MAP_Y19D014_G123_50s.png



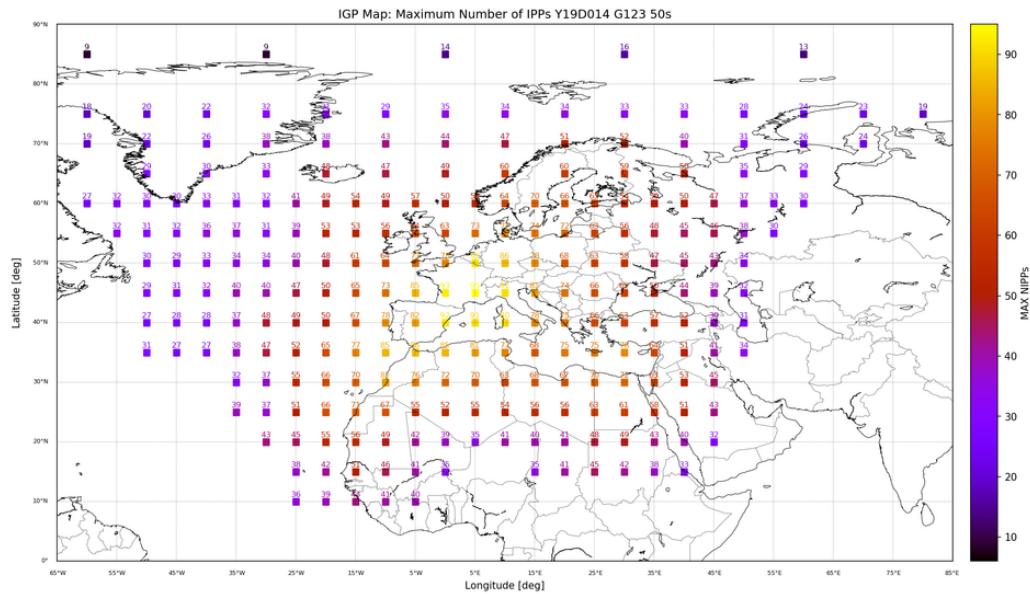
MIN-NIPPs

Name: IGP_MIN_NIPPs_MAP_Y19D014_G123_50s.png



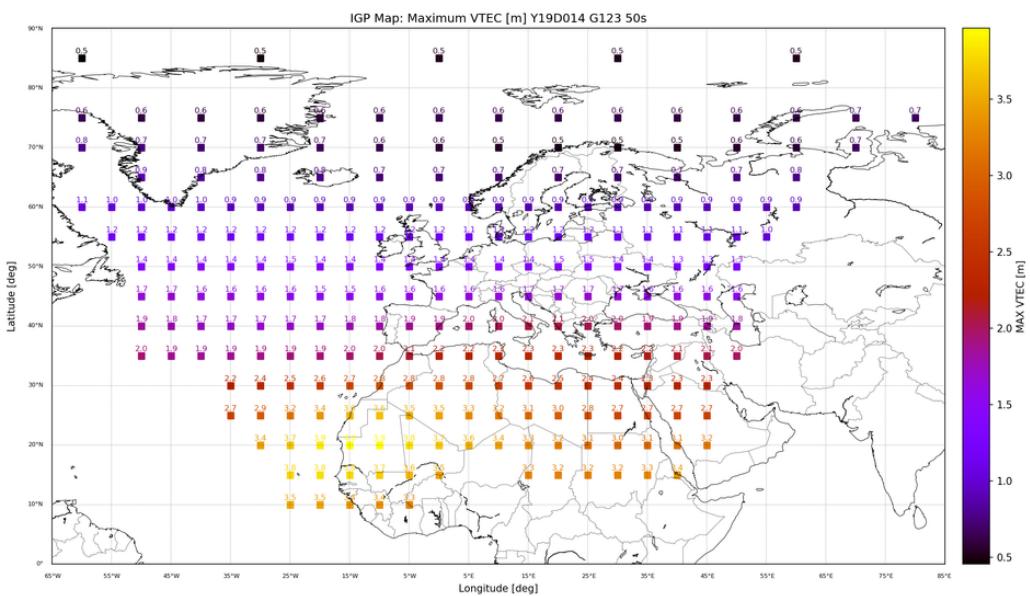
MAX-IPPs

Name: IGP_MAX_NIPPs_MAP_Y19D014_G123_50s.png



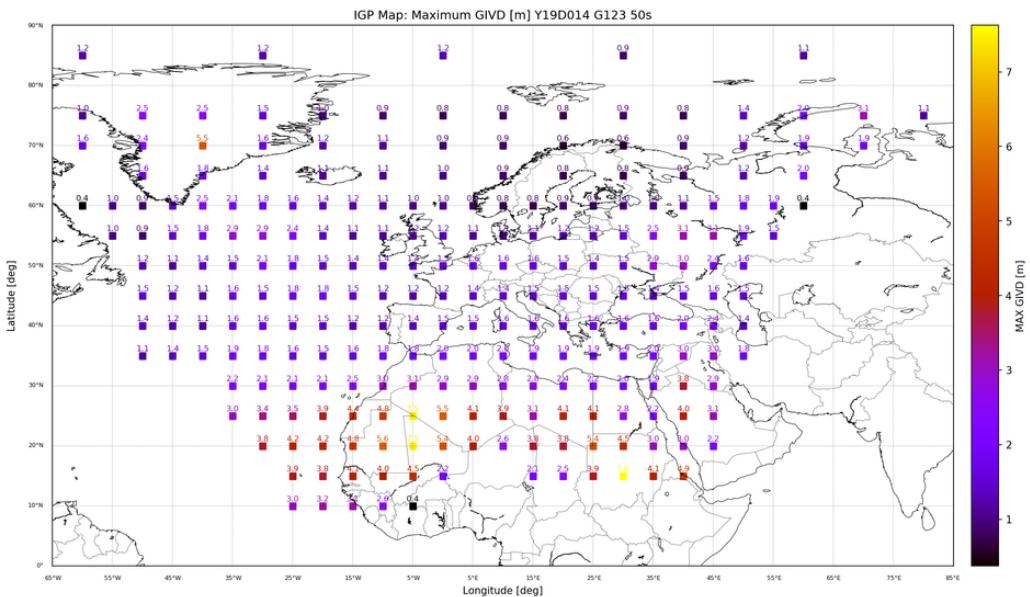
MAX VTEC

Name: IGP_MAX_VTEC_MAP_Y19D014_G123_50s.png



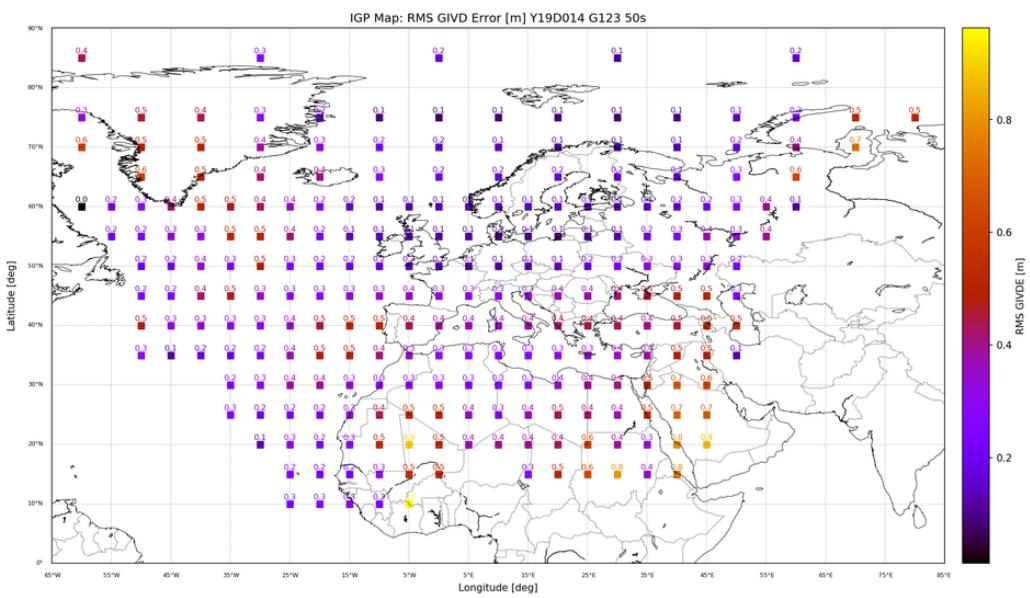
MAX GIVD

Name: [IGP_MAX_GIVD_MAP_Y19D014_G123_50s.png](#)



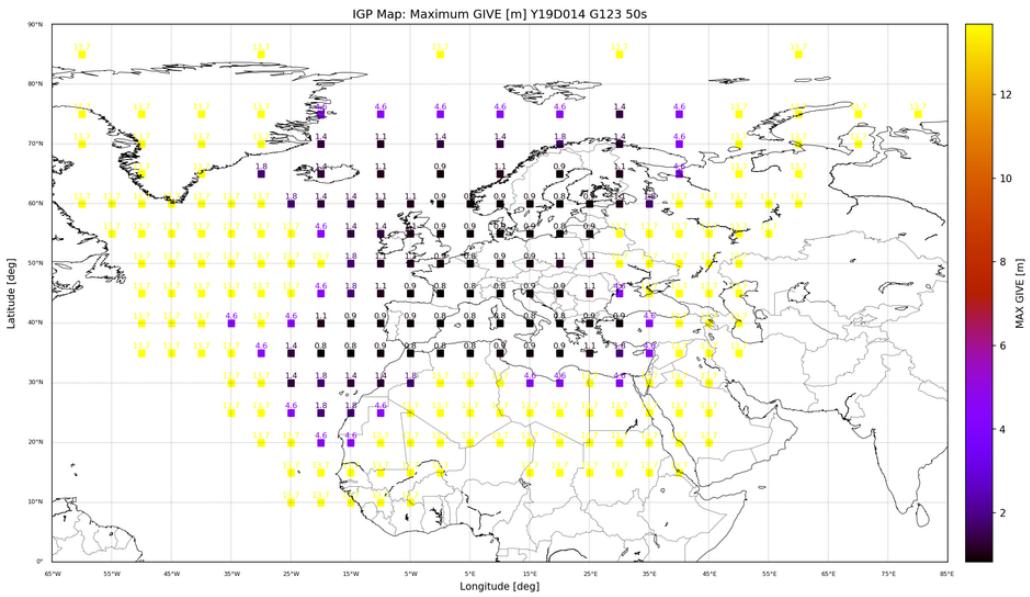
RMS-GIVDE

Name: [IGP_MAX_RMS_GIVDE_MAP_Y19D014_G123_50s.png](#)



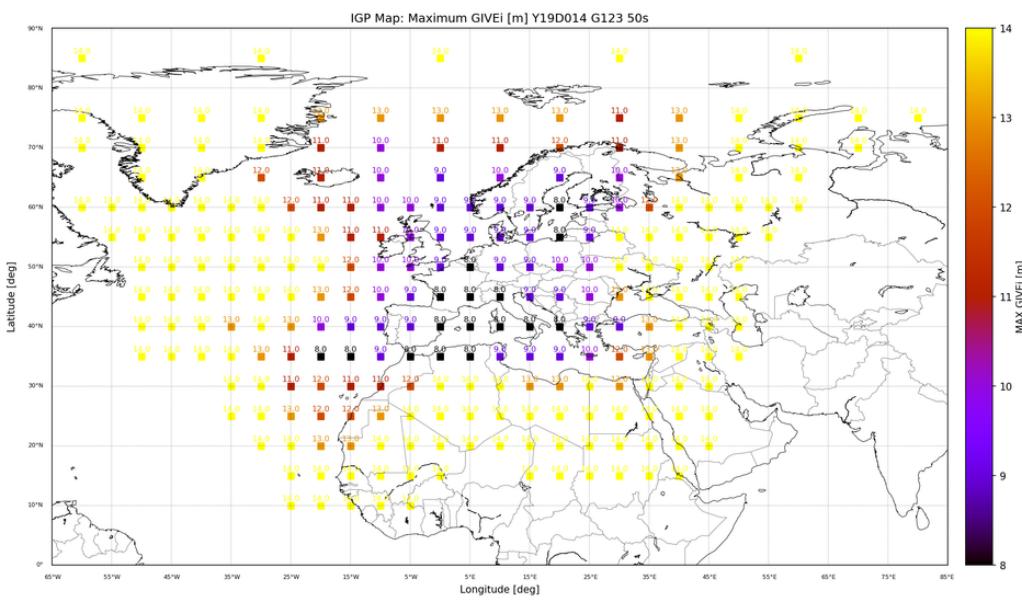
MAX GIVE

Name: [IGP_MAX_GIVE_MAP_Y19D014_G123_50s.png](#)



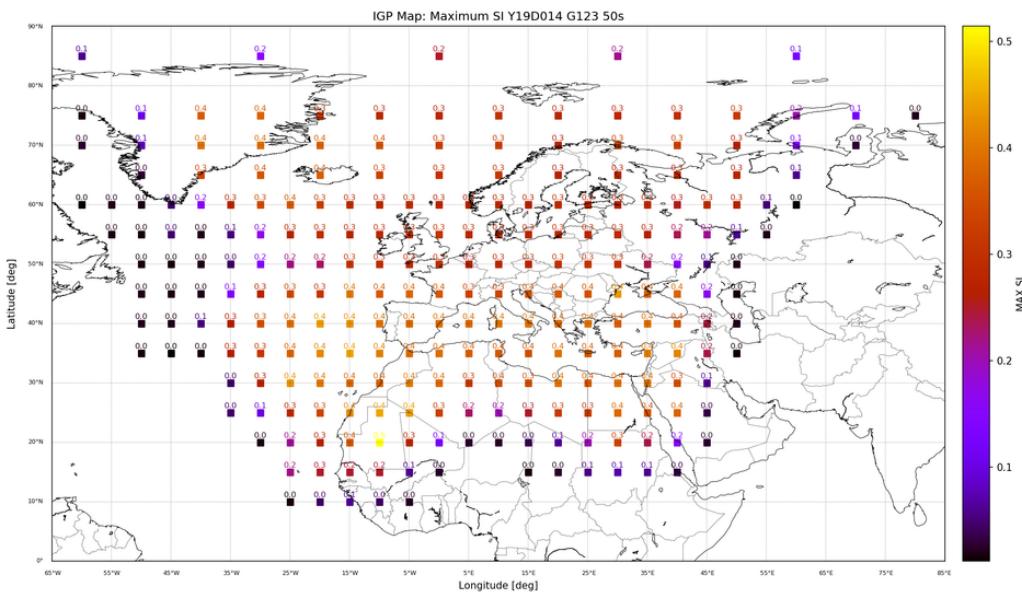
MAX GIVEi

Name: [IGP_MAX_GIVEi_MAP_Y19D014_G123_50s.png](#)



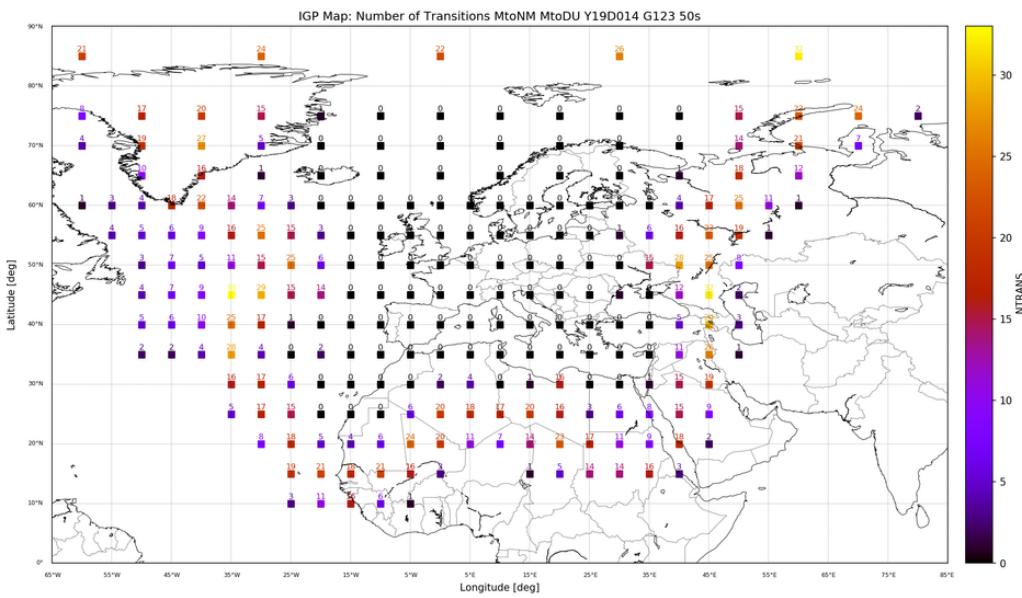
MAX SI

Name: [IGP_MAX_SI_MAP_Y19D014_G123_50s.png](#)



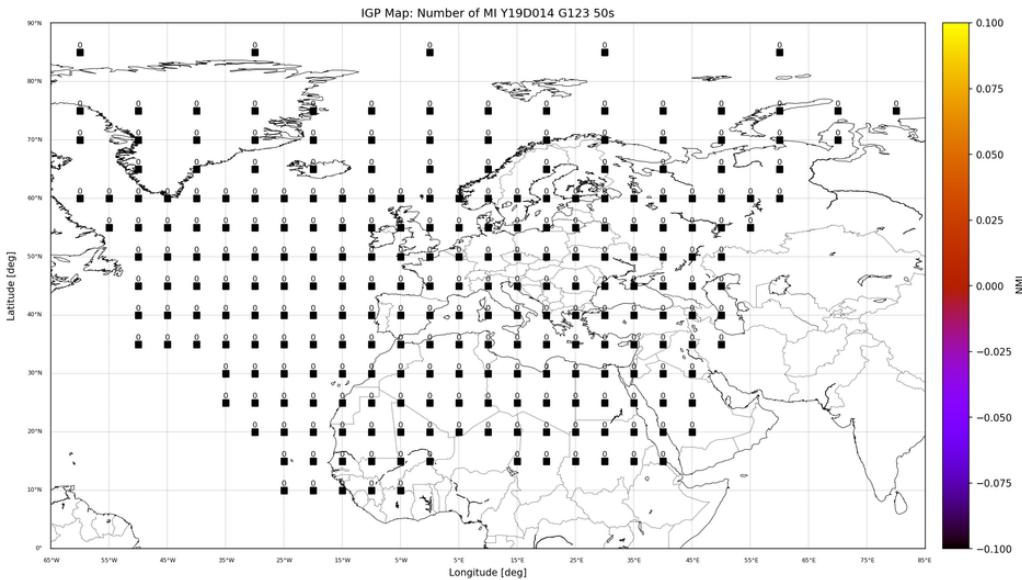
NTRANS

Name: [IGP_NTRANS_MAP_Y19D014_G123_50s.png](#)



NMI

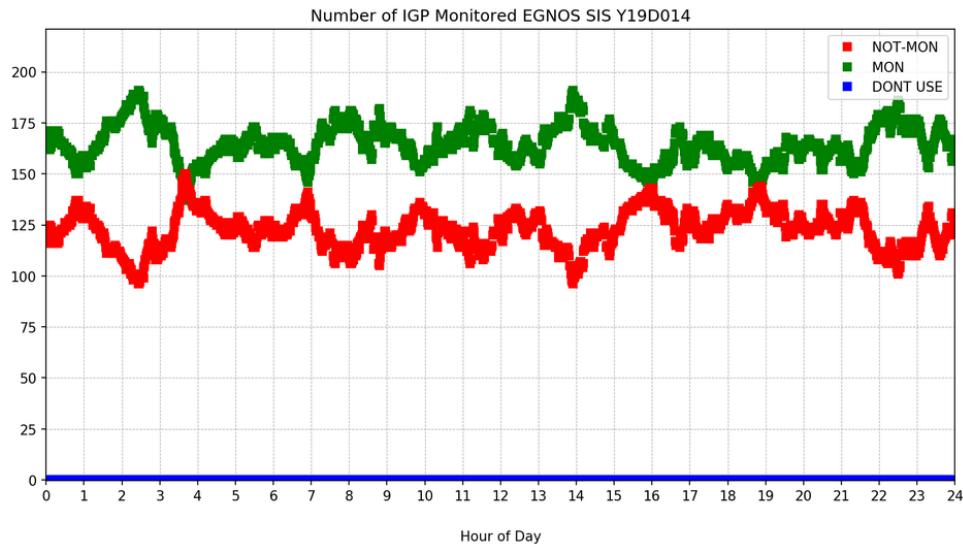
Name: [IGP_NMI_MAP_Y19D014_G123_50s.png](#)



T3. Plots vs Time

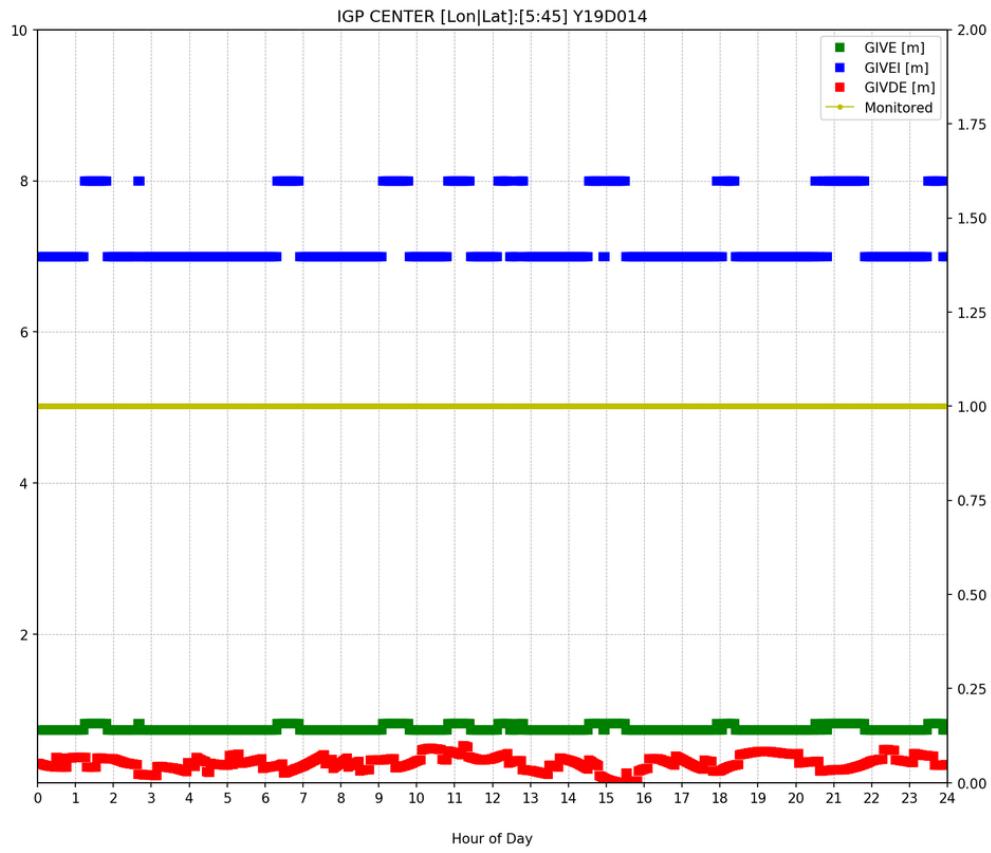
Monitoring

Name: [IGP_TIME_MON_Y19D014_G123_50s.png](#)



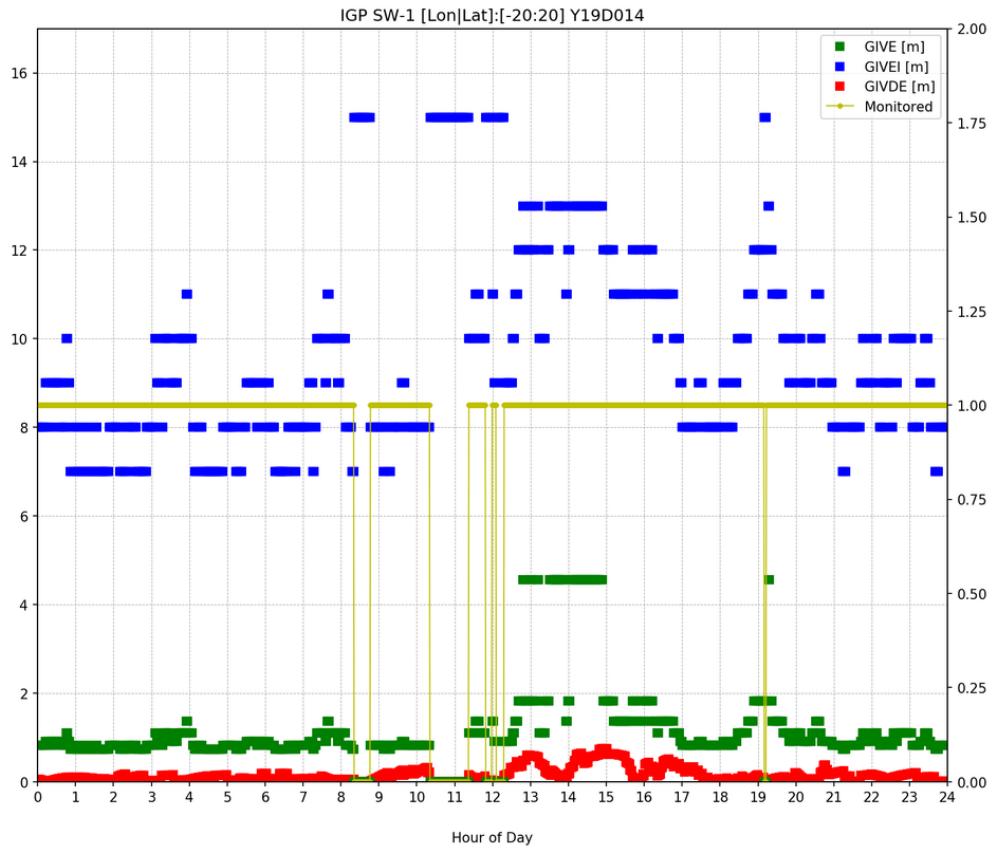
GIVDE, GIVE, GIVEi and Monitoring - IGP Center

Name: [IGP_TIME_GIVDE_GIVE_GIVEI_CENTER_Y19D014_G123_50s.png](#)

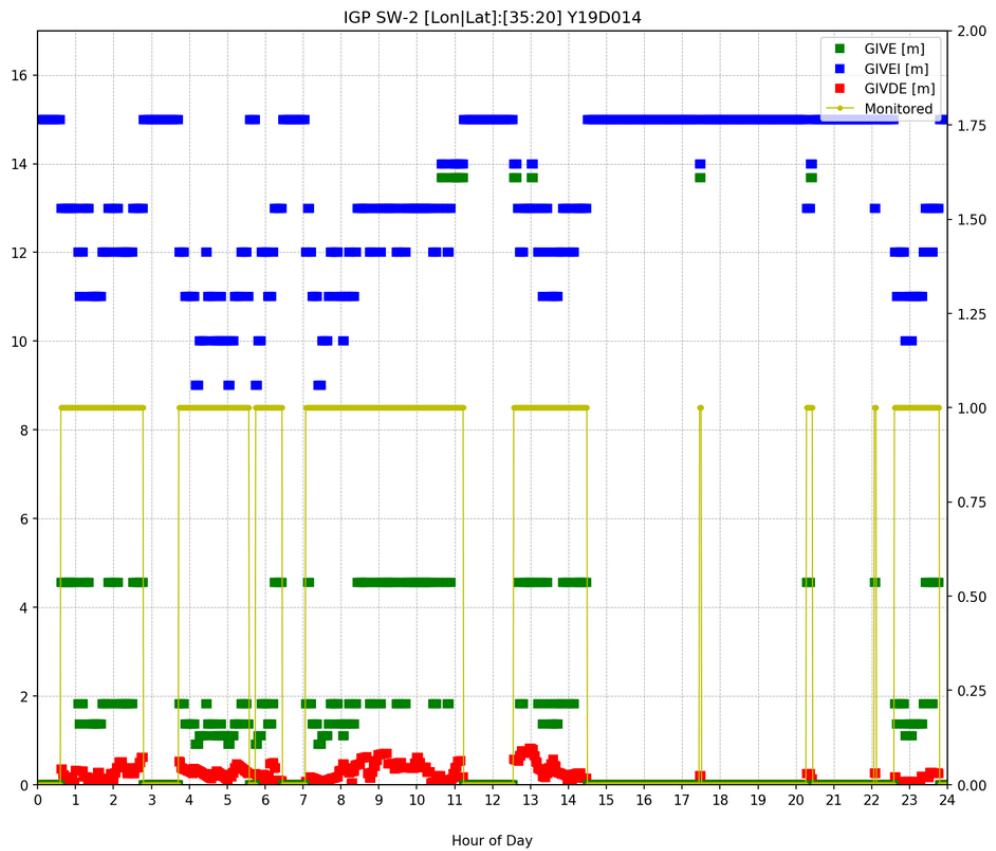


GIVDE, GIVE, GIVEi and Monitoring - IGPs Southern

Name: [IGP_TIME_GIVDE_GIVE_GIVEI_SW-1_Y19D014_G123_50s.png](#)

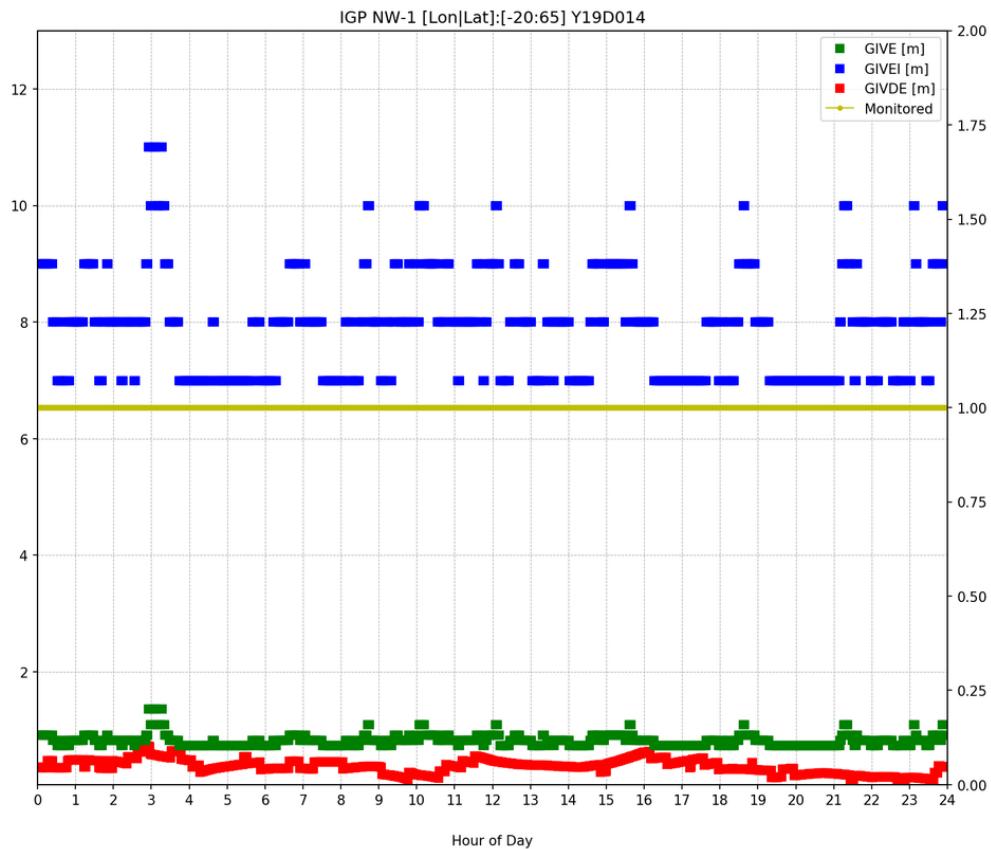


Name: IGP_TIME_GIVDE_GIVE_GIVEI_SW-2_Y19D014_G123_50s.png

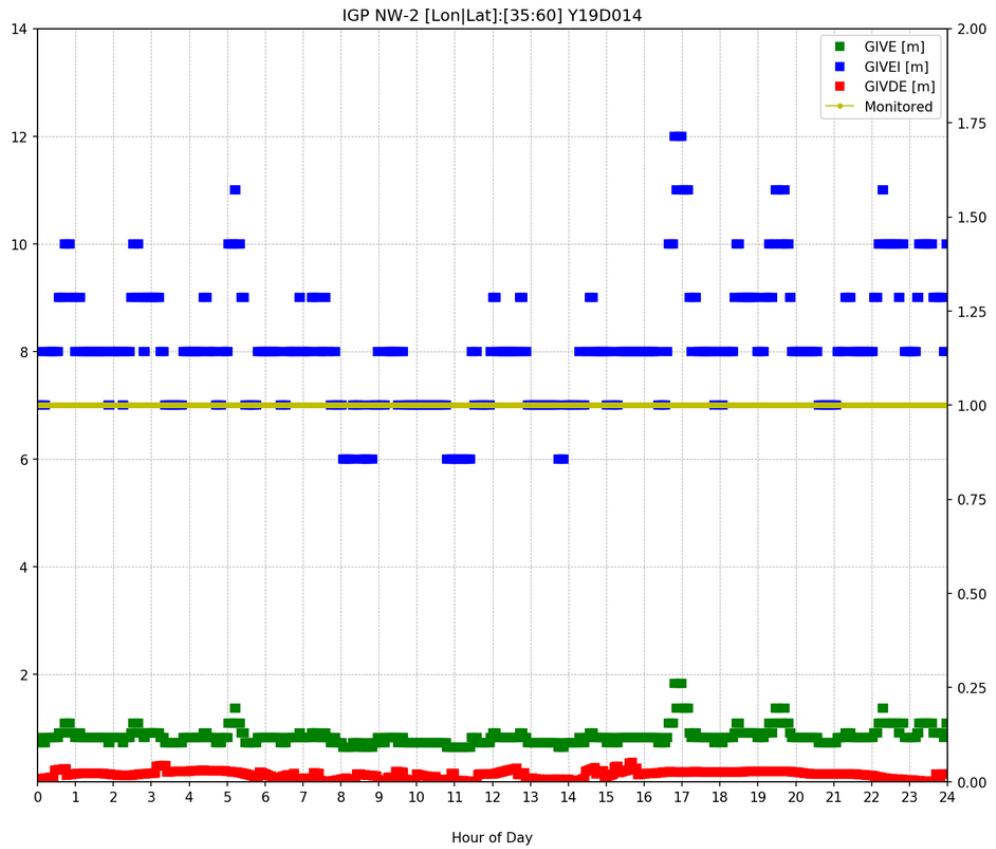


GIVDE, GIVE, GIVEi and Monitoring - IGPs Northern

Name: IGP_TIME_GIVDE_GIVE_GIVEI_NW-1_Y19D014_G123_50s.png

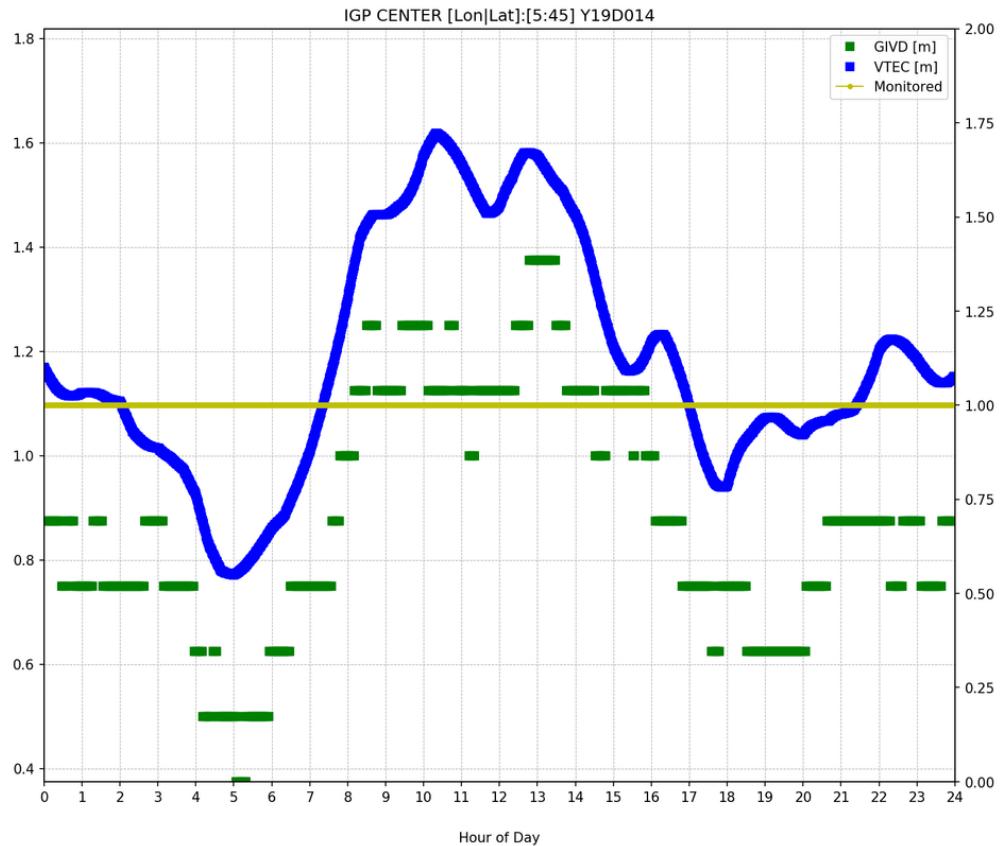


Name: IGP_TIME_GIVDE_GIVE_GIVEI_NW-2_Y19D014_G123_50s.png



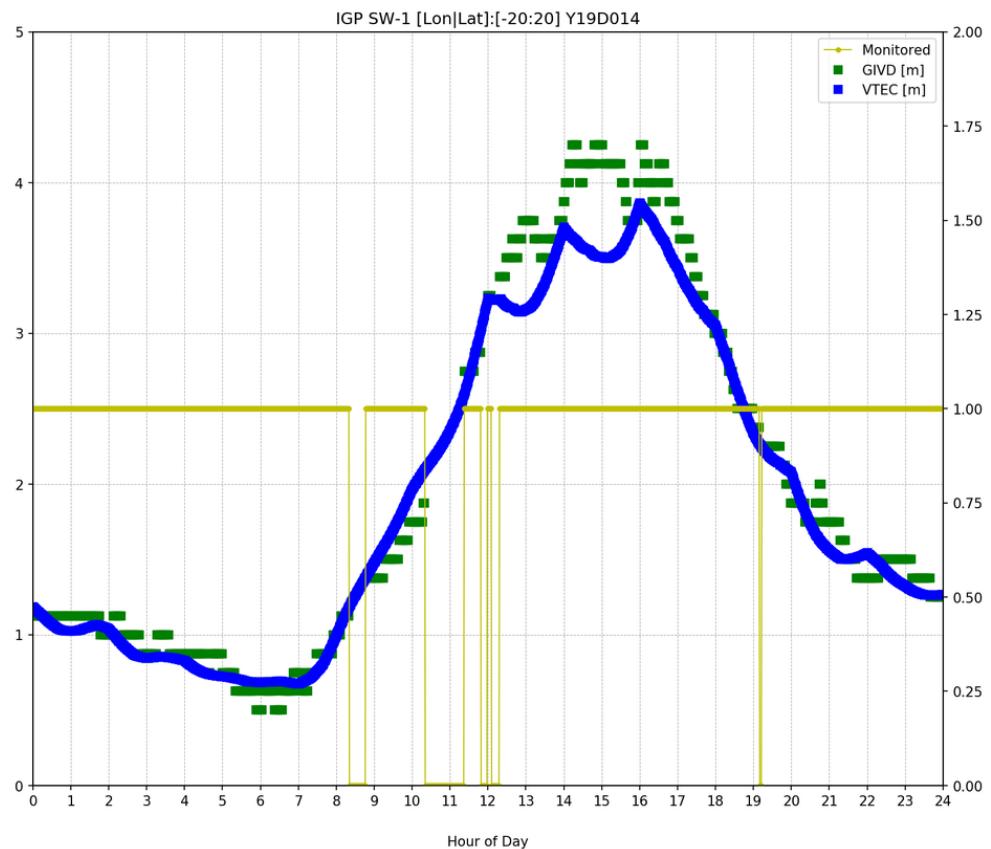
GIVD and VTEC - IGP Center

Name: [IGP_TIME_GIVD_VTEC_CENTER_Y19D014_G123_50s.png](#)

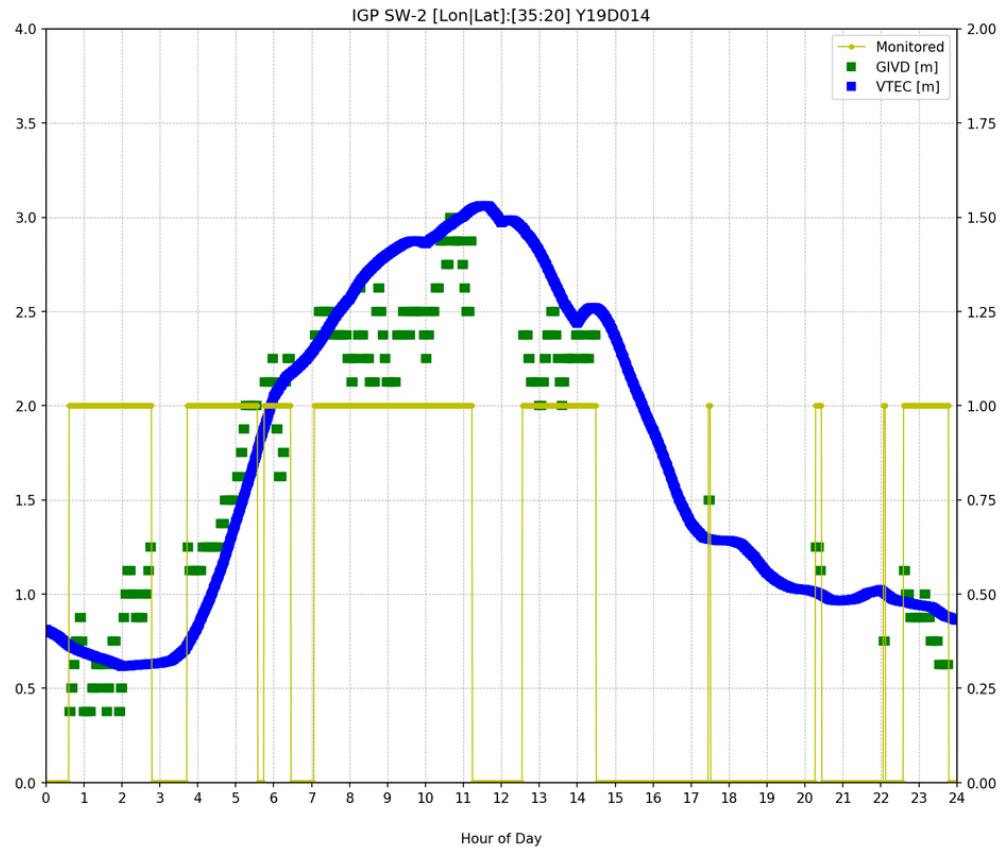


GIVD and VTEC - IGPs Southern

Name: IGP_TIME_GIVD_VTEC_SW-1_Y19D014_G123_50s.png

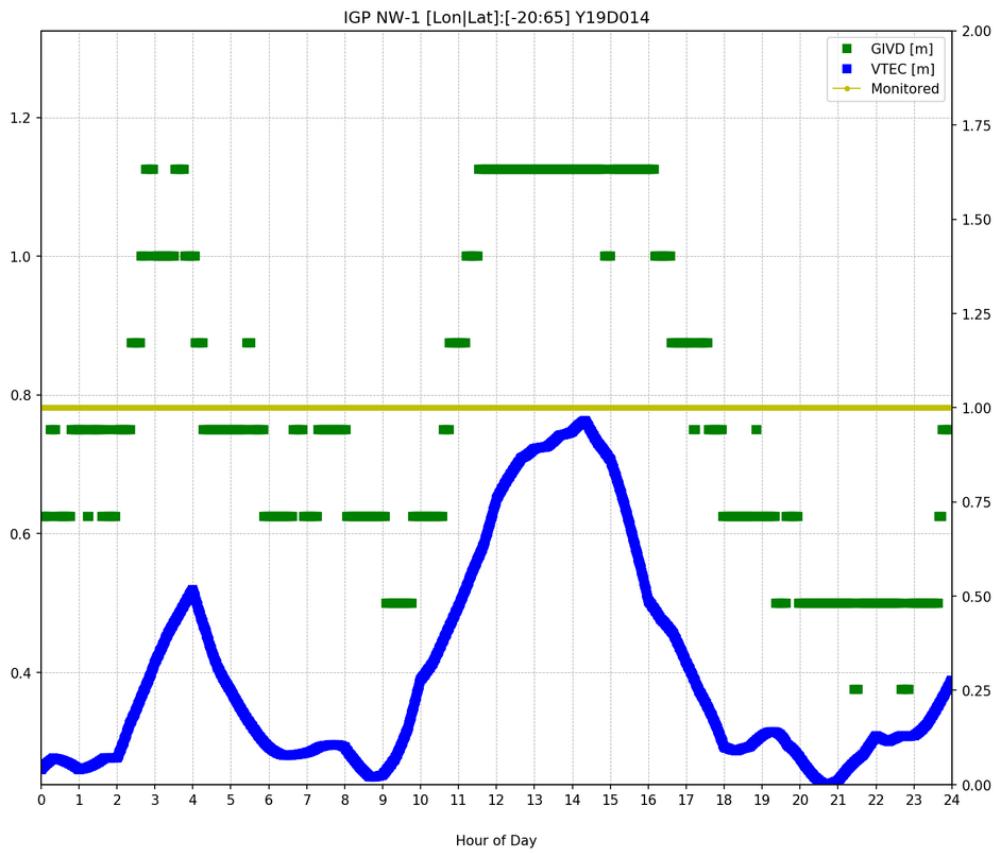


Name: IGP_TIME_GIVD_VTEC_SW-2_Y19D014_G123_50s.png

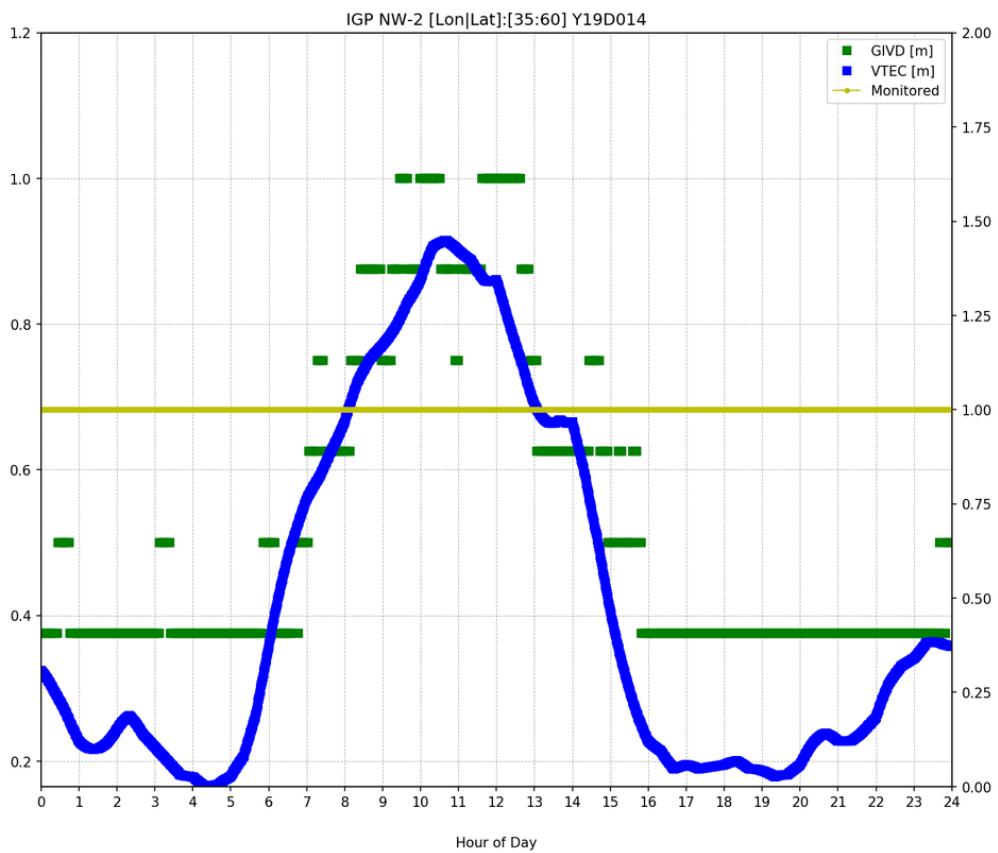


GIVD and VTEC - IGPs Northern

Name: IGP_TIME_GIVD_VTEC_NW-1_Y19D014_G123_50s.png

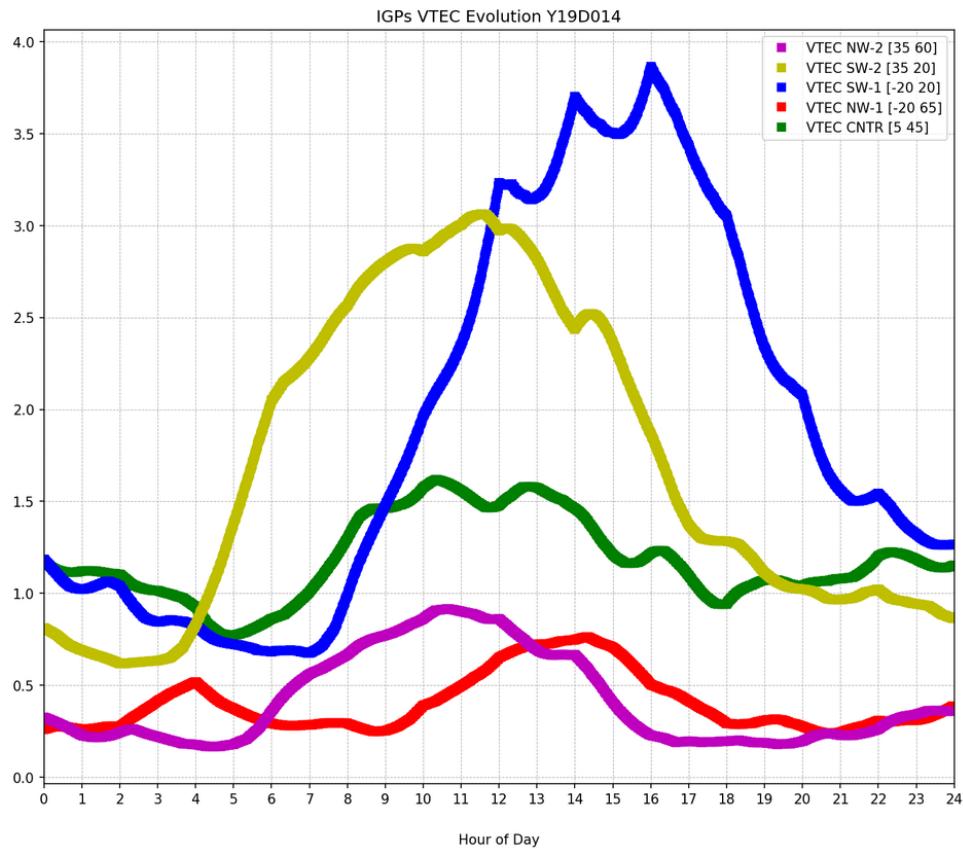


Name: IGP_TIME_GIVD_VTEC_NW-2_Y19D014_G123_50s.png



VTEC - All 5 IGPs

Name: IGP_TIME_VTEC_All_Positions_Y19D014_G123_50s.png



Safety Index (SI) - ALL 5 IGPs

SI = GIVDE/(5.33*GIVE)

Name: IGP_TIME_SI_All_Positions_Y19D014_G123_50s.png

IGPs GIVDE/5.33*GIVE Y19D014

