Availability and Completeness of IGS Tracking Data

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Motivation

Timely availability of GNSS tracking data is a basic condition for generation of best possible analysis products. Data availability problems are highlighted, with the main focus on the data flow of hourly observation files. CODE provides high-quality analysis products with regard to all transmitting GNSS satellites. This includes all satellites, and GPSGPS satellites being respositioned. In all mentioned cases, GNSS tracking data without interruption is desired.

Complete GNSS Tracking

The IGS has been generating orbit and clock products commonly for all transmitting GPS satellites, independent of whether they are declared unusable or not (by the GPS MCC). It is not unusual that one or more GPS (or GLONASS) satellites are marked unusable over a longer period of time. This was recently the case with respect to PRN01 (G01). The GNSS tracking situation for the entire month of April 2008 is illustrated in Fig. 1. 50% of the IGS ground receivers did sample PRN01.

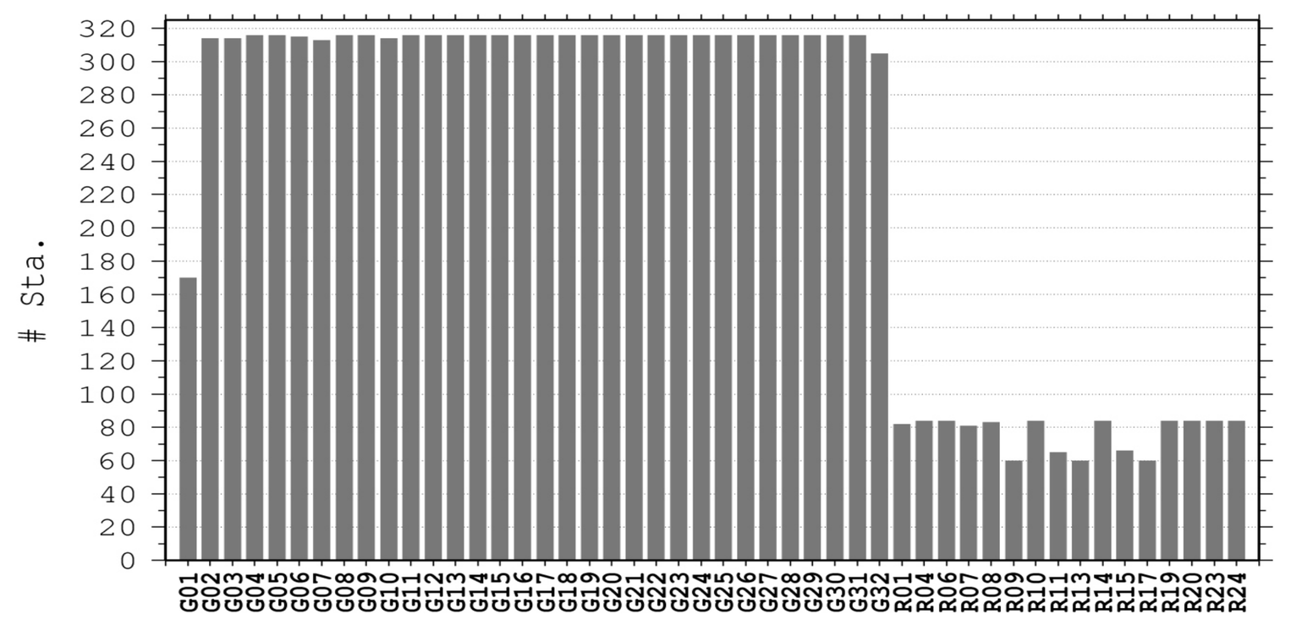

Fig. 1 (a): Absolute number of GNSS stations tracking a specific active GNSS satellite.

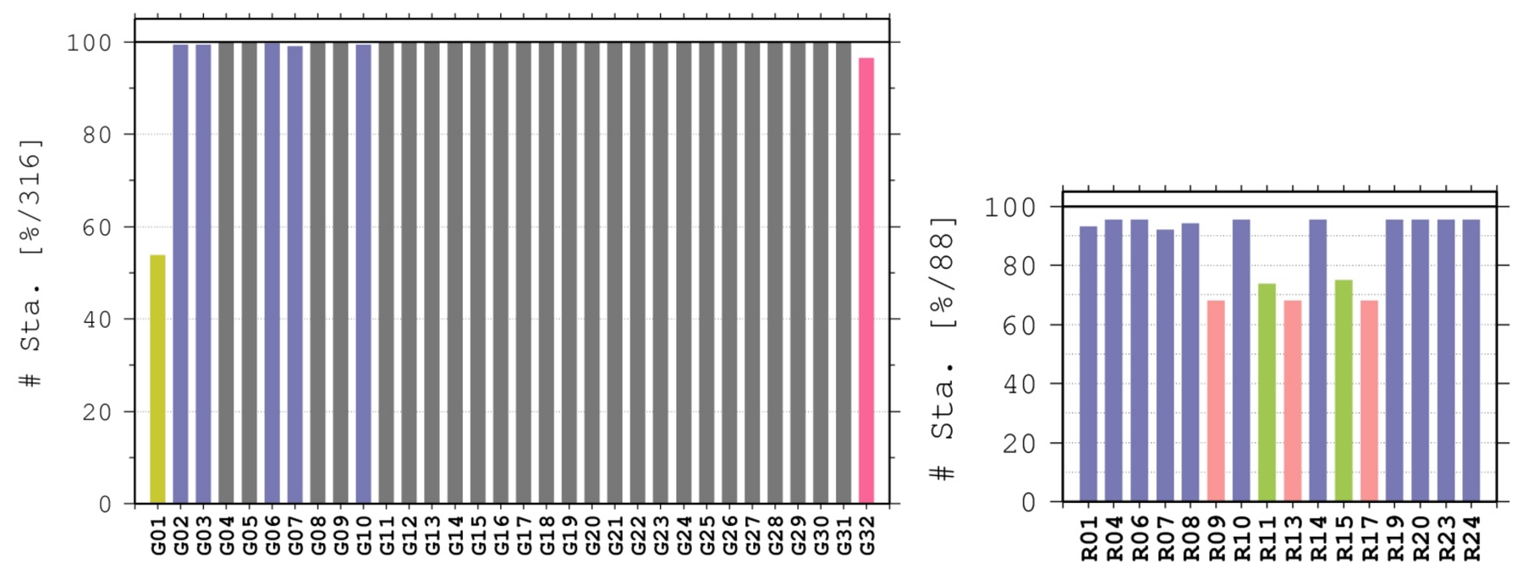

Fig. 1 (b): Relative number (percentage) of GNSS stations tracking a specific active GNSS satellite.

Fig. 1: Number of GNSS stations tracking a specific active satellite of the GPS and GLONASS constellation at least at one day during the entire month of April 2008. All stations (316) archived in CODE's datapool are considered.
We may notice: G01, decommissioned, but still providing MW signals; G32, although declared operational with a reduced number of observing stations due to firmware problems (missing update or old-fashioned hardware, like, Ashtech Z18).
Concerning GLONASS, clearly visible are R11 and R15 (at zero frequency channels) and R09, R13, R17 (at negative frequency channels). This is also a firmware (or hardware) issue. Please note that 100% is not reached in case of GLONASS, because there is a number of GPS/GLONASS-combined receivers (4) operating in GPS-only mode. That's a great pity.

For the same reason, POD of GPS satellites being repositioned is difficult due to the lack of tracking data.

IGS Hourly Data Flow

For NRT processing, the hourly file latency is a crucial factor. There is actually no reason why not all, or at least a significant fraction of the IGS hourly files should become available within few minutes after the end of each hour, the more so because exclusively stations are involved that are fully automatically operated.
A corresponding monthly statistics is shown on Tab. 3. This listing includes IGS stations that delivered hourly data for 30 May 2008. Note that the "min(imum)" delay specified may be considered as "nominal" delay of the station's hourly file submission.

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Incompleteness of data is, to an increased extent, a problem concerning GPS/GLONASS combined tracking. The differences between well performing and poorly behaving GNSS receivers is remarkable in terms of data completeness (not data quality!).
For example, the number of observations to GLONASS with zero or negative frequency channels is considerably reduced.

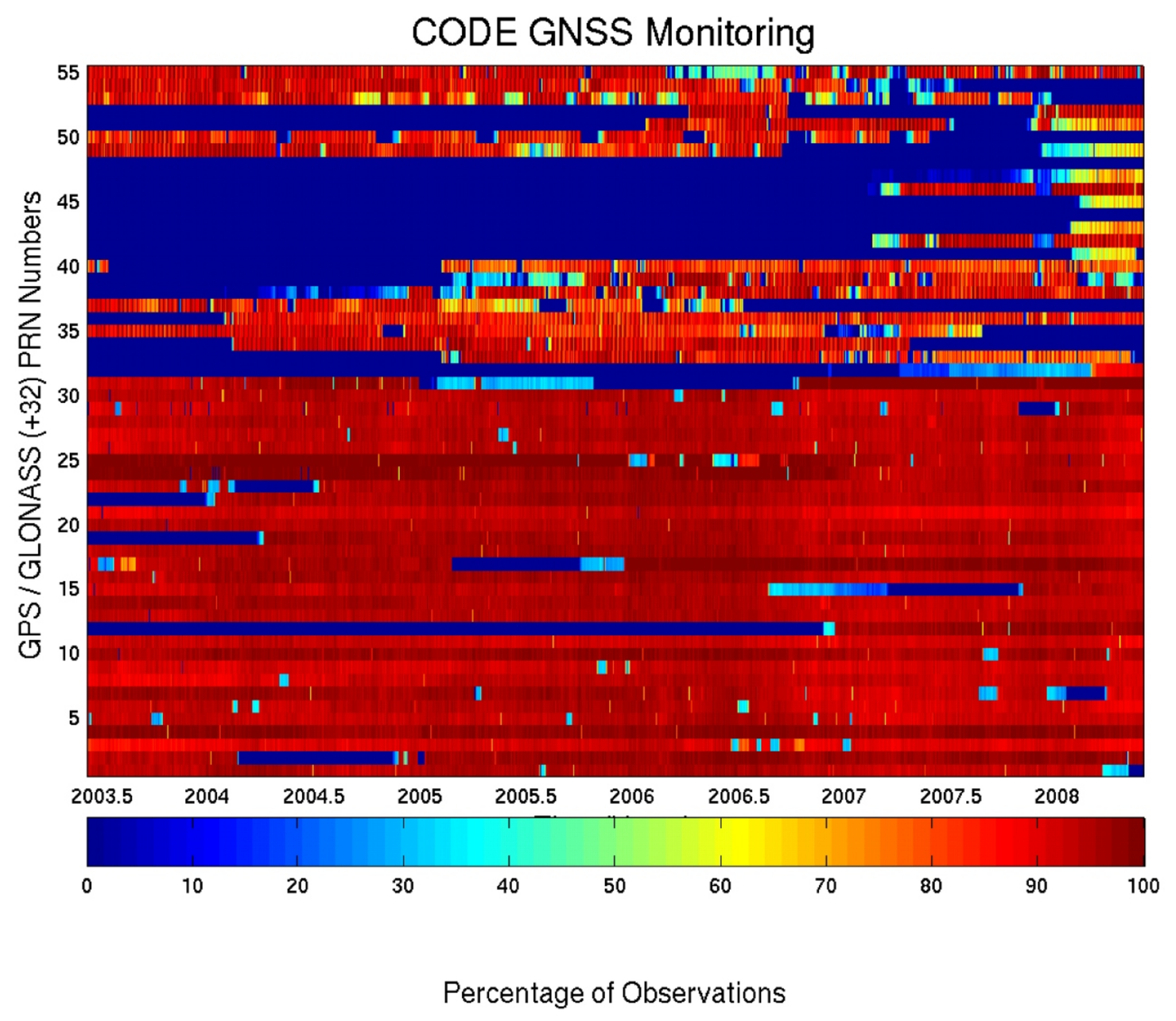

Fig. 2: The daily evolution of the quantity shown in Fig. 1(b) is shown. The varying colors for the GPS constellation indicate different satellite modes (operational, unhealthy, decommissioned, without broadcast orbit information, etc.). In case of GLONASS, we are confronted with a comparably high number of outages and interruptions.

BKG	: 62 of 94	(66.0%)
BKG_EUREF	: 74 of 99	(74.7%)
CDDIS	: 60 of 179	(33.5%)
CODE_AC	: 43 of 182	(23.6%)
GA	: 15 of 20	(75.0%)
GA_PUT	: 14 of 18	(77.8%)
IGN	: 0 of 0	(0.0%)
JPL	: 11 of 206	(5.3%)
OLG_EUREF	: 37 of 158	(23.4%)
SOPAC	: 39 of 214	(18.2%)

Tab. 1: Absolute and relative numbers of NRT stations where more than 90% of hourly observation files are available with a delay of less than 5 minutes are given for a list of data centers. The statistics shows a typical situation over one day (30 May 2008), available at:
www.aiub.unibe.ch/download/igsdata/nrtdata_0d.txt

Conclusions

- It should be possible to drastically reduce the mean hourly file latency. Desirable would be a maximum delay of 5 min, namely for all IGS stations that do not have explicit restrictions in communication. Reviewing the procedures at the IGS data centers would make sense.
- Generally all stations should submit their observation files to at least two IGS data centers (for backup). In case of ftp connection problems, "old", not yet submitted files of the previous (24) hours should be uploaded by the stations as soon as ftp connection is re-established.
- At CODE, we started to create daily observation files on the basis of hourly files for all stations where daily files are not available for rapid analysis. The fact that complete sets of 24 hourly files, but no daily files are available 3--5 hours after the end of the day for a number of IGS stations reveals also potential for improvements in terms of daily files.
- We consider complete GNSS tracking important for a continuous receiver network, like the IGS network. Javad, Topcon, Trimble GNSS receiver models, for example, are able to operate in "all-in-view" tracking mode. This is, however, only the case concerning IGS receivers that have been specifically reconfigured by the statin managers (successfully convinced by CODE). An official statement from IGS side addressing this issue would be appreciated. Finally, the wish for complete GNSS tracking had to be manifested when interacting with receiver manufacturers.

Inconsistencies of 1 Hz data compared to nominal 30 sec data are described on poster by Bock et al.

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amc2:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    ASHTECH Z-XII3T     IL01-1D04-MCF-12MX
auck: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    TRIMBLE NETRS       NP 1.15 / SP 0.00
bako:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10 R11     R14 R15     R19 R20 R23 R24 LEICA GRX1200GGPRO  5.00/3.13
bndy:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32     R04 R06     R08 R09 R10 R11 R13 R14 R15 R17 R19 R20 R23 R24 TRIMBLE NETR5       3.50
bogi: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32     R04 R06 R07     R09 R10 R11 R13 R14 R15 R17 R19 R20 R23 R24 JPS E_GGD           2.6.1 JAN,10,2008
cagz: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS E_GGD           3.1 MAR,13,2007 P2
cnmr:     G02 G03 G04 G05 G06 G07 G08 G09     G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32                                                                TRIMBLE NETR5       NP 3.50 / SP 0.00
como: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS E_GGD           3.1 JAN,24,2007 P1
crar: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS ODYSSEY_E       2.5 JUN,22,2005 P1
darw: G01 G02 G03 G04 G05 G06     G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08 R09 R10 R11 R13 R14 R15 R17 R19 R20 R23 R24 LEICA GRX1200GGPRO  5.62
faa1: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 JPS LEGACY          3.1
godz:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32                                                                ASHTECH Z18         0065      ZT16
gope: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    ASHTECH Z18         0065
grac:         G03 G04 G05     G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32                                                                ASHTECH Z18         0065
guug:     G02 G03 G04 G05 G06 G07 G08 G09     G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32                                                                TRIMBLE NETR5       NP 3.50 / SP 0.00
joz2:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10 R11     R14 R15     R19 R20 R23 R24 LEICA GRX1200GGPRO  5.10/3.013
kosg: G01 G02 G03 G04 G05 G06     G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    AOA SNR-12 ACT      3.3.32.4
kour: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10 R11     R14 R15     R19 R20 R23 R24 JPS LEGACY          3.2
mat1: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32                                                                ASHTECH Z18         0065      ZT16
metz:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06     R08     R10         R14         R19 R20 R23 R24 JPS EUROCARD        2.3 NOV,12,2002
mobj: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS LEGACY          2.3 APR,28,2004 P4
mtbg: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10 R11     R14 R15     R19 R20 R23 R24 TPS GB-1000
mtka:     G02     G04 G05 G06     G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31     R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 ASHTECH Z18         0065      ZT16
ntz1: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32                                                                TPS NETG3           3.2 DEC,12,2007
onsa: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 JPS E_GGD           2.3 FEB,17,2004 P4B2
park: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 JPS E_GGD           2.5
pgc5:         G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    TRIMBLE NETRS       0.4-1 G27 OCT 2005
pie1: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06     R08     R10 R11     R14 R15     R19 R20 R23 R24 ASHTECH UZ-12       CQ00
pous: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS GB-1000         2.5 APR,07,2005 P1B1
sfer:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    TRIMBLE NETRS       1.1-5
snec: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS GB-1000         2.5 JUN,22,2005 P1
spt0: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 JPS LEGACY          2.3 APR,28,2004 P4
ssia:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    TRIMBLE NETRS       NP 1.13 / SP 0.00
sunm: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 JPS LEGACY          JPS_4 / 2.3 NOV,12,
suwn:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    TRIMBLE NETRS       1.1
sydn:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 JPS E_GGD           2.3P3
tixj: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS ODYSSEY_E       2.5 JUN,22,2005 P1
unfe:     G02     G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31     R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 ASHTECH Z18         0065      ZT17
unpg: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS ODYSSEY_E       3.1 JUN,28,2007 P3
usud:     G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31                                                                    ASHTECH Z-XII3      CD00-1D02
vesl: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14         R19 R20 R23 R24 TPS GB-1000         3.1 JUN,28,2007 P3
wtzl: G01 G02 G03 G04 G05 G06 G07 G08 G09 G10 G11 G12 G13 G14 G15 G16 G17 G18 G19 G20 G21 G22 G23 G24 G25 G26 G27 G28 G29 G30 G31 G32 R01 R04 R06 R07 R08     R10         R14 R15     R19 R20 R23 R24 TPS NETG3           3.2 DEC,20,2007
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Fig. 3: GNSS satellites appearing in at least one daily observation file during the entire month of April 2008 were extracted for each station. We list here exclusively stations with incomplete tracking. Note that GPS-only stations just missing (decommissioned) G01 were disregarded.

Site	Delay in minutes Min	Mean	SDev	Availability	DC
ABPO	7	8.0	0.8	50.0%	CDDIS
ABPO	11	17.5	6.8	50.0%	CODE_AC
ABPO	7	8.0	0.8	50.0%	JPL
ABPO	9	14.0	6.3	50.0%	SOPAC
ACOR+	1	1.9	0.4	100.0%	BKG_EUREF
ACOR	6	6.0	0.0	100.0%	OLG_EUREF
AIRA+	3	3.9	2.5	100.0%	CDDIS
AIRA	5	14.2	13.3	100.0%	JPL
AIRA	12	14.5	2.1	100.0%	SOPAC
AJAC	6	6.0	0.0	12.5%	BKG
AJAC	15	15.0	0.0	12.5%	JPL
AJAC	24	24.0	0.0	12.5%	OLG_EUREF
AJAC	33	33.0	0.0	12.5%	SOPAC
ALAC+	0	0.2	0.5	100.0%	BKG_EUREF
ALAC+	3	4.1	1.6	100.0%	OLG_EUREF
ALBA+	1	1.0	0.0	100.0%	BKG_EUREF
ALBA	6	6.0	0.0	100.0%	OLG_EUREF
ALBH	7	7.0	0.0	100.0%	CDDIS
ALBH	17	22.2	4.7	100.0%	CODE_AC
ALBH	12	20.5	10.0	100.0%	JPL
ALBH	7	8.6	2.8	100.0%	SOPAC
ALGO+	4	4.0	0.0	100.0%	CDDIS
ALGO	6	18.2	7.6	100.0%	CODE_AC
ALGO	8	16.0	12.2	100.0%	JPL
ALGO	6	6.5	0.8	100.0%	SOPAC
ALIC+	1	1.0	0.0	100.0%	CDDIS
ALIC	6	6.6	1.8	100.0%	CODE_AC
ALIC+	1	1.0	0.0	100.0%	GA
ALIC+	1	1.0	0.0	100.0%	GA_PUT
ALIC	5	14.1	13.5	100.0%	JPL
ALIC+	3	4.8	2.0	100.0%	SOPAC
ALME+	0	0.2	0.5	100.0%	BKG_EUREF
ALME+	3	4.5	1.6	100.0%	OLG_EUREF
AMC2	6	6.4	0.5	100.0%	CDDIS
AMC2	10	17.8	7.0	100.0%	CODE_AC
AMC2	6	6.4	0.5	100.0%	JPL
AMC2	7	9.6	4.1	100.0%	SOPAC
ANKR+	3	4.0	1.1	100.0%	BKG
ANKR	10	11.2	3.5	100.0%	CDDIS
ANKR	5	11.1	5.1	100.0%	CODE_AC
ANKR	45	45.0	0.0	100.0%	OLG_EUREF
ANKR	15	19.1	3.5	100.0%	SOPAC
AQUI+	3	4.0	2.8	100.0%	BKG_EUREF
AQUI	6	10.9	13.8	100.0%	OLG_EUREF
AREQ	6	6.4	0.5	100.0%	CDDIS
AREQ	10	17.8	7.0	100.0%	CODE_AC
AREQ	6	6.4	0.5	100.0%	JPL
AREQ	7	9.0	3.1	100.0%	SOPAC
ARTU	18	18.4	0.5	100.0%	CDDIS
ARTU	20	23.0	3.9	100.0%	CODE_AC
ARTU	18	18.4	0.5	100.0%	JPL
ARTU	8	10.6	4.6	100.0%	SOPAC
AUCK	46	46.0	0.0	87.5%	CDDIS
AUCK	56	56.7	0.6	37.5%	SOPAC
AUT1+	3	4.0	2.8	100.0%	BKG_EUREF
AUT1+	3	3.0	0.0	100.0%	OLG_EUREF
AUTN	6	6.0	0.0	100.0%	BKG_EUREF
AUTN	9	15.4	13.1	100.0%	OLG_EUREF
BACA+	2	2.0	0.0	100.0%	BKG_EUREF
BACA	6	6.0	0.0	100.0%	OLG_EUREF
BADH+	3	3.8	1.0	100.0%	BKG_EUREF
BADH	45	45.0	0.0	100.0%	OLG_EUREF
BAIA+	2	4.1	2.9	100.0%	BKG_EUREF
BAIA	6	14.1	15.2	87.5%	OLG_EUREF
BAIE+	4	4.1	0.4	100.0%	CDDIS
BAIE	8	16.0	12.2	100.0%	JPL
BAIE	6	6.8	0.9	100.0%	SOPAC
BAN2+	2	2.9	0.6	100.0%	BKG
BAN2+	2	2.9	0.6	100.0%	CDDIS
BAN2+	3	6.0	2.3	100.0%	CODE_AC
BAN2	6	15.0	12.8	100.0%	JPL
BAN2	12	15.1	3.8	100.0%	SOPAC
BARH	6	32.0	18.3	50.0%	CDDIS
BARH	6	9.0	5.2	37.5%	JPL
BARH	12	12.5	0.7	25.0%	SOPAC
BBYS+	1	1.0	0.0	100.0%	BKG_EUREF
BBYS+	3	3.0	0.0	100.0%	OLG_EUREF
BDOS	6	14.8	19.7	62.5%	CDDIS
BDOS	0	0.0	0.0	12.5%	CODE_AC
BDOS	6	10.5	4.2	50.0%	JPL
BDOS	12	13.0	1.4	50.0%	SOPAC
BELF+	0	0.5	0.5	100.0%	BKG_EUREF
BELF	6	12.4	7.2	100.0%	OLG_EUREF
BILI	45	45.0	0.0	12.5%	CODE_AC
BILI	40	40.0	0.0	12.5%	JPL
BILI	39	39.6	0.5	100.0%	SOPAC
BISK+	3	4.4	1.7	100.0%	BKG_EUREF
BISK	6	13.9	14.0	100.0%	OLG_EUREF
BOGI+	1	1.0	0.0	100.0%	BKG
BOGI	10	11.1	0.8	100.0%	CDDIS
BOGI+	2	2.4	0.5	100.0%	CODE_AC
BOGI	5	15.9	12.5	100.0%	JPL
BOGI	6	6.0	0.0	100.0%	OLG_EUREF
BOGI	16	16.1	0.4	100.0%	SOPAC
BOGO+	1	1.0	0.0	100.0%	BKG_EUREF
BOGO	6	6.0	0.0	100.0%	OLG_EUREF
BOGT	5	5.0	0.0	25.0%	CDDIS
BOGT	11	19.0	11.3	25.0%	CODE_AC
BOGT	5	5.0	0.0	25.0%	JPL
BOGT	7	7.0	0.0	25.0%	SOPAC
BOR1+	1	1.0	0.0	100.0%	BKG
BOR1	10	11.0	0.9	100.0%	CDDIS
BOR1+	2	2.6	0.5	100.0%	CODE_AC
BOR1	5	15.9	12.5	100.0%	JPL
BOR1	45	45.0	0.0	87.5%	OLG_EUREF
BOR1	16	16.1	0.4	100.0%	SOPAC
BORJ	19	22.6	2.6	87.5%	BKG_EUREF
BORR+	1	1.0	0.0	100.0%	BKG_EUREF
BORR	6	6.0	0.0	100.0%	OLG_EUREF
BREW	5	7.8	5.4	100.0%	CDDIS
BREW	10	18.5	9.0	100.0%	CODE_AC
BREW	5	7.5	5.5	100.0%	JPL
BREW	6	11.0	6.1	100.0%	SOPAC
BRST	6	6.0	0.0	100.0%	BKG
BRST	10	11.9	3.3	100.0%	CODE_AC
BRST	21	31.5	9.9	50.0%	JPL
BRST	9	21.8	15.8	100.0%	OLG_EUREF
BRST	14	21.3	7.0	75.0%	SOPAC
BRUS+	2	2.0	0.0	100.0%	BKG
BRUS+	2	2.5	0.5	100.0%	CDDIS
BRUS+	3	3.1	0.4	100.0%	CODE_AC
BRUS	5	14.5	13.3	100.0%	JPL
BRUS	6	6.0	0.0	100.0%	OLG_EUREF
BRUS	16	17.5	1.9	100.0%	SOPAC
BSCN	6	6.0	0.0	100.0%	BKG_EUREF
BSCN	9	15.4	13.1	100.0%	OLG_EUREF
BUDP+	1	1.0	0.0	100.0%	BKG_EUREF
BUDP	6	6.0	0.0	100.0%	OLG_EUREF
BUTE+	2	2.9	0.4	100.0%	BKG_EUREF
BUTE	6	6.0	0.0	100.0%	OLG_EUREF
BZRG	10	10.1	0.4	100.0%	BKG
BZRG	10	10.0	0.0	100.0%	CODE_AC
BZRG	13	17.3	9.2	87.5%	JPL
BZRG	9	12.8	6.9	100.0%	OLG_EUREF
BZRG	20	25.3	9.0	75.0%	SOPAC
CACE+	1	1.0	0.0	100.0%	BKG_EUREF
CACE	6	6.0	0.0	100.0%	OLG_EUREF
CAGL+	3	4.0	2.8	100.0%	BKG
CAGL+	4	5.4	3.9	100.0%	CODE_AC
CAGL	5	16.1	12.9	100.0%	JPL
CAGL	6	10.9	13.8	100.0%	OLG_EUREF
CAGL	14	19.4	6.4	100.0%	SOPAC
CAGZ	16	17.4	1.2	100.0%	BKG
CAGZ	30	30.0	0.0	87.5%	CDDIS
CAGZ	20	20.0	0.0	100.0%	CODE_AC
CAGZ	23	28.8	6.3	100.0%	JPL
CAGZ	24	31.0	10.8	75.0%	OLG_EUREF
CAGZ	26	33.6	5.5	100.0%	SOPAC
CAME	10	10.0	0.0	37.5%	BKG_EUREF
CAME	24	24.0	0.0	37.5%	OLG_EUREF
CANT+	0	0.0	0.0	100.0%	BKG_EUREF
CANT	3	3.4	1.1	87.5%	OLG_EUREF
CAS1+	3	3.0	0.0	100.0%	CDDIS
CAS1	6	6.6	1.8	100.0%	CODE_AC
CAS1+	3	3.0	0.0	100.0%	GA
CAS1+	3	3.1	0.4	100.0%	GA_PUT
CAS1	5	14.6	13.2	100.0%	JPL
CAS1+	3	5.2	3.4	100.0%	SOPAC
CASC+	0	0.2	0.5	100.0%	BKG_EUREF
CASC+	3	3.8	1.4	100.0%	OLG_EUREF
CCJM+	2	3.4	2.3	100.0%	CDDIS
CCJM	6	7.1	3.2	100.0%	CODE_AC
CCJM	5	14.5	13.3	100.0%	JPL
CCJM	12	14.8	2.2	100.0%	SOPAC
CEDU+	2	2.1	0.4	100.0%	CDDIS
CEDU	6	6.6	1.8	100.0%	CODE_AC
CEDU+	2	2.1	0.4	100.0%	GA
CEDU+	2	2.4	0.7	100.0%	GA_PUT
CEDU	5	14.2	13.5	100.0%	JPL
CEDU+	3	4.9	1.4	100.0%	SOPAC
CEU1+	0	0.0	0.0	100.0%	BKG_EUREF
CEU1	3	3.9	1.5	87.5%	OLG_EUREF
CHAN	17	17.1	0.4	87.5%	CDDIS
CHAN	17	17.1	0.4	87.5%	JPL
CHAN	17	19.4	3.5	87.5%	SOPAC
CHPI	45	45.0	0.0	12.5%	CDDIS
CHPI	45	45.0	0.0	12.5%	JPL
CHPI	46	46.0	0.0	12.5%	SOPAC
CHUM	13	13.2	0.5	100.0%	CDDIS
CHUM	24	27.3	3.1	37.5%	SOPAC
CHUR+	4	4.0	0.0	100.0%	CDDIS
CHUR	6	18.2	7.6	100.0%	CODE_AC
CHUR	8	16.4	12.0	100.0%	JPL
CHUR	6	8.1	2.9	100.0%	SOPAC
CHWK	18	18.0	0.0	100.0%	CDDIS
CHWK	24	28.2	4.7	100.0%	JPL
CHWK	18	22.4	8.5	100.0%	SOPAC
CIC1+	2	3.5	1.6	100.0%	CDDIS
CIC1+	2	3.5	1.6	100.0%	JPL
CIC1+	3	5.8	1.7	100.0%	SOPAC
CNIV	46	46.0	0.0	100.0%	BKG_EUREF
CNIV	55	55.0	0.0	87.5%	OLG_EUREF
CNMR	49	51.5	3.5	25.0%	CDDIS
COBA+	1	1.2	0.5	100.0%	BKG_EUREF
COBA	6	6.0	0.0	100.0%	OLG_EUREF
COCO	4	5.6	3.6	62.5%	CDDIS
COCO	6	10.0	6.5	62.5%	CODE_AC
COCO	4	5.6	3.6	62.5%	GA
COCO	4	5.8	3.5	62.5%	GA_PUT
COCO	6	15.6	13.6	62.5%	JPL
COCO	5	9.0	3.1	62.5%	SOPAC
COMO+	2	2.9	0.4	100.0%	BKG_EUREF
COMO	6	6.0	0.0	100.0%	OLG_EUREF
CONT	3	3.6	1.0	87.5%	BKG
CONT	5	10.6	3.2	87.5%	CODE_AC
CONT	9	19.9	11.6	87.5%	JPL
CONT	14	21.0	6.4	87.5%	SOPAC
CONZ+	3	3.8	1.0	100.0%	BKG
CONZ	12	12.9	1.1	100.0%	CDDIS
CONZ	5	11.2	3.5	100.0%	CODE_AC
CONZ	9	19.1	10.3	100.0%	JPL
CONZ	16	17.9	1.2	100.0%	SOPAC
COST+	4	4.0	0.0	100.0%	BKG_EUREF
COST	9	12.8	6.9	100.0%	OLG_EUREF
CRO1	6	6.6	0.5	100.0%	CDDIS
CRO1	11	19.9	6.9	100.0%	CODE_AC
CRO1	6	6.4	0.5	100.0%	JPL
CRO1	9	13.8	4.2	100.0%	SOPAC
DAEJ+	2	2.0	0.0	100.0%	CDDIS
DAEJ	6	6.6	1.8	100.0%	CODE_AC
DAEJ	6	16.1	12.6	100.0%	JPL
DAEJ	13	14.6	3.0	87.5%	SOPAC
DARW+	1	1.0	0.0	100.0%	CDDIS
DARW	6	6.6	1.8	100.0%	CODE_AC
DARW+	1	1.0	0.0	100.0%	GA
DARW+	1	1.0	0.0	100.0%	GA_PUT
DARW	5	14.5	13.4	100.0%	JPL
DARW+	3	4.8	2.2	100.0%	SOPAC
DAV1+	3	3.0	0.0	100.0%	CDDIS
DAV1	6	6.6	1.8	100.0%	CODE_AC
DAV1+	3	3.1	0.4	100.0%	GA
DAV1+	3	3.1	0.4	100.0%	GA_PUT
DAV1	5	15.0	13.1	100.0%	JPL
DAV1+	3	4.0	0.5	100.0%	SOPAC
DAVR+	1	1.0	0.0	100.0%	CDDIS
DAVR	6	6.6	1.8	100.0%	CODE_AC
DAVR+	1	1.0	0.0	100.0%	GA
DAVR+	1	1.0	0.0	100.0%	GA_PUT
DAVR	5	14.5	13.4	100.0%	JPL
DAVR+	3	4.2	1.2	100.0%	SOPAC
DELF+	3	3.4	0.5	100.0%	BKG_EUREF
DELF	6	8.2	1.4	100.0%	OLG_EUREF
DENT+	4	4.0	0.0	100.0%	BKG_EUREF
DENT	9	12.8	6.9	100.0%	OLG_EUREF
DEVA+	2	2.2	0.5	100.0%	BKG_EUREF
DEVA	6	6.0	0.0	100.0%	OLG_EUREF
DGAR	7	7.1	0.4	100.0%	CDDIS
DGAR	11	20.4	7.6	100.0%	CODE_AC
DGAR	7	7.1	0.4	100.0%	JPL
DGAR	9	13.1	4.7	100.0%	SOPAC
DLFT+	3	3.8	0.5	100.0%	BKG
DLFT+	3	3.9	0.4	100.0%	CDDIS
DLFT	6	6.6	1.8	100.0%	CODE_AC
DLFT	6	16.1	12.6	100.0%	JPL

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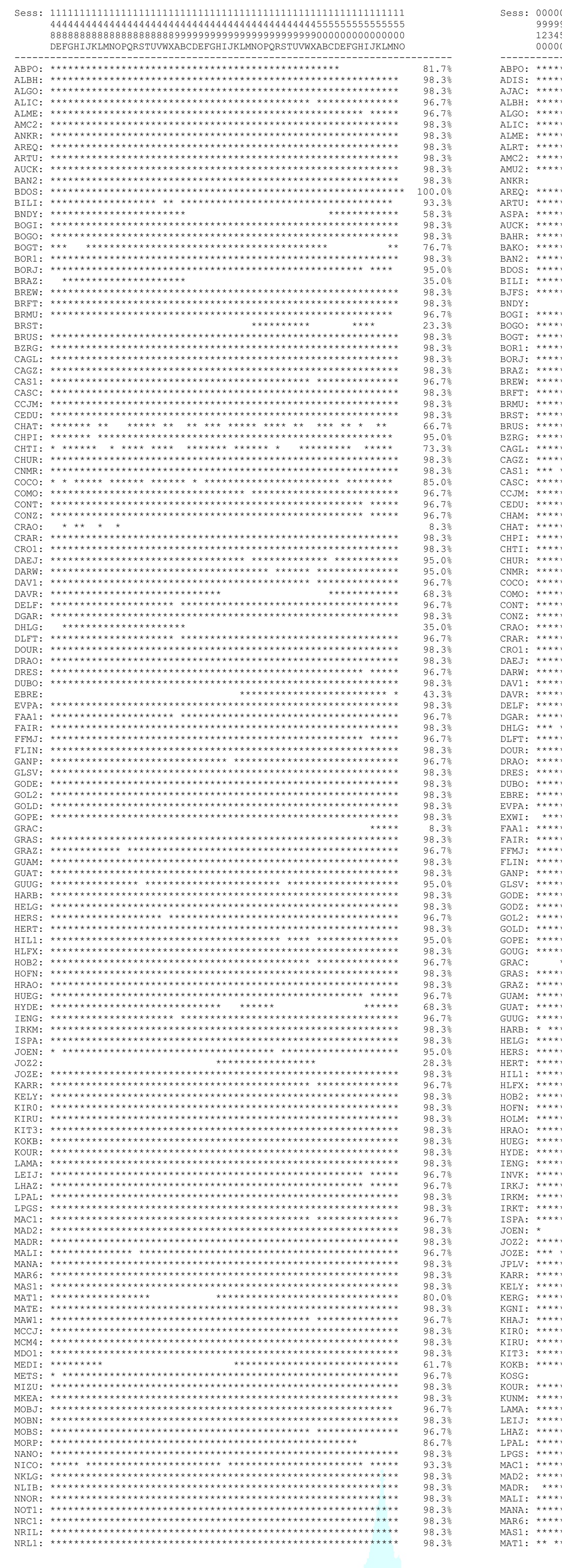
Tab. 2: Extract of the IGS hourly data latency statistics derived by CODE for near real-time analysis purposes. For a big number of IGS stations, the statistics shows serious data flow problems. The many percentage values far from 100% are unpleasant. (The complete list and further statistics are accessible at www.aiub.unibe.ch/ download/igsdata.)



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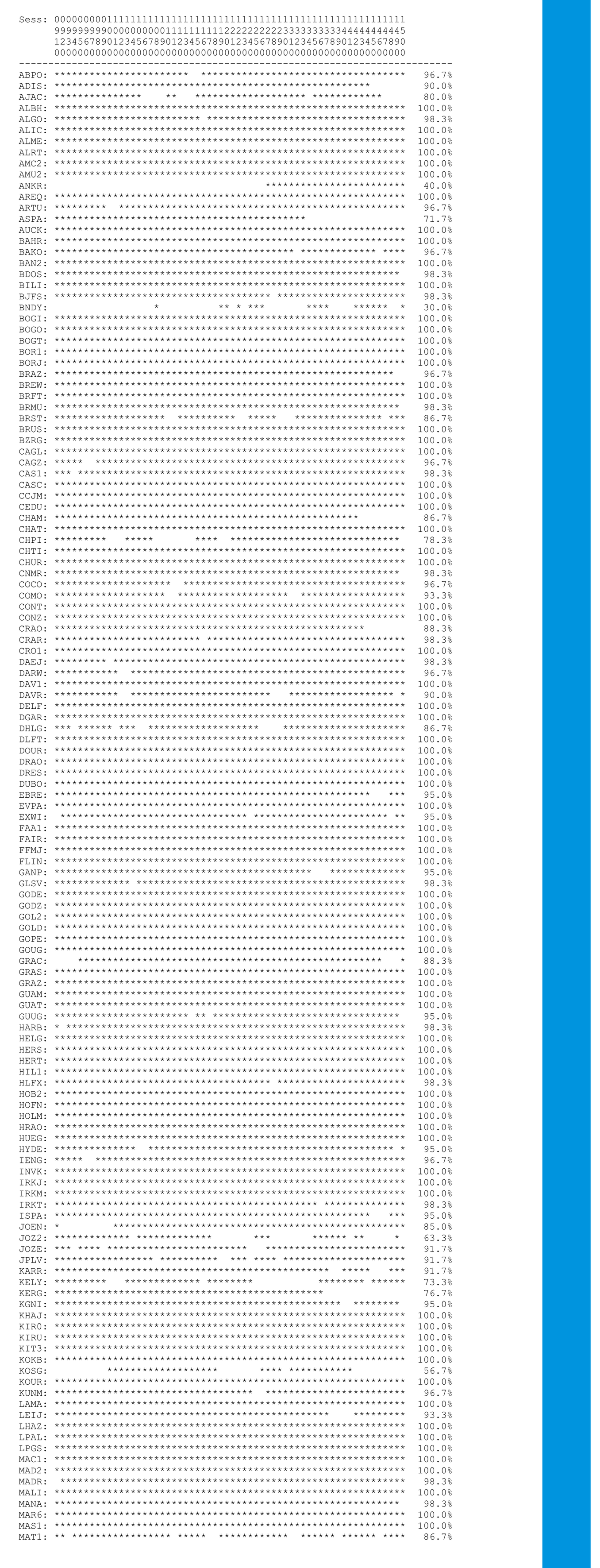

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Tab. 3: Left: Excerpt of availability of hourly observation files over 60 hours (2.5 days).
See also www.aiub.unibe.ch/download/igsdata/nrtdata.sum
Right: Excerpt of availability of daily observation files over 60 days.
See also www.aiub.unibe.ch/download/igsdata/rnxdata.sum