Bernese 5.2 introductury course, notes and screen shots

February 22, 2022

1 Setting up sessions, choosing active session

Here, only enter ???0 for the session ID. This matches any session day, like 2010 session 207 or 208 or 2011 session 205 or 206. The final "0" means the first and only session for that day.

The currently active session is listed on the bottom line: $\mathbf{Y}+\mathbf{0} = \mathbf{2010} = \text{year } 2010$, $\mathbf{S}+\mathbf{0} = \mathbf{2080} = \text{DOY} 208$ session char 0.

<mark> </mark>			В	erne	se GNS	S Soft	ware V	Vers	ion	5.2						
Configure	<u>C</u> arr	npaign	<u>R</u> INE	X	<u>O</u> rbits/	EOP	Proc	ess	ing	Se	rvic	e	Con	versi	on	
SESSIC	ON TAP	BLE														
			START	EPO	CH		Е	ND	EPC	осн				_		
	ID	уууу	mm dd	hh :	mm ss	уууу	mm	dd	hh	mm	ss		4]		
	???0			00 (00 00				23	59	59	+	-			
•																
^Top /	\Prev	^Nex	t Can	ce^l	Save	e^As	^Sa	ave	^	Run	۸	Out	put	Ren	^un	
> User: or	igo Ca	mpaig	n: \${P}/	ETH	\$Y+0:	=2018	\$S+	0=0	090	\$J:	=RE	Fi	le: /S	SESS	IONS.	SES

Choose the currently active session. Click on one of the four buttons to the right and enter the value. Like the first: change 2010 7 27 to 2011 7 24, and click on "Compute". The other three, Modifed Julian Date, GPS Week & Day of Week, and Year, Day of Year (DOY) will be filled in.

Then, click on "Set" and exit by clicking OK.

😣 Date Selection D	Dialog
Year Month Day (YYYY MM DD)	2010 7 27
Modified Julian Date	55404
GPS Week, Day of Week (WWWW D)	1594 2
Year, Day of Year (YYYY DDD)	2010 208
+1 -1 Toda	ay Compute
Session Char	0
Session Table	SESSIONS SES
Job ID	MV
Help Set C	ancel OK

2 Variable names

The environment variables (bottom right) also work on the command line:

- **\$U** User space GPSUSER52
- **\$T** Temporary GPSTEMP
- **\$X** Executables BERN52/GPS
- \mathbf{P} Campaign directory GPSDATA/CAMPAIGN52
- D Datapool GPSDATA/DATAPOOL
- \$S Savedisk GPSDATA/SAVEDISK

8 - 0			Bernese	GNSS Soft	ware Version	5.2			
Configure	<u>C</u> ampaign	<u>RINEX</u>	orbits/EOP	Processin	g <u>S</u> ervice	Conversion	BPE	<u>U</u> ser	<u>H</u> elp
MENU	VARIABLES - 1	MENU_VAR	1: Variab	les					-
PREDEI	TINED VARIAB	LES							
(tra	anslated in	the menu)							
Var	iable Cu	rrent val	ue D	escriptio	on				
\$	Y	18	т	wo digit	year of t	he current s	ession		
\$	М	01	М	onth of	the curren	nt session			
\$	D	09	D	ay of mon	nth of the	e current ses	sion		
\$	J	RE	J	ob ID					
TIGER	TETNET VAPT	ABLES				FNIVIEN	WADTAB	LFC	
(t	ranslated in	the menu	ı)		(t)	ranslated in	main p	rogram)	
Va	ariable (w/o	<pre>\$) Value</pre>		A	I	Variab	le	<u>~</u>	-
BL	ı.	WRZ2		+ -		U	+ -	•	
						т	+ -	•	
						x	+ -	-	
						P	+ -		
						USER	+ -		
								_	
^Top	Prev ^Next	Cance [^] I	Save^As	^Save	^Run ^Ou	utput Rer^un	^+Day	^-Day	_
> User: or	igo Campaign:	\${P}/ETH	\$Y+0=2018	\$S+0=00	0 \$J=RE	File: go/GPSUSI	ER52/PA	N/MENU_	VAR.INP

The menu variables are mainly about defining dates and sessions.

😣 – 😐			Ber	nese GNSS So	ftware Versi	ion 5.2				
Configure	Campaign	RINEX	Orbits/EOP	Processing	Service (Conversion	BPE	User	Help	
MENU_V	AR 2: Ran	ges								<u>^</u>
RANGES	OF PREDE	FINED VAR	IABLES							
Minu	ls range	-1 🗧	Plus	range	1					
Withou	t ranges		With range	s l	Format	Descr	iption			
(n=0,1	,9)									
\$+n	\$	-n	\$+-	I	DDD	Day o	f Year	(DOY)		
\$S+n	\$	S-n	\$S+-	I	DDDS	DOY,	Session	Characte	r	
\$Y+n	\$	Y-n	\$Y+-	3	YYYY	Year				
\$W+n	\$1	W-n	\$W+-	1	WWW	GPS W	leek			
\$M+n	\$1	M-n	\$M+ -	3	YMM	Year,	Month			
\$JD+n	\$	JD-n	\$JD+-	I	DDDDD	Modif	ied Jul	ian Date		
\$WD+n	\$1	WD-n	\$WD+-	1	WWWD	GPS W	eek and	Day		
\$YD+n	\$	YD-n	\$YD+-	3	YYDDD	Year	and DOY			
\$YSS+n	\$	YSS-n	\$YSS+-	3	YDDDS	Year,	DOY, S	ess. Char		
\$YMD_S	TR+n \$	YMD_STR-n	\$YMD_ST	'R+- 1	YYYY MM DI	D Year,	Month,	Day		_
										-
^Тор^	Prev ^Nex	ct Cance	Save^As	^Save ^F	łun ∣ ^Outp	put Rer^u	ו ^+Day	y ^-Day		
> User: orig	go Campaiç	gn: \${P}/EX	AMPLE \$Y+0	=2010 \$S+0:	=2080 \$J=N	IV File: orig	o/GPSUS	SER52/PAN/	MENU_	VAR.INP

3 Extrapolation of co-ordinates

\$YMD STR+0 YYYY MM DD \rightarrow 2010 07 27

 $\mathbf{Y}\mathbf{Y}\mathbf{Y}\mathbf{Y}$ year (2010)

 $\mathbf{MM} \mod (07)$

 ${\bf DD}\,$ day of month (27)

$\mathbf{APR}\$\mathbf{YD}{+}\mathbf{0} \ \operatorname{APRYYDDD} \rightarrow \operatorname{APR10208}$

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

8 - 0			Bei	nese GNSS S	oftware Ve	rsion 5.	2				
Configure	Campaign	RINEX	Orbits/EOP	Processing	<u>Service</u>	Cony	ersion	BPE	User	Help	
EXTRAP	OLATE COOP	DINATES -	COOVEL 1:	Filename	s						^
GENEDA	TRIPO										
Show	all gener	ral files		T							
INPOT	files t coordina	ate file		EX	AMPLE CR	D					
Inpu	t velocity	y file		EX	AMPLE VE	L					
PSD	correction	n (ITRF14)		IG	S14 PS	D					
REFERE	NCE EPOCH			УУУ	y mm dd		hh mm	SS			
				\$YM	D_STR+0		00 00	00			
RESULT	FILE										
Outp	ut coordin	nate file		API	R\$YD+0 C	RD					_
Stat	ions with	out PSD co	orrections		F	IX					
GENERA	L OUTPUT H	ILES								_	-
^Top ^	Prev ^Nex	t Cance^	Save^As	^Save /	Run ^O	utput	Rer^un	^+Day	^-Day		_
> User: orig	go Campaig	n: \${P}/EXA	MPLE \$Y+0	=2010 \$S+	0=2080 \$J	=MV F	ile: rigo	GPSUSE	R52/PAN	COOVEL	INP_MV
<u> </u>			Berr	nese GNSS S	oftware Ve	ersion 5	5.2				
Configure	<u>C</u> ampaig	n <u>R</u> INEX	<u>O</u> rbits/E	OP Proces	ssing <u>S</u> er	vice	Conver	sion <u>B</u>	PE	User	Help
COOVE	L 1.1: Ge	neral Fil	les								
GENER	AL INPUT	FILES									
Geo	detic dat	um	DATUM								
MENU Sel	SETTINGS	naign	de s	נסן / השתח							
Sel	ected ses	sion	ъ	ar 2018	ses	sion	0090				
Ses	sion tabl	e	\$	P}/ETH/S	TA/SESSI	ONS.S	ES				

^Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day

> User: origo Campaign: \${P}/ETH \$Y+0=2018 \$S+0=0090 \$J=RE File: o/GPSUSER52/PAN/COOVEL.INP_RE

4 Importing RINEX (RXOBV3)

Note that the RINEX files that were downloaded into the DATAPOOL are likely both .Z and Hatanaka compressed. You need to install CRZ2RNX and CRX2RNX to do the decompression. Place the binaries in X/EXE. For example

```
Q ≡
                           origo@origo-NJ50GU: ~/BERN52/GPS/EXE
origo@origo-NJ50GU:~/BERN52/GPS/EXE$ CRX2RNX -h
Usage: CRX2RNX [file] [-] [-f] [-s] [-d] [-h]
    stdin and stdout are used if input file name is not given.
    - : output to stdout
    -f : force overwrite of output file
    -s : skip strange epochs (default:stop with error)
            This option may be used for salvaging usable data when middle of
           the Compact RINEX file is missing. The data after the missing part, are, however, useless until the compression operation of all data
            are initialized at some epoch. Combination with use of -e option
           of RNX2CRX may be effective.
            Caution : It is assumed that no change in the list of data types
                      happens in the lost part of the data.
             : delete the input file if conversion finishes without errors
    -d
               (i.e. exit code = 0 or 2).
               This option does nothing if stdin is used for the input.
    -h : display help message
    exit code = 0 (success)
               = 1 (error)
               = 2 (warning)
    [version : ver.4.1.0]
origo@origo-NJ50GU:~/BERN52/GPS/EXE$
```

Note how .??D.Z is converted to .??O. Works for Unix compress (.Z) as well as for Gnu Zip (.gz):

🔕 – 🗉 🖻 origo@origo-NJ50GU: ~/BERN52/GPS/EXE 🔍	Ξ
RZ2RNX : C-shell script to decompress multiple RINEX files.	
Usage : CRZ2RNX [-c] [-d] [-f] [-q] [-v] file	
<pre>-c : output to the current directory -d : delete input files if decompressed successfully -f : force overwriting output files without inquiring -q : quiet mode (suppress display of files in progress) -v : verbose mode -h : show this message and stop file : input compressed RINEX (or CRINEX) files. Wildcards can be used.</pre>	
compressed RINEX/CRINEX> CRINEX> RINEX	
??????????d.gz(Z)> (?????????d)> ????????????	
??????????????????????????????????????	
???????????n.gz(Z)> ?????????n	
????????.?g.gz(Z)> ????????g	
??????????!.gz(Z)> ?????????!	
????????.?p.gz(Z)> ????????p	
??????????h.gz(Z)> ????????h	
????????.??b.gz(Z)> ????????b	
??????????m.gz(Z)> ????????m	
?????????.gz(Z)> ?????????c	
*.?0.crx.gz(Z)> *.?0.rnx	
*.rnx.gz(Z)> *.rnx	
Demarks	
 Installation of CRX2RNX is necessary to use this tool. The extensions of the input files must conform to the RINEX convention. origo@origo-NJ50GU:~/BERN52/GPS/EXE\$ 	

$\ref{states} ???\$S + 0 \text{ STATDDDS} \rightarrow \text{STAT2080}$

???? station

DDD day of year (208)

 ${f S}$ session character (0)

<mark>8</mark> – D		Bernese	GNSS Softwa	re Version	5.2			
Configure Camp	aign <u>R</u> INEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
TRANSFER RIN	EX OBSERVAT	ION FILES TO	BERNESE H	ORMAT -	RXOBV3 1:	Filename	s	<u>^</u>
GENERAL FILE	s							
Show all g	eneral file	5		Y				
INPUT FILES								
e orig	ginal RINEX	observation	files	???\$\$	8+0 180			
C smoo	othed RINEX	observation	files	???\$\$	S+0 SMT			
Station in	formation f	ile		ETH	STA			
RESULT FILES								
Measuremen	t types to	save						
r Co	de 🍸 I	Phase 🗹			C Ra	nge		
Update coo	rdinates	EXA	MPLE CRD	(b]	lank if not	used)		
GENERAL OUTP	UT FILES							
Program ou	tput	2	use RXOBV	3.Lnn		or R	XOBV3	OUT
Error mess	ages		merged to	program	n output	or E	RROR	MSG
								•
^Top ^Prev	Next Cance	^I Save^As	^Save ^	Run ^Ou	utput Rer^u	n ^+Day	/ ^-Day	
> User: origo Cam	paign: \${P}/ET	H \$Y+0=2018	\$\$+0=0090	\$J=RE	File: o/GPSUS	ER52/PAN	I/RXOBV3	.INP_RE

<mark>8</mark> – D				Bernese (GNSS S	oftwar	e Vers	sion 5.2				
Configure	<u>C</u> ampaign	RINEX	Orbits/	EOP <u>P</u> roce	essing	Serv	vice	Conversion	BPE	User	Help	
RXOBV3	1.1: Gener	al File	5									4
GENERA	L INPUT FII	ES	_									
Gene	ral constar	nts		CONST.								
Sate	llite infor	mation	5	SATELLIT.	108							
Sate	llite probl	ems		SAT_\$Y+0	C	RX						
Phas	e center of	fsets		PCV.I08								
GPS -	UTC seconds	3	-	GPSUTC.								
Abbr	eviation ta	able	Ī	ABBREV	A	BB						
Freq	uency infor	mation	Ī		E	'RQ						
MENU SI	ETTINGS											
Sele	cted campai	gn	\$	{P}/EXAM	PLE							
Sele	cted session	on	7	year 203	LO	sess	sion	2080				
Sess	ion table		\$	{P}/EXAM	PLE/S	TA/SE	ISSIO	NS.SES				
TEMPOR	ARY FILES											
Scra	tch files		Ē	XOBV3\$J	SCR		RXOB	V3\$J SC1	RX	OBV3\$J	SC2	•
^Top ^	Prev ^Next	Cance^	I Save	^As ^Sa	ve ^	Run	^Out	tput Rer^un	^+Day	y ^-Day		
> User: orig	go Campaign	: \${P}/EX/	AMPLE	\$Y+0=2010	\$S+0	=2080	\$J=I	MV File: rigo	GPSUSE	ER52/PAN/	RXOBV3	.INP_MV

😣 – 😐			Bei	rnese GNSS So	oftware Ver	sion 5.2				
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	<u>B</u> PE	<u>U</u> ser	Help	
RXOBV3	2: Input (Options	1							<u>^</u>
TITLE	Examp	le								
SATELL	ITE SYSTEM	SELECTI	ON							
Sate	llite syst	em to be	considered	3		ALL	-			
SUPATIO	N NAMES									
Gath	er station	names f	rom			FILE	NAME	-		
Acti	on if stat	ion not	in abbrevia	ation list		UPDAT	E 🔽			
GEGGTO	N TORNUTRI	70								
Sess	ion ID use	d for Be	rnese obsei	rvation fil	es	\$5+0	(blank	c: AUTO)		
						μu. σ	(,		
DATA S.	AMPLING						_			
Samp	ling inter	val				30	second	ls		
Samp	ling offse	t to ful	1 minute			0	second	is		
	1	1	1	1 1		I	1			•
^Top ^	Prev ^Next	Cance/	Save^As	^Save ^F	Run ^Ou	tput Rer^un	^+Day	^-Day		
> User: orig	go Campaign	1: \${P}/EX	AMPLE \$Y+0)=2010 \$S+0:	=2080 \$J=	MV File: rigo	GPSUSE	R52/PAN/	RXOBV3.IN	NP_MV

 $\mathbf{Y} + \mathbf{0} \mathbf{Y} \mathbf{Y} \mathbf{Y} \mathbf{Y} \rightarrow 2010$

 $\mathbf{Y}\mathbf{Y}\mathbf{Y}\mathbf{Y}\mathbf{Y}$ year (2010)

```
\$S{+}0 \text{ DDDS} \rightarrow 2080
```

DDD day of year (208)

 \mathbf{S} session character (0)

😣 – 🗆			Be	rnese GNSS So	oftware Ve	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
RXOBV3	3: Observa	ation Wi	ndow						
OBSERV	ATION WIND	W							
0	Take all	observa	ations						
•	Defined	by Year	and Sessio	n identifi	er				
	Year	\$Y+0	Session	\$S+0					
0	Defined	by Star	t and End t	imes					
		yyyy mn	dd h	h mm ss		yyyy mm dd	. ł	nh mm ss	
	Start	\$YMD_S7	rR+0 0	0 00 00	End	\$YMD_STR+0		23 59 59	
^Top ^	Prev ^Next	Cance/	Save^As	^Save ^	Run ^Oເ	tput Rer^un	^+Day	^-Day	
> User: orig	jo Campaigr	: \${P}/EX	AMPLE \$Y+0	0=2010 \$S+0	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN/I	RXOBV3.INP

😣 – 🗉 Bernese GNSS Software Version 5.2													
Configure	Campa	ign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help			
RXOBV3	4: Ing	put Oj	ptions 2										
SIGNAL	STREN	TH R	EQUIREME	NTS									
Mini	mum si	gnal	strength	L			1 🗧						
Acce	pt sig	nal s	trength	= 0			Y						
Acce	pt cyc	le sl	ip flags	from RINI	ΞX								
WINIT	N ODGE												
MINIMUM OBSERVATION NUMBER													
MINI	Minimum number of epochs requested per file 10 epochs												
OPTION	s conci	ERNIN	G ANTENN	AS									
Cons	ider r	adome	code of	the anter	nnas		M						
Corr	ect po	sitio	n of rad	lome code									
Chec	k phas	e cen	ter file	for anter	nna type		<u>۲</u> •	else WA	ARNING	•			
EVENT	FLAG HA	ANDLII	NG		_		(a	_					
What	το αο	in c	ase or e	event flags	3		SKIP	<u> </u>					
FREOUE	NCY CHI	ECK F	OR SLR										
Chec	k freq	lency	informa	tion file	for frequ	ency	WARNING	; -					
	CHECK HEQUENCY INFORMACION THE LOT HEQUENCY WARNING												
	^Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day												
	no Cam	naian			-2010 \$5+0	-2080 Fil	e: /home/orig		B52/DAN		D		
> 03er. 011	go cam	paign.	Ψ(FJ/EAA		-2010 90+0	-2000 FI	c. /nonie/ongo		HJZ/FAN	11/00/0.10			

8 - 0			Be	rnese GNSS So	oftware Ve	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	<u>H</u> elp
RXOBV	3 5.1: Chec	Conten	t of RINEX	Header 1					
ACTIO Sta Rec Rec Ant	NS IN CASE (tion name eiver/antenn eiver/antenn enna positic ker type	OF INCON na type na numbe on	SISTENCIES WAR r WAR WAR WAR WAR	RNING - RNING - RNING - RNING - RNING -	Try	also filena	me	T	
N W S E	O_CHECK : N ARNING : W KIP : S RROR : W	o check rite war kip file rite err	is done ning and c and conti or message	ontinue nue with n and stop j	ext file processi	ng			
^Тор	Prev ^Next	Cance^	I Save^As	^Save ^	Run ^Oı	utput Rer^un	^+Day	^-Day	

> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/RXOBV3.INP

8 - 0	Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
RXOBV3	5.2: Check	Content	t of RINEX	Header 2							
ADDITI	ONAL VERIFI	CATION									
Verify station name/number using											
Veri	Verify station name using RINEX filename										
HANDLI	NG OF KNOWN	INCONS	ISTENCIES								
Acce	Accepted station information										
^Top ^	Prev ^Next	Cance^	I Save^As	^Save ^F	Run ^Ou	tput Rer^un	^+Day	^-Day			
> User: orig	jo Campaign	:\${P}/EX/	AMPLE \$Y+0	0=2010 \$S+0:	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN	I/RXOBV3.	INP	

4.1 RINEX files

8 RXOFILE	
Look in: 🔄 /home/origo/GPSDATA/CAMPAIGN52/EXAMPLE/RA	₩/ • € 卷 ☷ ☷
□ JOZ22080.100 □ ONSA2080.100 □ WSR1	Г2080.100 [□] ZIM22080.100
GANP2080.100 LAMA2080.100 PTBB2080.100 WTZF	R2080.100 🗅 ZIMM2080.100
HERT2080.100 MATE2080.100 TLSE2080.100 WTZZ	2080.100
File name:	<u>O</u> pen
File type: ????2080.10O	
	Browse
	Select All

5 Create tabular orbits (PRETAB)

COD\$WD+0 CODWWWWD COD15942

 \mathbf{WWWW} GPS week (1594)

 \mathbf{D} GPS day (2)

COD\$YD+0 CODYYDDD COD10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

🛞 – 🗆 Bernese GNSS Software Version 5.2											
Configure Campaign RINEX Orbit	s/EOP Processing	Service	Conversion	BPE	User	Help					
CREATE TABULAR ORBITS - PRETA	B 1: Filenames										
GENERAL FILES Show all general files											
Show all yonolal lives											
INPUT FILES											
Precise ephemeris	COD\$WD+0 PRE										
Pole file	COD\$YD+0 ERP										
Ocean loading corr	EXAMPLE BLQ	(for	CMC)								
Atmospheric loading corr	EXAMPLE ATL	(for	CMC)								
RESULT FILES											
Tabular file(s)	COD\$YD+0 TAB	(blank:	same name a	as input	file(s))					
Satellite clock file	COD\$YD+0 CLK										
GENERAL OUTPUT FILES						_					
Program output	use PRETAB	.Lnn	0	r	PRETAB	OUT					
Error messages	merged to	program	output o	r	ERROR	MSG					
	1 1		1	1							
^Top ^Prev ^Next Cance^I Sa	ve^As ^Save ^F	Run ^Ou	tput Rer^un	^+Day	^-Day						
> User: origo Campaign: \${P}/EXAMPLE	\$Y+0=2010 \$S+0	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN/	PRETAB.INP					

8 - 0	😣 – 🛛 Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
PRETAB	1.1: Gener	ral File	s								
GENERAJ Gene: Subd Nuta Sate	L INPUT FII ral constan aily pole n tion model llite probi	LES nts model lems	CONS IERS IAU2 SAT_	T. 2010XY S 000R06 N \$Y+0 C	UB UT RX						
MENU SI Sele Sele Sess	ETTINGS cted campa: cted session ion table	ign on	\${P} year \${P}	/EXAMPLE 2010 /EXAMPLE/S	session FA/SESSI	2080 DNS.SES					
│ ^Top │ ^Prev │ ^Next │ Cance^I │ Save^As │ ^Save │ ^Run │ ^Output │ Rer^un │ ^+Day ^-Day > User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/PRETAB.INP											



I	🐸 – 🗖			Ве	rnese GNSS So	oftware Vei	rsion 5.2				
	Configure	<u>C</u> ampaign		Orbits/EOP	Processing	Service	Conversion	BPE	User	Help	
	PRETAB	3: Options	for Cl	ocks							
	OPTION	S FOR CLOCK	s								
	Inte	rval for po	lynomia	ls		12	hours				
	Poly	nomial degi	ree			2					
	^Top ^	Prev ^Next	Cance/	Save^As	^Save ^F	Run 🔤 ^Oເ	Itput Rer^un	^+Day	^-Day		
	> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/PRETAB.INP										

5.1 Precise ephemeris files

8 PREFIL										
Look in: 🔄 /home/origo/GPSDATA/CAMPAIGN52/EXAMPLE/ORB/ 🗾 🗢 🗈 💷 🎬										
□ □COD16460.PRE □IGL15941.PRE □IGL16461.PRE □IGS16460.PRE										
COD15941.PRE COD16461.PRE IGL15942.PRE IGS15941.PRE IGS16461.PRE										
COD15942.PRE COD19602.PRE IGL16460.PRE IGS15942.PRE										
File <u>n</u> ame:	<u>O</u> pen									
File type: *.PRE										
	Browse									
	Select All									

6 Generate standard orbits (ORBGEN)

COD\$YD+0 CODYYDDD COD10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

😣 – 😐			Be	rnese GNSS S	oftware V	ersion 5.2				
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	ו <u>B</u> PE	User	Help	
CREATE	/UPDATE STA	ANDARD O	RBITS - OR	BGEN 1: In	put File	es				<u>^</u>
GENERA Show	L FILES all genera	al files	i	Ч						
INPUT	FILES									
•	Start with	tabular	r orbits	co	D\$YD+0	FAB				
c	Start with	precise	e orbits]	PRE				
c	Update sta	ndard or	rbit							
	Orbital	elemen	ts, file 1]	ELE				
	Orbital	elemen	ts, file 2]	ELE				
Pole	file			co	D\$YD+0	ERP				
Ocea	n loading (correcti	ons	E	KAMPLE I	BLQ (1	for CMC)			
Atmo	spheric loa	ading co	rrections	E	KAMPLE 2	ATL (1	Eor CMC)			
										_
^Top ^	Prev ^Next	Cance/	I Save^As	^Save ^	Run ^C	utput Rer^	un ^+Day	^-Day		_
> User: orig	go Campaign	: \${P}/EX	AMPLE \$Y+	0=2010 \$S+0)=2080 F	ile: /home/ori	go/GPSUSE	R52/PAN	ORBGEN.	INP

DE405.EPH

Planetary ephemeris file. You may need to generate this yourself from files found on JPL web site.

🛞 – 🗆 Bernese GNSS Software Version 5.2											
Configure Campaign RINEX Orbits	EOP Processing Service	Conversion BPE	<u>U</u> ser <u>H</u> elp								
ORBGEN 1.1: General Files											
GENERAL INPUT FILES											
General constants	CONST.										
Satellite problems	SAT_\$Y+0 CRX										
Satellite information	SATELLIT.108										
Planetary ephemeris file	DE405 EPH										
Subdaily pole model	IERS2010XY SUB										
Nutation model	IAU2000R06 NUT										
Coeff. of Earth potential	M2008_SMALL.										
Solid Earth tides file	TIDE2000 TPO										
Ocean tides file	OT_FES2004 TID										
GPS-UTC seconds	GPSUTC.										
MENTI CEMETNOC											
Selected campaign	(D) (EVANDLE										
Selected campaign	\${P}/EXAMPLE	2080									
Session table											
	\$ { P } / EXAMPLE / STA / SESS	TONS.SES									
TEMPORARY FILES											
Scratch files	ORBGEN\$J SCR	ORBGEN\$	J SC2								
	,	,									
ATon APrey ANext CanceAL Say		utput Ber∆un ∆+Γ	av ^-Dav								
> User: origo Campaign: \${P}/EXAMPLE	\$Y+0=2010 \$S+0=2080 Fi	le: /home/origo/GPSU	SER52/PAN/ORBGEN.INP								

Generating DE405.EPH

//home/origo/BERN52/GPS/DOC/README_JPL_EPH.TXT	
Bernese GNSS Software, Version 5.2 Last mod.: 20-Jan-2020 Installation of the JPL planetary and lunar ephemerides	-
The JPL ephemerides are prepared at JPL by M.E.Standish et al. Information may be found at	
http://ssd.jpl.nasa.gov?planet_eph_export	
The ephemerides may be downloaded from this site (see below). There is also a CD available containing binary and ASCII versions of the JPL ephemerides covering the time interval from 1599 to 2200. The CD may be purchased for \$24.95 from William-Bell, Inc. See	
http://www.willbell.com/software/jpl.htm	
Installation procedure	
 The steps necessary to create the DE405 ephemeris file are: concatenate the downloaded ascii files convert the resulting file to binary using the program ASC2EPH test the resulting binary ephemeris file using program TESTEPH If all is well, copy the generated ephemeris file to the required directory for the Bernese Software. 	
The Fortran programs ASC2EPH and TESTEPH are part of the Bernese GNSS	• •
Find next prev > Clo	se

COD\$YD+0 CODYYDDD COD10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

ORB\$YD+0 ORBYYDDD ORB10208

🙁 – 🗉 Bernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	<u>R</u> INEX	Orbits/EC	DP <u>P</u> roce	ssing	Service	Conversion	BPE	<u>U</u> ser	Help	
ORBGEN	2: Result	and Out	put Files	5							
RESULT	FILES										
Stan	dard orbit	s	C	OD\$YD+0	STD						
Radi	ation pres	sure coe	ff.		RPR						
Resi	dual file		Γ		RES						
OUTPUT	FILES										
Summ	ary file		Г		LST						
Summ	ary file f	or IGS-A	.cc o	RB\$YD+0	LST						
Plot	file of r	esiduals	i i		PLT						
GENERAL	ו. סווידידי ד	TLES									
Prog	ram output	:	T	use	ORBGE	N.Lnn		or	ORBGEN	OUT	
Erro	r messages	3	Г Г	merg	ed to	program	output	or	ERROR	MSG	
									'		
^Top ^	Prev ^Nex	t Cance/	I Save^/	As ^Sav	/e ^F	Run ^Oເ	tput Rer^u	n ^+C	Day ^-Day		
> User: orig	jo Campaig	n: \${P}/EX	AMPLE \$	(+0=2010	\$S+0=	=2080 \$J=	MV File: igo	GPSU	SER52/PAN	ORBGEN.I	NP_MV

8 - 0	🔞 – 🗉 Bernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	<u>B</u> PE	User	Help			
ORBGEN	3.1: Optio	ons										
TITLE	ORBGEN	title										
TIME F	RAME, POTE	NTIAL AN	D TIDAL CO	RRECTIONS								
Time	frame			GPS -								
Ocea	n potentia n tides ma	1 degree x degree		12 -								
Appl	y CMC corr	ection	OTL:	 ▼ 		ATL:	·					
Appl	y antenna	offset										
SYSTEM	FOR DYNAM	ICAL ORB		ERS								
DYX	Sun-orient	ed (cons	tant + D1,	Y1, X1) -	old CODE	[model	¢					
D2X	Sun-orient	ed (cons	tant + D2,	D4, X1) -	new CODE	[model	с					
RSW	(radial, a	long-tra	ck, cross-	track) – LH	SO + SLR		с					
DRSW	(Direct,	radial,	along-trac	k, cross-ti	rack) – I	LEO + SLR	с					
^Top ^	Prev ^Next	Cance/	I Save^As	^Save ^	Run ^Ou	tput Rer^u	ın ^+Day	^-Day				
> User: orig	go Campaigr	n: \${P}/EX	AMPLE \$Y+0	0=2010 \$S+0	=2080 \$J=	MV File: ig	o/GPSUSEF	R52/PAN/C	RBGEN.INP	_MV		

🙁 – 🗉 Bernese GNSS Software Version 5.2											
Configure Campaign RINEX Orb	its/EOP Processing	Service	Conversion	BPE	<u>U</u> ser	Help					
ORBGEN 3.2: Options											
PRINT RESIDUALS	NO										
NUMERICAL INTEGRATION Number of iterations	2										
EQUATION OF MOTION Polynomial degree Length of interval	10 \Xi 01 00 00 ((hh mm ss)									
VARIATIONAL EQUATIONS Polynomial degree Length of interval Additional sets Use extended RPR Format	12 06 00 00 (0 1 1 1 1 1 1 1 1 1 1	(hh mm ss	,								

∬ ^Top │ ^Prev │ ^Next │ Cance^I │ Save^As │ ^Save │ ^Run │ ^Output │ Rer^un │ ^+Day ^-Day > User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 \$J=MV File: igo/GPSUSER52/PAN/ORBGEN.INP_MV

😣 – 🗉 Bernese GNSS Software Version 5.2											
Configure	Campaign	RINEX C	orbits/EOP	Processing	g <u>S</u> ervi	ce Co	nversion	BPE	User	Help	
ORBGEN 4: Parameter Selection											
DYNAMICAL ORBIT PARAMETERS											
Apart from six osculating elements, estimate the following parameters:											
D0 (d	direct)	M		Period	lic D1	terms	(cos, s	in)	7		
				Period	lic D2	terms	(cos, s	in)	~		
				Period	lic D4	terms	(cos, s	in)	×		
X0 (7	y-bias)	M		Period	lic Y1	terms	(cos, s	in)	Y		
x0		M		Period	lic X1	terms	(cos, s	in)	7		
R (ra	adial)	Г		Period	lic R1	terms	(cos, s	in)	Г		
S (al	long-track)	Г		Period	lic S1	terms	(cos, s	in)	Г		
W (oi	ut-of-plane	•) [Period	lic W1	terms	(cos, s	in)			
STOCHAS	STIC PULSES	IN (R, S	, W)-DIRE	CTIONS							
Sate	llite selec	tion					NC	NE	-		
List	of satelli	tes							_	-	
Para	neter spaci	ng							(hh mm s	s)	
^Top ^F	Prev ^Next	Cance [^] l	Save^As	^Save	Run	^Output	Rer^u	n ^+Day	^-Day		
> User: orig	o Campaign	: \${P}/EXAN	IPLE \$Y+0	=2010 \$S+	0=2080	File: /h	ome/orig	o/GPSUSE	R52/PAN/	ORBGEN.INP	

$\$\mathbf{Y}{+}\mathbf{0} \ \mathbf{Y}\mathbf{Y}\mathbf{Y}\mathbf{Y} \rightarrow 2010$

 $\mathbf{Y}\mathbf{Y}\mathbf{Y}\mathbf{Y}\mathbf{Y}$ year (2010)

S+0 DDDS $\rightarrow 2080$

DDD day of year (208)

S session character (0)

8 - 0	Sernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help			
ORBGEN	5: Orbital	l Arc De	finition									
ORBITAL ARC DEFINITION Number of arcs within the time window												
Time	Time window to be covered by the standard orbits											
9	C Defined by Year and Session identifier Year \$Y+0 Session \$S+0											
c	Defined	by Star	and End t	imes								
	Start	yyyy mm \$YMD_S7	dd h PR+0	h mm ss 10 00 00	End	yyyy mm dd \$YMD_STR+0	i i	h mm ss 23 59 59				
			1									
^Top ^	Prev ^Next	Cance/	I Save^As	^Save ^	Run ^Oເ	tput Rer^un	^+Day	^-Day				
> User: orig	go Campaign	: \${P}/EX	AMPLE \$Y+0	0=2010 \$S+0	=2080 \$J=	MV File: igo/0	GPSUSE	R52/PAN/O	RBGEN.INP_MV			

6.1 Tabular orbit files

S TABFIL	
Look in: 🔄 /home/origo/GPSDATA/CAMPAIGN52/EXAMPLE/OR	B/ ▼ ⇔ € 巻 ☷ ⅲ
COD11205.TAB	
COD10207.TAB COD11206.TAB	
^D COD10208.TAB	
File name:	<u>O</u> pen
File type: *.TAB	
	Browse
	Select All

7 Import Earth orientation parameters (POLUPD)

COD\$W+07 CODWWWW7 COD15947^a

 \mathbf{WWWW} GPS week (1594)

COD\$YD+0 CODYYDDD COD10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

🛛 – 🔍	🙁 – 🗆 Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
CONVER	T IERS POLE	FILES	TO BERNESE	FORMAT - H	POLUPD 1:	Input/Outp	ut Files	5			
GENERA Show	L FILES all genera	l files	3		Y						
INPUT	FILES										
Bern Fore	ese formatt ign formatt	ed ERP	files files		COD\$W+07	ERP IEP					
RESULT Bern	FILE ese formatt	ed ERP	file (out)		COD\$YD+0	ERP					
GENERA	L OUTPUT FI	LES									
Prog	ram output		P	use POI	UPD.Lnn		or	POLUPD	OUT		
Erro	r messages		Γ	merged	to progr	am output o	r	ERROR	MSG		
^Top ^	Prev ^Next	Cance	I Save^As	^Save ^	Run ^Ou	tput Rer^un	^+Day	^-Day			
> User: orig	jo Campaign	: \${P}/EX	AMPLE \$Y+0)=2010 \$S+0	=2080 \$J=	MV File: rigo	GPSUSE	R52/PAN/P	OLUPD.INP_MV		

^{*a*}Why the digit 7? Probably because these are *weekly* files giving values for 7+2 epochs, the target GPS week plus one day before and one day after. Data are given for noon each day.



8 - 0			Ве	rnese GNSS So	oftware Ve	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	<u>U</u> ser	Help
POLUPD	2: Options	5							
HEADER	INFORMATIO	ON							
Titl	e POLU	PD on EX	AMPLE					-	
Nuta	tion model		, F	12000R06 NU	т				
Subd	aily pole :	model	Ē	S2010XY SU	в				
DITT									
BULLET.	IN BASIN	PUT							
Use	1 or 5 day	values	Ŀ	L <u> </u>					
OPTION	S								
Use	ERP rates		٢						
Allo	w double e	pochs	Γ						
Incl	ude nutati	on offse	ts [_					
Use	time windo	w	Γ						
		1			1	1	1		
^Top ^	Prev ^Next	Cance/	I Save^As	^Save ^	Run ^Oເ	Itput Rer^un	^+Day	^-Day	
> User: orig	jo Campaigr	n: \${P}/EX	AMPLE \$Y+	0=2010 \$S+0	=2080 \$J:	MV File: rigo	GPSUSE	R52/PAN	POLUPD.INP_M

7.1 Bernese native Earth Orientation Parameter files ("pole files")

8 POLE										
Look in: 🔄 /home/origo/GPSDATA/CAMPAIGN52/EXAMPLE/ORB/ 🔽 🗢 🗈 🖝 🏾										
□ COD11205.ERP □ COD15947.ERP										
□ C04_2010.ERP □ COD11206.ERP □ COD16460.ERP										
C04_2011.ERP COD11207.ERP COD16461.ERP										
COD10207.ERP COD15941.ERP COD19607.ERP										
COD10208.ERP COD15942.ERP										
File name: COD?????.ERP	<u>O</u> pen									
File type: *.ERP										
	Browse									

8 Code based clock-synchronization (CODSPP)

http://www.bernese.unibe.ch/faq/#mess101:

GETSTAF: COORDINATES NOT FOUND

The reason for this message is very likely that the renaming of the stations in the station information file (.STA) was missed by RXOBV3 or the RINEX header does not fit in the search pattern of the STA file. Because as the corresponding station is used in your observation file, it needs also be added to the .CRD, .KIN and .STA files.

In my case, a remedy was looking in the subdirectory P/EXAMPLE/OBS: there are files there having the general form

 $\ref{shift} \texttt{S+0.PZO}$ for phase observations, like GANP2070.PZO

 $\ref{shorthold} $$\ref{shorthold} $$header file GANP2070.PZH$ header file GANP2070.PZH$

????\$S+0.CZH header file GANP2070.CZH.

The station name here is GANP. This is the original four-character station name, when the "remapped",¹ unique four-character station name according to \$P/EXAMPLE/STA/ABBREV.ABB should be GAN1. Similarly HERT, which is remapped to HER1, etcetera.

This is wrong.

The names of Bernese native observation files should use re-mapped four-character names, not the original ones. These non-remapped four-character station-name observation files should all be deleted. They are probably leftovers from a flawed, earlier run. Sadly, Bernese isn't very robust against being misled by its own file names in this way...

Also ABBREV.ABB should be cleaned up to only offer the original four-character station names with DOMES marker names. See figure 1 for a well-formed file.

COD\$YD+0 CODYYDDD COD10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

APR\$YD+0 APRYYDDD APR10208

??? **S**+0 STATDDDS \rightarrow STAT2080

???? station name (STAT)

S session character (0)

P1C1\$M+0 P1C1YYMM \rightarrow P1C11007

 $\mathbf{MM} \mod (07)$



¹The remapping apparently consists of taking the station name including the DOMES marker name and finding, from left to right, the first unique character to include in the remapped name. So, if both GANP and GANP 11515M001 are on the list, the latter is mapped to GAN1.

😣 – 🛛 Bernese GNSS Software Version 5.2										
Configure Campaign RINEX Orbits/EO	Processing	Service	Conversion	BPE	User	Help				
CODSPP 1.1: General Files						-				
GENERAL INPUT FILES										
General constants CONST.										
Subdaily pole model IERS2010XY SUB										
Nutation model	IAU2000R06	NUT								
Satellite information	SATELLIT.I	08								
Receiver information	RECEIVER.									
Satellite problems	SAT_\$Y+0	CRX								
Station information		STA								
Geodetic datum	DATUM.									
Phase center eccentricities	PCV.108									
Frequency information		FRQ								
GPS-UTC file	GPSUTC.									
MENU SETTINGS										
Selected campaign	\${P}/EXAMP	LE								
Selected session	vear 2010) ses	sion 2080							
Session table	\${P}/EXAMP	LE/STA/S	ESSIONS.SES							
		,								
TEMPORARY FILES										
Scratch files	CODSPP\$J	SCR CO	DSPP\$J SC1	CODS	PP\$J SC	22				
				,						
ATop APrev ANext CanceAl SaveAs	S ^Save ^F	Run ^Oເ	Itput Rer^un	^+Day	^-Day	-				
> User: origo Campaign: \${P}/EXAMPLE \$Y	-0=2010 \$S+0:	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN	CODSPP.INP				

8 - 0	😣 – 🗉 Bernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help			
CODSPP	1.3: Outpu	ut Files										
RESULT	FILES											
Coor	dinate res	ults			CRD							
Kine	matic coor	dinates			KIN							
Resi	dual file				RES							
Sate	llite cloc	k result	s		CLK							
Cloc	k RINEX re	sults			CLK							
GNSS	receiver 1	LC DCB V	alues		DCB							
OUTPUT	FILES											
Outp	ut summarv	(XYZ co	ord.)	XY7\$S+0	SMC							
Outp	ut summary	(E11.co	ord.)		SME							
-	-			1								
GENERAL	L OUTPUT FI	ILES										
Prog	ram output			🖌 use C	ODSPP.Lnr	1	or	CODSPP	OUT			
Erro	r messages			merge	d to prog	gram output	or	ERROR	MSG			
^Top ^	Prev ^Next	Cance^	I Save^As	^Save ^	Run ^Ou	tput Rer^un	^+Day	^-Day				

> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2070 \$J=MV File: rigo/GPSUSER52/PAN/CODSPP.INP_MV

<mark>8</mark> – D	Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	<u>R</u> INEX	Orbits/EOP	Processing	Service	Conv	ersion	<u>B</u> PE	<u>U</u> ser	Help	
CODSPP	2: Input C	ptions							_		
TITLE	title										
PARAMET	ERS										
Frequ	ency				L3	-					
Clock	polynomia	al degre	e		Е	•	E: one	offset p	er epoc	h	
Save	clock esti	mates			BOTH	-					
Estim	ate coordi	Inates			NO		-				
ATMOSPH	ERE MODELS	I									
Tropo	sphere				GMF		-				
Ionos	phere										
^Top ^P	rev ^Next	Cance^	I Save^As	^Save ^F	Run ^Ou	tput	Rer^un	^+Day	^-Day		
> User: origo	o Campaign	:\${P}/EX/	AMPLE \$Y+0)=2010 \$S+0:	=2080 Fil	e: /hon	ne/origo	GPSUSEF	852/PAN/0	CODSPP.INP	

Sernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
CODSPP	3: Input (Options									
OBSERV	ATION SELE	CTION									
Mini	mum elevat:	ion			3 🕂 🤇	legrees					
Samp	ling rate	of aloak	a allowed a	mor		gogonda (0.	no into	rpolatio	1		
Obse	rvation wi	ndow	s allowed (JVEL		seconds (0:	no ince	ipolacio	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
Use	mark flags	from ob	servation i	files							
PRINT	OPTIONS				_						
Elev	ations										
		1	1	1 1			1				
^Top _^	Prev ^Next	Cance [^]	Save^As	^Save ^	Run ^Oເ	Itput Rer^un	^+Day	^-Day			
> User: ori	go Campaign	n: \${P}/EX/	AMPLE \$Y+0	0=2010 \$S+0	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN	CODSPP.INP		
					<i>.</i>	1					
<u> </u>			Bei	rnese GNSS So	oftware Ve	rsion 5.2					
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
CODSPP	4: Screen:	ing Opti	ons								
TTERAT	TONS										
Max.	number of	iterati	ons	10							
OUTLIE	R DETECTION	N		_							
Outl	Outlier detection										
Conf	idence int	erval		5.0	(in unit	s of one sid	(ma)				
Min.	degree of	freedom		1							
Max.	RMS of kin	n. solut	ion	5.0	meters						

Confidence interval Min. degree of freedom Max. RMS of kin. solution Mark outliers in obs. files

meters •

NO

Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day

> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/CODSPP.INP

9 Form baselines (SNGDIF)

????\$S+0 STATDDDS STAT2070

 ${\bf STAT}$ station name (STAT)

DDD day of year (207)

 \mathbf{S} session character (0)

8 - 0			Bei	rnese GNSS S	oftware Ve	rsion 5.2					
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	<u>U</u> ser	Help		
CREATE	SINGLE-DI	FFERENCE	/BASELINE H	TLES - SNO	GDIF 1: 3	Input File f	Selection	L			
GENERA	T. PTT.PC										
Show	all gener	al files		Ч	-						
GENERA	GENERAL OPTIONS										
Meas	Measurement type PHASE										
Proc	essing str	ategy		C	BS-MAX	-					
Stat	ions must	contain	observ. fro	om 🖸	PS	•					
AUTOMA	TED BASELI	NE CREAT	ION	_							
Zero	-differenc	e observ	ation files	s ?	???\$S+0	PZH	???\$\$+0	CZH			
Refe	rence stat	ion for	STAR strate	эдХ		PZH		CZH			
MANUTAT	DAGELTNE	ODEAUTON									
MANUAL	BASELINE	CREATION	i	- r		Derri					
Firs	t zero-di	fference	input file			PZH		CZH			
Seco	na zero-ai	lierence	input file	•		PZH		CZH			
Sing	le-differe	nce outp	ut Ille	I		PSH		CSH			
^ ^	Prev ^Next	Cance/	Save^As	^Save ^	Run ^Ou	utput Rer^u	1 ^+Dav	^-Dav			
	ao Compoiar	. ¢(D)/EV		-2010 \$5.0	-2070 61-	MV Eilourige				M/\/	
> User: On	yo campaigi	1: \${F}/CA	AMPLE ST+C	J=2010 \$3+0	=2070	INV FILE: Hgt	GFSUSE		SNGDIF.INF		
			Be			cian E 2					
V - U			Del	nese GNSS S	ortware ve	rsion 5.2					
Configure	Campaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
SNGDIF	1.1: Gene	ral File	s								
GENERAL INPUT FILES											
Gene	General constants CONST.										
Sate	llite info	rmation	SATE	LLIT.IO8							

Geodetic datum DATUM. Abbreviation table ABBREV ABB MENU SETTINGS Selected campaign \${P}/EXAMPLE Selected session year 2010 session 2080 Session table \${P}/EXAMPLE/STA/SESSIONS.SES ^Top ^Prev ^Next Cance^! Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day

> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/SNGDIF.INP

APR\$YD+0 APRYYDDD APR11206

 $\mathbf{Y}\mathbf{Y}$ year (11)

DDD day of year (206)

<mark>8</mark> – D			Be	rnese GNSS So	ftware Ver	sion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	<u>U</u> ser	Help
SNGDIF	2: Filenar	nes							
INPUT I	FILES								
Stat	ion coordin	nates		APR\$YD+0	CRD				
Site	eccentric:	ities			ECC				
Clus	erinea pase ter definit	tion			BSL				
Cius	cer derimi	C1011		1					
RESULT	FILES								
List	ing of form	ned base	lines		BSL				
Clus	ter/baseli	ne assig	nment	CI	LB (2	digits wil	l be ap	pended)	
GENERA	L OUTPUT FI	LES							
Prog	ram output		7	use SNGDIF	.Lnn	0	r	SNGDIF	OUT
Erro	r messages			merged to	program	output o	r	ERROR	MSG
^Top ^	Prev ^Next	Cance^	Save^As	^Save ^F	Run ^Ou	tput Rer^un	^+Day	/ ^-Day	
> User: orio	o Campaign	: \${P}/EX/	AMPLE \$Y+0	=2010 \$S+0:	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN/S	

Bernese GNSS Software Version 5.2 Configure Campaign RINEX Orbits/EOP Processing Service Conversion BPE User Help SNGDIF 3: Options TITLE title SIMULTANEOUS OBSERVATIONS Tolerance to identify observations of one epoch 1.0 seconds SETTING OF NEW AMBIGUITIES Merge ambiguities from input files After a gap in the observations larger than 20 minutes If a cycle slip flag in one of the input files ^Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day

> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/SNGDIF.INP

8 – 🛛			Bei	nese GNSS So	ftware Vei	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
SNGDIF	3.1: Optio	ons for	Strategy OH	S-MAX					
SPEED U	P BASELIN	E SELECT	ION ALGORIT	MHM					
Minim	num number	of obse	rvations re	equested		600 🕂	(scaled,	see help)
Maxim	num distan	ce for f	ast observa	ation count	:	0 🕂	kilomete	rs	
Maxim	num baseli	ne lengt	h considere	ed		9000 🕂	kilomete	rs	
ALLOW R	EDUNDANT H	BASELINE	S						
Add r	edundant l	baseline	s						
ADD BON	US DEPEND	ING ON B	ASELINE LEN	IGTH					
Maxim	num bonus :	for numb	er of obser	rvations		10	percent		
Direc	et L1/L2: 1	Baseline	length fro	om 0 to		20 🕂	kilometer	rs	
Wide-	/Narrowla	ne: Base	line lengtl	n from 0 to)	200 🕂	kilomete	rs	
Other	: Baselin	e length	from 0 to			0 🕂	kilomete	rs	
^Top ^P	Prev ^Next	Cance/	I Save^As	^Save ^F	Run ^Oເ	Itput Rer^u	n ^+Day	^-Day	
> User: orig	o Campaigr	1: \${P}/EX	AMPLE \$Y+0	=2010 \$S+0	=2080 Fil	e: /home/orig	o/GPSUSE	R52/PAN/S	NGDIF.INP

10 Phase preprocessing (MAUPRP)

The main purpose of this processing phase is to clean the single-difference carrier-phase observation files from "outliers" (individual erroneous observations) and to fix "cycle slips" — sudden changes in the integer ambiguity of a single-difference observation arc of a satellite due to loss of lock by the receiver on the radio signal of the satellite. Normally, after acquisition by the receiver of a satellite's radio signal, it tracks the cycling of the phase of the carrier wave, counting the whole cycles. The fractional cycle (the part between 0 and 2π radians, or 0 and 1 cycles), is measured at acquisition.

????\$S+0 STSTDDDS STST2080

ST station names (two characters)

 $\mathbf{DDD}\xspace$ day of year (208)

S session character (0)

APR\$YD+0 APRYYDDD APR10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

COD\$YD+0 CODYYDDD COD10208



<mark>8</mark> – • Bo	🔉 – 🗆 Bernese GNSS Software Version 5.2										
Configure Campaign RINEX Orbits/EOF	Processing	Service	Conversion	BPE	<u>U</u> ser	lelp					
MAUPRP 1.1: General Files											
GENERAL INPUT FILES											
General constants	CONST.										
Geodetic datum	DATUM.										
Subdaily pole model	IERS2010XY	SUB									
Nutation model	IAU2000R06	NUT									
Satellite information	SATELLIT.I	08									
Satellite problems	SAT_\$Y+0	CRX									
Station information	EXAMPLE	STA									
Phase center eccentricities	PCV.108										
MENU SETTINGS											
Selected campaign	\${P}/EXAMP	LE									
Selected session	year 2010) ses	sion 2080								
Session table	\${P}/EXAMP	LE/STA/S	ESSIONS.SES								
TEMPORARY FILES											
Scratch files	MAIIPPP\$.T	SCR	F		SC1						
	IHAOF KF #0	BCK	ŀ	MAOF KF #0	501						
^Top ^Prev ^Next Cance^I Save^As	^Save ^F	Run 🛛 ^Oເ	utput Rer^u	n ^+Day	^-Day						
> User: origo Campaign: \${P}/EXAMPLE \$Y+	0=2010 \$S+0:	=2080 Fil	e: /home/origo	GPSUSEF	R52/PAN/M	AUPRP.INP					
<mark>8</mark> – • Be	ernese GNSS So	ftware Ve	rsion 5.2								

Configure	Campaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help	
MAUPRP	2: Output	Files								
RESULT	FILES									
Coor	dinate res	ults		CRD						
Resi	dual file			RES						
GENERA	L OUTPUT FI	ILES								
Prog	ram output		М	use MAUPRP	.Lnn	o	r	MAUPRP	OUT	
Erro	r messages			merged to	program	output o	r	ERROR	MSG	
0 T 01	D	0				Denter Denter	A D-			

 ^Top
 ^Prev
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 Save^As
 ^Save
 ^Run
 ^Output
 Rer^un
 ^+Day
 ^-Day

 > User: origo
 Campaign: \${P}/EXAMPLE
 \$Y+0=2010
 \$S+0=2080
 File: /home/origo/GPSUSER52/PAN/MAUPRP.INP

😣 – 😐			Ве	rnese GNSS So	oftware Ve	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
MAUPRP	3: General	Option	S						
TITLE	title								
GENERA	L SETTINGS								
Scre	ening mode,	, freque	ncy to che	ck	[AUTO	•		
Max.	baseline 1	length t	o use BOTH	mode		20 km			
Inte	rpolation o	of clock	s allowed	over		0 second	ds (0:no	interp)	
Save	screened o	observat	ion files		ľ	·			
TROPOS	PHERE MODEL	ING							
ZPD	model and m	mapping	function		ſ	GMF	•		
SAVING	COORDINATE	s							
Defi	ne the fixe	ed stati	on		ſ				
						(blank: auto	matic se	election)	
^Top ^	Prev ^Next	Cance/	I Save^As	^Save ^	Run ^Oເ	Itput Rer^un	^+Day	^-Day	
> User: orig	go Campaign	:\${P}/EX	AMPLE \$Y+0)=2010 \$S+0	=2080 Fil	e: /home/origo	GPSUSE	R52/PAN/M	AUPRP.INP

8 - 0			Ber	nese GNSS So	oftware Vei	sion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
MAUPRP	4: Marking	of Obse	rvations						
MARKING Mark Mark	OF OBSERV if marking observatio	ATIONS B g flags i ons below	EFORE CYCL n observat an elevat	E SLIP DET ion file ion of	ECTION	degrees fo	or stati	ons	
Minim Maxim	um time ir um gap acc	nterval a cepted wi	ccepted fo thin conti	r continuc nuous obse	0 ous observations	degrees fo cvations	or LEOs 301 61	sec	conds conds
^Top ^P	rev ^Next	Cance^l	Save^As	^Save ^I	Run ^Oเ -2080	tput Rer^un	^+Day	^-Day	
> User. origo	Campaign	· •1 - 1/ EAA		=2010 \$3+0	-2000 FI	e. /nome/origo	GF303E	njz/r An	MAUFHFINF
<mark>8</mark> – •			Ber	nese GNSS So	oftware Vei	sion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	<u>H</u> elp
MAUPRP	5: Non-Par	ametric a	Screening						
GENERAL Exten Maxim	OPTIONS t of progr um time ir	ram outpu nterval f	t or polynom	ial fit		SUMMARY	tes		
SCREENI	NG ON DIFF Original Polyn Disco	ERENT DI observat omial dec ontinuity	FFERENCE Li ions from gree level	EVELS file 1 0.4	for meters	ZD-files: SD-files:	zero d single d	liff. liff.	
P	Differen Polyn Disco	ces betwe omial dep ontinuity	een satelli gree level	ites 1	for meters	ZD-files: SD-files:	single d double d	liff. liff.	
ATop AP	rev ANext	Cance^l	Save^As	^Save ^I	Run ^Oเ =2080 Fil	tput Rer^un	^+Day	^-Day B52/PAN	
	vanpaign	••[•],=/•		-2010 0010	-2000 11	or / nonic/origo			
8 - 0			Ber	nese GNSS So	oftware Ver	sion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
MAUPRP	6: Epoch-I)ifference	e Solution		for	7D-files	double	i; f f	
Frequ Kinem	ency for t atic coord	the solut	ion timation	L3	•	SD-files:	triple (diff.	
Maxim RMS 1	um observe imit for e	ed-comput epoch sol	ed value ution	0.5	mete	ers (0.0: no ers (0.0: no	check) check)		
Ч	A priori X-coordin Y-coordin	coordinat ate ate	e/baseline	e vector s	igmas met met	ers ers			
	Z-coordín	ate		0.1	met	ers			
^Top ^P	rev ^Next	Cance^I	Save^As	^Save ^I	Run ^Oเ	itput Rer^un	^+Day	^-Day	

<mark>8</mark> – D	😣 – 🗉 Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	<u>U</u> ser	Help		
MAUPRP	8: Cycle	Slip Det	ection/Corr	rection							
CYCLE S	SLIP DETEC	TION				(CITING DA					
Do n	Do not accept cycle slip corrections										
Minimum size of accepted cycle slip correction 10 cycles											
Test	Test only observations with cycle slip flag										
L5 is	s clean ex	cept for	observatio	ons with fl	lags						
NO CYCI	LE SLIP HY	POTHESIS				a					
Sigma	a for Ll o	bservati	ons			0.0020	mete	ers			
Maxi	um ionosp	beric ch	ange from e	enoch to er	och	0.0020	mete	51.5			
fo	r single f	requency	mode (or	short bsl.)	30	% 01	E L1 cvc	les		
fo	r combined	mode	(or	long bsl.)	400	% of	E L1 cyc	les		
us	e the comb	ined mod	e value fo	r bsl long	er than	2000	km				
CYCLE S	SLIP CORRE	CTIONS									
Sear	ch width t ah width t	o find L o find I	I cycle sli 5 gwglo gli	lp correct	lon		ntegers				
Beald	ch width t		5 cycle si	ip correct.			licegers				
		1	1	1			1				
^Top ^F	^Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day										
> User: orig	- User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/MAUPRP.INP										
8 - 0			Bei	nese GNSS So	oftware Ver	rsion 5.2					



11 Parameter estimation (GPSEST): initial run

Here, we first determine initial co-ordinates and an initial tropospheric delay solution to be used in further runs. The solution uses the L3 or *ionosphere-free* linear combination of the observables L1 and L2, and no ambiguity resolution is attempted: the ambiguities are treated as real-valued unknowns.

The output files produced are called FLT YD+0.CRD (co-ordinates) and FLT YD+0.TRP (tropospheric parameters), and re-loaded in later runs.

????\$S+0 STSTDDDS STST2080

STAT station names (two characters)

DDD day of year (208)

S session character (0)

FLT\$YD+0 FLTYYDDD FLT10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

COD\$YD+0 CODYYDDD COD10208



<mark>⊗</mark> – □ B	🗴 – 🗉 Bernese GNSS Software Version 5.2										
Configure Campaign RINEX Orbits/EO	Processing	Service	Conversion	BPE	User	Help					
GPSEST 1.4: General Files											
GENERAL INPUT FILES											
General constants	CONST.										
Geodetic datum	DATUM.										
Phase center variations	PCV.108										
Receiver information	RECEIVER.										
Satellite information	SATELLIT.I	08									
Satellite problems	SAT_\$Y+0	CRX									
Earth potential coefficients	M2008_SMAL	ь.									
Subdaily pole model	IERS2010XY	Z SUB									
Nutation model	IAU2000R06	5 NUT									
SINEX header file	SINEX.										
IONEX control file	IONEX.										
GPS-UTC file	GPSUTC.										
Frequency information		FRQ									
MENII SEMUTNAS											
Sologtod gampaign											
Selected campaign	Vear 201) Sec	sion 2000								
Session table	fol/EXAMP	J Dea	FERTONS SEC								
	φ{F}/EAAMP	LE/SIR/S	ESSIONS.SES								
TEMPORARY FILES											
Scratch files	GPSEST\$J	SCR	GPSEST\$J SC	1 GI	PSEST\$J	SC2					
ATop APrev ANext CanceAI SaveAs	s ^Save ^	Run ^Oı	Itput Rer^un	^+Day	^-Day						
> User: origo Campaign: \${P}/EXAMPLE \$Y	+0=2010 \$S+0	=2080 Fil	e: /home/origo	GPSUSE	ER52/PAN	GPSEST.INP					

For session 2010 / 208, the normal equation was singular. For this reason, the CORRECT correlation strategy was replaced by the BASELINE one, which led to a successful run for this session. Also, choose as satellite system GPS/GLO, as that is all we have.

😣 – 🛛 Bernese GN	NSS Software Version 5.2
Configure Campaign RINEX Orbits/EOP Process	ssing Service Conversion BPE User Help
GPSEST 3.1: General Options 1	
TITLE title	
ODGEDUATION GELEGETON	
OBSERVATION SELECTION	
Satellite system	GPS/GLO ·
Frequency/linear combination	
Elevation cutoff angle	3 degrees
Sampling interval	seconds
Tolerance for simultaneity	100 milliseconds
Special data selection	NO
Observation window	
OBSERVATION MODELING AND PARAMETER ESTIMAT	ATION
A priori sigma of unit weight	0.001 meters
Elevation-dependent weighting	COSZ
Type of computed residuals	NORMALIZED
Correlation strategy	BASELINE
LEO-SPECIFIC SELECTION AND MODELING OPTION	
Elevation cutoff angle	0 degrees
Elevation-dependent weighting	NONE
ATop APrey ANext CanceAl SaveAs Asave	e ABun AQutput BerAun A+Day A-Day
> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$	\$5+0=2080 File: /home/origo/GPSUSER52/PAN/GPSEST.INP

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Configure Campaign RINEX Orbits/EOP Prod	cessing <u>S</u> ervice	Conversion BPE	User	Help							
GPSEST 3.2: General Options 2											
A PRIORI TROPOSPHERE MODELING											
ZPD model and mapping function	DRY_GMF MENDES-PAVLI	• for GNSS IS • for SLR									
HANDLING OF AMBIGUITIES											
Resolution strategy	NONE										
Solve ambiguities for	ALL	*									
Consider GPS quarter-cycle biases	IF_INDICATE	D									
Save resolved ambiguities											
Introduce widelane integers											
Introduce L1 and L2 integers	۲										
SPECIAL PROCESSING OPTIONS Stop program after NEQ saving Activate extended program output	<u>م</u>										
│ │ ^Top │ ^Prev │ ^Next │ Cance^I │ Save^As │ ^S > User: origo Campaign: \${P}/EXAMPLE \$Y+0=201	ave │ ^Run │ ^O 10 \$S+0=2080 Fi	utput Rer^un ^+E)ay ^-Day ISER52/PAN/GI	PSEST.INP							

8 - 0	🛛 – 🗆 Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
GPSEST 4: Datum Definition for Station Coordinates											
DATUM 1	DATUM DEFINITION TYPE										
0	Free ne	work solu	ition								
° (Coordin	ates const	rained		MANUAL	-					
с –	Coordin	ates fixed	l		MANUAL	~					
A PRIO Nort East Up	RI SIGMAS	0.0001 m 0.0001 m	neters neters neters								
^Top ^	Prev ^Nex	Cance^I	Save^As	^Save /	Run ^C	Output Rer^u	n ^+Day	^-Day			
> User: orio	o Campaig	n: \${P}/EXA	MPLE \$Y+0	=2010 \$S+0)=2080 F	ile: /home/orig	GPSUSE	R52/PAN/0	GPSEST.INP		

😣 – 🗉 Bernese GNSS Software Version 5.2										
Configure Campaign RINEX Orbits/EOP Process	ing <u>S</u> ervice	Conversion	BPE	User <u>H</u> el	р					
GPSEST 5.1: Setup of Parameters and Pre-Elimination 1										
STATION-RELATED PARAMETERS	STATION-RELATED PARAMETERS Setup Pre-Elimination									
Station coordinates NO -										
Ambiguities NO ·										
ATTMOSPHERTC DARAMETERS										
Site-specific troposphere parameters		NO								
Global ionosphere parameters		NO								
		110								
GLOBAL PARAMETERS										
Orbital parameters		NO		~						
Earth orientation parameters		NO		-						
Geocenter coordinates		NO		~						
EPOCH PARAMETERS										
Receiver clock offsets	<u>~</u>	EVERY EP	OCH	-						
Satellite clock offsets	Ē	EVERY EP	OCH							
Kinematic coordinates		EVERY EP	OCH	-						
Stochastic ionosphere parameters		EVERY_EP	OCH	-						
^Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day										
> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$\$	S+0=2080 Fil	e: /home/origo/0	GPSUSE	R52/PAN/GPSE	ST.INP					

11.1 Results: station coordinates

A posteriori sigma of 1.2 mm is quite good. The *a priori* sigma was 1 mm. The $\frac{\chi^2}{\text{DOF}}$ is 1.54, a bit high. Perhaps because of the per-baseline correlation model. This value is the square of (*a posteriori* / *a priori*).

8	\${P},	EXAMP	LE/OUT/GP	SEST.L26			
A POSTERIORI SIGMA OF	7 UNIT WEIGHT	(PART	1):				
A POSTERIORI SIGMA OF	UNIT WEIGHT	:	0.0012 1	M (SIGMA	OF ONE-WAY	L1 PHASE	OBSERVAI
DEGREE OF FREEDOM (DC CHI**2/DOF	DF)	:	642950 1.54				
1EXAMPLE title							
STATION COORDINATES:			(NOT	SAVED)			
NUM STATION NAME	PARAMETER	A PR	IORI VALU	JE I	NEW VALUE	NEW-A	PRIORI
75 GANP 11515M001	X Y Z	392 145 479	9181.4214 5236.8208 3653.9502	1 39 3 14 1 47	929181.3040 455236.8079 793653.8527	-0.1 -0.0 -0.0	174 129 975
Find	next prev						► Close

11.2 Results: tropospheric parameters

Tropospheric parameters were estimated for all stations at 2 hour intervals. Not just total zenith delays, but also north and east direction gradients. These values are offsets from a reference model.

8	8 \${P}/EXAMPLE/OUT/GPSEST.L26												
SITE	-SPECIFIC TROPOSPH	ERE PARAMETERS:	(NOT SAVE	D)			-						
REFEI MINII MAPP:	RENCE ELEVATION AN MUM ELEVATION ANGL ING FACTOR AT MINI	GLE OF GRADIENT TER E MUM ELEVATION ANGLE	MS: 45.0 : 3.0 : 19.1	DEGREES DEGREES									
		CORRECTIONS	(M)	RMS	ERRORS	(M)							
REOU	. STATION NAME	NORTH EAST	ZENITH	NORTH	EAST	ZENITH	ANC						
1	GAND 11515M001	0 00061 0 00187	0 13441	0 00003	0 00004	0 00057							
2	CANP 11515M001	0.00053 0.00171	0.13302	0.00003	0.00004	0.00039							
3	GANP 11515M001	0.00045 0.00155	0.13854	0.00002	0.00003	0.00034							
4	GANP 11515M001	0.00037 0.00139	0.15232	0.00002	0.00003	0.00035							
5	GANP 11515M001	0.00029 0.00123	0.16631	0.00002	0.00002	0.00034							
6	GANP 11515M001	0.00021 0.00107	0.16658	0.00002	0.00002	0.00031							
7	GANP 11515M001	0.00013 0.00091	0.16863	0.00002	0.00002	0.00030							
8	GANP 11515M001	0.00005 0.00075	0.16816	0.00002	0.00002	0.00036							
9	GANP 11515M001	-0.00003 0.00059	0.16226	0.00002	0.00002	0.00034							
10	GANP 11515M001	-0.00011 0.00043	0.15624	0.00002	0.00003	0.00032							
11	GANP 11515M001	-0.00019 0.00027	0.17003	0.00002	0.00003	0.00038							
12	GANP 11515M001	-0.00027 0.00011	0.16475	0.00003	0.00003	0.00036							
13	GANP 11515M001	-0.00035 -0.00005	0.15662	0.00003	0.00004	0.00053							
14	HERT 13212M010	-0.00053 -0.00194	0.21237	0.00004	0.00005	0.00084							
15	HERT 13212M010	-0.00057 -0.00168	0.20591	0.00004	0.00005	0.00055							
16	HERT 13212M010	-0.00060 -0.00142	0.19330	0.00003	0.00004	0.00046							
17	HERT 13212M010	-0.00064 -0.00116	0.19483	0.00003	0.00004	0.00048							
18	HERT 13212M010	-0.00068 -0.00090	0.22340	0.00003	0.00003	0.00047							
Find	n	ext prev					Close						

12 Parameter estimation (2)

We add a ionosphere model, and produce co-oordinate output and tropospheric parameter output. The output files produced are called FLT\$YD+0.CRD (co-ordinates)and FLT\$YD+0.TRP (tropospheric parameters), and re-loaded in later runs. Ionosphere model added.

????\$S+0 STSTDDDS STST2080

STAT station names (two characters)

DDD day of year (208)

 ${f S}$ session character (0)

APR\$YD+0 APRYYDDD APR10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

COD\$YD+0 CODYYDDD COD10208

P1C1\$M+0 P1C1YYMM P1C11007

 $\mathbf{MM} \mod (07)$



Output iono- and troposphere estimates to file.

FLT\$YD+0 FLTYYDDD FLT10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

🔕 – 🗆 Bernese GNSS Software Version 5.2										
Con <u>f</u> igure <u>C</u> ampaign <u>R</u> INEX	Orbits/EOP	Processing	Service	Conversion	BPE	<u>U</u> ser	Help			
GPSEST 2.1: Output File	s 1									
GENERAL OUTDUT FILES										
Program output		use GPSESI	.Lnn		or	GPSEST	OUT			
Error message		merged to	program	output	or	ERROR	MSG			
NORMAL FOLLATION SYSTEM			NO(, ,						
NORMAL EQUATION SISTEM		I	NQU)						
STATION - AND SATELLITE -	RELATED RESU	LTS								
Station coordinates	monta	FLT\$	YD+0 CRI)						
Earth rotation parame	ters		ERI	5 9						
Earth rotation parame	ters (IERS)		IEI	,						
ATMAGDUEDE-COPATETA DEC	TT.TPS									
Troposphere estimates	0115	FLT\$	YD+0 TRE	ò						
Troposphere estimates	(SINEX)		TRO)						
Ionosphere models	NTRV)			1						
lonosphere models (10	NEX)	 	IN2	S						
^Top ^Prev ^Next Cance	Al Save^As	^Save ^	Run ^Ou	Itput Rer^u	ו ^+Da	y ^-Day				
> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/GPSEST.INP										
	Dec									
😣 – 🗉	Ber Orbite/EOP	nese GNSS S	oftware Ve	rsion 5.2	RDE	llsor	Help			
S - Configure <u>Campaign</u> <u>RINEX</u>	Ber Orbits/EOP	nese GNSS S Processing	oftware Ver <u>S</u> ervice	rsion 5.2 Con <u>v</u> ersion	BPE	<u>U</u> ser	<u>H</u> elp			
S - Configure <u>Campaign</u> <u>RINEX</u> GPSEST 4: Datum Definit	Ber <u>O</u> rbits/EOP ion for Stat	nese GNSS S <u>Processing</u> tion Coord	oftware Ver <u>S</u> ervice inates	rsion 5.2 Con <u>v</u> ersion	BPE	<u>U</u> ser	<u>H</u> elp			
S - D Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE	Ber Orbits/EOP ion for Stat	nese GNSS S Processing ion Coord	oftware Ver <u>S</u> ervice inates	rsion 5.2 Con <u>v</u> ersion	BPE	User	<u>H</u> elp			
S - Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network so Free Network so	Ber Orbits/EOP ion for Stat	rnese GNSS S <u>Processing</u> ion Coord	oftware Ver <u>S</u> ervice inates	rsion 5.2 Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE G Free network sc G Coordinates fir C Coordinates fir	Ber Orbits/EOP ion for Stat	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FL2 MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network so Coordinates con C Coordinates fir	Ber Orbits/EOP ion for Stat plution astrained ced	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
S - C Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network so C Coordinates con C Coordinates fix A PRIORI SIGMAS	Ber Orbits/EOP ion for Stat plution astrained ted	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE	Ber Orbits/EOP ion for Stat olution astrained ced meters meters	nese GNSS S <u>Processing</u> ion Coord	oftware Ver <u>Service</u> inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Onfigure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network set c Coordinates coi c Coordinates fix A PRIORI SIGMAS North 0.001 East 0.001 Up 0.001	Derbits/EOP ion for Stat	nese GNSS S <u>Processing</u> ion Coord	oftware Ver <u>Service</u> inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Image: Second state sta	Derbits/EOP ion for Stat olution strained ted meters meters meters meters	nese GNSS S <u>Processing</u> ion Coord	oftware Ve <u>Service</u> inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Image: North East Upp 0.001	Derbits/EOP ion for Stat olution strained ced meters meters meters meters	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network sc C Coordinates coordinates C Coordinates fit A PRIORI SIGMAS North 0.001 0.001 Up 0.001 0.001	Ber Orbits/EOP ion for Stat olution astrained ted meters meters meters meters	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FLA MANUAL	Conversion	BPE	<u>U</u> ser	<u>H</u> elp			
Source Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network set C Coordinates condition C Coordinates condition C Coordinates condition C Coordinates condition C Coordinates fix A PRIORI SIGMAS North North 0.001 Up 0.001	Deriver Service Servic	nese GNSS S <u>Processing</u> ion Coord	oftware Ver <u>S</u> ervice inates WITH_FLA MANUAL	AG Y	BPE	<u>U</u> ser	<u>H</u> elp			
Solution Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network set C Coordinates con C Coordinates con C Coordinates fix A PRIORI SIGMAS North North 0.001 Up 0.001	Deriver Service Servic	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FLA MANUAL	AG Y	BPE	<u>U</u> ser	<u>H</u> elp			
Image: Second state Configure Campaign RINEX GPSEST 4: Datum Definit DATUM DEFINITION TYPE C Free network second C Coordinates coordinates coordinates coordinates fix A PRIORI SIGMAS North 0.001 East 0.001 Up 0.001	Orbits/EOP ion for Stat	nese GNSS S <u>Processing</u> ion Coord	oftware Ver Service inates WITH_FLA MANUAL	AG Y	BPE	<u>U</u> ser	<u>H</u> elp			
Image: Second state sta	Orbits/EOP ion for Stat	Processing Frocessing Frocessing	Oftware Verinates	Itout RerAut	<u>B</u> PE	<u>U</u> ser	<u>H</u> elp			

8 - 0			Ber	nese GNSS So	oftware Vei	rsion 5.2				
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	<u>H</u> elp	
GPSEST	5.1: Setup	of Para	ameters and	l Pre-Elimi	nation 1	L				
STATIO	N-RELATED P	ARAMETEI	RS	:	Setup	Pre	-Elimin	ation		
Stat	ion coordin	ates				NO			•	
Ambi	guities					EVERY_S	ESSION		-	
ATMOSP	HERIC PARAM	ETERS								
Site	-specific t	roposph	ere paramet	cers	M	NO			•	
Glob	al ionosphe	ere para	meters			NO				
GLOBAL	PARAMETERS	1								
Orbi	tal paramet	ers			Γ	NO			~	
Eart	h orientati	on para	meters			NO			*	
Geoc	enter coord	linates				NO			~	
EPOCH	PARAMETERS									
Rece	iver clock	offsets			Y	EVERY_E	POCH		~	
Sate	llite clock	offset	s		Γ	EVERY_E	POCH		~	
Kine	matic coord	linates				EVERY_E	POCH		*	
Stoc	hastic iono	sphere j	parameters			EVERY_E	POCH		~	
^Top ^	Prev ^Next	Cance^	I Save^As	^Save ^F	Run ^Oເ	Itput Rer^un	^+Day	/ ^-Day		
User: orio	o Campaign	. \${P}/FX		-2010 \$5+0	-2080 Fil	e: /home/origo	GPSUS	R52/PAN	GPSEST	INP

Add soft regularization constraint on troposphere parameters

🛛 – 🛛				Ber	nese GNSS S	oftware \	/ersion 5	.2			
Configure	Camp	baign	RINEX 9	Orbits/EOP	Processing	Servic	e Con	version	BPE	User	Help
GPSES	г 6.1.1	L: Site	e-Specifi	ic Troposp	here Para	meters	1				
ZENITO	ם האשם			TD C							
Par	ameter	spaci	na			0 (hh	mm ss)			
HORIZ	ONTAL (GRADIE	NT PARAME	TERS							
Gra	dient	estima	tion mode	el	CHENHEF	-					
Par	ameter	spaci	ng		24 00 0	0 (hh	mm ss)			
	OPT GT	יא איי			Abgolut	-		Po	lativo		
Zen	ith pa	th dela	av		Absolut	e met	ers	Ke 5	lative	meters	
Hor	izonta	l grad	ients			met	ers	5		meters	
					,			,			
EXTRA	CTION C	OF PARA	AMETERS F	FOR TROPOS	PHERE SIN	EX FILE					
Off	set		(hh	lh mm ss)	5	lime rea	solutio	on 01	00 00	(hh mm	ss)
			1	1	1			1	1		
^Тор	^Prev	^Next	Cance ¹	Save^As	^Save /	Run ^	Output	Rer^un	^+Day	^-Day	
> User: or	> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2010 \$S+0=2080 File: /home/origo/GPSUSER52/PAN/GPSEST.INP										

13 Ambiguity resolution

Here we resolve the ambiguities on a baseline-by-baseline basis. Doing this for all baselines together, even on a session-by-session basis, would be too heavy on the computer. The baseline station names, two two-character names from ABBREV.ABB, are input manually.

For ambiguity resolution, we use the QIF (Quasi Ionosphere Free) technique. This requires use of the original L1&L2 observables together, and stochastic ionosphere parameters. In this stage we *input* the co-ordinate and troposheric parameter files determined earlier: FLTYD+0.CRD and FLTYD+0.TRP.

Baselines and network:

Note that this is just one example of a set of baselines generated by SNGDIF. Running the program with different options, or on data with a different processing history, will produce different sets of baselines. So don't

be surprised if you are getting a different set.

The automated strategies, like the OBS-MAX and STAR stategies, will always produce an independent set of baselines. So, with 13 stations, one gets 12 baselines.

1	GNJZ	GANP	JOZ2		
2	PBZ2	PTBB	ZIM2		
3	LMW1	LAMA	WTZR	ТАМА	
4	TSZ2	TLSE	ZIM2		
5	W4Z2	WTZZ	ZIM2	$\begin{array}{c} & \downarrow 5 \\ WSDT DTBB WT7D \end{array}$	ONGA
6	GNMT	GANP	MATE		JNSA ↑ 7
7	JZOS	JOZ2	ONSA	$0 \downarrow \downarrow 2 \qquad \downarrow 9$ HERT 11 \ 7IM9 \ 5 WT77 \ 19	1072
8	WRZ2	WSRT	ZIM2	$\frac{112}{4} \xrightarrow{7} 10$	JOZ2 ↑ 1
9	W1W4	WTZR	WTZZ	$\frac{4}{\sqrt{10}}$	1 I I AND
10	Z2Z1	ZIM2	ZIMM	TESE ZIMM	
11	HRZ2	HERT	ZIM2	٢	↓ ∪ MATE
12	JZW4	JOZ2	WTZZ	1	

GNJZ\$S+0 STSTDDDS GNJZ2080

GNJZ station names (two characters, here GN and JZ)

DDD day of year (208)

S session character (0)

FLT\$YD+0 FLTYYDDD FLT10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

COD\$YD+0 CODYYDDD COD10208

COD\$WD+0 CODWWWWD COD15942

WWWW GPS week (1594)

D GPS day (2)



FLT\$YD+0 FLTYYDDD FLT10208

 $\mathbf{Y}\mathbf{Y}$ year (10)

DDD day of year (208)

8 - 0			Bei	rnese GNSS So	ftware Ve	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
GPSEST	1.2: Input	: Files	2						
ADDITIC	ONAL INPUT	FILES	_						
Sate	llite orbit	t partia	ls		RPR				
Cloc	k RINEX fil	Le			CLK				
Inte	r-system bi	Lases			ISB				
Trop	ospnere est	limates		FLT\$YD+	0 TRP				
Mete	orological	data			MET				
GRIDDE	D LOADING F	ARAMETE	RS						
Atmo	spheric pre	essure			CPD				
Ocea	n, non-tida	al			GRD				
Hydr	ostatic pre	essure			GRD				
-	-								
AUXILI	ARY STATION	I FILES							
Stat	ion informa	ation			STA				
Kine	matic coord	linates			KIN				
Rece	iver anten	na orien	tation		AZI				
Obse	rvation sig	gma fact	ors		SOS				
Stat	ion eccents	ricities			ECC				
	^Top ^Prey ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day								
> User: orig	> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2011 \$S+0=2060 File: /home/origo/GPSUSER52/PAN/GPSEST.INP								

 $\mathbf{GNJZ\$}{+}\mathbf{0Q} \ \mathbf{GNJZDDDQ} \rightarrow \mathbf{GNJZ206Q}$

DDD day of year (208)

8 - 0			Bei	rnese GNSS So	ftware Ve	rsion 5.2				
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help	
GPSEST	2.1: Outr	ut Files	1							
GENERA	L OUTPUT F	ILES								
Prog	ram output	:		use GPSEST	.Lnn		or	GNJZ\$+0Q	OUT	
Erro	r message			merged to p	program	output	or	ERROR	MSG	
NORMAL	EQUATION	SYSTEM			NQO)				
STATIO	N- AND SAT	ELLITE-RI	ELATED RESU	JLTS						
Stat	ion coordi	nates			CRI)				
Sate	llite orbi	tal elem	ents		ELE	8				
Eart	h rotation	n paramet	ers		ERE	,				
Eart	h rotation	n paramet	ers (IERS)		IEF	,				
ATMOSP	HERE - SPECI	FIC RESUL	LTS							
Trop	osphere es	stimates			TRE	,				
Trop	osphere es	stimates	(SINEX)		TRC)				
Iono	sphere mod	lels		i i i i i i i i i i i i i i i i i i i	ION	1				
Iono	sphere mod	lels (ION	EX)		INX	C				
^Тор ^	Prev ^Nex	t Cance^	I Save^As	^Save ^F	Run 🔤 ^Oເ	Itput Rer^u	n ^+D	ay ^-Day		
> User: orig	o Campaig	n: \${P}/EX/	AMPLE \$Y+0)=2011 \$S+0:	=2060 Fil	e: /home/orig	o/GPSU	SER52/PAN	/GPSEST.I	NP

Configure Campaign RINEX Orbits/EOP Processing Service Conversion BPE User Help GPSEST 3.1: General Options 1 TITLE title OBSERVATION SELECTION Satellite system ALL
GPSEST 3.1: General Options 1 TITLE title OBSERVATION SELECTION Satellite system
GPSEST 3.1: General Options 1 TITLE title OBSERVATION SELECTION Satellite system ALL
TITLE title OBSERVATION SELECTION Satellite system ALL
TITLE title OBSERVATION SELECTION Satellite system ALL
OBSERVATION SELECTION Satellite system ALL
Satellite system ALL ·
All All
Frequency/linear combination
Elevation cutoff andle 10 degrees
Sampling interval 30 seconds
Tolerance for simultaneity 100 milliseconds
Special data selection NO
Observation window
OBSERVATION MODELING AND PARAMETER ESTIMATION
A priori sigma of unit weight 0.001 meters
Elevation-dependent weighting COSZ
Type of computed residuals NORMALIZED
Correlation strategy BASELINE
LEO-SPECIFIC SELECTION AND MODELING OPTIONS
Elevation cutoff angle
Elevation-dependent weighting NONE
ATop APrev ANext CanceAI SaveAs ASave ARun AOutput RerAun A+Day A-Day
> User: origo, Campaign: \${P}/FXAMPLF_\$Y+0=2011_\$S+0=2060_File: /home/origo/GPSUSFR52/PAN/GPSEST INP

L1&L2 concurrent processing is mandatory for quasi-ionosphere-free ambiguity resolution.

🛛 – 🛛			Be	nese GNSS So	oftware Ver	sion 5.2			
Configure	<u>C</u> ampaign	<u>R</u> INEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
GPSEST	3.2: Gene	ral Opti	ons 2						
A PRIO	RI TROPOSP	HERE MOD	ELING						
ZPD	model and	mapping	function	DRY MEND	GMF ES-PAVLI:	for GNS	S		
HANDLI	NG OF AMBI	GUITIES							
Resc	lution str	ategy		QIF		-			
Solv	re ambiguit	ies for		ALL		-			
Cons	ider GPS q	uarter-c	ycle biase	IF_I	NDICATED	-			
Save	e resolved	ambiguit	ies	M					
Intr	oduce wide	lane int	egers						
Intr	oduce L1 a	nd L2 in	tegers						
SPECIA	L PROCESSI	NG OPTIO	NS						
Stop	program a	fter NEQ	saving						
Acti	vate exten	ded prog	ram output						
^Top ^	Prev ^Next	Cance/	Save^As	^Save ^	Run ^Ou	tput Rer^un	^+Day	^-Day	
> User: ori	go Campaigi	n: \${P}/EX	AMPLE \$Y+0	=2011 \$S+0	=2060 File	e: /home/origo/	GPSUSE	R52/PAN/0	GPSEST.INP

One ambiguity fix per iteration step is necessary when processing GLONASS.

<mark> 20 – 10</mark>			Be	rnese GNSS So	oftware Ve	rsion 5.2				
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	<u>H</u> elp	
GPSEST OPTION Maxi Sear Maxi Maxi	3.2.4: Qua s AND CRITH mal number ch width fa mal sigma o mal fractio	ASI-IONO ERIA FOR of ambi or pairs of resol onal par	TESTING guities fi of L1 and vable NL a t of resol	e Ambiguity xed per ite L2 ambigui mbiguities vable NL am	v Resolut eration a ities nbiguitio	ion Strateg step es	1 0.5 0.03 0.1	WL cycl NL cycl NL cycl NL cycl	es es	
│ │ ^Top │ ^│ >User: orig	Prev ANext o Campaign	Cance/ a: \${P}/EX	NI Save^As AMPLE \$Y+0	│ ^Save │ ^I 0=2011 \$S+0:	Run ^Oเ =2060 Fil	Itput Rer^un	/GPSUS	ay ^-Day SER52/PAN	/GPSEST.I	INP

8 - 0	😣 – 🗉 Bernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help			
GPSEST	4: Datum I	Definiti	on for Stat	ion Coordi	nates							
DATUM I C	DATUM DEFINITION TYPE C Free network solution C Coordinates constrained C Coordinates fixed DIDOT											
, e	Coordina	tes fixe	bd	I	FIRST	<u> </u>						
A PRIO	RI SIGMAS											
Nort	h 🛛	.001	meters									
East	0	.001	meters									
Up	0	.001	meters									
^Top ^I	Prev ^Next	Cance^	I Save^As	^Save ^	Run ^Ou	tput Rer^un	^+Day	^-Day				
> User: orig	o Campaign	n: \${P}/EX/	AMPLE \$Y+0	=2011 \$S+0:	=2060 Fil	e: /home/origo	GPSUSE	R52/PAN/	GPSEST.INP			

Stochastic ionosphere parameters are mandatory with QIF.

8 – 🗆	Bernese GNS	5S Software Ver	sion 5.2							
Configure Campaign RINE	X Orbits/EOP Process	ing Service	Conversion	BPE	User	Help				
GPSEST 5.1: Setup of F	arameters and Pre-E	limination 1								
STATION-RELATED PARAME	TERS	Setup	Pre	Elimin	ation					
Station coordinates			NO			•				
Ambiguities			NO			•				
ATMOSPHERIC PARAMETERS		_				-				
Site-specific tropos	phere parameters		NO			~				
Global ionosphere pa	rameters		NO			~				
GLOBAL PARAMETERS										
Orbital parameters		Г	NO			-				
Earth orientation pa	arameters	Γ	NO			~				
Geocenter coordinate	es		NO			4				
EPOCH PARAMETERS						_				
Receiver clock offse	ets	Y	EVERY_EI	POCH		<				
Satellite clock offs	sets		EVERY_EI	POCH		-				
Kinematic coordinate	es		EVERY_EI	POCH		~				
Stochastic ionospher	e parameters	Y	EVERY_EI	POCH		-				
				1						
ATop APrev ANext Can	ce^I Save^As ^Save	^Run ^ Ou	itput Rer^un	^+Day	/ ^-Day					
> User: origo Campaign: \${P}/	EXAMPLE \$Y+0=2011 \$	S+0=2060 File	e: /home/origo/	GPSUSE	ER52/PAN/	GPSEST.INP				
8	😕 – 🗉 Bernese GNSS Software Version 5.2									
Configure Campaign RINE	X Orbits/EOP Process	ing <u>S</u> ervice	Conversion	BPE	User	Help				

Sec. 2	Bernese GNSS So	oftware Versi	on 5.2							
Configure Campaign RINE	X Orbits/EOP Processing	Service C	Conversion	<u>B</u> PE	<u>U</u> ser	Help				
GPSEST 6.7: General Options for Epoch Parameters										
OPTIONS SPECIFIC TO E	POCH PARAMETERS									
Epoch parameters on	ly from phase									
Var-covar wrt epoch	parameters	s	IMPLIFIED		-					
Sampling rate for re	esubstitution	Ĺ	se	conds	_					
Sampling rate for p	re-elimination	Ĺ	se	conds						
^Top ^Prev ^Next Cance^I Save^As ^Save ^Run ^Output Rer^un ^+Day ^-Day										
> User: origo Campaign: \${P}/EXAMPLE \$Y+0=2011 \$S+0=2060 File: /home/origo/GPSUSER52/PAN/GPSEST.INP										

😣 – 🗉 Bernese GNSS Software Version 5.2										
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	<u>U</u> ser	Help	
GPSEST	6.10: Sto	chastic	Ionosphere	Parameters	1					
STOCHASTIC IONOSPHERE PARAMETERS Elimination of reference ionosphere parameters Elevation-dependent parameter constraining Absolute a priori sigma on single difference level 0.25 meters Relative a priori sigma of ionospheric random walk m/min**1/2										
│										

14 The Station Information File etc.

This is a central file used by most of the Bernese software modules, so its content — like that of the session file SESSION.SES and the station name abbreviations file ABBREV.ABB — needs to be correct for everything to function correctly.

The example campaign EXAMPLE or INTRO provided by the Bernese people as part of their training material is ready set up: it is called EXAMPLE.STA. If you want to process your own material, you need to set it up yourself from your RINEX files. Fortunately there is a program called RNX2STA that automates the job: it is found under the menu Service>Station Information Files>Extract information from RINEX.

8 - 0			Ве	rnese GNSS So	oftware Ve	rsion 5.2			
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help
EXTRAC	T STATION	INFORMAT	ION FROM R	INEX HEADEF	RS - RNX	2STA 1: Fil	enames		
GENERA	L FILES	al filos							
SIIOw	all gener	ai iiies	Ľ						
INPUT	FILES								
•	Original	l RINEX o	observation	n files		???\$\$+0 1	80		
с С	Smoothed	d RINEX o	observation	n files		92	BMT		
RESULT	FILES								
Stat	ion inform	ation fr	om RINEX f	iles		ETH	STA		
GENERA	L OUTPUT F	ILES	—	D					
Prog	ram output		ت <u>۲</u>	ise RNX2STA	.Lnn	o utput o	r	RNX2STA	OUT
EII0	I messayes			lerged to p	iogram c	αιραι ο	1	ERROR	MSG
 . .									
	Prev ^Next	Cance^	Save^As	^Save ^	Kun / ^Oi	Itput Rer^u	in ^+Day	у ^-Day	
> User: orig	jo Campaigi	n: \${P}/ETH	1 \$Y+0=2018	8 \$S+0=0090	File: /ho	me/origo/GPS	SUSER52/	PAN/RNX2S	TA.INP

8 - □ Bernese GNSS Software Version 5.2											
Configure	<u>C</u> ampaign	RINEX	Orbits/EOP	Processing	Service	Conversion	BPE	User	Help		
RNX2ST	RNX2STA 2: Options										
TITLE	buildin	g ET:.ST	A					_			
OPTION	OPTIONS FOR STATION INFORMATION FILE										
Flag	for TYPE	001: Ren	aming of s	tations		001					
Flag Cons	for TYPE ider radom	002: Sta e code	tion inform	nation		001					
Add	marker num	ber to s	tation name	e		۲ ۲					
Conv	ert receiv	er seria	1 number to	REC #							
Conv	ert antenn	a serial	number to	ANT #		۲					
^ ^Top ^	Prev ^Next	Cance/	Save^As	^Save ^	Run ^Oı	utput Rer^un	^+Day	^-Day			
> User: orig	jo Campaigr	n: \${P}/ET	H \$Y+0=2018	\$\$+0=0090	File: /ho	me/origo/GPSl	JSER52/P	AN/RNX2	STA.INP		

Noteworthy is that in Panel 2, there is the option "Convert antenna serial number to ANT #". This option should be chosen if the software fails to find the antenna calibration information from the general file PCV.* used, though the information is there.

14.1 A priori coordinates

With a new campaign, also a file containing a priori coordinates for the stations must be provided. It ends in *.CRD. Files containing all the IGS stations globally are provided with the Bernese distribution. If your station(s) are not on that list, you must add them manually. The approximate XYZ co-ordinates of a station are found in its RINEX file headers.

The adding of the station co-ordinates is done automatically by RXOBV3 if you give it the name of the preexisting *.CRD file: "Update coordinates" in the below panel.

8 - 0	😣 🗕 🗆 Bernese GNSS Software Version 5.2										
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Upda	te coordina	ates	EXA	MPLE CRD	(b]	lank if not	used)				
GENERA	L OUTPUT FI	LES									
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Erro	r messages			merged to	o program	n output	or ER	ROR	MSG		
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CREATE/UPDATE STATION ABBREVIATION TABLE - EDITABB											-		
Filename /home/origo/GPSDATA/CAMPAIGN52/ETH/STA/ABBREV.ABB													
[Stat	ion name		4-Chr	2-Chr	Remark					~		_
	ADIS	31502M001		ADIS	AD	Added by	y SR updab	b		+ -	-		
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	MBAR	33901M001		MBAR	MB	Added by	y SR updab	b		+ -	•		
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> User	> User: origo Campaign: \${P}/ETH \$Y+0=2018 \$S+0=0090 \$J=RE File: /home/origo/GPSUSER52/PAN/EDITABB.INP												

Figure 1: A well-formed station-name abbreviation file.

14.2 The station-name abbreviation file

A well formed station-name abbreviation file looks like figure 1:

Any double or multiple occurrences of names for the same station, or multiple variations of the four- or twocharacter abbreviations, means that the file is corrupted, which unfortunately can easily happen due to the guesswork Bernese has to do. Delete the superfluous lines and edit to make sure that only reasonable abbreviations remain.

Also, check the directory $P/<CAMPAIGN>/OBS for Bernese observation files having these superfluous names, and delete them. <math display="inline">\dot{}$

15 The output files of the program runs

× menu	
Look in: a/home/origo/GPSDATA/CAMPAIGN52/EXAMPLE/OUT/	H
ORBGEN.L03 ORBGEN.L17 ORBGEN.L31 POLUPD.L15 POLUPD.L30 PRETAB.L13	
COOVEL.L00 ORBGEN.L04 ORBGEN.L18 ORBGEN.L32 POLUPD.L16 PRETAB.L00 PRETAB.L14	
COOVEL.L01 DORBGEN.L05 ORBGEN.L19 POLUPD.L00 POLUPD.L17 PRETAB.L01 PRETAB.L15	
COOVEL.L02 ORBGEN.L06 ORBGEN.L20 POLUPD.L01 POLUPD.L18 PRETAB.L02 PRETAB.L16	
COOVEL.L03 ORBGEN.L07 ORBGEN.L21 POLUPD.L02 POLUPD.L19 PRETAB.L03 PRETAB.L17	
COOVEL.L04 ORBGEN.L08 ORBGEN.L22 POLUPD.L03 POLUPD.L20 PRETAB.L04 RNXGRA.L00	
COOVEL.L06 DORBGEN.L09 DORBGEN.L23 DPOLUPD.L04 DPOLUPD.L21 DPRETAB.L05 DRNXGRA.L01	
COOVEL.L07 ORBGEN.L10 ORBGEN.L24 POLUPD.L05 POLUPD.L22 PRETAB.L06 RNXGRA.L02	
COOVEL.L09 ORBGEN.L11 ORBGEN.L25 POLUPD.L06 POLUPD.L23 PRETAB.L07 RNXGRA.L03	
DEFXTR.L00 ORBGEN.L12 ORBGEN.L26 POLUPD.L08 POLUPD.L24 PRETAB.L08 RNXGRA.L04	
DEFXTR.L01 DORBGEN.L13 DORBGEN.L27 DPOLUPD.L11 DPOLUPD.L26 DPRETAB.L09 DRXOBV3.L01	
ORBGEN.L00 ORBGEN.L14 ORBGEN.L28 POLUPD.L12 POLUPD.L27 PRETAB.L10 RXOBV3.L03	
ORBGEN.L01 ORBGEN.L15 ORBGEN.L29 POLUPD.L13 POLUPD.L28 PRETAB.L11 SATGRA.L00	
ORBGEN.L02 ORBGEN.L16 ORBGEN.L30 POLUPD.L14 POLUPD.L29 PRETAB.L12	
File name:	Ok
File type: *.OUT *.[L,0-9][0-9]	Cancel