
Converting (six-)hourly SBF files to (compressed) RINEX v3.x files

Script	Task
sbf_daily.py	Combine (six-)hourly SBF files to daily files
sbf_rinex.py	Convert SBF daily file to RINEX v3.X observation & navigation file
prepare_sbf2rnx.py	Combines above scripts and offers to get compressed RINEX v3.x files

Combining (15 minutes) P3RS2 RINEX files into daily RINEX v3.x files

Script	Task
rnx15_combine.py	Combines 15 minutes RINEX files from P3RS2
prepare_rnx15.py	Usage above script and add possibility for compressed RINEX v3.x files

Python scripts

Converting (six-)hourly SBF files to (compressed) RINEX v3.x files

sbf_daily.py

`sbf_daily.py` creates a daily SBF file based on (six) hourly SBF files found in given directory

Usage

```
[amuls:~/amPython/rnxproc] [rnxproc]$ sbf_daily.py -h
usage: sbf_daily.py [-h] [-d DIR] [-o] [-l LOGGING LOGGING]
```

`sbf_daily.py` creates a daily SBF file based on (six) hourly SBF files found in given directory

optional arguments:

<code>-h, --help</code>	show this help message and exit
<code>-d DIR, --dir DIR</code>	Directory of SBF file (defaults to .)
<code>-o, --overwrite</code>	overwrite daily SBF file (default False)
<code>-l LOGGING LOGGING, --logging LOGGING LOGGING</code>	specify logging level console/file (default INFO DEBUG)

Example run

```
[amuls:~/amPython/rnxproc] [rnxproc]$ sbf_daily.py -d ~/RxTURP/BEGPIOS/ASTX/19134/
INFO: sbf_daily.py - main: working directory is /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_daily.py - main: changed to directory /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_daily.py - main: combine SBF (six-)hourly files to daily SBF file
INFO: sbf_daily.py - main: creating daily SBF file SEPT1340.19_
```

```
[amuls:~/amPython/rnxproc] [rnxproc]$ sbf_daily.py -d ~/RxTURP/BEGPIOS/ASTX/19134/
INFO: sbf_daily.py - main: working directory is /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_daily.py - main: changed to directory /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_daily.py - main: combine SBF (six-)hourly files to daily SBF file
INFO: sbf_daily.py - main: reusing daily SBF file SEPT1340.19_
```

sbf_rinex.py

`sbf_rinex.py` converts a SBF file into RINEX v3.x observation and navigation files.

Usage

```
[amuls:~/amPython/rnxproc] [rnxproc]$ rinex.py --help
usage: sbf_rinex.py [-h] -f SBFF [-r RNXDIR] [-l LOGGING LOGGING]
```

`sbf_rinex.py` convert binary raw data from SBF to RINEX Obs & Nav files

optional arguments:

```
-h, --help          show this help message and exit
-f SBFF, --sbff SBFF  Binary SBF file
-r RNXDIR, --rnxdir RNXDIR
                    Directory for RINEX output (default .)
-l LOGGING LOGGING, --logging LOGGING LOGGING
                    specify logging level console/file (default INFO DEBUG)
```

Example run

```
[amuls:~/amPython/rnxproc] [rnxproc]$ sbf_rinex.py --sbff /home/amuls/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ --rnxdir /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_rinex.py - sbf2rnx3: arguments processed: dRnx = {'dirs': {'sbf': '/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134', 'rnx': PosixPath('/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134')}, 'sbff': '/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_', 'rnxdir': '/home/amuls/RxTURP/BEGPIOS/ASTX/19134'}
INFO: sbf_rinex.py - checkValidityArgs: check existence of sbfDir /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_rinex.py - checkValidityArgs: check existence of binary file /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ to convert
INFO: sbf_rinex.py - checkValidityArgs: check existence of rnxdir /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134 and create if needed
INFO: location.py - locateProg: sbf2rin is /opt/Septentrio/RxTools/bin/sbf2rin
INFO: sbf_rinex.py - sbf2rnx3: convert binary file to rinex
INFO: sbf_rinex.py - sbf2rinex: RINEX conversion from SBF binary
INFO: sbf_rinex.py - sbf2rinex: creating RINEX observation file
INFO: amutils.py - run_subprocess_output: running
/opt/Septentrio/RxTools/bin/sbf2rin -f /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ -x RSCJI -s -D -v -R3 -l -O BEL
Creating RINEX file: done | 0%
INFO: sbf_rinex.py - sbf2rinex: creating RINEX navigation file
INFO: amutils.py - run_subprocess_output: running
/opt/Septentrio/RxTools/bin/sbf2rin -f /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ -x RSCJI -s -D -v -n P -R3 -l -O BEL
Creating RINEX file: done | 0%
INFO: sbf_rinex.py - sbf2rnx3: dRnx =
{
  "dirs": {
    "sbf": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134",
    "rnx": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134"
  },
  "sbff": "SEPT1340.19_",
  "bin": {
    "SBF2RIN": "/opt/Septentrio/RxTools/bin/sbf2rin"
  },
  "obs3f": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_M0.rnx",
  "nav3f": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx"
}
```

prepare_sbf2rnx.py

This script combines the scripts `sbf_daily.py` and `sbf-rinex.py` and offers the possibility to perform compression of these files:

- RINEX observation file undergoes a Hatanaka compression using the program `rnx2crz`,
- RINEX navigation file is `gzip` compressed.

Usage

```
[amuls:~/amPython/rnxproc] [rnxproc]$ prepare_sbf2rnx.py -h
usage: prepare_sbf2rnx.py [-h] [-r ROOT_DIR] -m MARKER -y YEAR -d DOY [-c] [-o] [-l LOGGING LOGGING]
```

`prepare_sbf2rnx.py` Combining and conversion of SBF files to RINEX v3.x Obs/Nav files

optional arguments:

```
-h, --help          show this help message and exit
-r ROOT_DIR, --root_dir ROOT_DIR
```

```
Root directory of SBF data collection (default /home/amuls/RxTURP/BEGPIOS/)
-m MARKER, --marker MARKER
                        marker name (4 chars)
-y YEAR, --year YEAR   Year (4 digits)
-d DOY, --doy DOY      day-of-year [1..366]
-c, --compress         compress obtained RINEX files
-o, --overwrite        overwrite daily SBF file (default False)
-l LOGGING LOGGING, --logging LOGGING LOGGING
                        specify logging level console/file (default INFO DEBUG)
```

Example run

```
[amuls:~/amPython/rnxproc] [rnxproc]$ prepare_sbf2rnx.py -m ASTX -y 2019 -d 134 -c
INFO: === prepare_sbf2rnx.py - combine_sbf: passing control to sbf_daily.py (options: --dir /home/amuls/RxTURP/BEGPIOS/ASTX/19134) ===
INFO: sbf_daily.py - combine_sbf: working directory is /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_daily.py - combine_sbf: changed to directory /home/amuls/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_daily.py - combine_sbf: combine SBF (six-)hourly files to daily SBF file
INFO: sbf_daily.py - combine_sbf: reusing daily SBF file SEPT1340.19_
INFO: >>>>> prepare_sbf2rnx.py - prepare_rnx_data: obtained daily SBF file = SEPT1340.19_
INFO: === prepare_sbf2rnx.py - sbf_rnx3: passing control to sbf_rinex.py (options: --sbf /home/amuls/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ --rnx /home/amuls/RxTURP/BEGPIOS/ASTX/19134) ===
INFO: sbf_rinex.py - sbf2rnx3: arguments processed: dRnx = {'dirs': {'sbf': '/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134', 'rnx': PosixPath('/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134')}, 'sbf': '/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_', 'rnx': PosixPath('/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_')}
INFO: sbf_rinex.py - checkValidityArgs: check existence of sbfDir /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134
INFO: sbf_rinex.py - checkValidityArgs: check existence of binary file /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ to convert
INFO: sbf_rinex.py - checkValidityArgs: check existence of rnxDir /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134 and create if needed
INFO: location.py - locateProg: sbf2rin is /opt/Septentrio/RxTools/bin/sbf2rin
INFO: sbf_rinex.py - sbf2rnx3: convert binary file to rinex
INFO: sbf_rinex.py - sbf2rinex: RINEX conversion from SBF binary
INFO: sbf_rinex.py - sbf2rinex: creating RINEX observation file
INFO: amutils.py - run_subprocess_output: running
/opt/Septentrio/RxTools/bin/sbf2rin -f /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ -x RSCJI -s -D -v -R3 -l -O BEL
Creating RINEX file: done | 0%
INFO: sbf_rinex.py - sbf2rinex: creating RINEX navigation file
INFO: amutils.py - run_subprocess_output: running
/opt/Septentrio/RxTools/bin/sbf2rin -f /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134/SEPT1340.19_ -x RSCJI -s -D -v -n P -R3 -l -O BEL
Creating RINEX file: done | 0%
INFO: sbf_rinex.py - sbf2rnx3: dRnx =
{
  "dirs": {
    "sbf": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/19134",
    "rnx": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134"
  },
  "sbf": "SEPT1340.19_",
  "bin": {
    "SBF2RIN": "/opt/Septentrio/RxTools/bin/sbf2rin"
  },
  "obs3f": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_MO.rnx",
  "nav3f": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx"
}
INFO: >>>>> prepare_sbf2rnx.py - prepare_rnx_data: obtained RINEX observation file = /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_MO.rnx
INFO: >>>>> prepare_sbf2rnx.py - prepare_rnx_data: obtained RINEX navigation files = /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx
INFO: location.py - locateProg: rnx2crz is /home/amuls/bin/rnx2crz
INFO: location.py - locateProg: gzip is /usr/bin/gzip
INFO: compress_utils.py - compress_rnx_obs: Compressing RINEX observation /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_MO.rnx
INFO: amutils.py - run_subprocess: running
/home/amuls/bin/rnx2crz -f -d /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_MO.rnx
INFO: >>>>> prepare_sbf2rnx.py - prepare_rnx_data: compressed RINEX observation file = /home/amuls/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_MO.rnx
INFO: compress_utils.py - gzip_compress: Compressing RINEX navigation /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx
INFO: amutils.py - run_subprocess: running
/usr/bin/gzip -f /media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx
INFO: >>>>> prepare_sbf2rnx.py - prepare_rnx_data: compressed RINEX navigation file = /home/amuls/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx
INFO: prepare_sbf2rnx.py - prepare_rnx_data: SBF preparation information =
{
  "dirs": {
    "root": "/home/amuls/RxTURP/BEGPIOS/",
    "sbf": "/home/amuls/RxTURP/BEGPIOS/ASTX/19134",
    "yydoy": "/home/amuls/RxTURP/BEGPIOS/ASTX/rinex/19134"
  },
  "cli": {
```

```
    "marker": "ASTX",
    "yyyy": 2019,
    "doy": 134,
    "compress": true,
    "overwrite": false
  },
  "rnx": {
    "obs3f": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_M0.rnx",
    "nav3f": "/media/amuls/porsche/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx",
    "obs3fc": "/home/amuls/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_01S_M0.crx.Z",
    "nav3fc": "/home/amuls/RxTURP/BEGPIOS/ASTX/rinex/19134/SEPT00BEL_R_20191340000_01D_MN.rnx.gz"
  },
  "sbffile": "SEPT1340.19_",
  "bin": {
    "rnx2crz": "/home/amuls/bin/rnx2crz",
    "gzip": "/usr/bin/gzip"
  }
}
```

Resulting directory structure

```
[amuls:~/amPython/rnxproc] [rnxproc]$ ls -lht ~/RxTURP/BEGPIOS/ASTX/rinex/19134
total 29M
-rw-rw-r-- 1 amuls amuls 3.1K Feb  4 15:16 prepare_sbf2rnx.log
-rw-rw-r-- 1 amuls amuls 28M Feb  4 15:16 SEPT00BEL_R_20191340000_01D_01S_M0.crx.Z
-rw-rw-r-- 1 amuls amuls 439 Feb  4 15:16 sbf_rinex.json
-rw-rw-r-- 1 amuls amuls 117K Feb  4 15:16 SEPT00BEL_R_20191340000_01D_MN.rnx.gz
```