

UTC TIME TO SWATH TOOL

1. DESCRIPTION OF THE EXECUTABLE ROUTINE

The following items have been delivered as part of the UTC to Swath tool:

- Linux 32-bit executable:
 - `utc2swath_tools/LINUX/utc2swath`
- Linux 64-bit executable:
 - `utc2swath_tools/LINUX64/utc2swath`
- Windows 32-bit executable:
 - `utc2swath_tools/WINDOWS/utc2swath`
- Example data files:
 - Input SMOS Orbit Scenario File:
 - `utc2swath_tools/input/SM_OPER_MPL_ORBSCT_20091102T031142_20251231T000000_331_008_1.EEF`
 - Input CRYOSAT Orbit Reference File:
 - `utc2swath_tools/input/SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF`

Details about each one of these items and some usage hints are given in the next sections.

1.1 Change history

Issue	Change Description	Date
1.0	First version	10/06/2011
1.1	Add support for Cryosat. New input parameter: satellite name	07/08/2012

2. EXAMPLE PROGRAM INTERFACE DESCRIPTION

2.1 Executable program *utc2swath*

For the requested UTC time, the executable program *utc2swath* computes the geocentric longitude and geodetic latitude of the swath points defining the instantaneous footprint. It requires an Orbit File as input. The data generated by the executable is provided via the standard output. Nominal attitude is assumed.

2.1.1 Command line input parameters description

The command line parameters of the executable routine are the following (provided in the order in which they have to be supplied):

- `satellite_name`: allowed values SMOS or CRYOSAT
- `orbit_scenario_filename` : Filename of the SMOS or CRYOSAT Orbit File. It may include the path. Supported orbit file types:
 - EE CFI Orbit Scenario File
 - EE CFI Predicted Orbit File
 - EE CFI Restituted Orbit File
 - Cryosat Reference Orbit File (ORBREF)

Note that there is a runtime increase with orbit files other than Orbit Scenario files.

- `utc_time`: Requested UTC time in CCSDS-A ascii time format “yyyy-mm-ddThh:mm:ss.uuuuuu”

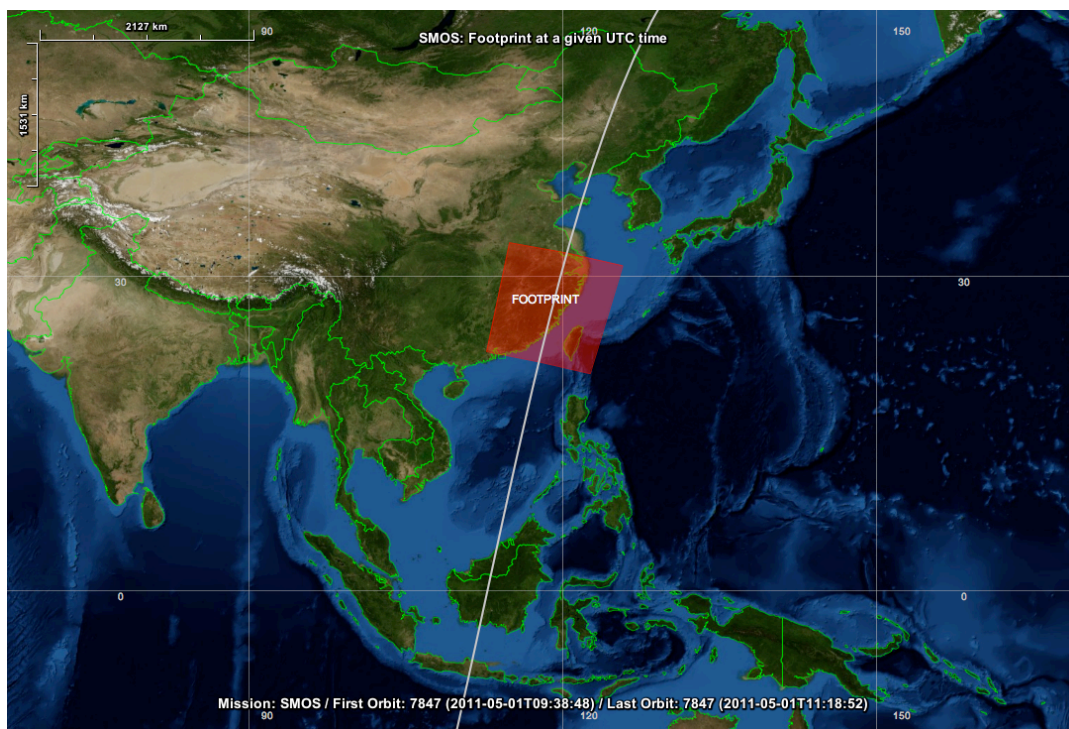
- **swath_mode:**
 - allowed values for SMOS: NOMINAL, NARROW. The NOMINAL swath corresponds to the “MIRAS P” swath and the NARROW swath to the “MIRAS Q” swath.
 - allowed values for CRYOSAT: NOMINAL. The NOMINAL swath corresponds to the intersection point of the SIRAL line of sight direction with the Earth surface (geodetic nadir point).

2.1.2 Command line output parameters description

The following parameters are given as output:

List of Geocentric Longitude and Geodetic Latitude pairs of the points defining the footprint (in degrees).

The SMOS footprint is modelled as a polygon defined as a sequence of six points: 3 points defining the bottom side, 3 points defining the top side (see image below).



The CRYOSAT footprint is modelled as a point.

2.1.3 Examples

2.1.3.1 SMOS Nominal Swath

The executable program can be called in the following way:

- From Linux shell

```
./utc2swath SMOS ../input/SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF 2011-05-01T10:20:00.000000 NOMINAL
```

- From Windows command prompt window

```
utc2swath.exe SMOS ../input/SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF 2011-05-01T10:20:00.000000 NOMINAL
```

The executable program shows the following messages and output data:

UTC2SWATH v1.1: MANUAL MODE

Input data:

Satellite: SMOS
UTC Time: 2011-05-01T10:20:00.000000
Orbit File: SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF
Swath Mode: NOMINAL

Output data:

Footprint: List of Geocentric Longitude [deg] Geodetic Latitude [deg]
+114.905184 +033.207504
+120.389252 +032.224491
+125.743058 +031.008885
+122.628743 +020.700901
+117.709923 +021.827781
+112.718696 +022.805784

2.1.3.2 SMOS Narrow Swath

The executable program can be called in the following way:

- From Linux shell

```
./utc2swath SMOS ../input/SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF 2011-05-01T10:20:00.000000 NARROW
```

- From Windows command prompt window

```
utc2swath.exe SMOS ../input/SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF 2011-05-01T10:20:00.000000 NARROW
```

The executable program shows the following messages and output data:

UTC2SWATH v1.1: MANUAL MODE

Input data:

Satellite: SMOS
UTC Time: 2011-05-01T10:20:00.000000
Orbit File: SM_OPER_MPL_ORBSCT_20091102T031142_20500101T000000_360_001_1.EEF
Swath Mode: NARROW

Output data:

Footprint: List of Geocentric Longitude [deg] Geodetic Latitude [deg]
+117.111077 +032.843534
+120.389252 +032.224491
+123.620344 +031.521567
+120.672090 +021.168435
+117.709923 +021.827781
+114.721607 +022.433445

2.1.3.3 CRYOSAT Nominal Swath

The executable program can be called in the following way:

- From Linux shell

```
./utc2swath CRYOSAT ../input/CS_OPER_MPL_ORBREF_20110617T070122_20120619T224135_0001.EEF 2011-07-01T10:20:00.000000 NOMINAL
```

- From Windows command prompt window

```
utc2swath.exe CRYOSAT ../input/CS_OPER_MPL_ORBREF_20110617T070122_20120619T224135_0001.EEF 2011-07-01T10:20:00.000000 NOMINAL
```

The executable program shows the following messages and output data:

UTC2SWATH v1.1: MANUAL MODE

Input data:

Satellite: CRYOSAT

UTC Time: 2011-07-01T10:20:00.000000

Orbit File: CS_OPER_MPL_ORBREF_20110617T070122_20120619T224135_0001.EEF

Swath Mode: NOMINAL

Output data:

Footprint: List of Geocentric Longitude [deg] Geodetic Latitude [deg]

-042.567987 +062.817984

3. ANNEX

3.1 SMOS Swath Modes

The highlighted areas indicate the boundaries of the two possible MIRAS swaths:

- In green: nominal (P swath)
- In blue: narrow (Q swath).

