

1. Description of the tool

CFOSAT project provides a tool for pass-over determination composed of two files:

- cfosat_cycles_t0_vX.X.txt
- cfosat_trace_vX.X.kml

The combined use of these two files allows the computation of CFOSAT pass over dates and times, within a five to ten minutes' precision, which should be sufficient for product selection or for campaign preparation.

- cfosat_cycles_t0_vX.X.txt file provides the absolute UTC starting date & time of CFOSAT cycles,
- cfosat_trace_vX.X.kml file provides the relative date & time of pass over, relatively to the cycle start.

1.1. DESCRIPTION OF CFOSAT_CYCLES_T0_VX.X.TXT

CFOSAT have a 13 days repetitive cycle

The cfosat_t0_cycles_vX.X.txt file is an ascii file providing cycles number and cycle start dates for the past and the next scheduled cycles.

Format : Cycle Number ; R (realised) or E (extrapolated) ; UTC datetime of T0 (YYYY-MM-DD HH:MM:SS).

Example : extract of file generated on June 2019 :

```
0009;R;2019-02-13 10:11:13
0010;R;2019-02-26 10:11:33
0011;R;2019-03-11 10:11:47
0012;R;2019-03-24 10:11:54
0013;R;2019-04-06 10:11:53
0014;R;2019-04-19 10:11:50
0015;R;2019-05-02 10:12:33
0016;R;2019-05-15 10:13:08
0017;R;2019-05-28 10:13:34
0018;R;2019-06-10 10:13:54
0019;R;2019-06-23 10:14:08
0020;E;2019-07-06 10:12:00
0021;E;2019-07-19 10:12:00
0022;E;2019-08-01 10:12:00
```

1.2. DESCRIPTION OF CFOSAT_TRACE_VX.X.KML

cfosat_trace_vX.X.kml is a kml file (for viewers as GoogleEarth) which have 3 kinds of geolocalised tags :

- A thin white line giving the nadir track of the cycle, this trace is repeatable from one cycle to another +/- 20 km
- Timetags along the nadir track given each 2 min, named « T0+[DD]d [HH]:[MM] »
 - DD ; HH ; MM number of entire days, hours and minutes after the cycle T0.

Theses tags provide the delay between the beginning of a cycle and the CFOSAT pass over this point.

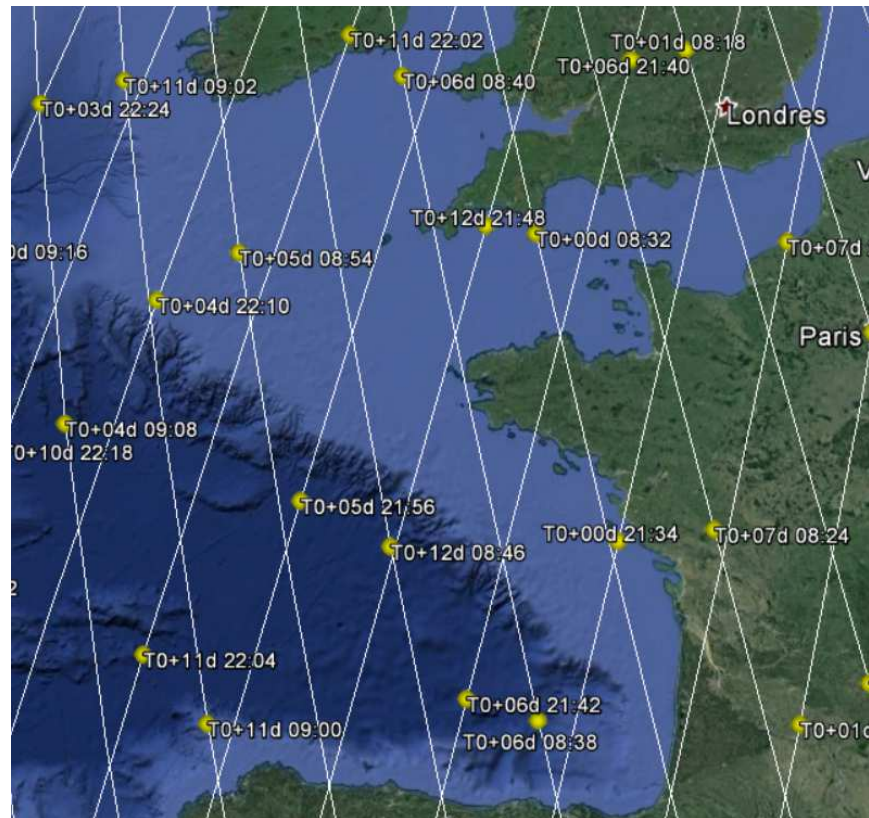


Fig : Nadir Track (thin white line) and timetags each 2 minutes (displaying delay since the cycle start)

- Tags giving the track number (consistent with the « trace » attribute of products). This tag is printed at each equator crossing ($\pm 0.3^\circ$); and repeated at $+42^\circ$ and -42° of latitude (yellow pin)

The track number is always between 1 and 394. A track is defined as a half earth revolution, going from a pole to another.

- Odd track number : ascending westing track (from South pole to North pole)
- Even track number : descending westing track (from North pole to South pole)

For example, track #1 crosses equator at $+127,49^\circ$ (Indonesia) at approximately 24 minutes after the start of each cycle.



Fig : Track number tag along the equator

This information is provided in order to easy the cross check with the « trace » attribute of the products.

2. Use Case

Use Case : One wants to know colocalisations between CFOSAT and a scheduled campaign.

Application : Example of maritime campaign leaving **Perth, Australia on 2019 July, 10**, sailing 300 Nm West in a week.

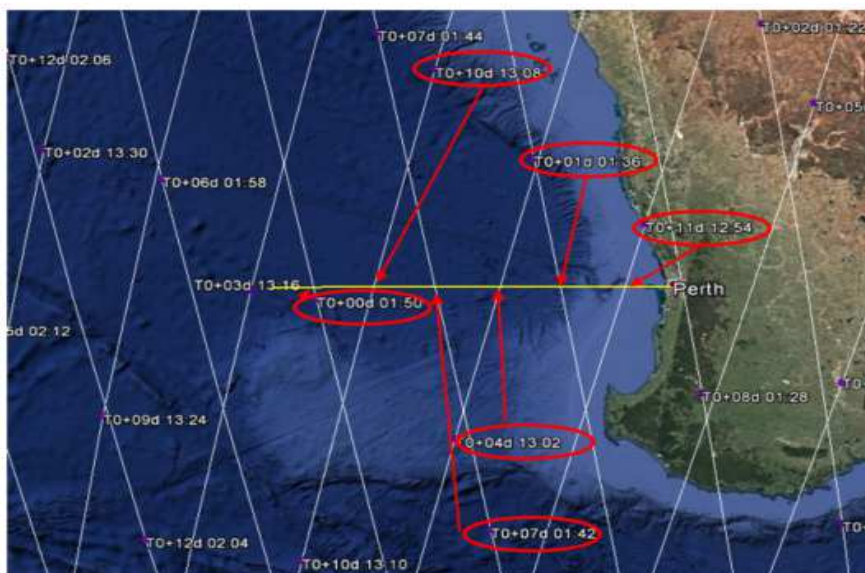
- First step is to find the T0 date & time of the cycle immediately before the campaign (with .txt file)

Application : Cycle 20 : **T0_cycle = 2019-07-06 10:12**

- Second step is to read the time tags that cross the campaign trajectory.

Application (from right to left):

- T0 + 11d 12 :54
- T0 + 01d 01 :36
- T0 + 04d 13 :02
- T0 + 07d 01 :42
- T0 + 10d 13 :08
- T0 + 00d 01 :50



- We obtain the pass over date & time by adding the T0 value :

Application (from right to left):

- 2019-07-06 10 :12 + 11d 12 :54 = 2019-07-17 23 :06 UTC
- 2019-07-06 10 :12 + 01d 01 :36 = 2019-07-07 11 :48 UTC
- 2019-07-06 10 :12 + 04d 13 :02 = 2019-07-10 23 :14 UTC
- 2019-07-06 10 :12 + 07d 01 :42 = 2019-07-13 11 :54 UTC
- 2019-07-06 10 :12 + 10d 13 :08 = 2019-07-16 23 :20 UTC
- 2019-07-06 10 :12 + 00d 01 :50 = 2019-07-06 12 :02 UTC

- Last step is to select the CFOSAT pass over within the campaign dates

Application : Our campaign (from July, 10th to 17th) will cross CFOSAT pass over on:

- 2019-07-10 23 :14 UTC
- 2019-07-13 11 :54 UTC
- 2019-07-16 23 :20 UTC
- 2019-07-17 23 :06 UTC