Working with processed aircraft data

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Plan

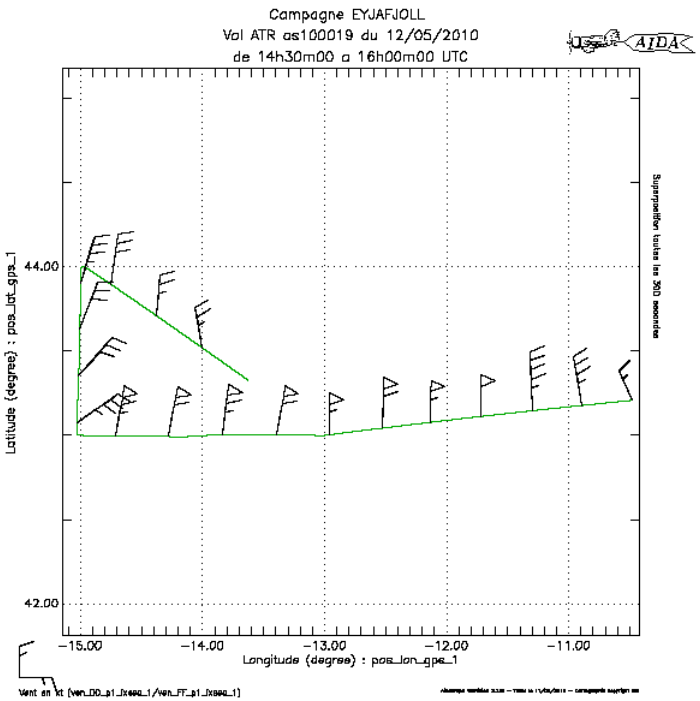
- The context
- AIDA
- exported files
- You work

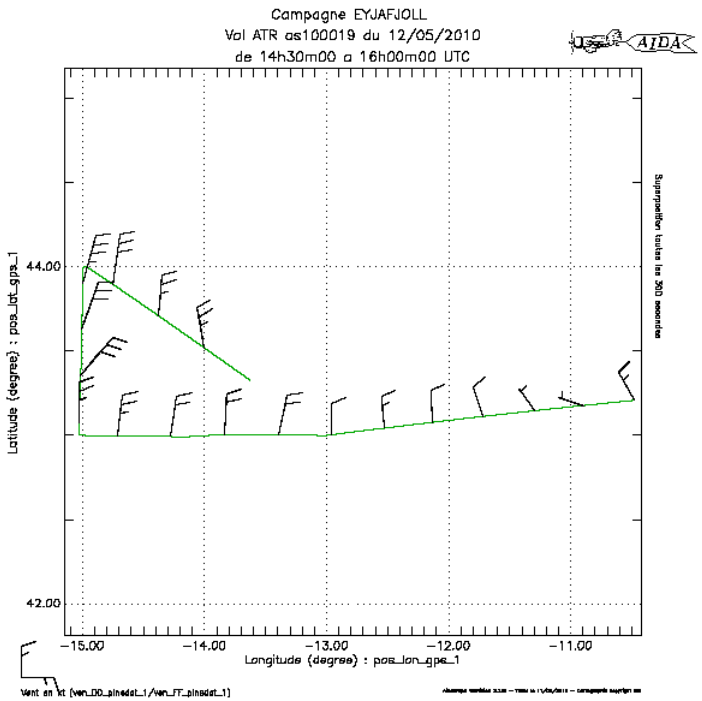
Data Flow

Three different contexts :

- Onboard aircraft : near-real-time. Automated processing.
- Quick-look : Fast. 1 Hz data. Automated processing. Simple to handle (one variable per measurement ("_comp_"))
- Processed data : Slow. Max sample rate. Human choices. Multiple versions. Iterations with PIs (versioning).

Difference between QL and processed data





The TETRAD case

Campaign's goal, for an operator :

Deliver qualified data to investigators

- General case : transfer files
- Specific needs : access to some visualisation tools.

working within AIDA

Why ?

- Access to full dataset, at each processing step.
- Using existing tools.
- One workstation available

but

- needs some training
- a Unix/Linux thing
- Will not cover all your needs.

AIDA in a few words

A very general freamework for the processing of time series.

- Metadata tied to data : autodocumented data format, automatic processing of metadata.
- One unique data format, whatever origins
- Simple storage : one directory/flight, one file per parameter + one per-flight metadata file.
- multiple-langages friendly : main processing library in C, but also labvie, Python, R, scilab.

Open framework (but you'll mostly meet AIDAGraph).

Used for QL **and** final processing.

Processing steps and variable naming

We divide variables in three groups :

raw ("quanta") : direct ouput from the machine.

calibrated : automatic transformation of the above, in geophysical unit.

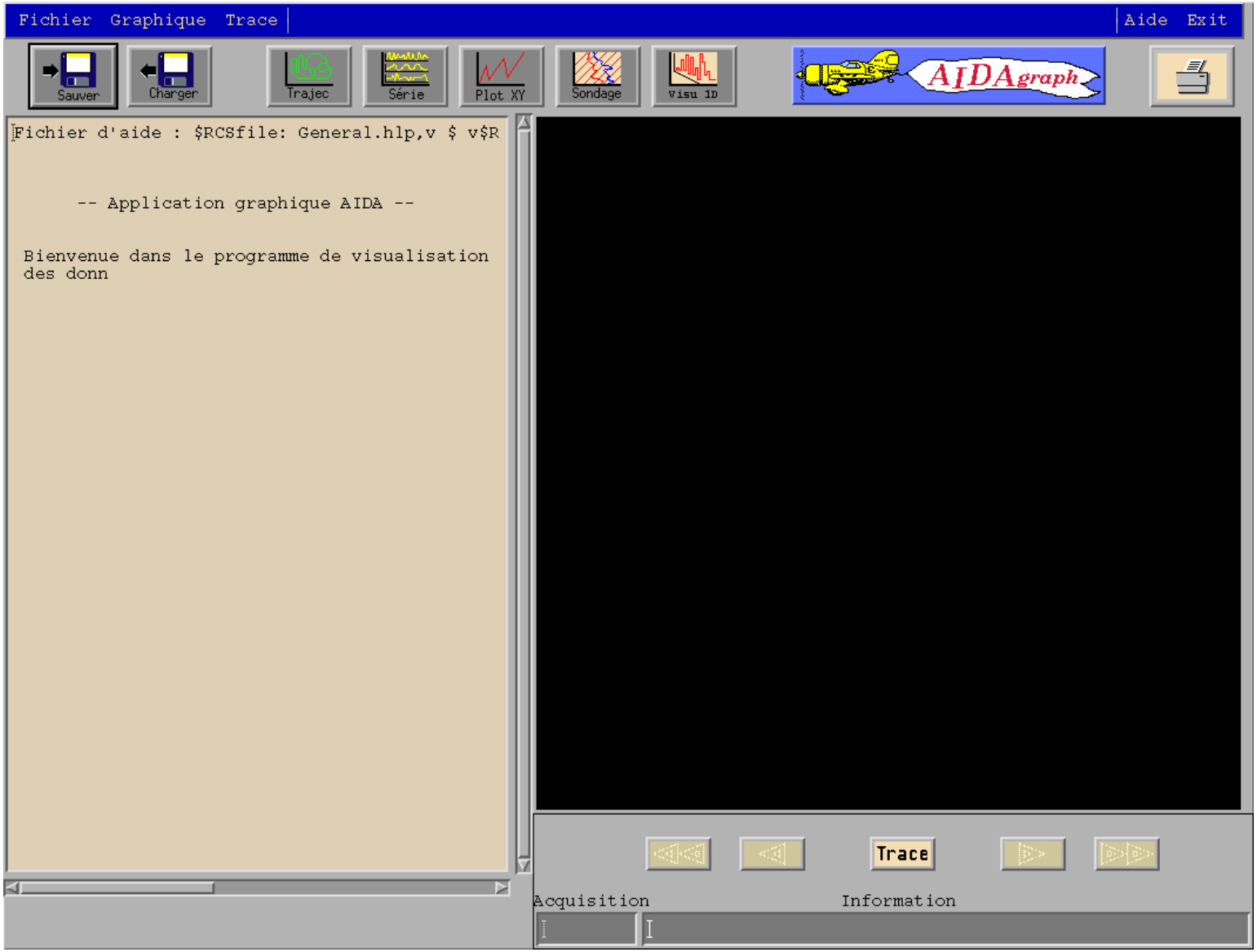
processed : intermediate or final version.

Raw data names are in CAPITALLETTERS
Calibrated and processed variables use this naming scheme :

- A prefix : the family
- A postfix : the sample frequency
- in between : qualifiers, when needed : sensor, processing method. for calibrated variables : lower(raw_name) + "_cal"

parameters families

acc : acceleration
alt : altitude
att : attitude
chm : chemical compounds
ctl : control (houskeeping)
lwc : liquid water
hum : water vapour
irf : refractive index
mic : microphysique
nav : navigation
pos : horizontal position
prp : precipitation
pre : (air) pressure
ray : radiation
tpr : temperature
rft : time
ven : wind
vit : speed
trb : turbulence
flx : flux


Fichier Graphique Trace
Aide Exit
Sauver
Charger
Trajec
Série
Plot XY
Sondage
Visu 1D
AIDAgraph
Fichier d'aide : $RCSfile: General.hlp,v $ v$R
-- Application graphique AIDA --
Bienvenue dans le programme de visualisation
des donn
Trace
Acquisition
Information

Processed files

Why work with these files ?

- the real use-case in most campaigns
- origin-independant.
- using an already known tool

commonly availables

text NASA-AMES 1001

netcdf : two conventions (RAF & CF)

`.tur` : Laboratoire aérologie (*cf.* Marie)

"tasfile" : Simple text file, for some microphysics analysis

`.kml` : To show to your boss

Text files

NASA-AMES 1001 Format
Pros and con of text files :

- portable, but large.
- readable by humans . . . not always (more than 2D), and risk of reduced resolution (`0.0001` vs. `1.23456e-4`)
- self-describing, but no universal glossary, nor dataset discovery mechanism.

We'll note :

- A family of formats (up to 4 dimensions, FFI)
- Simple structure (header, then text), giving ease of use (spreadsheet, various programming langages)

Basic NASA-Ames example

```
f = open(file_path)
NLHEAD, mark = f.readline().split()
NLHEAD = int (NLHEAD)
ONAME = f.readline()
# some more reading of the header
f.close()

M = np.loadtxt(file_path, skiprows=NLHEAD)

plt.plot(M[ :,3], M[ :,2])
plt.axis([3, 8, 51, 53])
plt.show()
```

netcdf files

- binary format : close to the "true" representation.
- need specific software, but medata come for free.
- not afraid by large datasets
- more than one convention

What's available on local network ?

machine : lxtramm4 / 192.168.1.100, serves FTP, telnet

users : group_a to group_e

passwd : hyeres

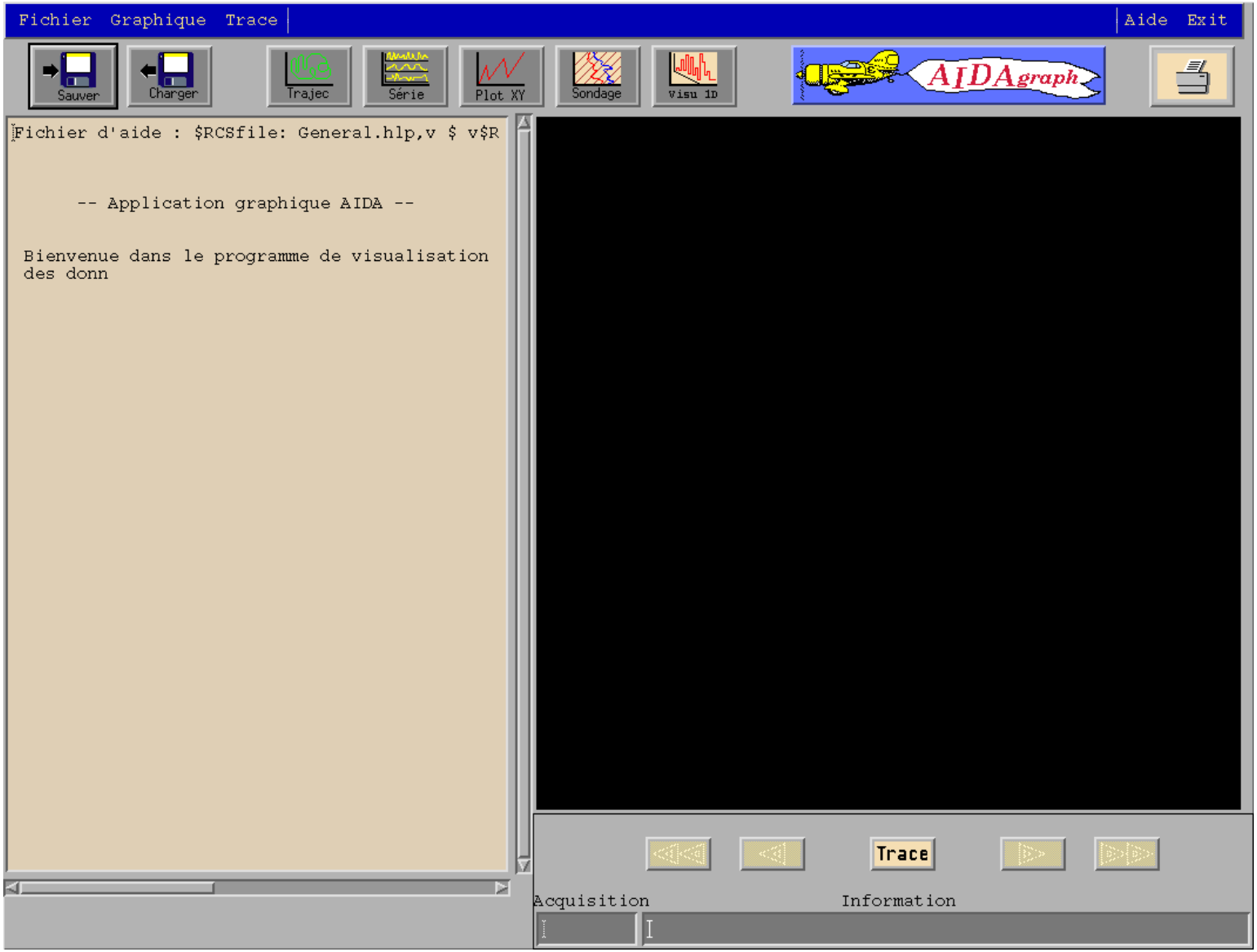
data available at : $HOME/data_files

printer : trammlp2 / 192.168.1.10

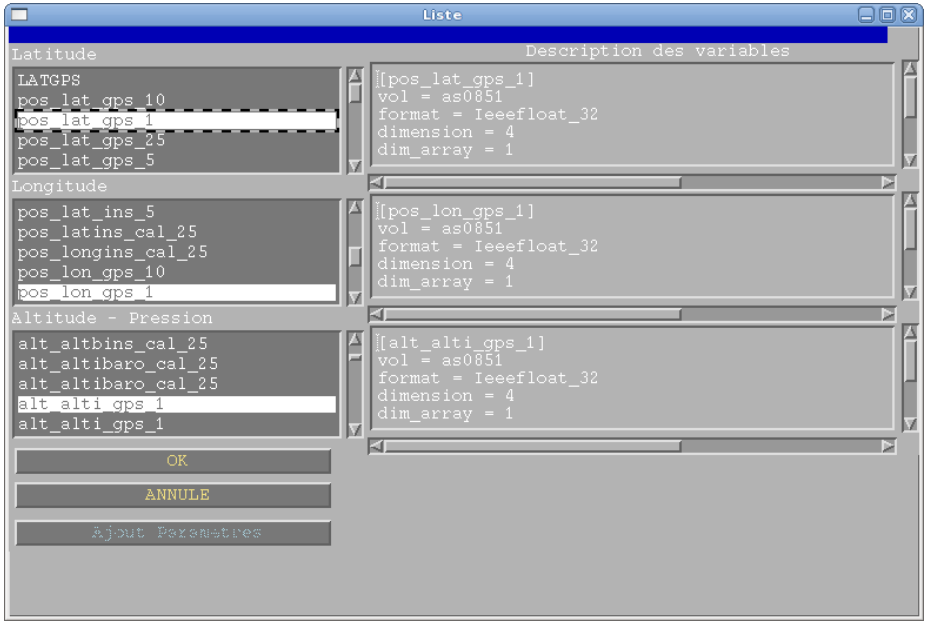
wifi access :

SSID : equipe-tramm

WEP key : BD7FCAE784


Fichier Graphique Trace
Aide Exit
Sauver
Charger
Trajec
Série
Plot XY
Sondage
Visu 1D
AIDAgraph
Fichier d'aide : $RCSfile: General.hlp,v $ v$R
-- Application graphique AIDA --
Bienvenue dans le programme de visualisation
des donn
Trace
Acquisition
Information


Fichier Graphique Trace
Aide Exit
Sauver
Charger
Trajec
Série
Plot XY
Sondage
Visu 1D
AIDAgraph
Module trajectoire
Liste Variables
Style du paramètre superposé
Texte
Barres
Epaisseur
Vent
Période de tracé
300
300
en secondes
Palette de couleurs
Type de trajectoire
2D horizontal
Géographie
NON
Topographie
NON
Repères
Aucuns
Affichage
NON
des tops
Echelles
OUI
couplées
Titre du graphique
Campagne
Longitude
Latitude
Altitude
min
max
Reset
Ecart (latmax-latmin)
Reset
Choix des séquences
Début et fin du tracé
000000
653239
Trace
Acquisition
Information

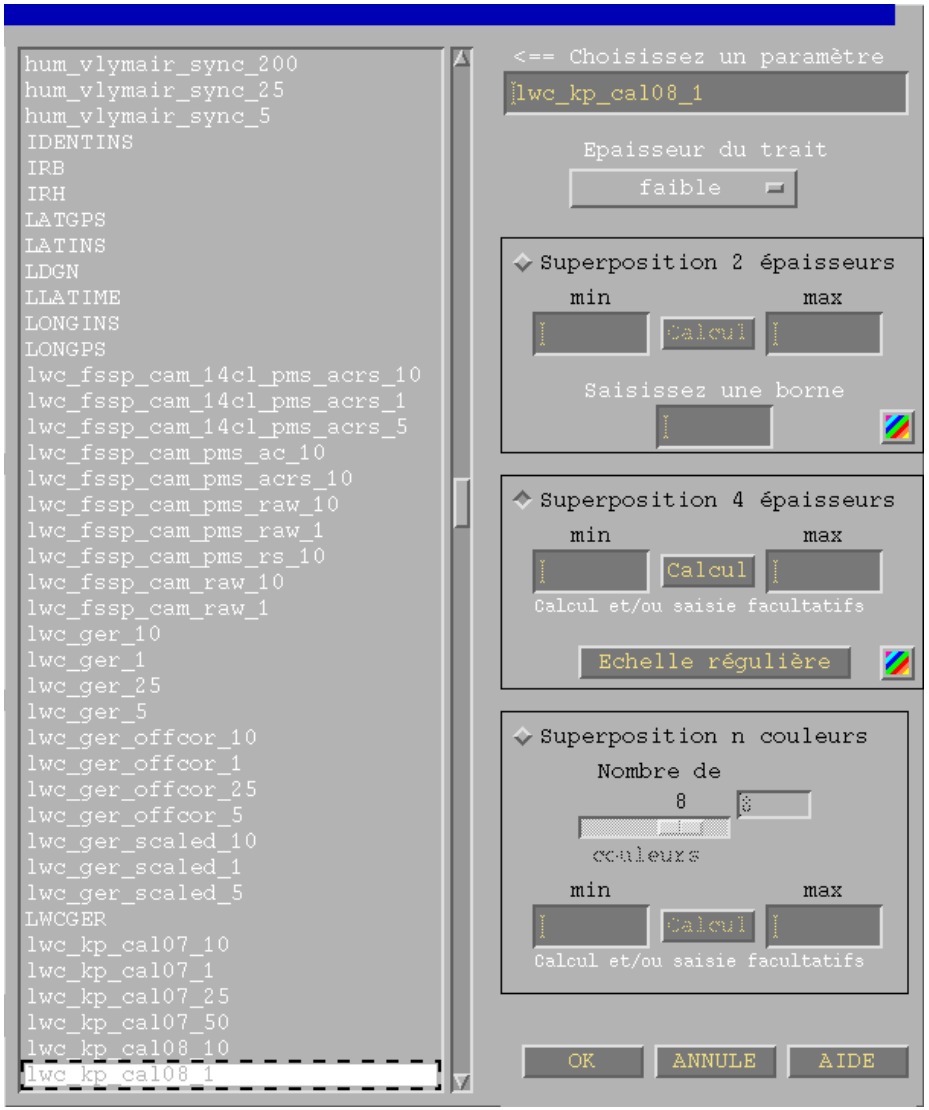


Many GPS variables

-> choose `pos_lat_gps_1`, `pos_lon_gps_1`

! Be careful !

There are **more than one** definition of altitude !

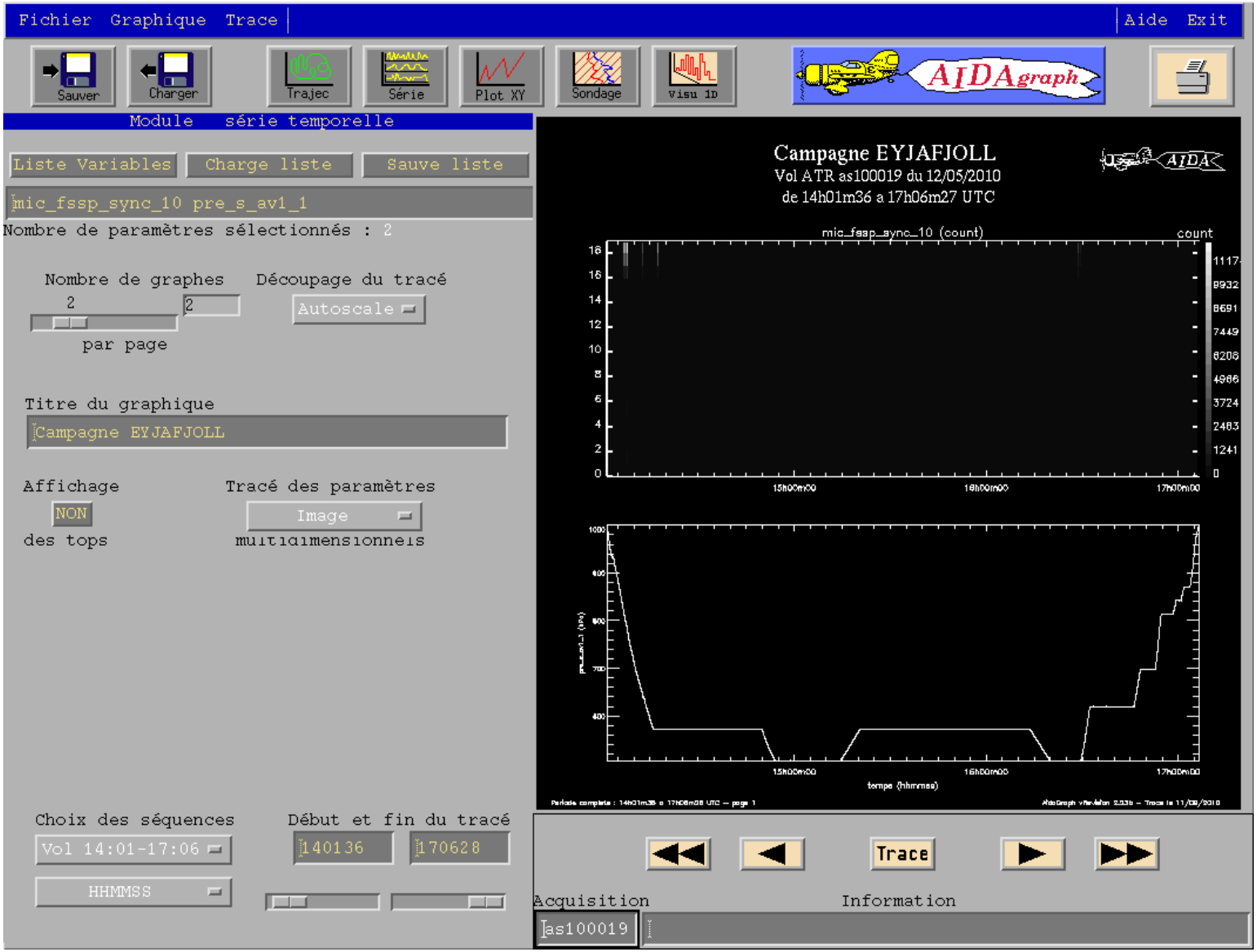


Introduction

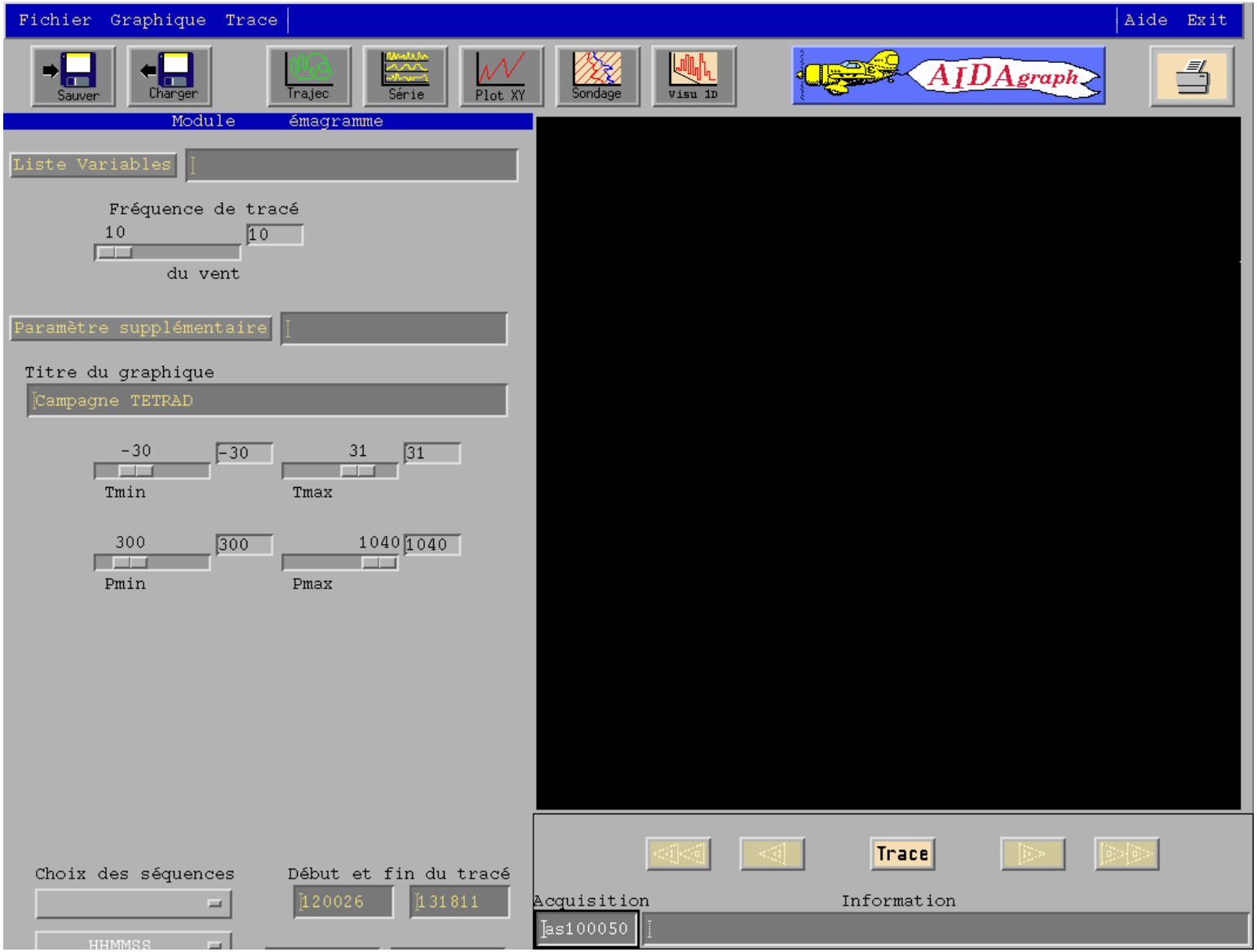
AIDA

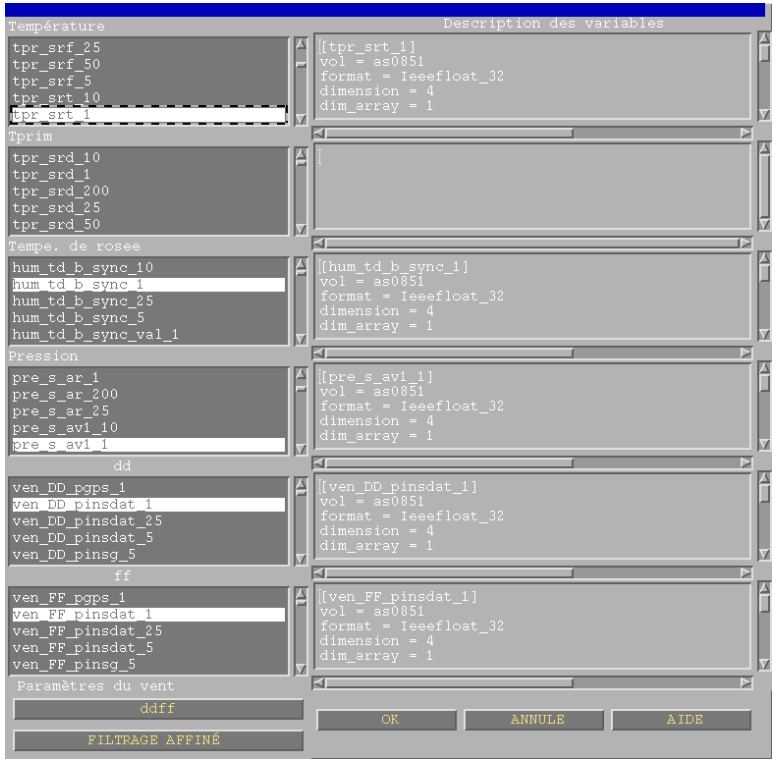
Files

Hands on


Fichier Graphique Trace
Aide Exit
Sauver
Charger
Trajec
Série
Plot XY
Sondage
Visu 1D
AIDAgraph
Module série temporelle
Liste Variables
Charge liste
Sauve liste
mic_fssp_sync_10 pre_s_av1_1
Nombre de paramètres sélectionnés : 2
Nombre de graphes
2
2
par page
Découpage du tracé
Autoscale
Titre du graphique
Campagne EYJAFJOLL
Affichage
NON
des tops
Tracé des paramètres
Image
multidimensionnels
Choix des séquences
Vol 14:01-17:06
HHMMSS
Début et fin du tracé
140136
170628
Campagne EYJAFJOLL
Vol ATR as100019 du 12/05/2010
de 14h01m36 a 17h06m27 UTC
mic_fssp_sync_10 (count)
count
15h00m00
16h00m00
17h00m00
tempe (hhmmss)
Trace
Acquisition
as100019
Information

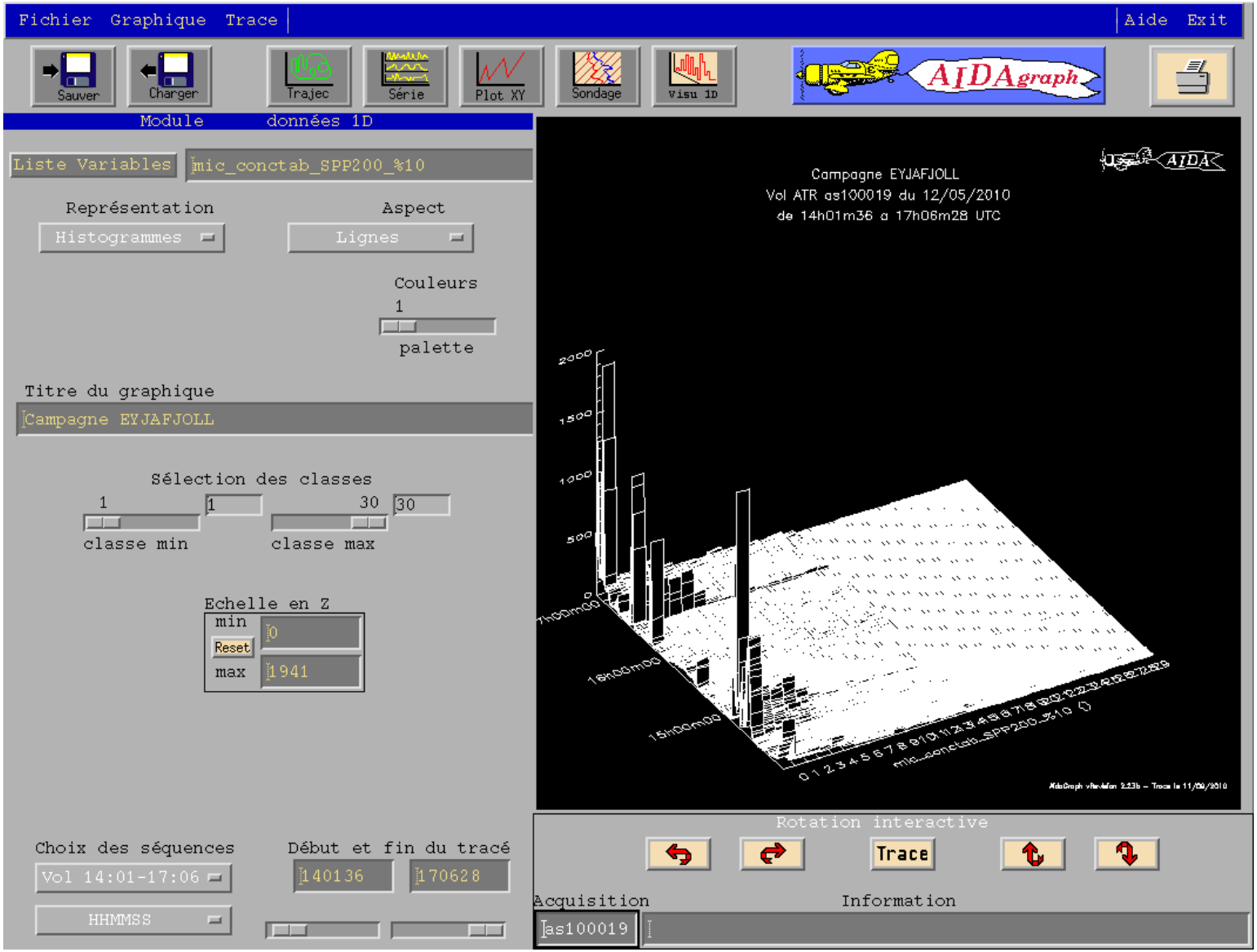
Only synchronous variables ! !


Fichier Graphique Trace
Aide Exit
Sauver
Charger
Trajec
Série
Plot XY
Sondage
Visu 1D
AIDAgraph
Module émagramme
Liste Variables
Fréquence de tracé
10
10
du vent
Paramètre supplémentaire
Titre du graphique
Campagne TETRAD
-30
-30
31
31
Tmin
Tmax
300
300
1040
1040
Pmin
Pmax
Trace
Choix des séquences
Début et fin du tracé
120026
131811
HHMMSS
Acquisition
Information
as100050



Many GPS variables

choose `ven_DD_pinsdat_1`, `vent_FF_pinsdat_1` (or `ven_U_pinsdat_1`, `vent_V_pinsdat_1`)


Fichier Graphique Trace
Aide Exit
Sauver
Charger
Trajec
Série
Plot XY
Sondage
Visu 1D
AIDAgraph
Module données 1D
Liste Variables
mic_conctab_SPP200_%10
Représentation
Histogrammes
Aspect
Lignes
Couleurs
1
palette
Titre du graphique
Campagne EYJAFJOLL
Sélection des classes
1
1
30
30
classe min
classe max
Echelle en Z
min
0
Reset
max
1941
Campagne EYJAFJOLL
Vol ATR as100019 du 12/05/2010
de 14h01m36 a 17h06m28 UTC
AIDA
2000
1500
1000
500
0
Rotation interactive
Trace
Choix des séquences
Vol 14:01-17:06
HHMMSS
Début et fin du tracé
140136
170628
Acquisition
Information
as100019