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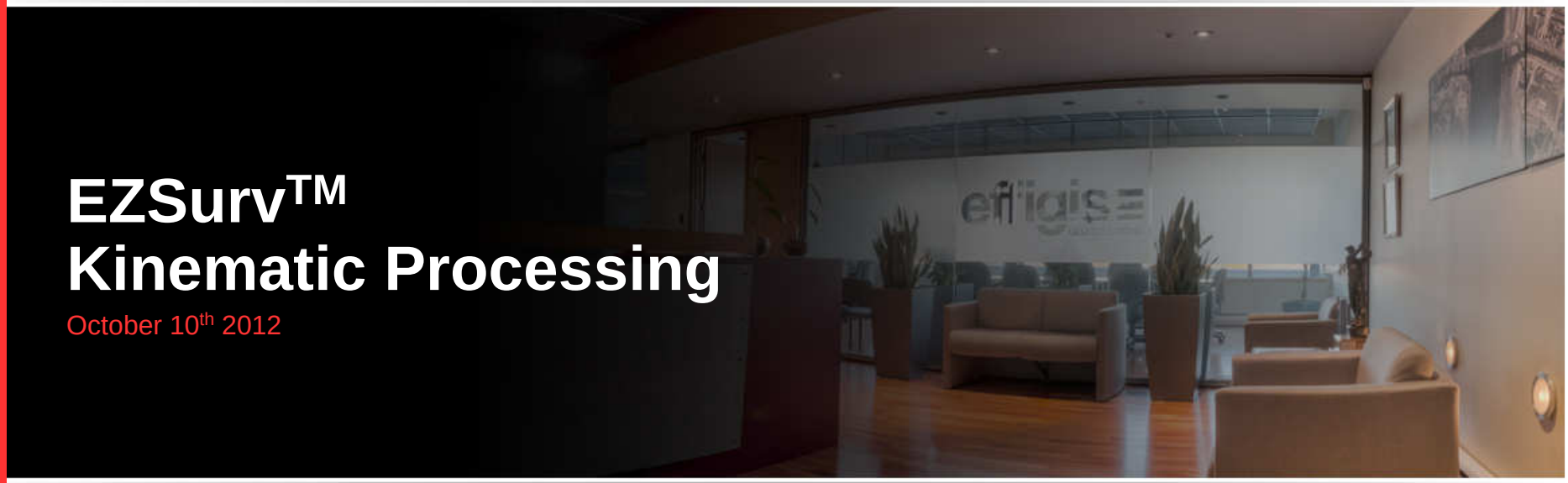
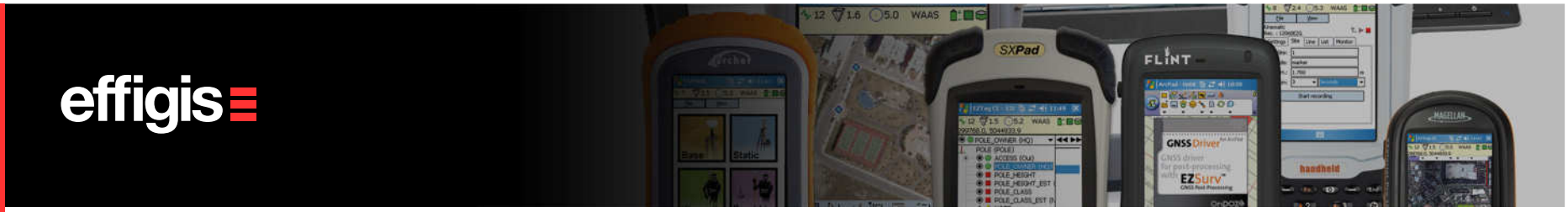


EZSurv™
Kinematic Processing

October 10th 2012

2012 - Training documents



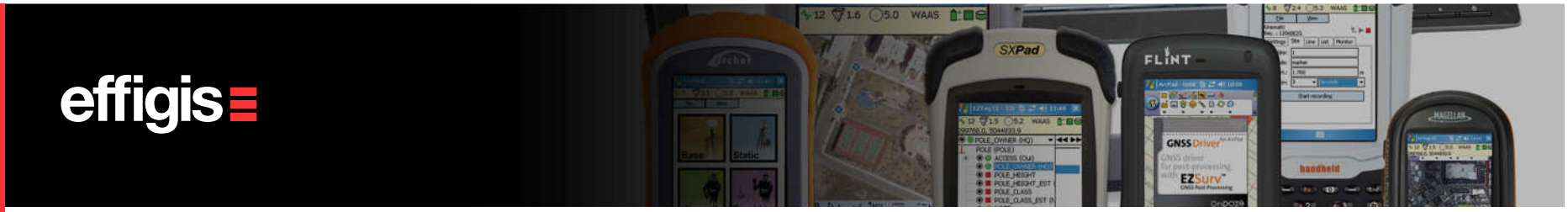
About the Kinematic Data

- Here we discuss how to process GNSS observations recorded directly on the receiver SD card (or on any other basic recording devices).
- Typically, this data are simply raw GNSS data files (Observations&Orbits), as opposed to data collected with survey software that provides different metadata information (in addition to Raw GNSS data files).

What is a Trajectory in EZSurv™

- A trajectory is ***the combination of a static (Base Station) and a kinematic (rover) data file that are recorded simultaneously.*** These observation data set allow differential post-processing.
- The well-known RTK mode is simply a trajectory computed in real-time in differential positioning mode. ***In that respect, the Post-Processor can be seen as an RTK offline application***

*In EZSurv™ a kinematic data file is known as a **«Rover»** file*

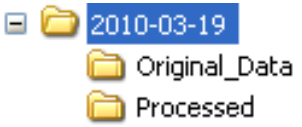


Trajectory Data

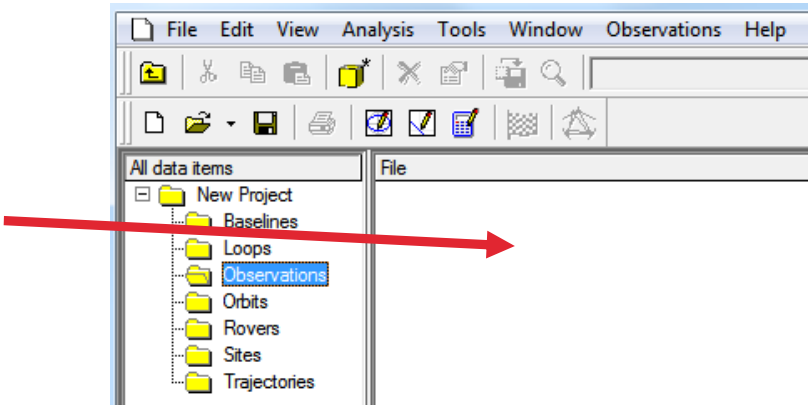
- **Static** (Base Station) file can be from a Base Station providers (public or private) or can come from data collected by the user on a known marker (private Base Station). This file can be in a binary or RINEX format.
- **Kinematic** (Rover) file is from a binary file recorded directly on your receiver SD card (or on any other device).
- Although you can create manually a trajectory, ***simultaneous datasets are automatically recognized by EZSurv™***. There is no need to specify matching files (static and kinematic).

Importing Observation Files

- It is suggested to manage data collection on a daily basis. Each daily folder should contain a subfolder for the original data files collected on the field and another one for the post-processing project files.



- Transfer your GNSS data files to your PC and if required your Base Station observation file.
- Select **Observations > Import…** or simply drag and drop your files into the observations folder of the Post-Processor.
- If needed set your kinematic antenna model



View/Project Manager

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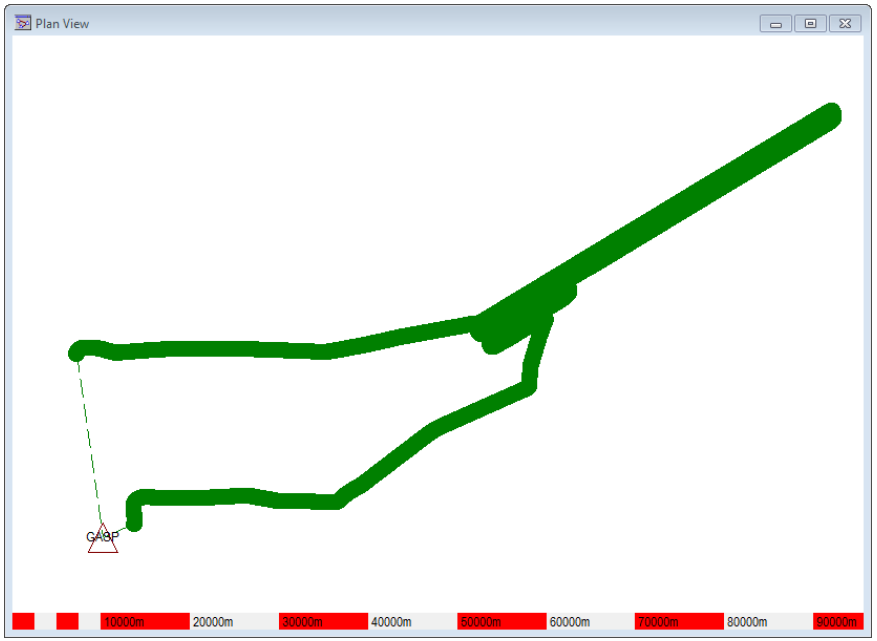
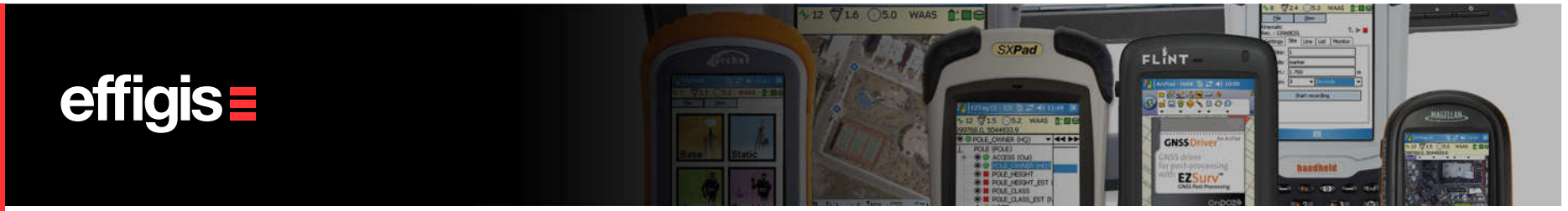
View your Data in a PlanView

All your data (static and kinematic) can be seen in a Plan View from the main menu View/Plan or Press [F4]

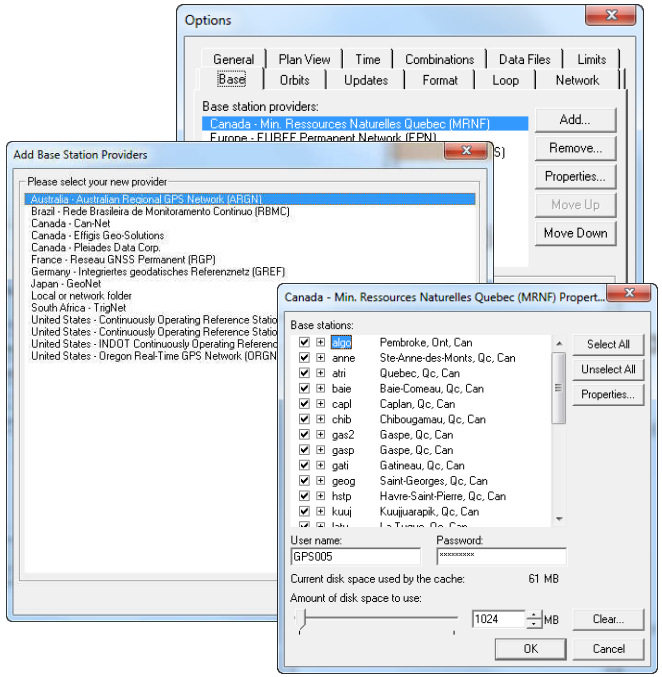




To be done only once

Configuring Base Station Providers

- Select **Options...** from the **Tools** menu.
- Select the **Base** tab. Click **Add...** to add a GNSS Base Station provider. Select a provider from the list and click **OK**.
- Type the user name and password if required *(commercial providers).*
- Click **Properties...** to retrieve the information about the selected base station provider *(You can have info for every single base station of the provider).*

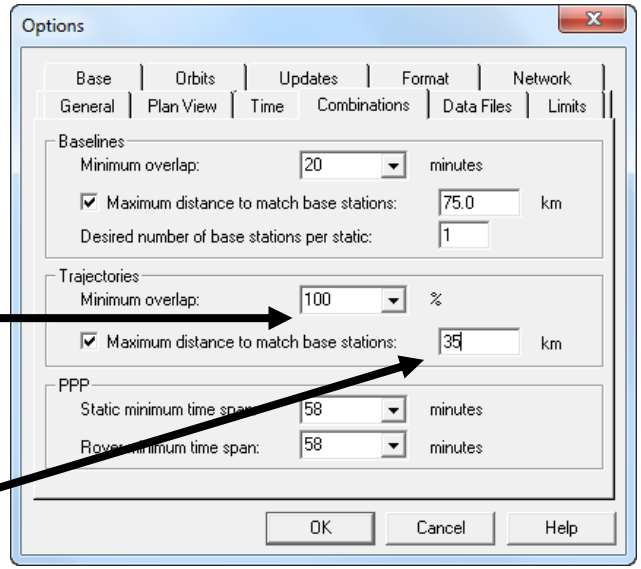


See «Base Station Setting» Training Module for more details

To be done only once

Configuring Trajectories Parameters

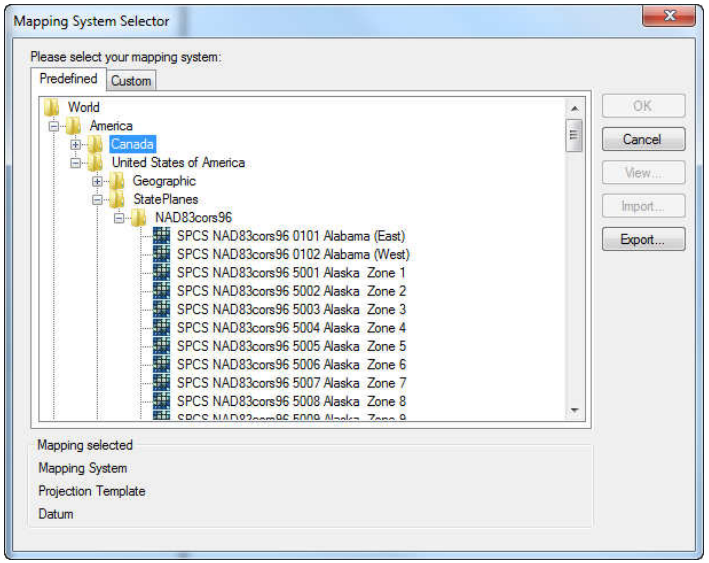
- EZSurv™ generates automatically all trajectories using field metadata («start and end time» of each observation file, as well as their status, Base and Rover)
- Select the **Combinations** tab from **Tools > Options**. In the **Trajectories** section, set the percentage of data coverage of your rover by the Base (typically we look for 100%)
- Also make sure that **Maximum distance** option is checked and input a proper distance tolerance (*maximum distance between rover and base*)



To be done only once

Set your Mapping System/datum

- Set your mapping coordinates using the **Mapping Systems** dialog, under **Tools > Mapping Systems > Selector** from the main menu.
- From this dialog, you can select an existing mapping system. You can create new ones using **Tools > Mapping Systems > Editor**, these new mapping systems will be available under the **Custom** Tab of the **Tools > Mapping Systems > Selector**

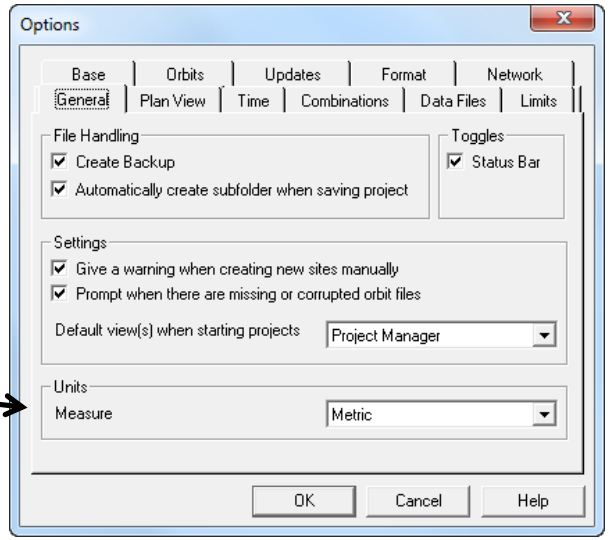


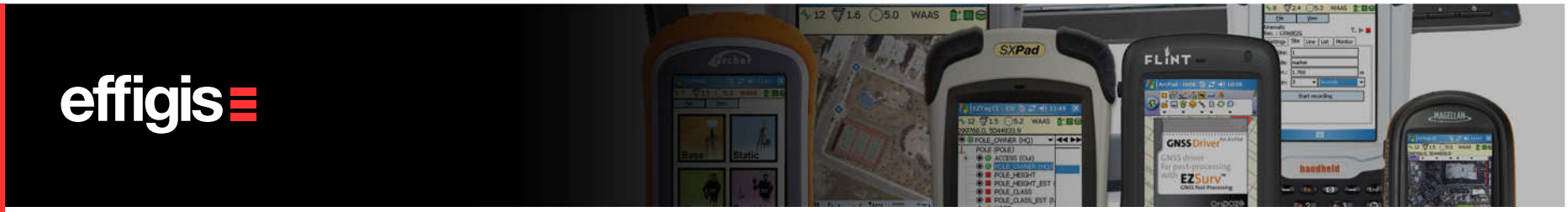
See the «Mapping Systems» training Module.

To be done only once

Configuring Unit of Measure

- Usually, this has to be done once if the user always uses the same reference system.
- Select the **General** tab from the **Tools > Options**. In the *Units* section, select your unit of measure (International Feet, Metric or US Survey Feet).



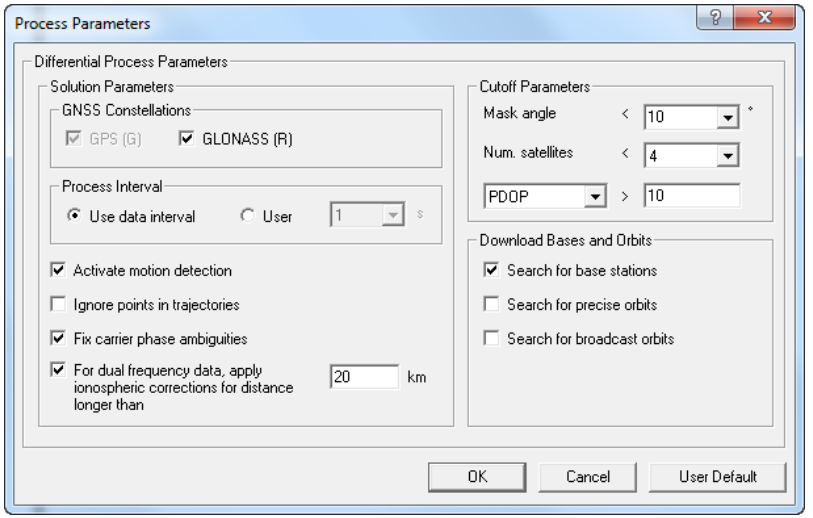


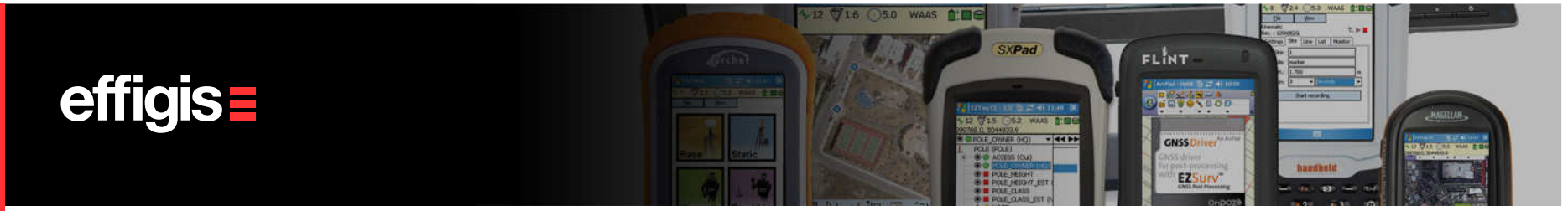
To be done only once

Configuring the Process Parameters

See the «Default Parameters» training Module to properly set your process parameters:

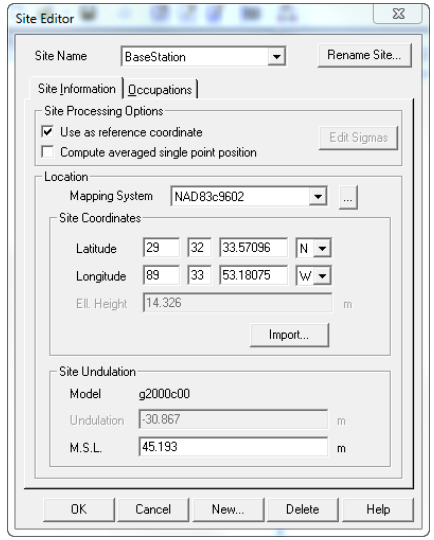
- Constellation (GPS or GPS&GLONASS)
- Process interval
- Ambiguity fixing mode
- Base Station search
- Precise orbits
- Etc.





Set Local Base Station *(if not using Base Station Providers)*

- If you operate your own GNSS base station in the field, simply drag and drop this observation file into the observation folder of the Post-Processor.
- Make sure that your Base station file is set as a “Base” (select the ”Base” status using the *right click* and select “base”).
- Go to the **Site Editor** using **Edit > Site**. Enter its coordinate (make sure you are using the proper datum).



See the «Base Station Settings» training Module

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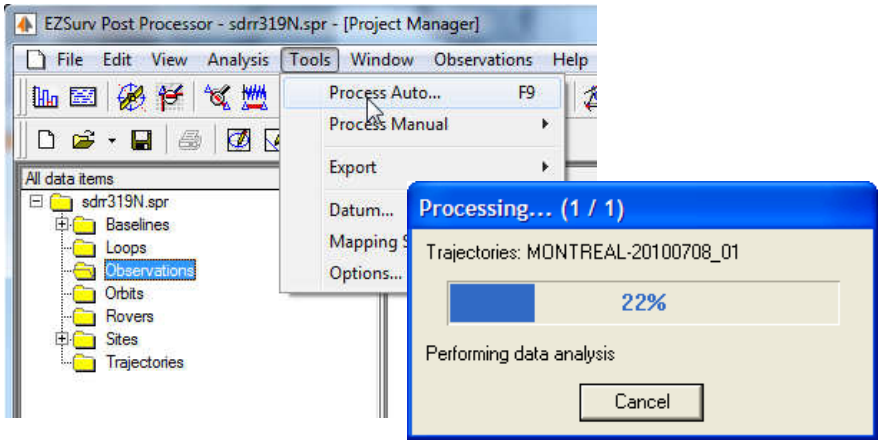
Processing Kinematic Files

Select **Process Auto...** from the **Tools** menu to start the GNSS post-processing (or press **F9** on the keyboard). The following steps are performed automatically:

> scan for base stations.
> merge base data (if required).
> define trajectories/baselines.
> post-process the data.



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Processing Kinematic Files

The **Process Summary** is displayed once the GNSS post-processing is completed.

Last Process Summary

Last Processed

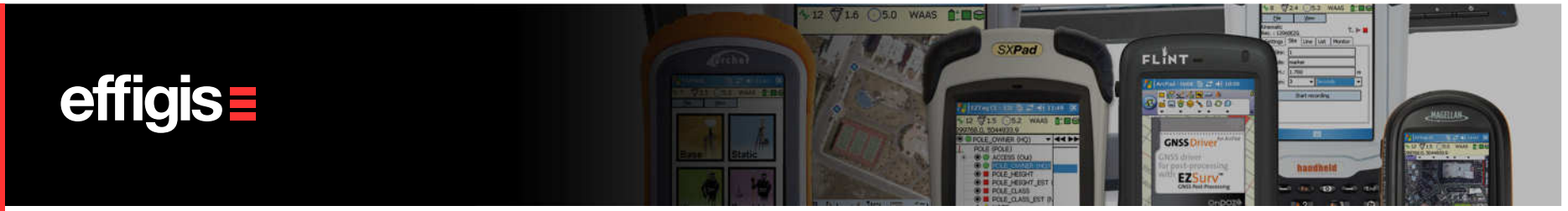
```
LAST PROCESS SUMMARY
EZSurv 2.91

-------------------------------------------------------------------------------------------------------
|  Project              |  c:\test\demoservicehydrographique\datalucshc\processor\20120216.SPR  |
|  Processing Date      |  2012/02/16 16:43:04.39 (UTC)                                         |
|  Mapping System       |  UTM NAD83csrs Automatic                                              |
|  Projection Template  |  Universal Transverse Mercator, Automatic (UTM-A)                     |
|  Datum                |  NAD83 - Canadian Spatial Reference System                            |
|  Geoid Model          |  <None>                                                               |
-------------------------------------------------------------------------------------------------------

TRAJECTORIES

-----------------------------------------
|  Base Station      |  GASP            |
|  X                 |    390890.489 m  |
|  Y                 |   5409539.481 m  |
|  Ellipsoid Height  |       27.990 m   |
|  Undulation        |        0.000 m   |
|  Mean Sea Level    |       27.990 m   |
|  Scale Factor      |  0.9997463       |
|  Central Meridian  |  W 63°           |
-----------------------------------------

-------------------------------------------------------------------------------------------------------
|                    |  ____Number of epochs____  |  ____________Number of sites____________  |
|  Rover      Distance  |  Total  Solved  % Solved  |  Total  Fixed  Float  PSR  Failed  Unproc  |
|                 (km)  |                           |                                           |
|-------------------+---------------------------+-------------------------------------------|
|  ROVER2130     48.7  |  34002   34002    100.00  |      0      0      0    0       0        0  |
-------------------------------------------------------------------------------------------------------
```



Kinematic Results - Export

- Trajectory results (position of each epoch) can be exported in few predefined ASCII format:
  - ASCII brief geographic
  - ASCII brief Mapping
  - ASCII detailed geographic
  - ASCII detailed mapping
- It could also be exported in a custom CSV format
- The export is access through **Tools > Export > Trajectories…**

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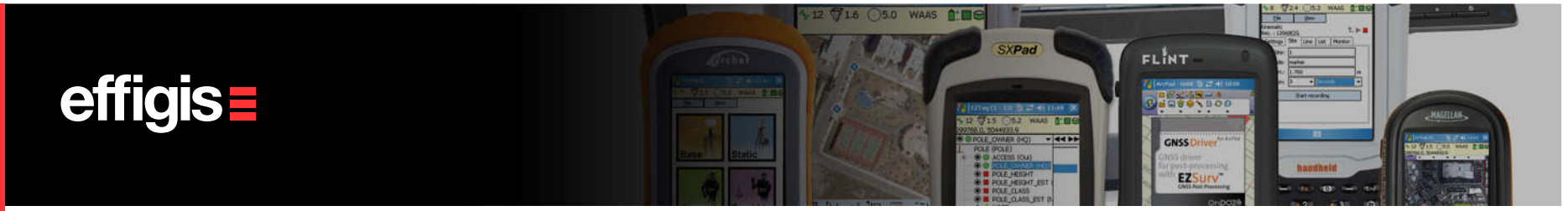
Kinematic Results – Export (ASCII Detailed mapping)

```
EZSurv(TM) v2.91                              TRAJECTORY EPOCH FILE(detailed)
TRAJECTORY:  GASP-ROVER2130

Project:          c:\...\datalucshc\processor\20120216.SPR
Processing Date:  2012/06/09 20:37 (UTC)
Orbits:           Broadcast                   Clock Model:      Broadcast
Mapping System:   UTM NAD83csrs Automatic
Datum:            NAD83 - Canadian Spatial Reference System
Geoid Model:      <None>

BASE STATION:  GASP                              [C:\...\DataLucSHC\BASE213.09O]
-------------------------------------------------------------------------------
Site Occupation:        001          Antenna Height:     0.064 [Slant:   0.064]
Measurement Interval:   5.0 seconds   Antenna Model:   LEIAT504* (m)

WGS84                        NAD83 - Canadian Spatial ReferUTM NAD83csrs Automatic (m)
Lat: N 48 49 45.313724       Lat: N 48 49 45.274290        X: 390890.489
Lon: W 64 29 12.072080       Lon: W 64 29 12.065755        Y: 5409539.481
Hgt: 26.966                  Hgt: 27.990
MSL: 26.966                  MSL: 27.990

ROVER INFORMATION  (ROVER2130)                [C:\...\DataLucSHC\ROVER2130.09O]
-------------------------------------------------------------------------------
Measurement Interval:     1.0 second
Antenna Height:    0.000  [Slant:   0.000]   Antenna Model: <None> (m)

TRAJECTORY RESULTS
-------------------------------------------------------------------------------
Processing Interval: 1.0 second
Time Interval: 2009/08/01 09:17:11 to 2009/08/01 18:43:52 (UTC)      [566 min.]
Observations:  284422                        Observations Used: 283774     [ 99.77% ]

2009/08/01,09:17:11.000,10,4,398909.676,5428047.192,0.538,0.538,0.0304,0.0321,0.0617,1.7
2009/08/01,09:17:12.000,6,10,398908.508,5428048.206,0.530,0.530,0.0194,0.0204,0.0398,1.7
2009/08/01,09:17:13.000,6,10,398907.345,5428049.091,0.507,0.507,0.0166,0.0176,0.0342,1.7
```

Code	Short name	Long name	Category
1	PSR	Pseudoranges (raw)	Pseudorange
4	L1	L1 (fixed)	Fixed
6	L3	L3 (fixed iono-free)	Fixed
9	L1f	L1 (float)	Float
10	L3f	L3 (iono-free)	Float

Solution code

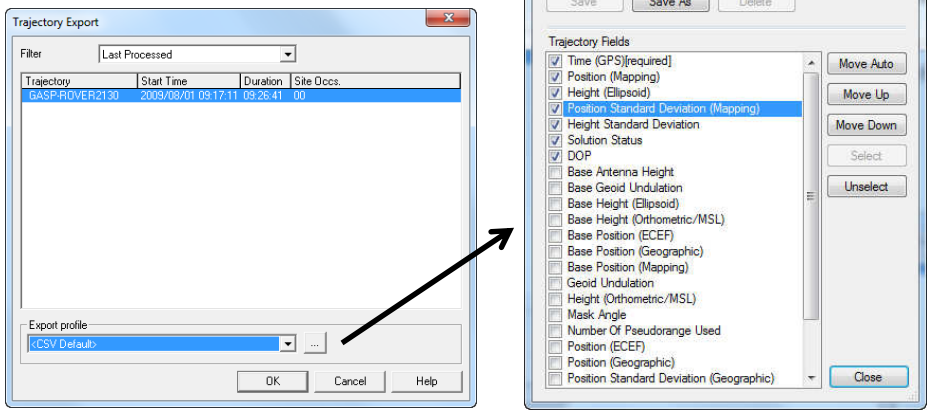


Kinematic Results – CSV Export

CSV export can be configured as you want. All parameters related to a trajectory can be exported. You can configure a CSV output and save it using a profile

Tools > Export > Trajectories…

- Click [...] on to access the Profile Editor
- Then select your parameters, order them using the «Move up» and «Move down»
- Save it under a specific name



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Kinematic Results – CSV Export

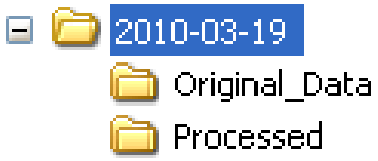
DenisP3_01.csv

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	GPSWeek	GPSSecond	X	Y	EllHgt	StdDevX	StdDevY	StdDevHgt	Solution	NDOP	EDOP	VDOP	TDOP	HDOP	PDOP	GDOP
2	1542	551846	398909,676	5428047,192	0,538	0,030	0,032	0,062	L3 (iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
3	1542	551847	398908,508	5428048,206	0,530	0,019	0,020	0,040	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
4	1542	551848	398907,345	5428049,091	0,507	0,017	0,018	0,034	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
5	1542	551849	398906,250	5428049,936	0,499	0,017	0,018	0,035	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
6	1542	551850	398905,247	5428050,777	0,504	0,016	0,017	0,034	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
7	1542	551851	398904,346	5428051,627	0,517	0,017	0,018	0,035	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
8	1542	551852	398903,491	5428052,435	0,516	0,019	0,020	0,040	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
9	1542	551853	398902,644	5428053,178	0,509	0,020	0,021	0,041	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
10	1542	551854	398901,811	5428053,865	0,502	0,019	0,020	0,038	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
11	1542	551855	398901,054	5428054,506	0,502	0,016	0,017	0,033	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
12	1542	551856	398900,393	5428055,128	0,504	0,017	0,018	0,036	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
13	1542	551857	398899,842	5428055,715	0,511	0,015	0,016	0,031	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
14	1542	551858	398899,364	5428056,254	0,500	0,016	0,017	0,034	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
15	1542	551859	398898,899	5428056,749	0,504	0,016	0,017	0,033	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
16	1542	551860	398898,420	5428057,180	0,500	0,015	0,016	0,031	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
17	1542	551861	398897,988	5428057,599	0,506	0,015	0,016	0,031	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
18	1542	551862	398897,581	5428058,051	0,505	0,013	0,014	0,027	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
19	1542	551863	398897,205	5428058,544	0,514	0,013	0,014	0,027	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
20	1542	551864	398896,874	5428059,028	0,507	0,014	0,015	0,030	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
21	1542	551865	398896,529	5428059,549	0,486	0,013	0,013	0,026	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
22	1542	551866	398896,105	5428060,137	0,515	0,015	0,015	0,030	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
23	1542	551867	398895,660	5428060,787	0,515	0,015	0,016	0,031	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
24	1542	551868	398895,194	5428061,507	0,501	0,016	0,017	0,033	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71
25	1542	551869	398894,670	5428062,306	0,503	0,016	0,017	0,032	L3 (fixed iono-free)	0,60	0,57	1,29	0,76	0,83	1,53	1,71

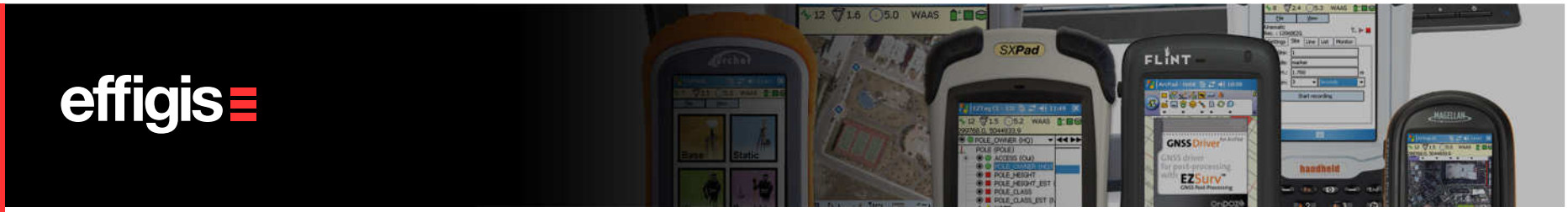
DenisP3_01

Kinematic – Saving your Project

- As previously mentioned, before saving your Post-Processor project, it is suggested to manage the survey files on a daily basis. Each daily folder should contain a subfolder for the GNSS observations and a subfolder to hold the post-processed project files. A Post-Processor project generates many files.



- Save your Post-Processor project (a location is proposed).
- The SPR file can be reopened any time to add more data, unless you move, delete some files of the project or you edit the folder path.
- To move your project to another folder or computer, create an archive. Select **File > Archive Project…**
- Select **File > Open Archived Project…** to reopen an archived project.



Kinematic Processing in Short

Few easy steps to get the job done

- Import your kinematic data
- Set your Base Station Provider parameters (or import your local base station data)
- Launch the automatic processing (F9)
- Export your corrected Positions

Few settings to be done once

- The kinematic antenna model
- Mapping system
- Unit of measure
- Process parameters
- «Base – Rover» combination parameters