#SeminaireAgrotic

Mardi 23 avril 2019

La géolocalisation en agriculture

Que vont changer Galileo et les évolutions d'Egnos?

CHAIRE AgroTIC

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Opérateur de nouveaux services d'augmentations GNSS par Positionnement Ponctuel Précis (PPP)

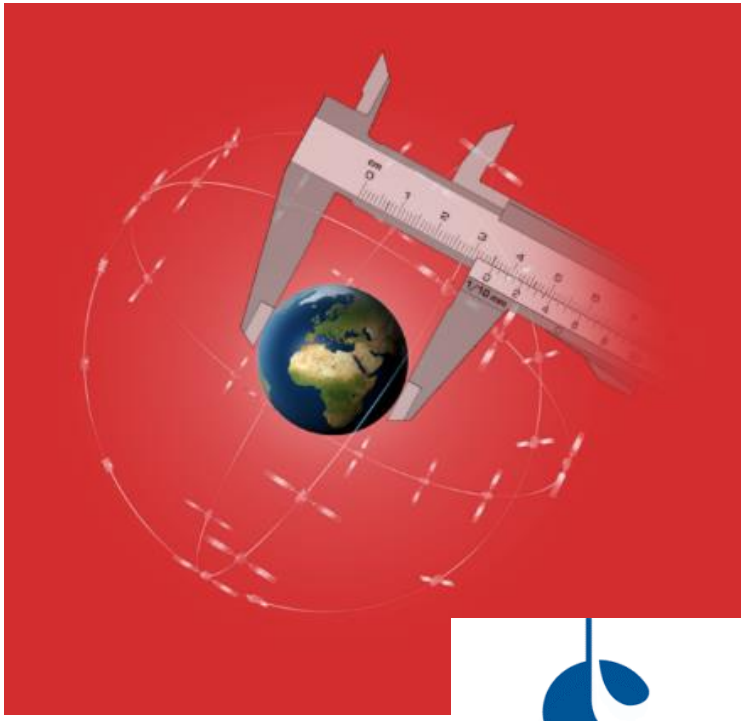
GEOFLEX provides disruptive GNSS solutions

GEOFLEX is operator of new GNSS augmentation services to augment GNSS accuracy, integrity and continuity

GEOFLEX sold:

- **Corrections data stream in an open format under subscriptions**
- **Optionally accompanied by HDK, SDK & Reference implementations**

To provide simple, affordable, and state of the art solutions adapted to applicative integrators to reach an accuracy up to 4 cm (2D-95%), in real time, everywhere in the world



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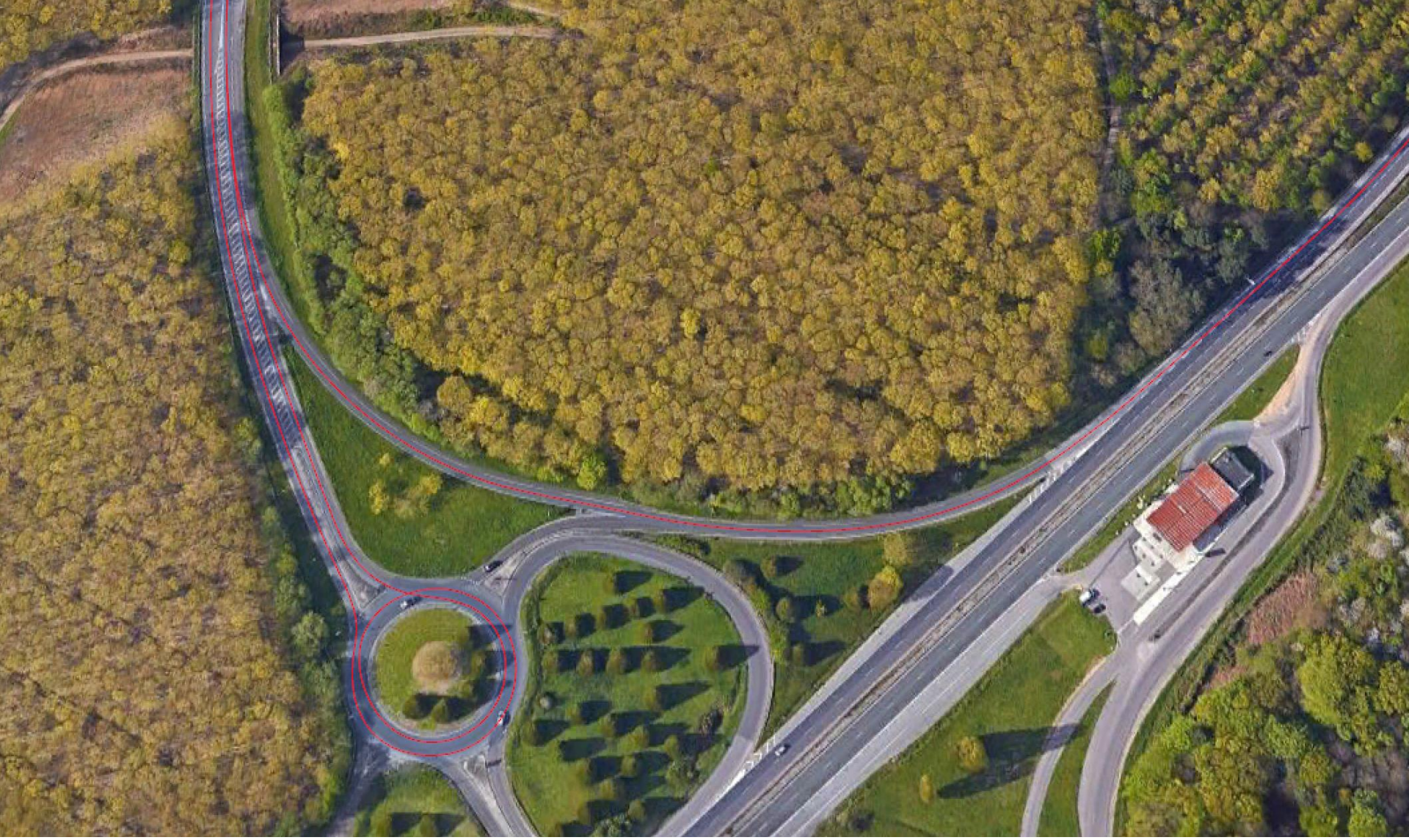


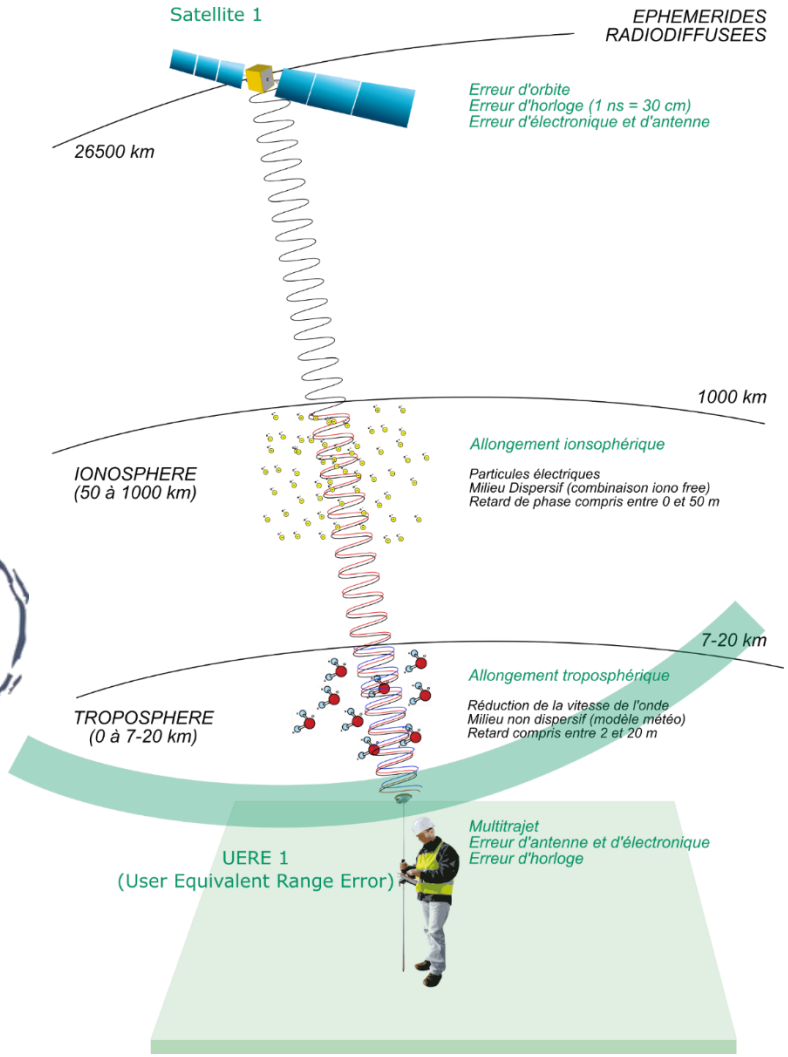
geo flex

How does it works ?

Errors affecting GNSS measurements

General principles of GNSS

- **User Equivalent Range Error:**
  - Satellites errors
    - Orbits errors
    - Clocks errors
    - Antenna phase center and electronic biases
  - Atmospheric errors
    - Ionospheric refraction
    - Tropospheric refraction
  - Multipaths
  - Receiver errors
    - Clocks errors
    - Antenna phase center and electronic biases



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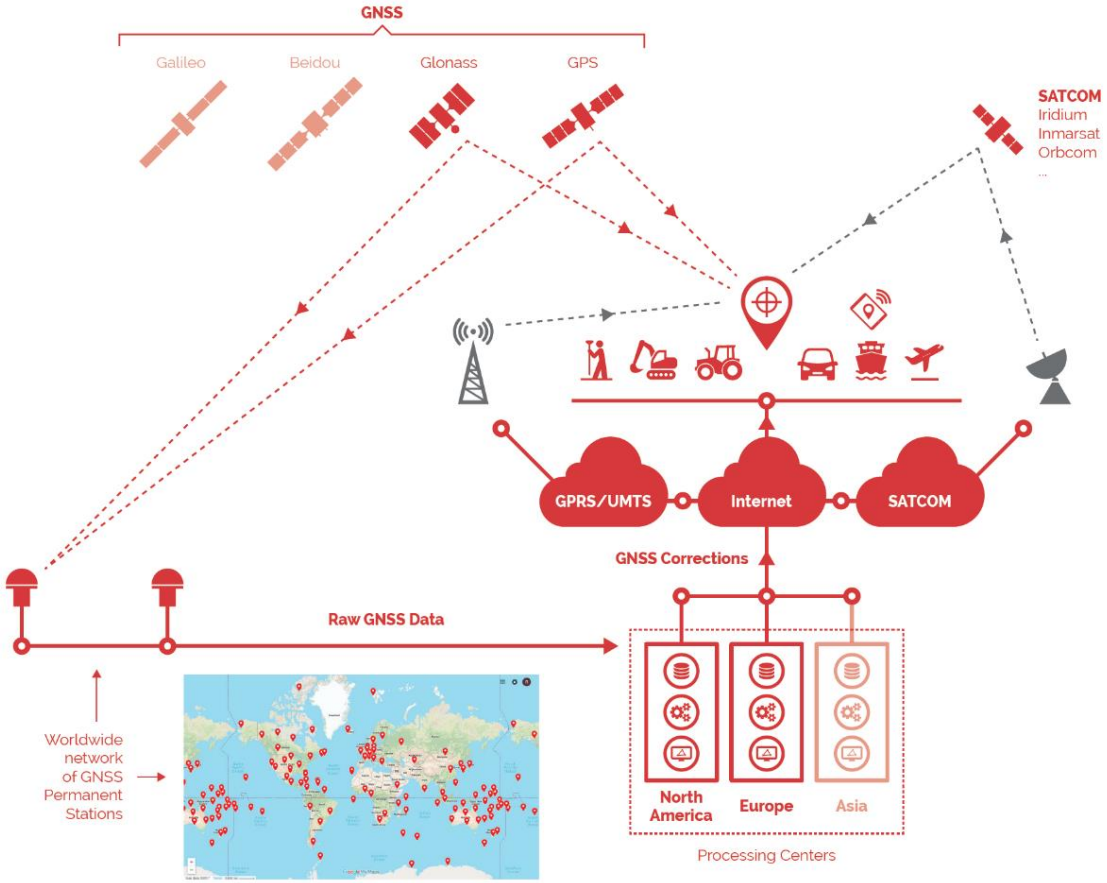
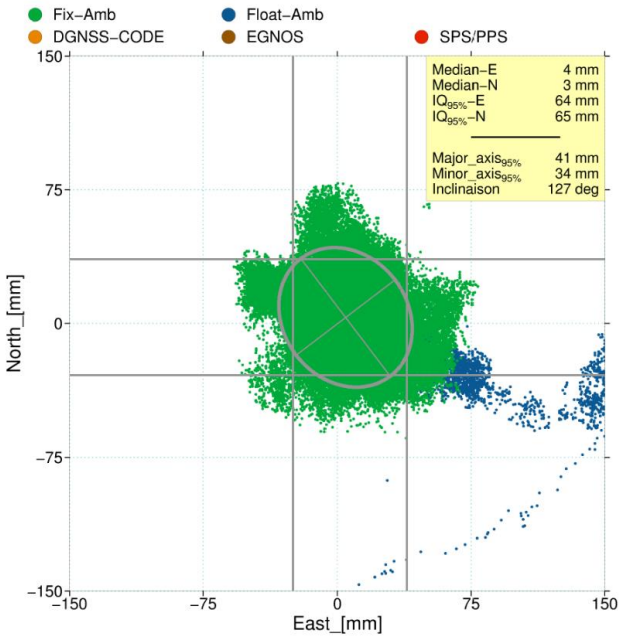
GEOFLEX provides disruptive GNSS solutions

<u>Precise Point Positioning (PPP):</u> Model / estimate each error affecting GNSS measurements to reach an accuracy of up to 4 cm





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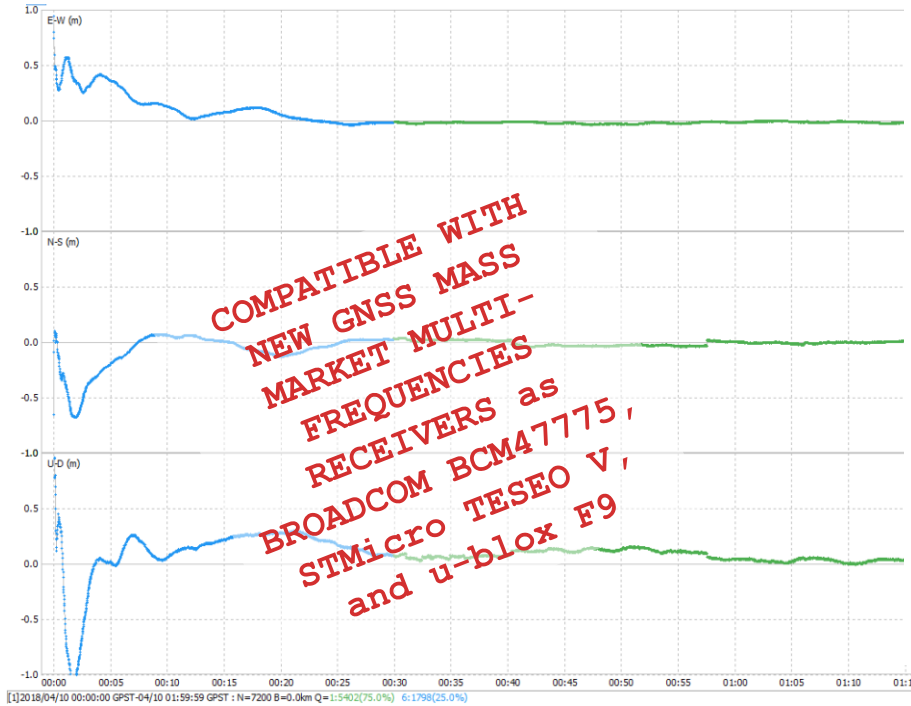
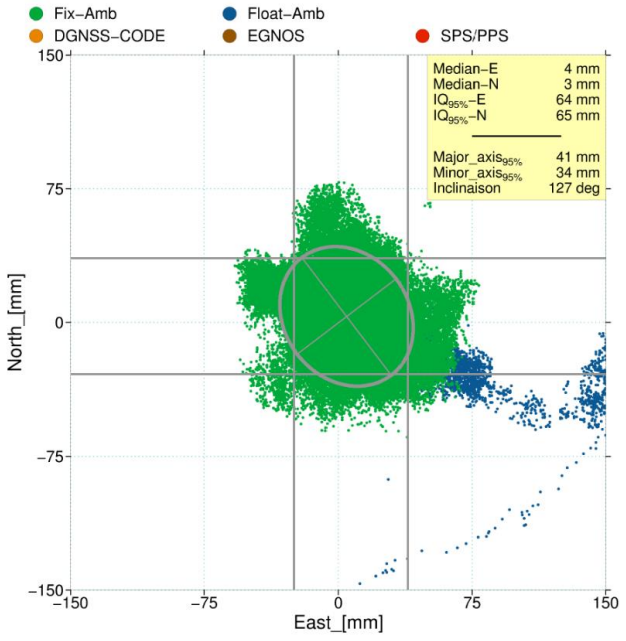
Our Technology

Precise Point Positioning (PPP): Model / estimate each error affecting GNSS measurements to reach an accuracy of up to 4 cm

- 30 minutes of convergence to reach an accuracy of 4 cm (2D-95%) = More than 68% of surveying points matching a 2 euros coin year after year (absolute precision) = PPP-IAR





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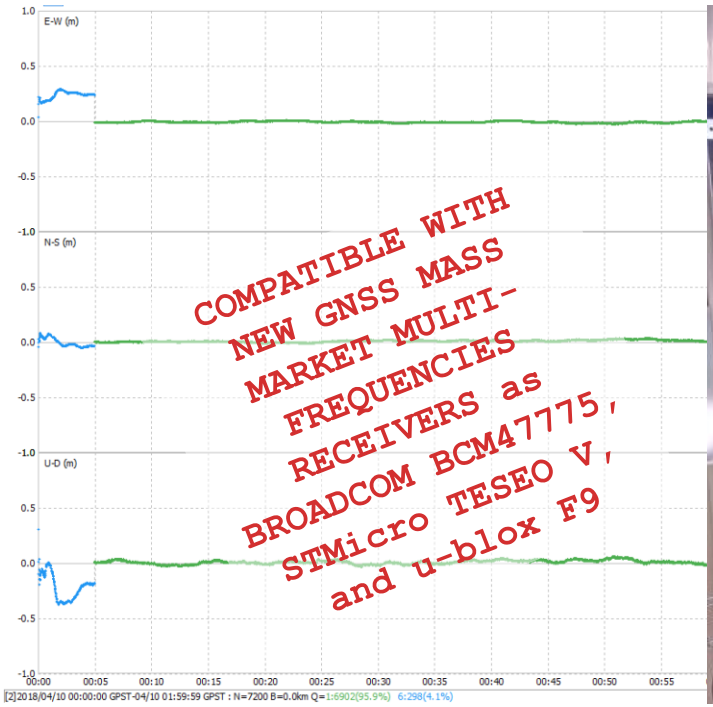
Our Technology

Precise Point Positioning (PPP): Model / estimate each error affecting GNSS measurements to reach an accuracy of up to 4 cm

- 1 - 5 minutes of convergence using atmospheric refractions from a local “atmospheric base station” serving an area of interest with a radius up to 100 km ! = Local PPP-RTK (50 CORS for France)



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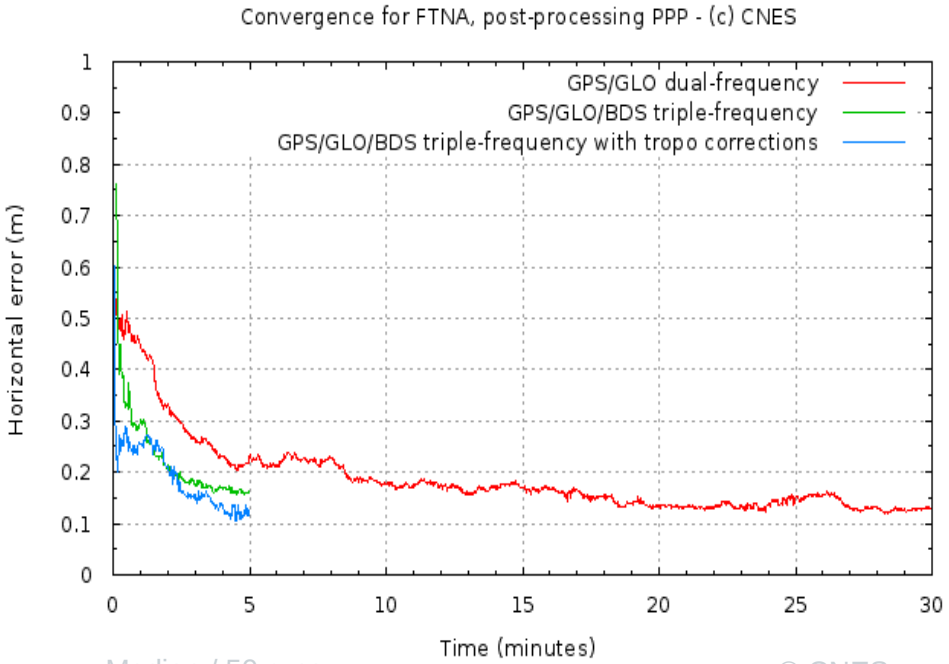
Our Technology

Precise Point Positioning (PPP): Model / estimate each error affecting GNSS measurements to reach an accuracy of up to 4 cm

- **Instantaneous precision of 20 cm** and 10 cm after 5 minutes with tri-frequencies observations and an innovative worldwide model of tropospheric refractions = Global PPP-RTK



Median / 50 runs

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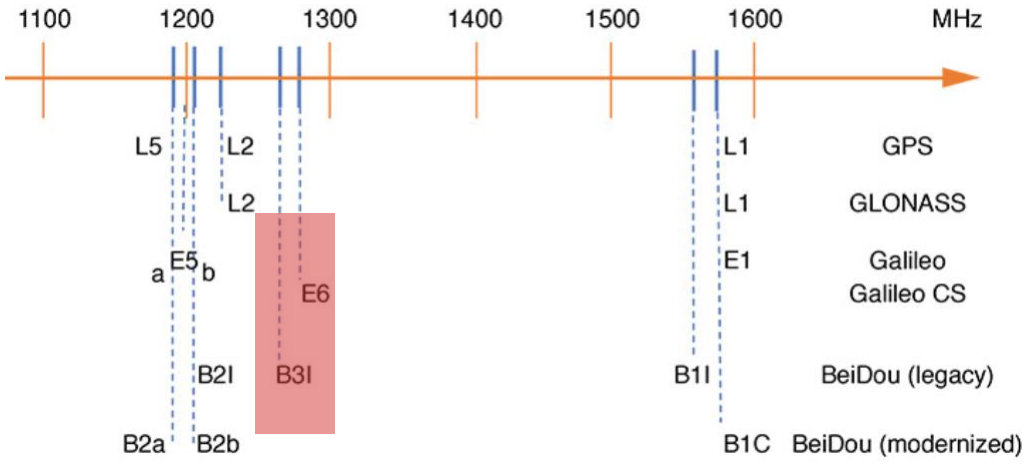
Our Technology

Precise Point Positioning (PPP): Model / estimate each error affecting GNSS measurements to reach an accuracy of up to 4 cm

- **Instantaneous precision of few centimeters** with quadri-frequencies observations E1/E5a/E5b/E5/E6 since March 2018 = Ultra-fast Global PPP-RTK



Constellation	Number of operational satellites on December 2018	Number of frequencies
GPS	12 Block IIF	3
BEIDOU	18 MEO 3S	5
GALILEO	20 FOC and 2 IOV	5

UNDER DEVELOPMENT / EXPERIMENTAL RESULTS

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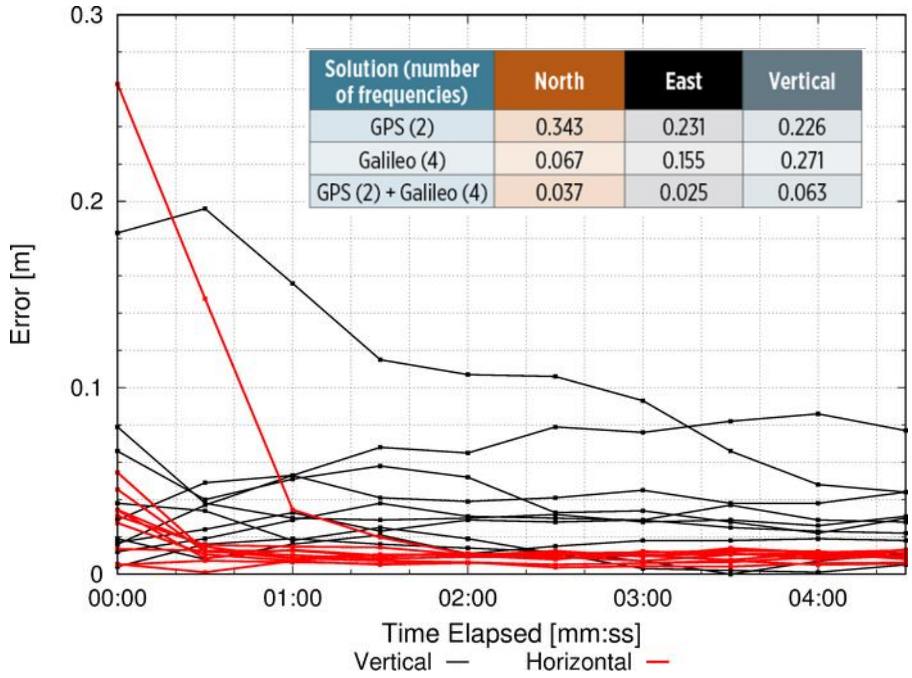

UNDER DEVELOPMENT / EXPERIMENTAL RESULTS

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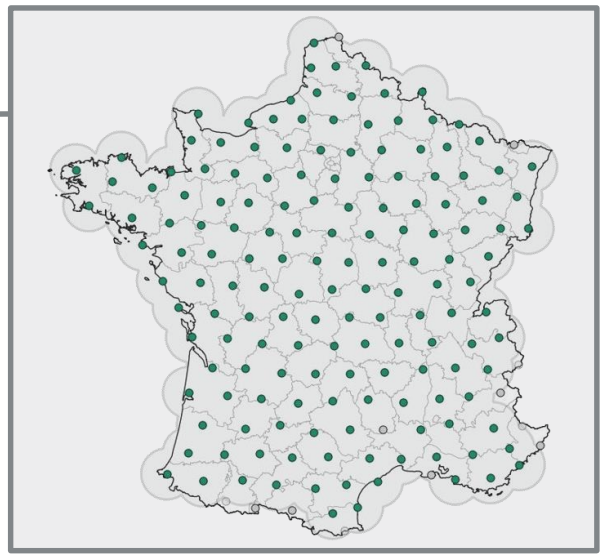
Radically different of others solutions

Others solutions as RTK/NRTK exists but:

- They are not scalable to worldwide operations with at least 200 reference stations for a country as France



- They doesn't allow the tight hybridization between GNSS and others sensors to ensure continuity and integrity

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Radically different of others solutions

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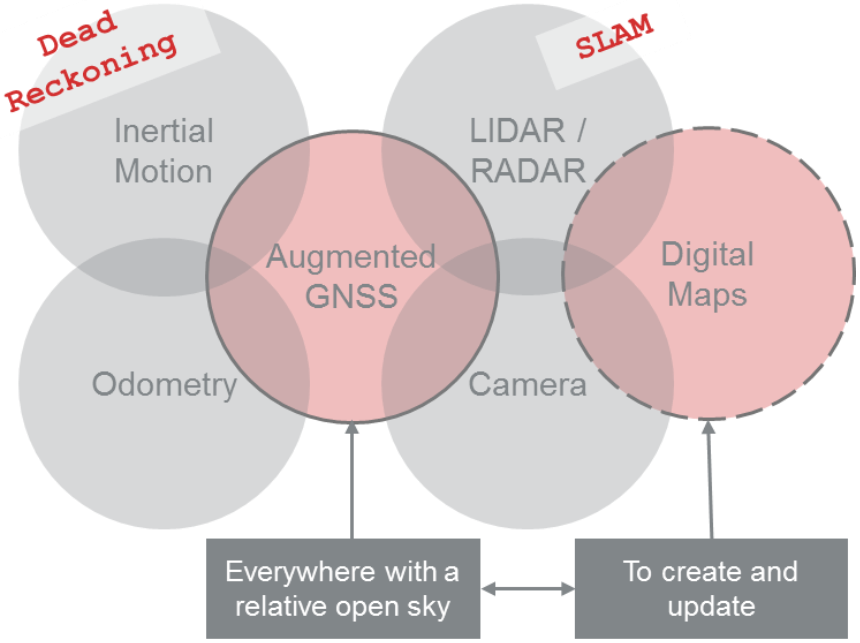
- They doesn't allow the tight hybridization between GNSS and others sensors to ensure continuity and integrity



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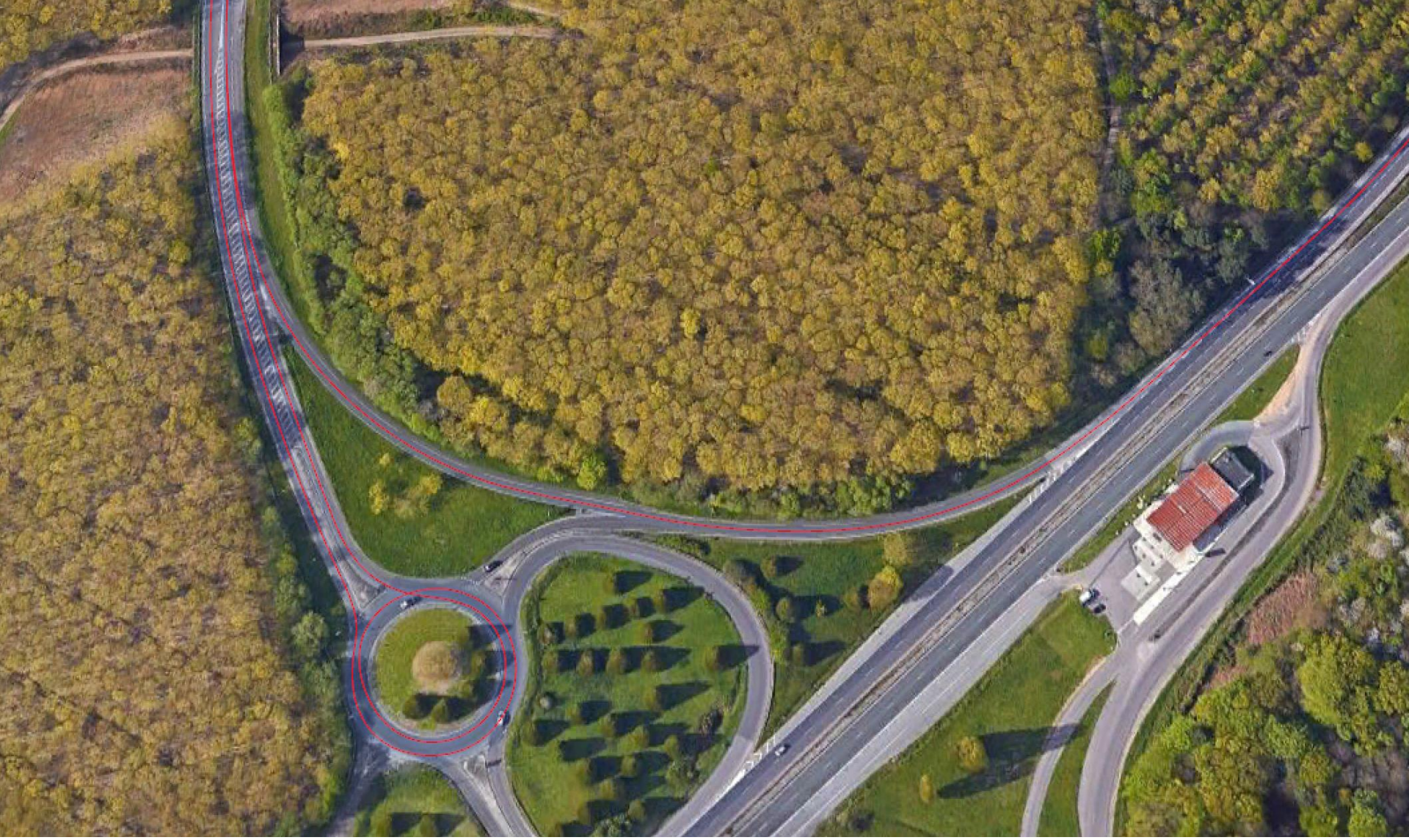

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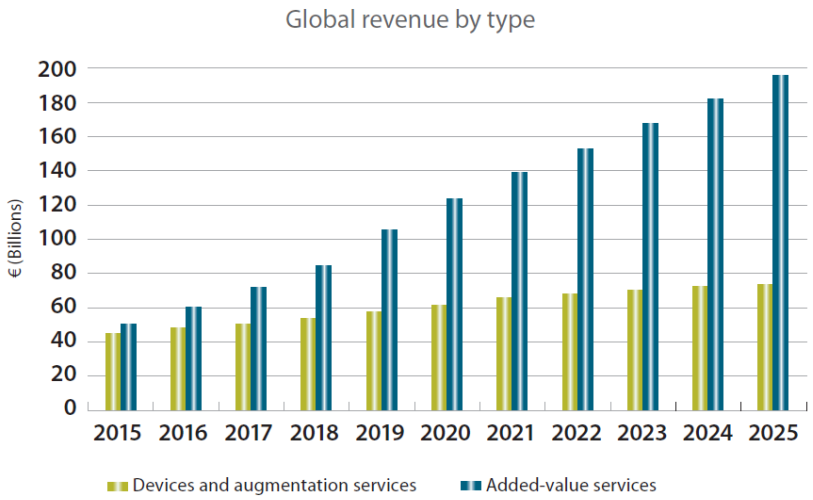
What are the downstream applicative chains ?

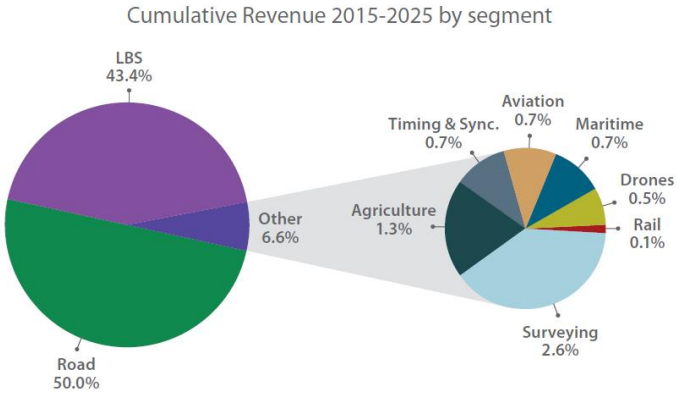
Diversified and very important markets

Core GNSS market of **more than 60 billions of Euros in 2020**

GNSS augmentation market of about **3 billions of Euros in 2020**

In 2030, GNSS will impact 30% of the European GDP (6% in 2015)





European Global Navigation Satellite Systems Agency

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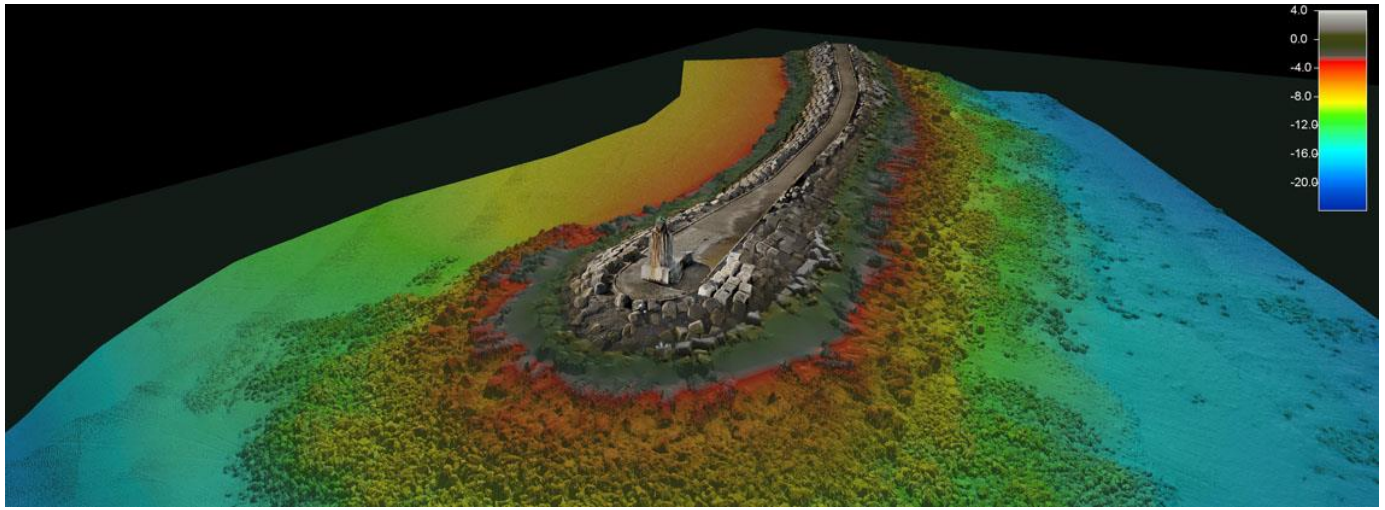
Diversified and very important markets

Data georeferencing to pass from Information System to 4D/4.5D GIS as support for **field activities automatization**



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Diversified and very important markets

Data georeferencing to pass from Information System to 4D/4.5D GIS as support for **field activities automatization**

SMART FARMING: Auto-steering

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Diversified and very important markets

Data georeferencing to pass from Information System to 4D/4.5D GIS as support for **field activities automatization**

SMART FARMING: GIS collection

GÉOFLEX 100% compatible with Android N (Google)

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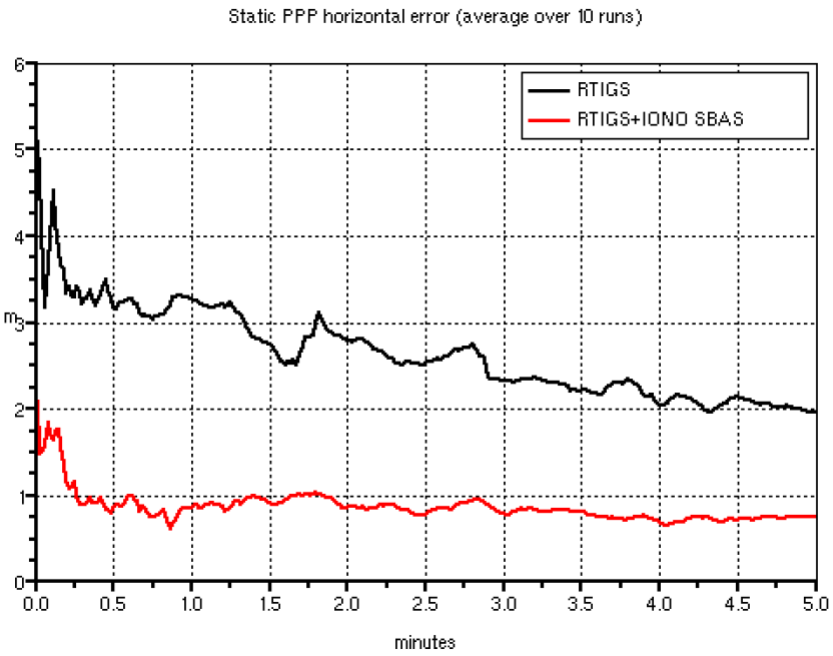
Diversified and very important markets

Data georeferencing to pass from Information System to 4D/4.5D GIS as support for **field activities automatization**

SMART FARMING: GIS collection



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Diversified and very important markets

Data georeferencing to pass from Information System to 4D/4.5D GIS as support for **field activities automatization**

SMART FARMING: GIS collection

Smartphone Applications for Precise Point Positioning

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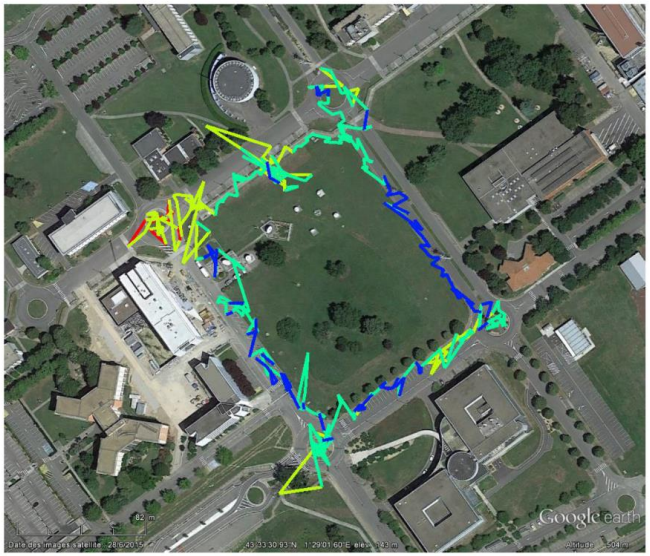
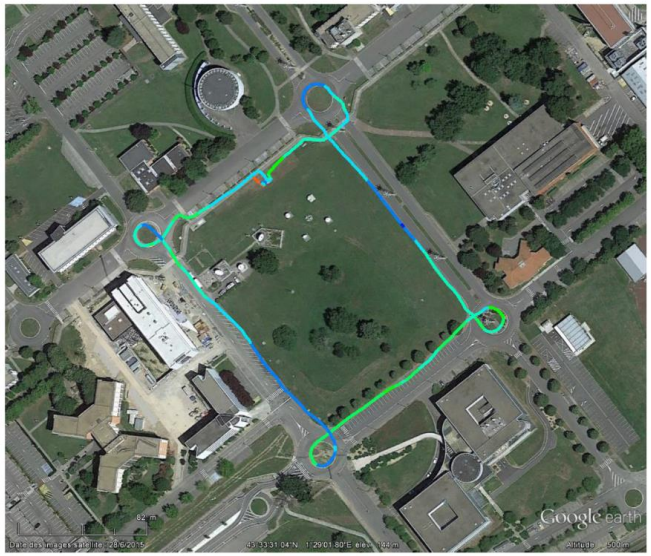
PPP Wizlite: results in dynamic mode (pedestrian)



Rtklib PVT (GPS+GLO)



PPP Wizlite (GPS + GLO)

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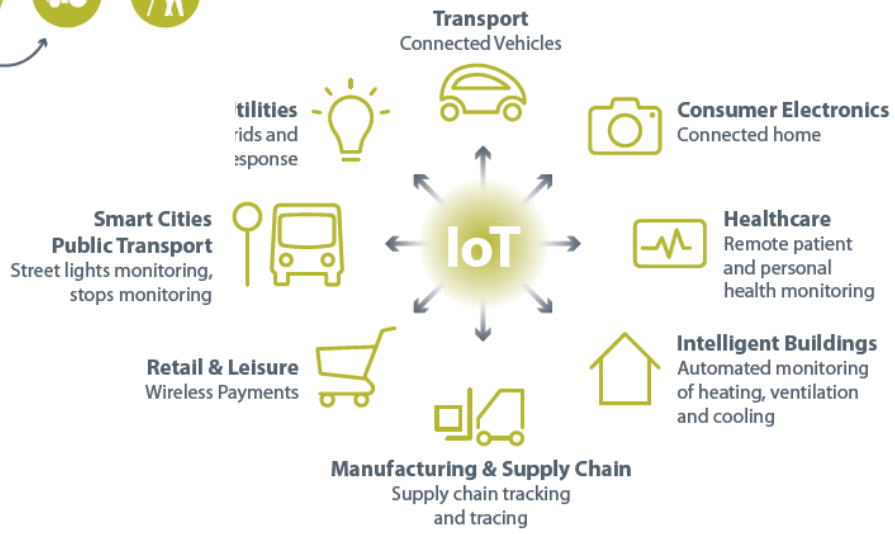
Diversified and very important markets

Data georeferencing to pass from Information System to 4D/4.5D GIS as support for **field activities automatization**

SMART FARMING: IoT / PoT



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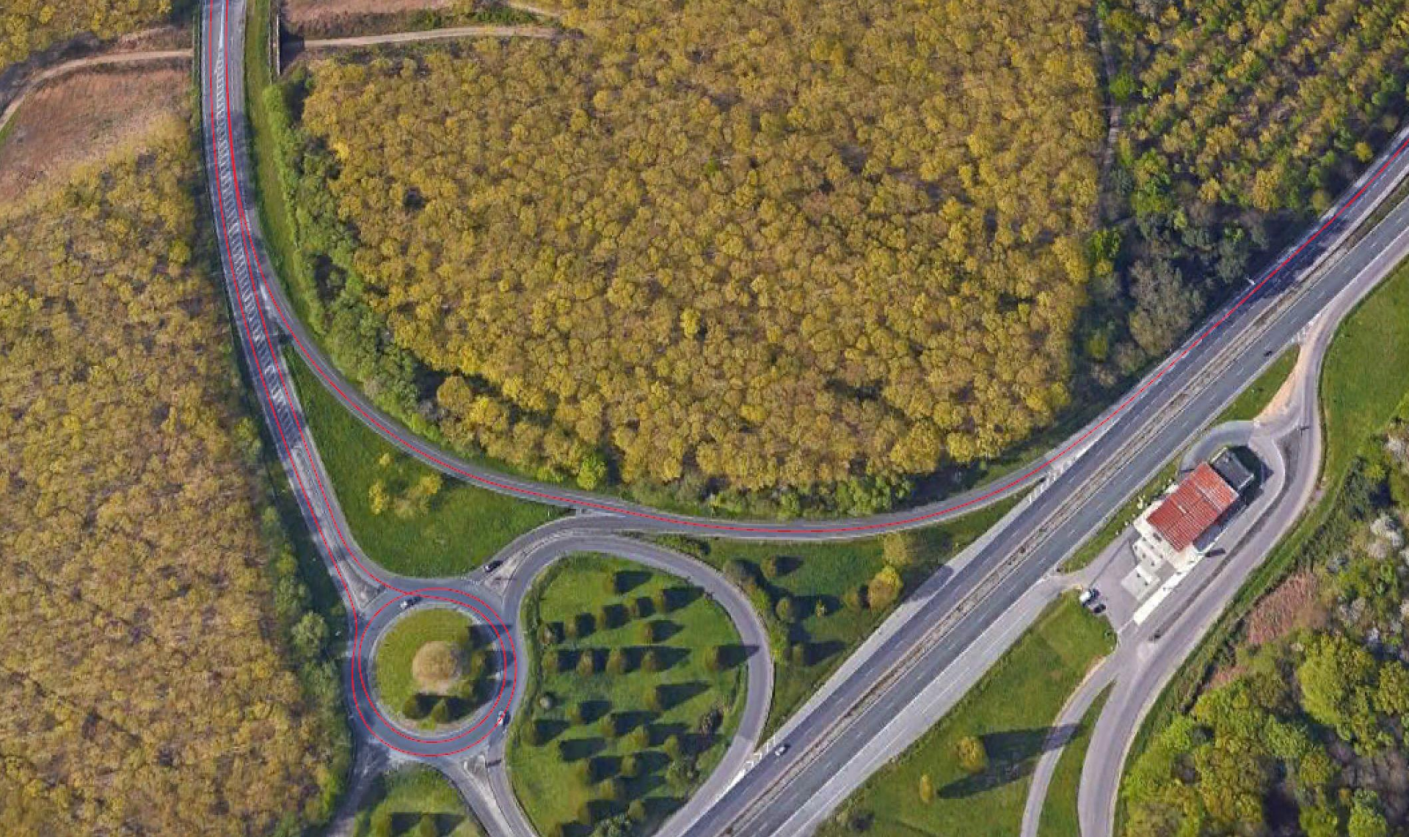
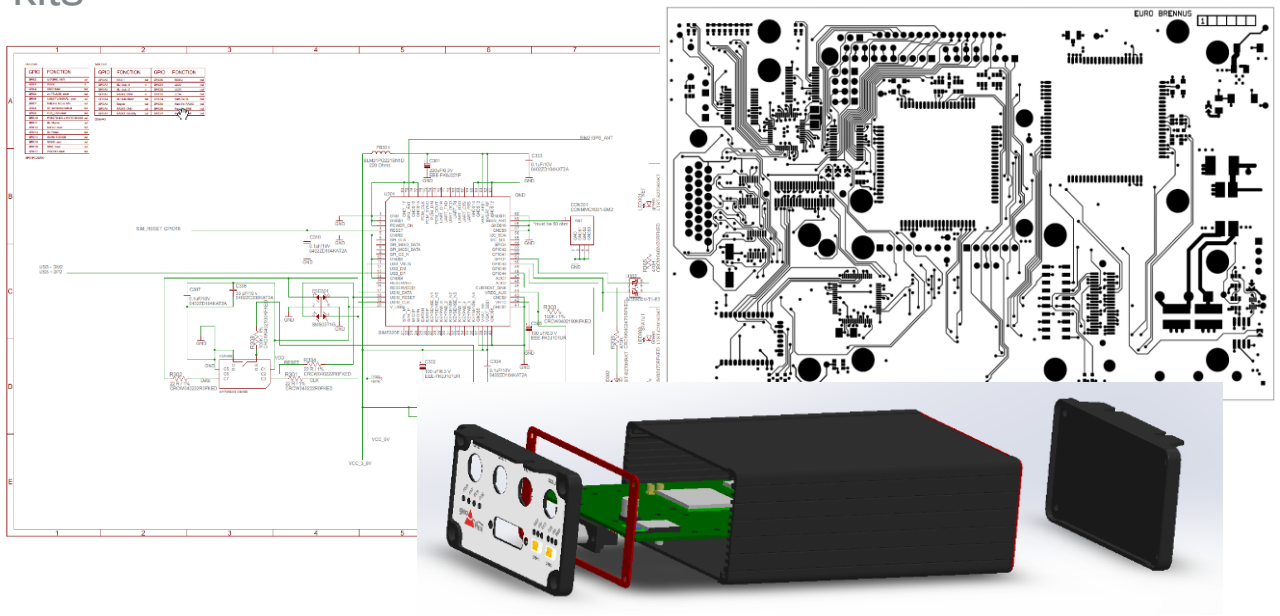


What is our strategy ?

Our Strategy / Singularity

Open model to mark our singularity:

- Sales of corrections through subscriptions in an interoperable format (RTCM3 SSR)
- HDK/SDK enabling manufacturers, integrators and resellers to quickly create applicative downstream chains with a very high added value
- GNSS BOX of augmentation services as reference implementations of those developments kits



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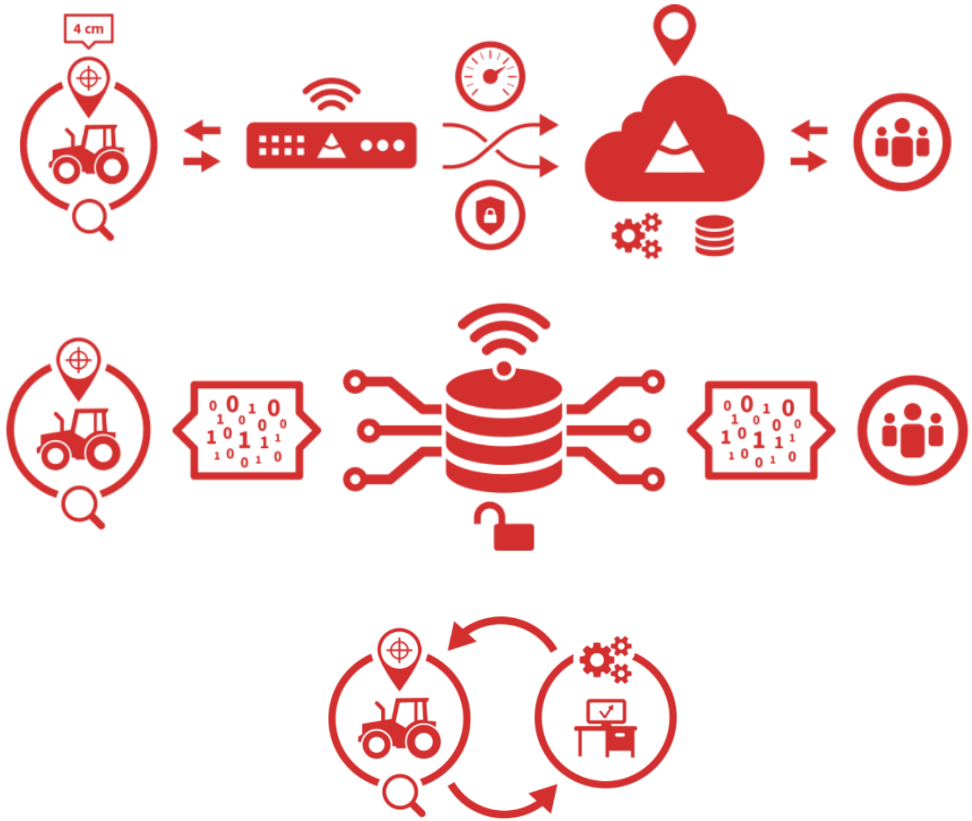
Our Strategy / Singularity

Global concept of GNSS box of augmentation services:

- We provide a global open ecosystem to use GNSS augmentation in order to digitize the field activities of enterprise



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Our Strategy / Singularity

Global concept of GNSS box of augmentation services:

- Configuration server
- Firmware server
- Logs servers
- Management of remote access

Device:

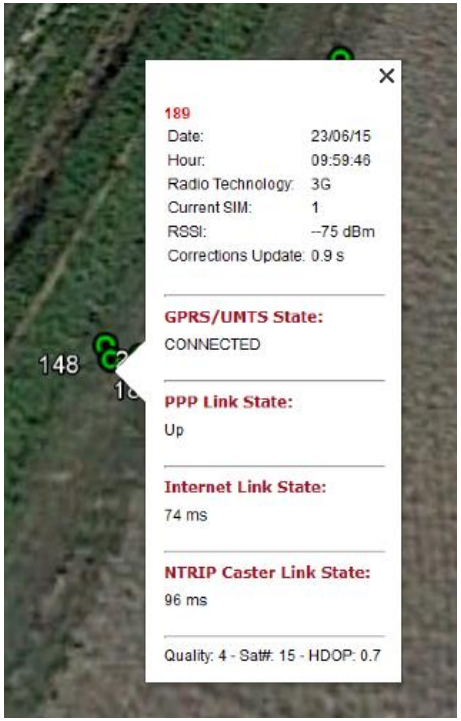
IMEI: 359998044121921

SIMs:

IMSI1	208011400524063
OPERATOR1	orange
APN1	orange.m2m.spec
IMSI2	208104289994424
OPERATOR2	sfr
APN2	m2minternet

Tracks statistics:

Date	23-06-2015
First epoch	08:29:42
Last epoch	10:02:19
Elapsed secondes	5557
Exported GNSS Points:	197
Interval Point (m)	50.000
Distance (km)	10540.4
Threshold:	45/30/15
Correction Quality:(under 45 s)	100.0 %
Correction Quality:(under 30 s)	99.5 %
Correction Quality:(under 15 s)	99.5 %
RTK Fix (4):	87.2 %
RTK Float (5):	1.0 %
NDGNSS Fix (2):	9.2 %
GNSS Fix (1):	2.6 %



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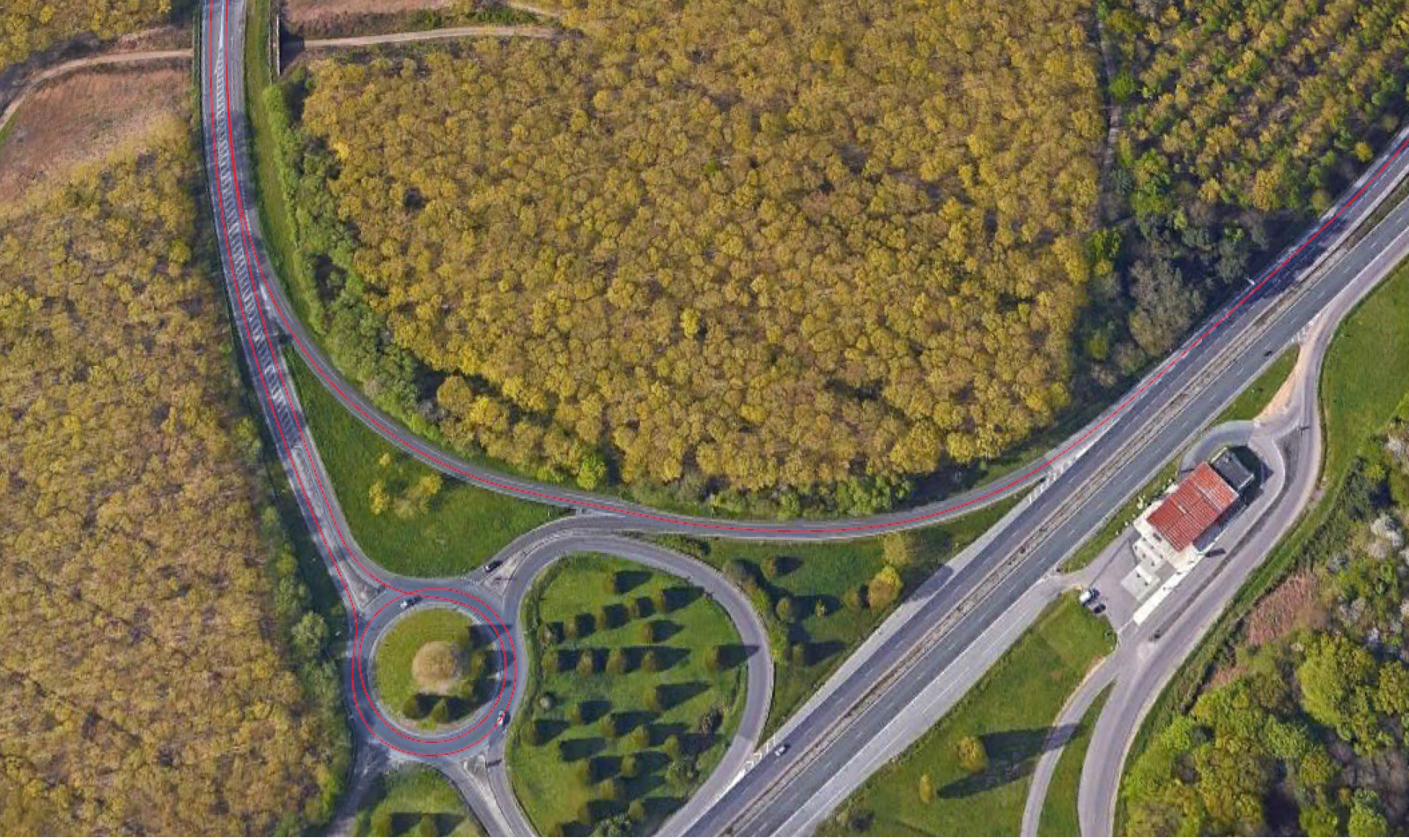

geo flex

What are our solutions ?

Our Solutions

Precise Point Positioning (PPP): Model / estimate each error affecting GNSS measurements

Field validation by ARVALIS INSTITUT DU VÉGÉTAL:

PPP-RTK:

- Absolute accuracy of 3.4 cm with a convergence time of 15 minutes

PPP-IAR:

- Absolute accuracy of 3.8 cm with a convergence time of 30 minutes

RT-PPP-L1 “Fast and Precise”:

- Absolute accuracy of 50/60 cm

ARVALIS Institut du végétal

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Our Solutions

The THD box for « True High Definition »:

- From L1 GPS/GLO/GAL to L1/L2/L5 GPS/GLO/GAL/BEI dual-antennas
- WAAS / EGNOS
- DGNSS / N-DGNSS
- RTK / N-RTK
- PPP / PPP-AR / PPP-RTK
- PPS
- MARKER EVENT

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Our Solutions

The THD box for « True High Definition »:

- **UHF Radio 430-450 MHz**
  - External and Internal
- **GPRS-UMTS**
  - Two internal modems
  - Multilink NTRIP Client
- **Satcom**
  - External INMARSAT–IRIDIUM etc.
  - Internal IRIDIUM to follow

9/36V

2 SERIAL, 1 USB, 1 BLUETOOTH

1 ETHERNET, 1 WIFI

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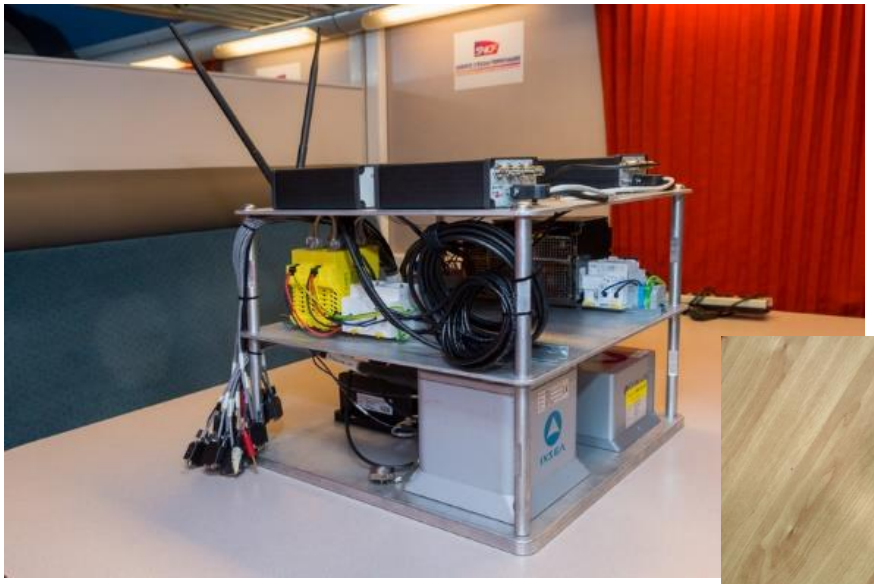
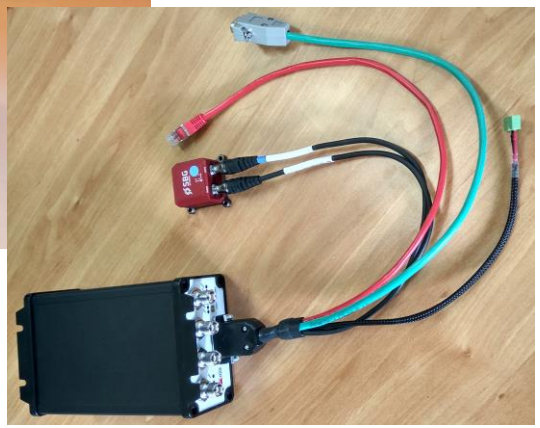
Our Solutions

The THD box for « True High Definition »:

- Perfect Integration of the quadri-frequency GPS/GLO/GAL/BEI with the Inertial Measurement Unit from iXblue (URSA3 / ATLANS / PHINS) and SBG (ELLIPSE, EKINOX, APOGEE)





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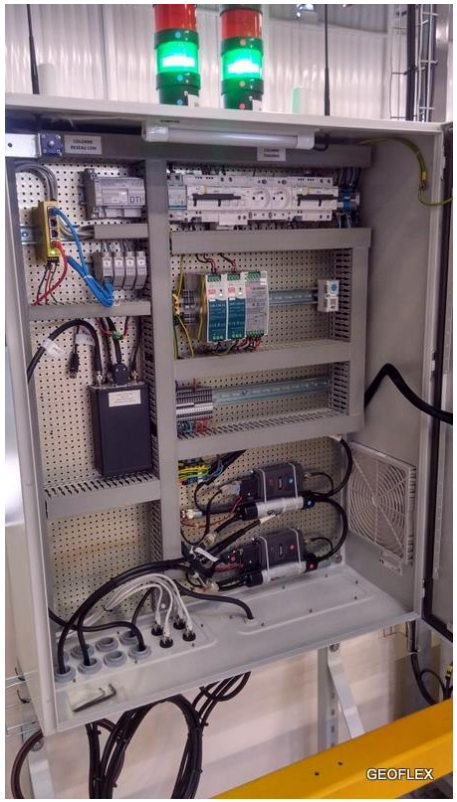
Our Solutions

The THD box packaged in a GNSS CORS (Continuously Operating Reference Station): Full secured installation to meet industrial requirements



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Our Solutions

The THD box packaged in an Auto-georeferenced RTK or Atmo Base Station:

- Automatic georeferencing of a Base station anywhere in the world, in a global or local geodetic system
- Sending RTK corrections or PPP iono/tropo by UHF and/or GPRS

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Up to 4 cm, everywhere in the world, every time, in real time or post-processing,

To serve applicative integrators with available and open GNSS augmentation,

To endows the others sensors of a global localization system with the power of our solutions,

To use GNSS in mass market applications

INVESTISSEMENTS D'AVENIR

DEMETER

CES INNOVATION AWARDS 2019 HONOREE

HONOREE

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