



# REPORT ON THE ALGERIAN GPS/GNSS PERMANENT NETWORK



Mohamed KHALDI <sup>1</sup>, Bruno GARAYT <sup>2</sup>, Saïd MAROUF <sup>1</sup>

<sup>1</sup>Laboratory of geodesy,  
National Institute of Cartography and Remote Sensing , Algiers, Algeria

<sup>2</sup> Geodesy Department, IGN, France



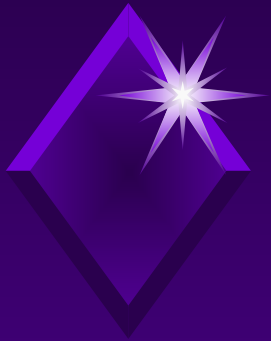
## Outline

1. Presentation of INCT
2. Main missions
3. Algerian GPS/GNSS Permanent Network
  - 3.1- Description
  - 3.2- Equipements
  - 3.3- Data acquisition
  - 3.4- GPS Data Processing
4. GNSS permanent network of CRAAG
5. GNSS Projects at INCT
  - 5.1- Contribution to AFREF
  - 5.2- Implementation of GNSS Data Processing Center
  - 5.3- Contribution to EUREF
6. Perspectives



## 1. Presentation of INCT

- ◆ The National Institute of Cartography and Remote Sensing (INCT) was created in 1967 and is operating as the main authority in charge of producing geographical information over the national territory and national mapping;
- ◆ Placed under the authority of the Algerian MoD, INCT is from 2009 an industrial and commercial public enterprise;
- ◆ The institute has a man power 670 persons with three regional representations (East, South, West of the country).



## 2. Main Missions

- ◆ Realize/maintain over the national territory of a geodetic, gravimetric and leveling networks
- ◆ Cover the territory with aerial photography (at different scales);
- ◆ Establish and up-date topographic maps at scale 1/50 000 and 1/200 000;
- ◆ Acquire and archive satellite images;
- ◆ Produce geographical databases;
- ◆ Develop research activities in order to support the production



# **Algerian GPS/GNSS Permanent Network (AGPN)**

## **3.1 Description**

The Algerian GPS/GNSS Permanent Network (AGPN) was initiated in 2006 by the INCT in the framework of the AFREF project (African Reference Frame).

Four stations out of nine initially planned are already operational:

- Algiers (in October 5, 2006),
- Oran (in November 28, 2006),
- Constantine (in January 14, 2007),
- Ouargla (in May 12, 2012).



## Algerian GPS/GNSS Permanent Network (AGPN)

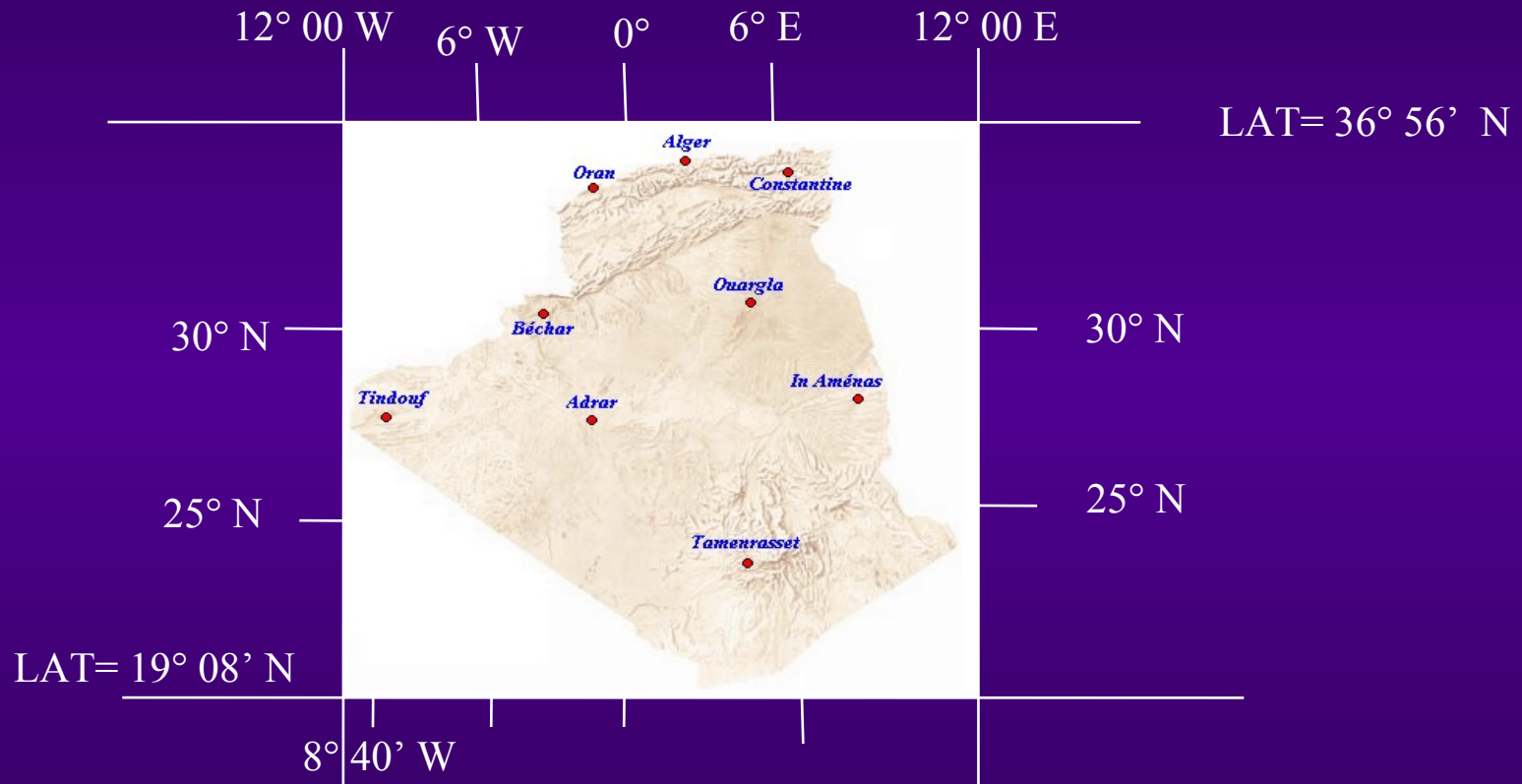
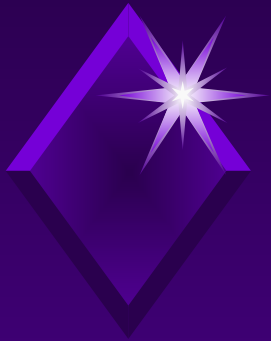


Figure 1. Algerian GPS/GNSS Permanent Network (AGPN) project.



## 3.2 Algerian GPS/GNSS Permanent Network (AGPN)

### Station GNSS equipments

- ◆ GNSS Receivers/Antennas :

- ◆ Ashtech UZ-12 / ASH701945E\_M SNOW (3),
- ◆ Leica GRX1200+GNSS / Choke Ring GNSS antenna AR25 (4)

- ◆ Manager Softwares:

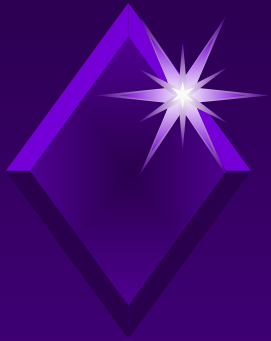
- ◆ ASHTECH Micro Manager.
- ◆ GNSS Spider

GNSS Station of Ouargla



GNSS Station of Oran





### 3.3 Data acquisition

- ◆ GPS/GNSS data are collected using parameters:
  - ◆ Length of sessions: 24 hours
  - ◆ Cut off angle:  $05^{\circ}$ ,
  - ◆ Recording rate: 30 s
- ◆ Intranet access : the network of Algerian MoD.
- ◆ Quality control : GNSS QC software

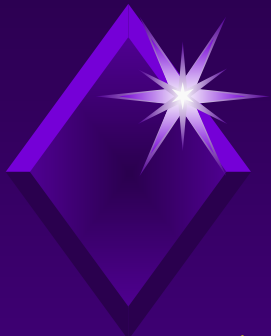




## 3.4 GNSS Data Processing

GPS/GNSS Data of the APGN are processed with Bernese software version 5.0 using IGS data/products:

- ◆ precise orbits and pole information files
- ◆ satellite clocks files
- ◆ absolute GNSS receiver and satellite antenna phase center offsets and variations
- ◆ GPS data of the IGS stations used as fiducial stations around Algeria (Matera, Noto, Villafranca, Mas Palomas, Grasse, .. etc.. )

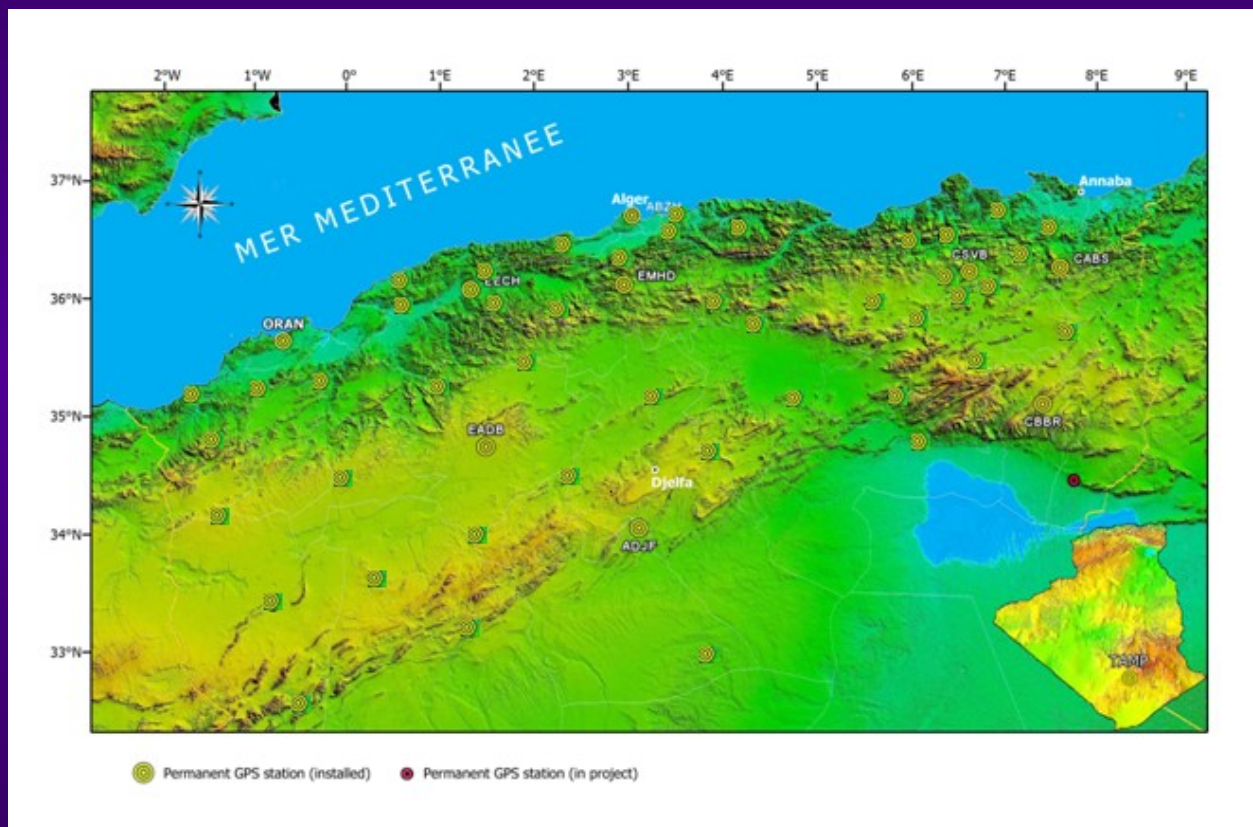


## 4. GNSS Permanent Network of CRAAG Description

- The Algerian Research Center for Astronomy, Astrophysics and Geophysics (CRAAG) has planed a GNSS Permanent Network for geodynamics studies and sismic activity of Algeria.
- 35 stations out of 60 initially planed are already operational.
- GNSS LEICA GRX1200 Pro receivers with choke Ring Antenna are used.
- Parameters: Lenght of sessions: 24 hours, recording rate: 30 seconds, cut off angle:  $05^{\circ}$ .
- GAMIT software is used for processing GNSS data collected.



# GNSS Permanent Network of CRAAG





## 5.1 Contribution to AFREF

- ◆ INCT is associated to the realisation of the African Geodetic Reference Frame (AFREF).
- ◆ At least three (03) GPS/GNSS stations of the AGPN Network will be integrated into the African Permanent GNSS Network.



## 5.2 Implementation of a GNSS Data Processing Center

INCT and IGN have signed on 2010 a scientific cooperation agreement related to GNSS to assist INCT to :

- ◆ setup a GNSS Data and Analysis Center.
- ◆ participate to EUREF and AFREF related activities

### Current actions

- Update APGN infrastructure to IGS standards (file names, metadata, ...)
- Run in parallel a test campaign including APGN stations and IGS/EPN ones



## 5.3 Contribution to EUREF

- ◆ At. least three (03) GPS Stations (Algiers, Oran and Constantine) are proposed to integrate the EPN network in order to densify the north African region.
- ◆ Participation of INCT to geodynamics (interaction African/European tectonic plate) and atmospheric studies



## Perspectives

- ◆ Densification of the AGPN in order to build an homogenous and precise geodetic infrastructure based on GNSS
- ◆ RT GNSS capacities/applications
- ◆ Participation to the maintenance of the ETRS89 as an analysis center



# REPORT ON THE ALGERIAN GPS/GNSS PERMANENT NETWORK



Thank You...

Mohamed KHALDI <sup>1</sup>, Bruno GARAYT <sup>2</sup>, Saïd MAROUF

<sup>1</sup>

<sup>1</sup>Laboratory of geodesy,  
National Institute of Cartography and Remote Sensing ,  
Algiers, Algeria

<sup>2</sup> Geodesy Department - IGN - France