

## **Chapter I : Review of the main features of Algerian geology**

### **I. INTRODUCTION :**

Algeria, a vast territory with an area of 2,381,741 km<sup>2</sup>, occupies a strategic position in the north of the African continent, bordered by the Mediterranean Sea to the north for nearly 1600 km of coastline. It shares its land borders with Tunisia and Libya to the east, Morocco to the west, Mauritania, Western Sahara to the southwest, as well as Mali and Niger to the south. Located near the Greenwich meridian, near Mostaganem, it extends over great distances — about 2000 km from the Mediterranean coast to the Hoggar massif and 1800 km from In Amenas to Tindouf.

It is understood to have 4 major regions from North to South :

- the Tell Atlas (or the Tell), consisting of steep reliefs and coastal plains, the richest of which in Algeria are the Mitidja in the centre, the Chelif in the west, and the Seybouse in the east ;
- the High Plateaus and the High Plains : form large surfaces from east to west ;
- the Saharan Atlas forms a long series of reliefs orientated NE-SW extending from the Moroccan border to that of Tunisia ;
- the Sahara is a desert formed by vast expanses of dunes (Eastern Erg and Western Erg), rocky plains (regs), and oases (El Oued, Ghardaïa, and Djanet). The Eglab massif in the West and the Hoggar massif in the East form the southern boundary (southern limit) of the Algerian Sahara.

### **II. STRUCTURAL ASPECTS :**

On the tectonic level, Algeria is subdivided into two major structural units, separated by the South Atlantic accident (fault).

- In the north, the Maghrebian domain (Alpine Algeria) is strongly marked by Alpine tectonics, with folded and faulted chains resulting from the closure of the Tethys and the convergence movements between the African and Eurasian plates.

- In the south, the Saharan platform extends, attached to the North African craton, characterised by a Precambrian basement covered by a thick sedimentary layer that is relatively little deformed, giving it an overall stable structural appearance.

#### **1. Northern Algeria :**

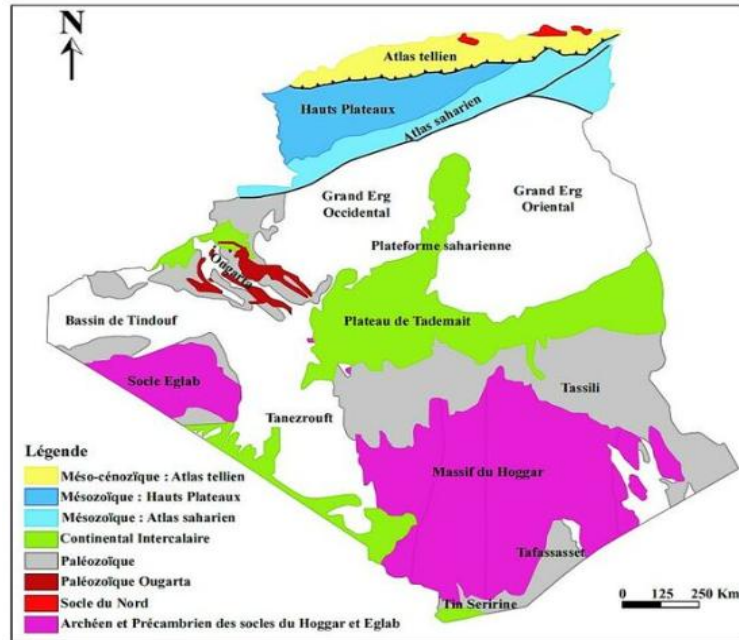
Northern Algeria is delimited by the following elements :

- to the South, the Saharan Atlas, a mountain range of alpine origin ;
- in the Centre, platforms such as the Oran Meseta to the west and the Ain Regada mole to the east ;
- in the northern part, the Tell Atlas is a complex zone made up of nappes put in place during the Lower Miocene. Late Neogene basins such as the Chélif and the Hodna have settled on these nappes.

## 2. The Saharan Platform :

It is made up of a Precambrian basement covered with transgressive Phanerozoic sediments.

Different tectonic elements delineate sedimentary basins in which the lithostratigraphy is more or less complete.

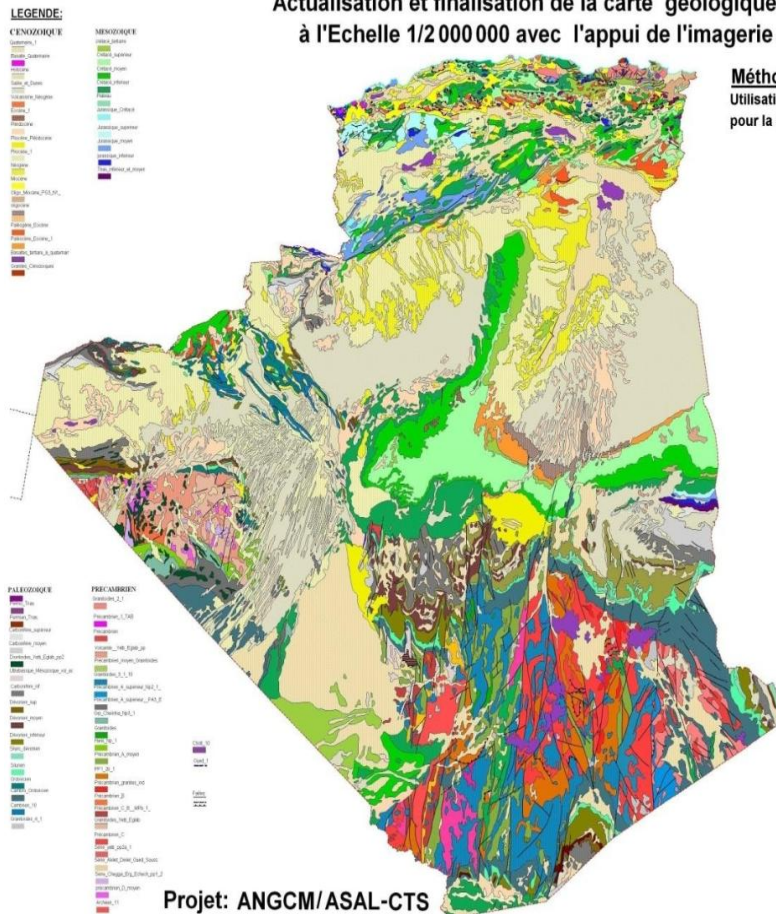


## III. GEOLOGICAL FRAMEWORK :

The geological history of Algeria bears witness to a long geodynamic evolution that has shaped its current landscape. The territory is thus subdivided into two distinct major domains :

- In the north, alpine Algeria, marked by recent tectonic dynamics;
- In the south, the Saharan platform, characterised by relative stability.

**Actualisation et finalisation de la carte géologique de l'Algérie  
à l'Echelle 1/2000000 avec l'appui de l'imagerie ALSAT-1**



**Méthodologie:**  
Utilisation des images satellitales par télédétection de synthèse pour la détection des objets géologiques:

- les traces lithologiques
- les failles
- les pendages
- les formations lithologiques



Image satellitale de la structure de Benzireg ( Région de béchar)



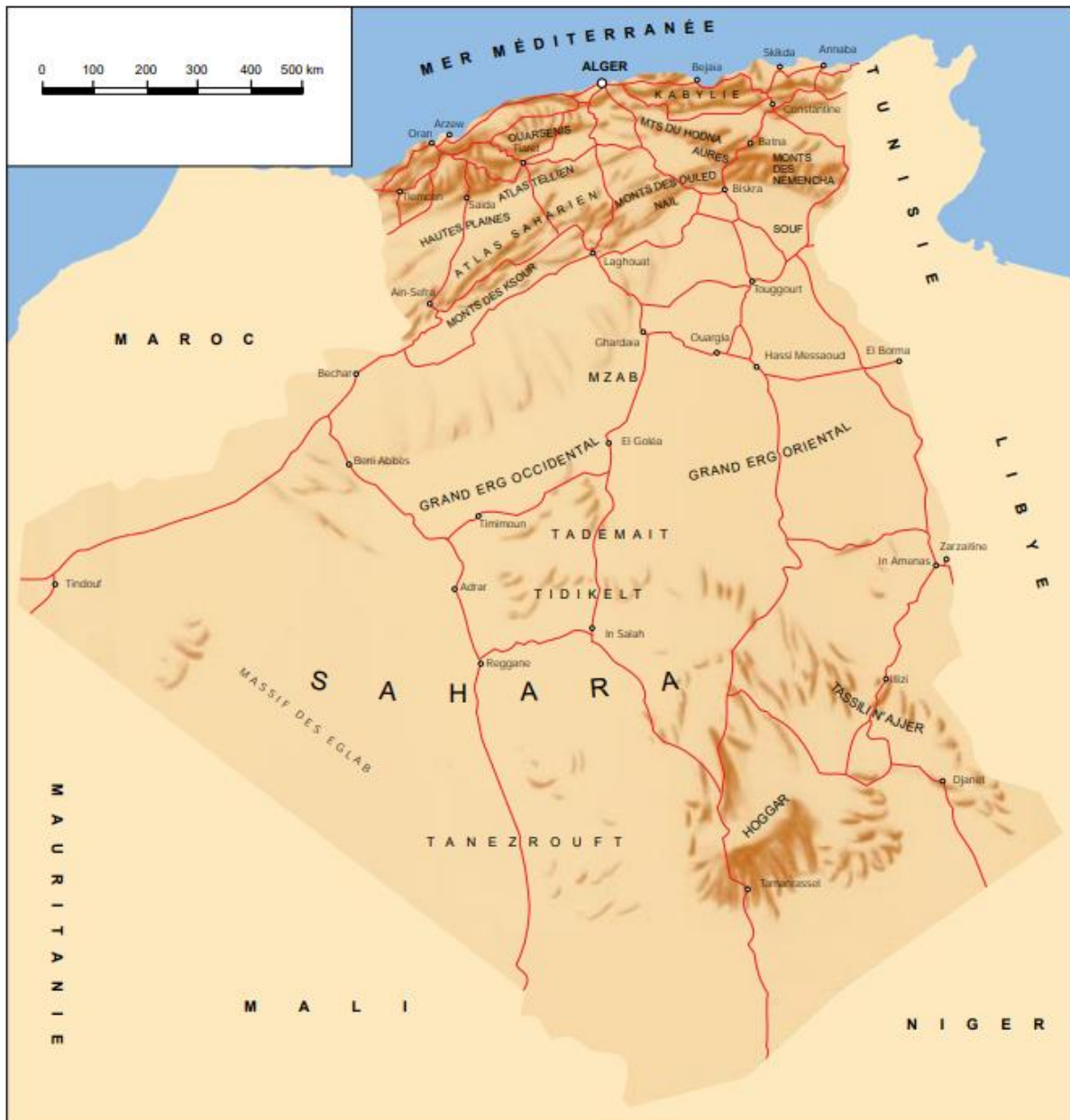
Image satellitale dans le massif du Hoggar

**1. Alpine Algeria :**

Northern Algeria features recent landforms, shaped during the Tertiary period by Alpine tectonic movements.

This area, known as "alpine," is composed of structural-sedimentary units organised from north to south.

- **A : The Tell Atlas is the domain of nappes**, with intramontane basins (e.g., the Chélif basin), whose sedimentary series extends from the Jurassic to the Miocene. Several deposits of varying interest are known there: Ain Zeft, Tliouanet, Oued Guettirini. The main petroleum targets are the Middle Cretaceous, the Miocene, and the allochthonous Eocene ;
- **B : The high plateaus, alpine foreland**, with reduced sedimentary cover, where local extensional processes have allowed the formation of intramontane basins such as those of Telagh and Tiaret. The main petroleum target is the Lias ;
- **C : The Saharan Atlas** was born from a long subsiding trough pinched between the high plateaus and the Saharan Platform. During the Mesozoic, this trough was filled by a powerful sedimentary series (7000 to 9000 m). During the Tertiary, compressive tectonics reactivated the previous extensional structures into faults and reverse structures, leading to the formation of this mountain range. The main petroleum target is the Jurassic.

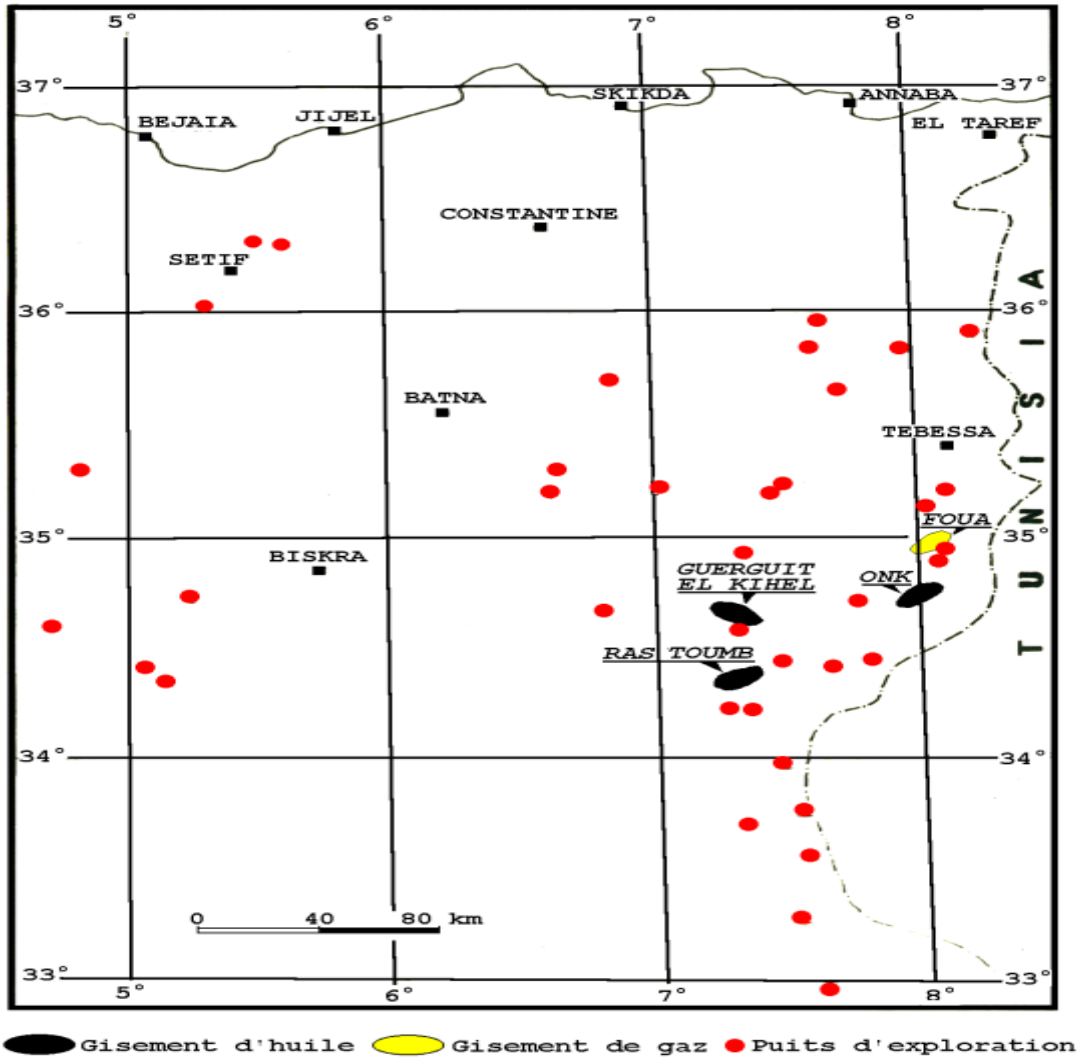


Carte création LR/GÉOGRAPH, 1994

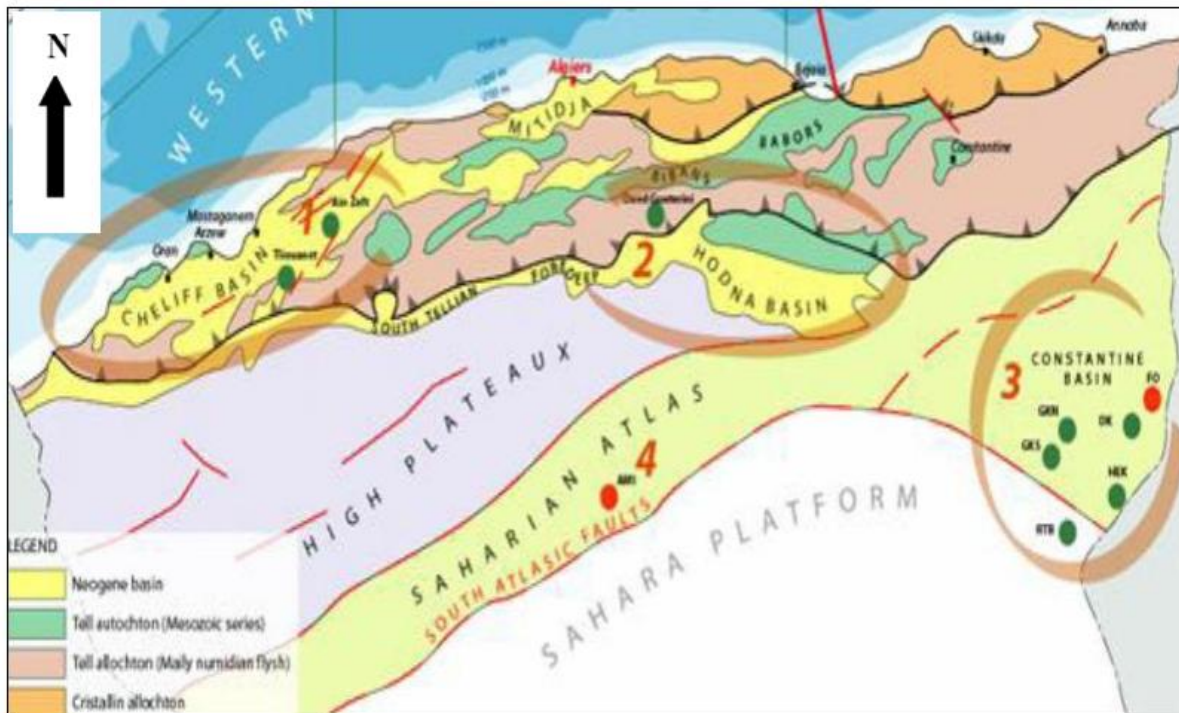
**These complexes include several basins, including :**

- **The Chélif basin**, which is part of the Tellian domain or the North African alpine chain, where we can distinguish the post-nappe Neogene terrains of the Cheliff and the autochthonous terrains outcropping in the Oran, Arzew, and South of Tialet massifs, which are of Jurassic-Cretaceous age, and the allochthonous terrains or napped units of Cretaceous to Oligo-Miocene age. The exploration of the Cheliff basin was motivated by the observation of the first surface hydrocarbon indicators in the Ain Zeft and Tliouanet regions; where the potential was confirmed by modest discoveries made in the basin.
- **The South East Constantine Basin (SEC)**, structured in the Tertiary, with Cretaceous filling (5000 m), generated and accumulated hydrocarbons primarily in the Cretaceous

(Djebel Onk, Rass Toumb, Guerguet El Kihal Nord). Located in the eastern part of the Algerian mining domain. It is bordered to the North by a very extensive allochthonous domain, mainly composed of Meso-Cenozoic terrains. In the South, it is a relatively undeformed area, characterised by Cretaceous fold structures, elongated in a sigmoid shape following a NE-SW orientation. It corresponds to a subsiding sedimentary basin whose history begins at the end of the Triassic and ends in the Tertiary.



- **The Hodna**, the Hodna is a Neogene-aged basin whose filling sequence begins with Oligocene-aged continental deposits and continues with a marine Miocene. Structurally, the Hodna basin is complex, having experienced several episodes of intense deformation, consequences of the Africa-Eurasia convergence; this is manifested by a stacking of allochthonous nappes on Miocene-aged terrains. Exploration in the Hodna basin began in the forties, where the Oued Gueterini oil deposit was discovered, which represents a small productive oil field in the Neogene; with some 3000 m of light oil per year, as well as the presence of heavy oil.



## 2. The Saharan Platform:

It is located south of alpine Algeria and belongs to the North African Craton. It includes a Precambrian basement on which a thick sedimentary cover rests discordantly, structured in the Paleozoic into several basins separated by high zones.

From West to East, we distinguish:

- a. the Tindouf and Reggane basins** located on the northern and northeastern edges of the Reguibat shield: The sedimentary cover would reach 8000 m in the Tindouf basin and 6500 m in the Reggane basin.
- b. the Béchar basin** bordered to the North by the High Atlas, to the South and West by the Ougarta range. Its sedimentary cover would reach 8000 m.
- c. the Ahnet-Timimoun basin**, limited to the North by the Oued Namous shoal, to the West by the Ougarta range, to the South by the Touareg shield, and to the East by the Idjerane-Mزاب ridge. The cover would be on average 4000 m.
- d. the Illizi-Ghadamès syncline** is bounded to the West by the Amguid-El Biod ridge and to the East by the Tihemboka promontory and the Tunisian-Libyan borders. In the Ghadamès basin, the sedimentary cover (exceeding 6000 m)
- e. the Mouydir and Aguemour-Oued Mya basins** are bounded to the west by the Idjerane-Mزاب ridge and to the east by the Amguid-El Biod ridge.