

EXCURSION 1: M'GOUN UNESCO GLOBAL GEOPARK (Central High Atlas)

The main aim of the excursion is to look closely at concrete examples of how climate change affects mountainous regions and how local people are adapting by exploring new economic activities. The itinerary illustrated in Figure 1 includes 13 geomorphosites to be visited along a 640 km tourist route. It takes three days and two nights to complete. This region is part of the M'Goun Geopark, which was included in the UNESCO Global Geopark Network in 2014.

“Valleys, natural curiosities, fossilised footprints, engravings and authentic Berber villages”

The M'Goun UNESCO Global Geopark is located some 100 km from Marrakech, in the middle of the High Atlas chain. Its territory covers an area of medium to high mountains. The geological history of the territory fits into the geological evolution of the central High Atlas dating back to the Triassic period, 250 million years ago, while the main stages took place during the Jurassic period, about 180 million years ago. Geological structures of this intra-continental chain resulting from a structural reversal of a Jurassic basin tied to the collision of the African and European plates. It includes famous and spectacular footprints of sauropod and theropod dinosaurs and many deposits of bones. The M'Goun UNESCO Global Geopark consists of a large number of geosites showing several large tectonic structures of the Atlas Mountains that sculpt the landscape.

©M'Goun UNESCO Global Geopark, Morocco

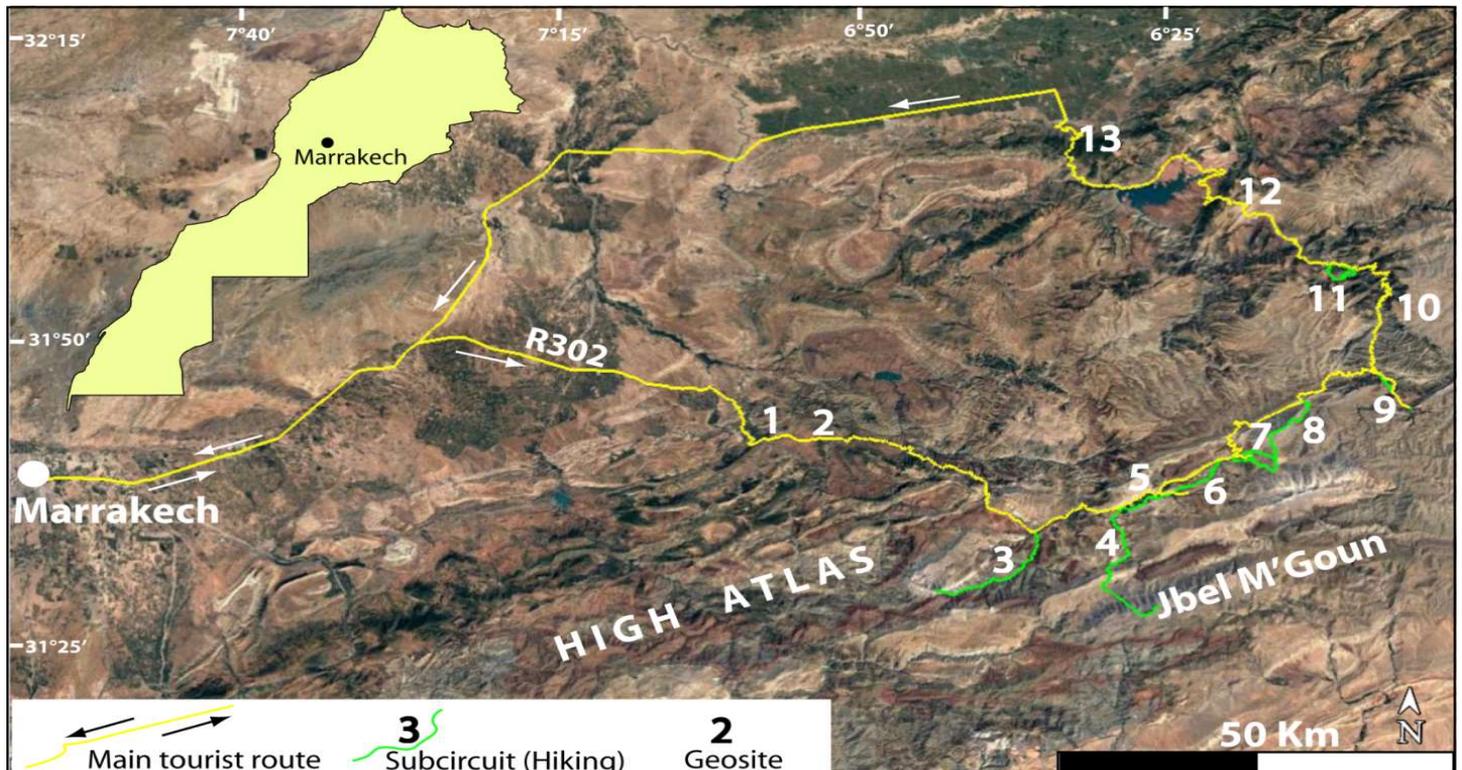
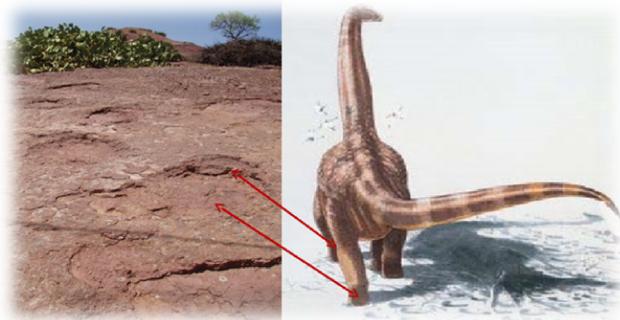


Figure 1–The itinerary proposed for the excursion.

Stop1:Natural Bridge of Imi-n-Ifri

The Imi-n-Ifri bridge is a 30-meter natural Arch over a narrow valley carved out of Lower Jurassic limestone (-180 Ma) by the Oued Tissikht.

The natural bridge is the result of the precipitation of spring waters rich in dissolved calcium carbonates, which encapsulates the intricate relationships between geological formations and environmental processes.



Stop 2: Iwariden

One of the largest dinosaurs ever to walk the earth has been discovered in Taghbalout and named *Breviparopus taghbaloutensis*.

It is a giant sauropod that left its footprints along a 90 m long track, whose footprints reach record dimensions (up to 1.15 m in diameter). Reconstructions of this large animal (closely related to Brachiosaurus) put its height at 20 m, its length at 30 m and its weight at 50 tonnes.

Age: Middle to Upper Jurassic (-160 million years).



Stop3:Ait Blal

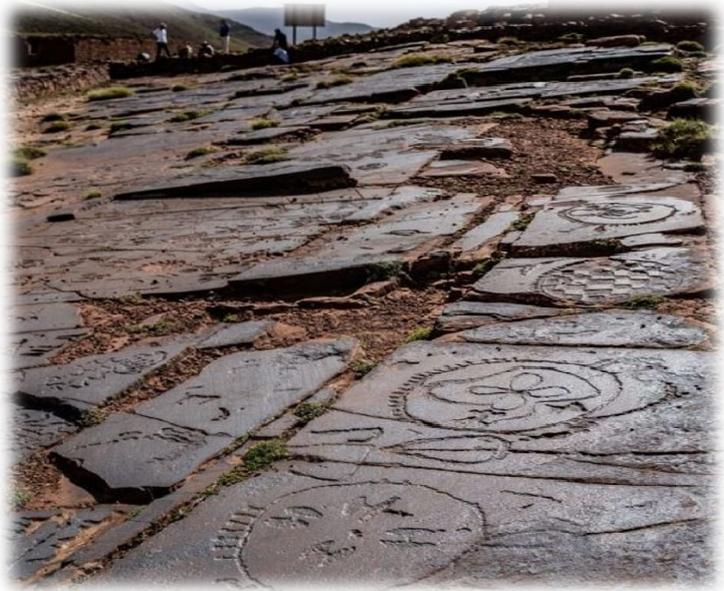
Jurassic limestone slab: Lower Jurassic (-185 years) showing footprints tracks of small theropod dinosaurs with 3 slender fingers (15 to 30 cm). The dinosaurs that left these footprints were coelurosaurian Dromaeosaurid theropods, small (1 to 1.50 m tall), light and fast carnivorous hunters.



Stop4:Rock Engravings of Tizi N'Tighiys

Engravings of horsemen with spears and shields depicting transhumance, fighting, and hunting scenes, engraved on Triassic sandstone, around 3500 to 4000 years ago (Bronze Age).

These silent narratives etched into the rocks Offer a unique window into historical ecosystems. Explore the intersection of archaeology and climate science, decoding Earth's history at this valuable geosite.



de valley wedged between the high M'Goun massifs. It's a tourist valley : quality environment, traditional architecture, fossilized dinosaur tracks, folk art, customs, and traditions, and much more. Immerse yourself in the unique connection between nature, people, and animals at this picturesque site.

Stop 6: Ibaqualliwn

Two types of dinosaur footprints can be seen On grey-white limestone from the lower Jurassic (-185 million years).

These fossilized imprints unraveling the dynamic Interplay between ancient life and environmental changes.



Stop7:Zaouit Ahançal

ZaouitAhançal is one of the most emblematic Amazigh villages in the central High Atlas.

Age-old buildings techniques, combining stone and pizé, are widely used in these regions with their harsh climates (snow, rain, cold).

The diversity of shapes and the richness of motifs illustrate a highly developed artistic spirit. The social and cultural aspects are reflected in the quest for a collective and egalitarian vision.



Stop 8: Taghia



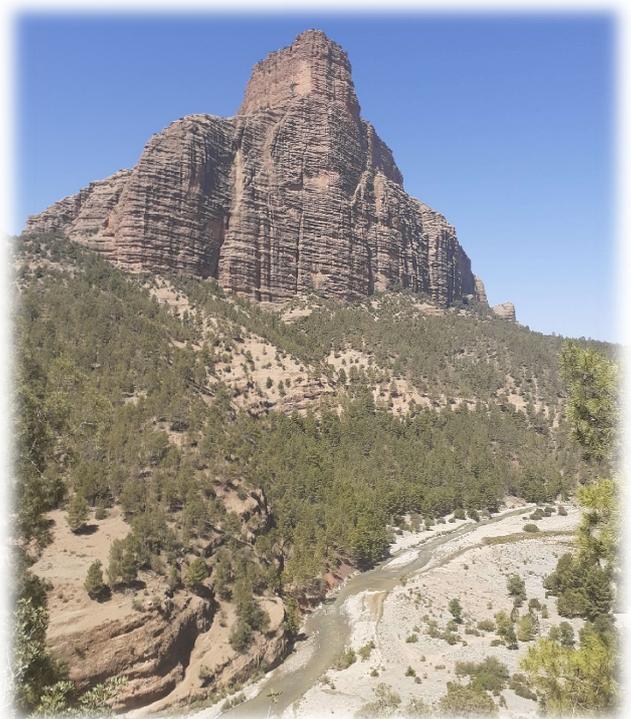
Taghia boasts awe-inspiring limestone cliffs that beckon rock climbers and nature enthusiasts. This village exudes traditional Berber charm against a backdrop of dramatic gorges and lush valleys, fostering a deep appreciation for the delicate harmony between humanity and the environment.

Stop9:“Cathédrale” Mastfrane

The Mastfrane cathedral rock forms an imposing cliff that rises more than 300 m above the Assif n’ou Ahançal stream.

The sediments were formed by the accumulation of conglomerates and sandstones resulting from the erosion of the Atlas reliefs and their transport as alluvium by ancient rivers in the Miocene–Pliocene (between –2 and –10 million years ago).

These deposits were subsequently raised to their present altitude (Atlas orogeny) and sculpted by erosion, giving them their present impressive shape.



Stop10:Bin El Ouidane Lake

The Bin El Ouidane dam was vaulted in a narrow valley over an Aalenian Bajocian carbonate bar (-170 million years) in 1949 and impounded in 1953, 132 m high and 290 m long. The lake is one of the Morocco Kingdom's largest reservoirs. With a surface area of 37 Km² and an average volume of 1,380 billion m³, the water is held back by impermeable red clays from the Middle to Upper Jurassic (-160 million years ago), surrounded by Reliefs from the Lower Jurassic (- 180 million years ago).It is fed by 2 main rivers: the Oued el Abid to the east and the Assif n'ou Ahançal and its tributary the Assif Melloul to the south. It is used to generate electricity and irrigate the Tadla plains.Here, the focus will be on highlighting the impact of climate change on the immediate environment and the services provided by the dam.



Stop11:Ouzoud Waterfalls

Ouzoud Waterfalls captivate visitors with their breathtaking beauty. Cascading from a height of approximately 110 meters, the three-tiered falls create a mesmerizing spectacle surrounded by lush greenery.

