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Applicant UNESCO Global Geopark

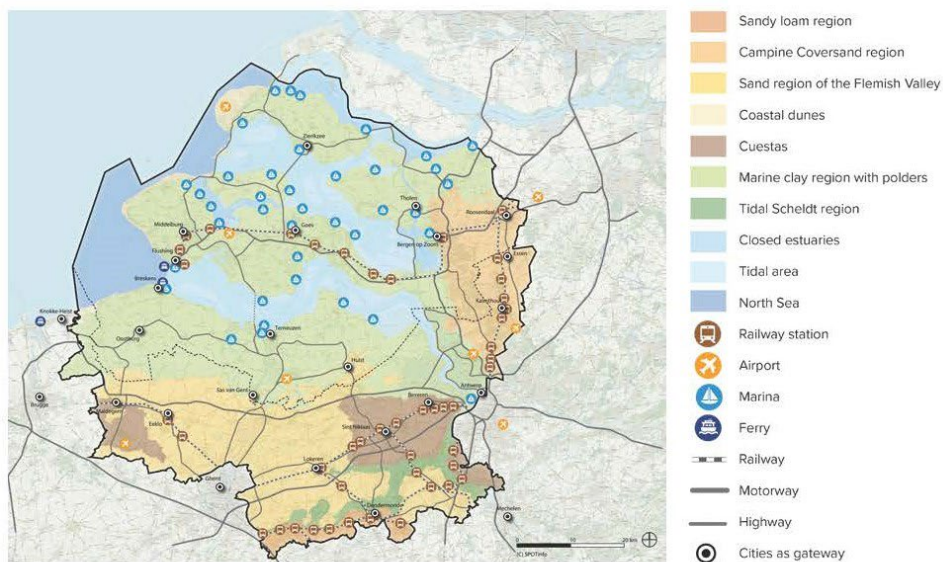
Schelde Delta-Transnational Geopark,

Belgium/The Netherlands/

Geographical and geological summary



The location of the Aspiring UNESCO Global Geopark Schelde Delta in Europe.



General map of the Aspiring UNESCO Global Geopark Schelde Delta.

1. Physical and human geography

The transnational Geopark Schelde Delta is situated at the south-western part of the Netherlands and the north-western part of Belgium, bordering the North Sea. It surrounds the tidal zone of the Scheldt and the geological features around this estuary, covering an area of 5.467 km². The Geopark falls within 2 countries, 5 provinces and 63 municipalities. The 5 provinces involved are: Zeeland (NED), Noord- Brabant (NED), Antwerpen (BE), Oost-Vlaanderen (BE) and West-Vlaanderen (BE). Through a cross-border cooperation, this Geopark strengthens the relationship between both countries. Due to interaction between geology, natural processes and mankind at the transitions of land and water, an enormous wealth and variation of geomorphology, landscapes, cultural history (material and intangible) and nature has been created over time. This can all be experienced at the many sites and activities within the Geopark.

The area can roughly be divided into 3 different landscape characteristics:

- (1) The southern part of the Geopark in the Belgian provinces, surfacing pre-Quaternary sequences in cuervas and the Flemish Valley;
- (2) The lower, north-western part in the Province of Zeeland, covering the marine clay and tidal region of the Scheldt;
- (3) The north-eastern part, covering the sandy region of the Flemish Valley along with the Brabant Escarpment in the Province of Noord-Brabant. The Geopark has a moderate maritime climate. This type of climate generally features mild winters and cool summers. Precipitation is common all year round. With more than 1.5 million inhabitants, this Geopark has a high population density: 274 inhabitants per km². The transport infrastructure facilitates mobility in the region, together with highly active businesses.

2. Geological features and geology of international significance

The position of the Geopark in the transitional area between the subsiding North Sea Basin and the uplifting Brabant Massif provides a unique setting in which near-ubiquitous Pleistocene and pre-Quaternary units with a north-northeastern dip are being exposed, eroded and traversed by much more recent fluvial deposits from the Scheldt and its tributaries on the upland side, whilst thick Holocene deposits of marine and coastal nature have been accumulating on the basin side. The Oedelem-Zomergem cuesta is one of only two locations in Belgium and the Netherlands with outcrops of late Lutetian and Bartonian sediments. The Waasland and Boom cuervas are similar in origin but carved from marine Oligocene units. North of the Boom cuesta and surrounded by tidal deposits, a former quarry at Nieuw-Namen shows a unique exposure of Pliocene iron-cemented beach deposits overlain by Pleistocene coversand. The Brabant Escarpment is situated on the western margin of an extensive plateau of late Pliocene and early Pleistocene (Tiglian) fluvial and estuarine sand, and intercalated clay. The plateau's subsurface is exposed in the partly filled former quarries Boudewijn and De Bunt. With 1.8-million-year-old tidal deposits, they show some of the oldest Pleistocene deposits in the Netherlands and Belgium. At the Scheldt polders in Waasland, intact coversand surfaces are sealed underneath Holocene peat and tidal clastics, which are some of the best-preserved and most thoroughly studied prehistoric landscapes in north-western Europe. On the Holocene coastal plain of Zeeland, tidal action



eroded some parts and left thick deposits of sand and mud in others. Early and middle Holocene tidal deposits are either under water or covered by younger peat and clay layers.

Applicant UNESCO Global Geopark

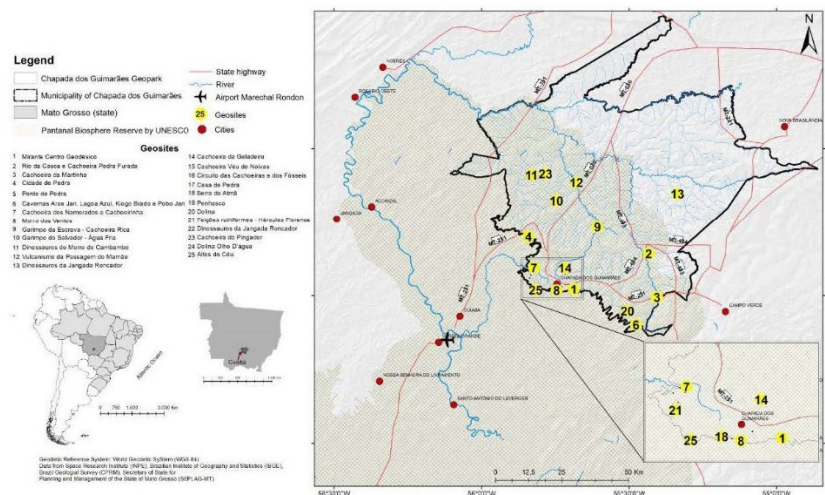
Chapada dos Guimarães, Brazil

Geographical and geological summary

Location of the Chapada dos Guimarães aspiring UNESCO Global Geopark.



Map of the Chapada dos Guimarães aspiring UNESCO Global Geopark indicating the boundary, cities, general geographic points, superposition with biosphere reserve.



1. Physical and human geography

Chapada dos Guimarães Aspiring Geopark is located between 15° 10' and 15° 30' South latitude and 55° 40' and 56° 00' West longitude, in the Midwest of Brazil, in the state of Mato Grosso. The territory is made up of a municipality that has an area of 6200 km² and an estimated population of 22,521 inhabitants. The state capital, Cuiabá, is located 65 km away, and access is via the MT 251 highway. The climate type was classified as Tropical Savannah Climate (Aw) according to the KOPPEN Classification, the total rainfall normally varies between 1650 and 2100 mm, and the average temperature varies between 21.5 and 23° C. The relief is composed by four units: Chapada dos Guimarães, Plateau do Casca, Patamar Dissecado do Mutum-Arruda and Depressão Cuiabana. The altitude varies from approximately 200 meters to approximately 850 meters. Waterfalls, lookouts, flat tops, caves, hills, escarpments, ruiniform reliefs, among other features are found in the territory. The local economy is driven by the service sector, tourism and agriculture. The municipality has a health structure, schools in several locations, a well-established local business center, several restaurants, regular bus lines to Cuiabá, inns, and hotels, among other structures.

2. Geological features and geology of international significance

In the territory, the Neoproterozoic metamorphic rocks of the Cuiabá Group emerge, which represent a complete cycle of opening and closing of an ocean. These rocks are overlapped by the Paraná Basin, whose first unit is the Rio Ivaí Group, from the Ordovician-Silurian period, in which trace fossils such as *Arthropycus* are found. During the Devonian, the rocks of the Furnas and Ponta Grossa formations were deposited, units in which several new species of brachiopods were described, in addition to molluscs, trilobites, among others. The Botucatu Formation, was deposited on the boundary between the Jurassic and Cretaceous, in a large desert that left as a record, successions of dunes over 350 meters thick. The rocks of this unit shelter the Guarani Aquifer. 84 million years ago, in the Upper Cretaceous, the history of the Cambambe Basin began, with emplacement of basalts of the Paredão Grande Formation, covered by the Quilombinho, Cachoeira do Bom Jardim and Cambambe formations. In the second of these formations, fossils of sauropods, turtles and crocodiles are found, in addition to *Pycnonemosaurus nevesi*, a species described based on fossils collected in the region. The most recent unit is the Cachoeirinha Formation, deposited in the Paleogene, it has economic relevance due to the occurrence of diamonds. The geomorphological evolution of the area led to the emergence of caves in siliciclastic rocks such as Aroe Jari site, which are over 1500 meters, being one of the sites of international relevance.

Applicant UNESCO Global Geopark

Uberaba, Brazil

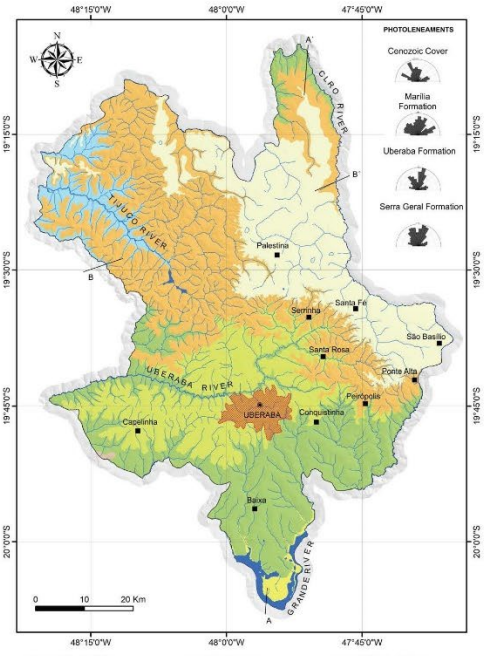
Geographical and geological summary



Maps showing the location of the Aspiring Geopark Uberaba:



Map of the Uberaba Aspiring Geopark indicating the boundary, cities, general geographic points.



Source: Cavalcanti et al (2022). Available in: <https://rigeo.cprm.gov.br/handle/doc/22944>.

1. Physical and human geography

The territory of the Aspiring Uberaba Geopark is in the South American continent, having as central coordinates the parallel $19.361858^{\circ}\text{S}$ and the meridian $48.082096^{\circ}\text{W}$. With an average altitude of 805 m above sea level, it covers an area of about 4,523.00 km², in the region known as Triângulo Mineiro, in the state of Minas Gerais – Brazil. With an estimated population of around 340,000 inhabitants, the municipality of Uberaba, or equally the territory of the Aspiring Geopark, celebrated 202 years of political emancipation in 2022. Even before its emancipation, it always played a nationally prominent role, given its geographic location privileged, next to the great centers of urbanization of the 19th century, it is close to the largest financial centers in the country within a radius of 500 km. Called Sertão da Farinha Podre, the city was a warehouse on the commercial axis from São Paulo to Goiás and Mato Grosso states. Over the years, Uberaba also began to stand out for its productive diversification with the development of the agricultural system and the modern agro-industry, commercial, industrial and service activities, including trade and business and religious tourism. The municipality is classified as medium-sized and attracts new investments in various sectors of economic activities and population.

2. Geological features and geology of international significance

Throughout its territorial extension, the Aspiring Uberaba Geopark consists of a regional basement with rocks from the Serra Geral Formation marked by successive and discontinuous basaltic flows associated with the fragmentation of the supercontinent Gondwana in the early Cretaceous, covering the sedimentary rocks of the Botucatu Formation. This unit comprises one of the largest freshwater reserves in the world, the Guarani aquifer. Over these spills, which reached an average thickness of 400 m, in the territory, are the sedimentary rocks of the Uberaba and Marília formations belonging to the Bauru Basin and on the tops the detritic-lateritic coverings of the Neogene, eventually having unconsolidated Quaternary deposits. The territory has more than three dozen fossil occurrences, almost all associated with the Uberaba and Marília Formations, where more than ten thousand fossils have already been excavated and deposited in reference repositories in the cities of Rio de Janeiro and Uberaba in the last 70 years of systematic research. In the current scenario, fossils have been found in several places, including in urban areas such as excavations for the foundations of buildings, hospitals, opening of streets and avenues, excavation of surface wells for water collection, water mains, shopping malls and even soccer field stadiums, the enormous paleontological wealth of the city is unmistakable. Currently, over 50% of these fossil sites are located in urban areas.

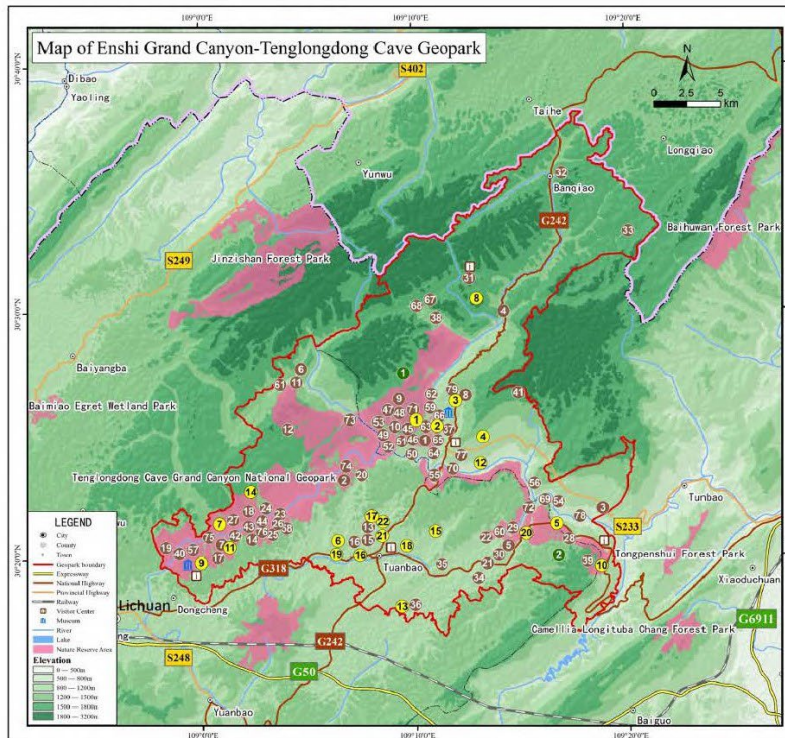
Applicant UNESCO Global Geopark

Enshi Grand Canyon Tenglongdong Cave, P.R. China

Geographical and geological summary



Figure 1 Location map of Enshi Grand Canyon-Tenglongdong Cave Geopark



1. Physical and human geography

Enshi Grand Canyon-Tenglongdong Cave Geopark is located in Lichuan and Enshi City of Enshi Tujia and Miao Autonomous Prefecture, which is in the southwest of Hubei Province of the People's Republic of China in the east of Asia. It is 590 km away from Wuhan City in the east and 350 km away from Chongqing City in the west. The geographical coordinates are 30°16'47.910" N - 30°35'59.856" N, 108°57'44.816" E - 109°20'34.681" E. Enshi Grand Canyon - Tenglongdong Cave Geopark is a geopark featured by karst and structural landforms, covering an area of 679.19 km², with a population of around 119,800. With an average elevation of 1,366.33 m, the Geopark is dominated by middle and high mountains with erosion and dissolution landforms. The Geopark is surrounded by the stretching branches of Wushan Mountain in the north, with the highest point of 2083 m above sea level and the lowest point of 546 m above sea level. The western boundary of the Geopark is the Lichuan Karst Basin (Polje), and the eastern boundary is the Enshi Faulted Basin. With a subtropical continental monsoon climate, the Geopark is rich in biological species as well as flora and fauna resources. The forest coverage rate in the park is as high as 70,14%. There are more than 4,000 kinds of plants and 500 kinds of terrestrial vertebrates in 1,038 genera of 219 families, of which more than 40 kinds of plants and 70 kinds of animals belong to national rare and protected species. The area where the Geopark is located is one of the settlements of ethnic minorities in China, with abundant cultural resources of Tujia, Miao and Dong minorities. There are ethnic architectures folk songs and dances ethnic festivals, ethnic brocades, National intangible cultural heritages in the Geopark. The Geopark area's economy is dominated by agricultural tourism industry. In 2019, 71,17 million tourists visited the Geopark providing tourism 53,045 billion yuan income.

2. Geological features and geology of international significance

Enshi Grand Canyon-Tenglongdong Cave Geopark has a North- East Mountain range, and its terrain is high in the northwest and low in the southeast. The topography is deeply cut, by the Qingjiang River System, into landscapes forming steep cliffs and deep gorges. presenting multi-stage karst platforms which are connected by slopes or steep cliffs, forming a rare multi-stage karst geomorphic landscape.

The rich and diverse geological sites in the Geopark demonstrate scientific and aesthetic value providing systematic and scientific evidence for regional geological evolution and global comparative study. The Geopark has recorded the sedimentation, structural deformation and morphological processes since the Cambrian, and preserved rich and diverse geological sites. The Tenglongdong Cave system (with a total proved 59.8 km passage) is composed of multiple layer caves, with dry caves on the upper layers and underground river on the lower layer. Among them, the main dry cave of Tenglongdong Cave is 8694 m long, 40-80 m wide and 50-90 m high. Tenglongdong water cave (underground river) is an important part of Tenglongdong Cave system. The entrance to the underground river is a world-famous huge waterfall "Wolongtunjiang" with a fall of 30 m. Qingjiang River pours into the underground river with a length of 16.8 km and a drop of 163 m. It is the longest underground river system with the largest drop in China.

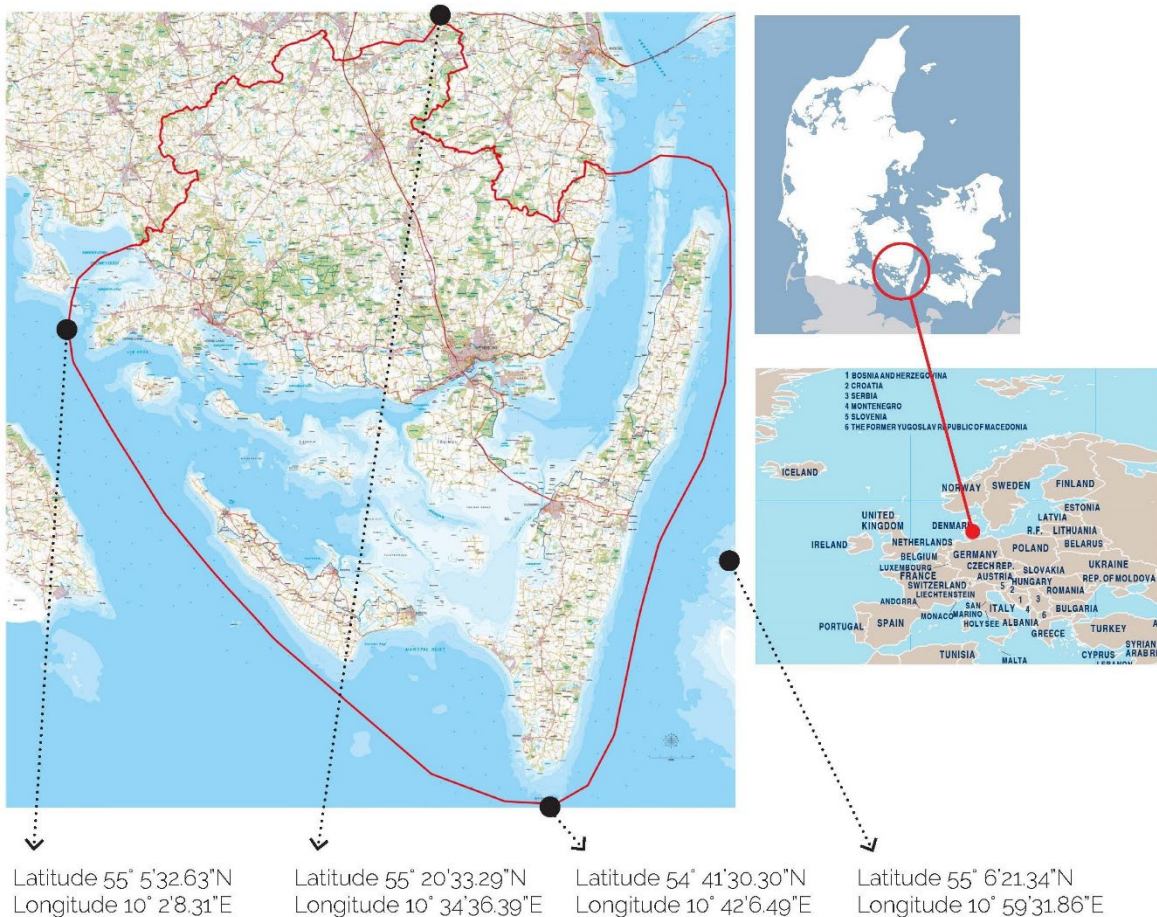


The Enshi Grand Canyon is located in the northeast of the Geopark and contains 108 km of cliffs composed of nearly horizontal Triassic thick-layered dolomite and dolomitic limestone on the upper side. Multiple sets of vertical faults and joints are developed in the rock layer. The thick-layered rock mass of the upper canyon gradually disintegrated into cliffs and many huge stone pillars, forming rare stone pillar forests and cliffs dissolution and gravity collapse thanks to the crustal uplift which created wide canyon valleys in the upper part, and a narrow gorge in the lower part.

Applicant UNESCO Global Geopark

The South Fyn Archipelago, Denmark

Geographical and geological summary



1. Physical and human geography

Geopark The South Fyn Archipelago is located in the central and southern part of Denmark (south of 55° 20'33.29"N ,10° 34'36.39"E). A good network of roads, railways and ferries connects the aUGGp to the rest of Denmark and northern Europe. The capital is reached in two hours by car or public transportation.

The aUGGp falls in the administrative region of Southern Denmark and is constituted by four municipalities: Svendborg, Faaborg-Midtfyn, Langeland and Ærø. The total number of inhabitants is 128,601 of which 27,000 live in the city of Svendborg. The main sources of employment are public administration, education, and health care. In general, levels of income and education are below the national average.

The aUGGp covers a total area of 2,733 km² of which 1,429 km² (52.3%) is terrestrial and 1,304 km² (47.7%) marine. The aUGGp is comprised of more than 55 larger and smaller islands which in total provides 551 km of coastline. The maximum and minimum elevation are 128 m.a.s.l. and -3.0 m.b.s.l. The terrestrial landscape is dominated by its rolling hills, cultivated areas and smaller or larger forest patches. Crop land takes up 66.5 % of the surface area, forest 10.1%, build-up areas and infrastructure 14%, and wetland 9%. 93 % of all lands lie on private hands, while marine areas fall under State authority.

Denmark enjoys small climatic variations geographically. For the period 1990 to 2020, the average annual precipitation of Denmark was 758 mm and average temperature 8,7 degrees Celsius. The warmest months are July and August with mean highest temperatures of 21.2 degrees Celsius. Coldest months are January and February with mean lowest temperatures of -0.7 and -0.9 degrees Celsius respectively.

2. Geological features and geology of international significance

The aUGGp is situated in southern Denmark and geologically located in the complex transition zone between the Precambrian Baltic Shield and large Palaeozoic sedimentary basins of the Northwest European Craton. The geodiversity ranges from deep-seated/non-exposed Proterozoic-Mesozoic rocks to exposed marine Paleogene sediments and various Quaternary deposits and landforms. As a part of the North European mid-latitude lowlands, the area was subjected to repeated glaciations during the Pleistocene resulting in a broad spectrum of glacial landforms, which, coupled with complex glacial-interglacial sedimentary sequences, glaciotectonics and Holocene coastal development, illustrate the latest c. 800,000 years of geological history.

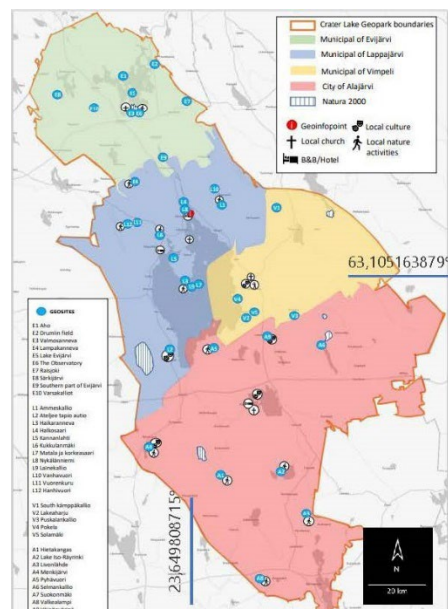
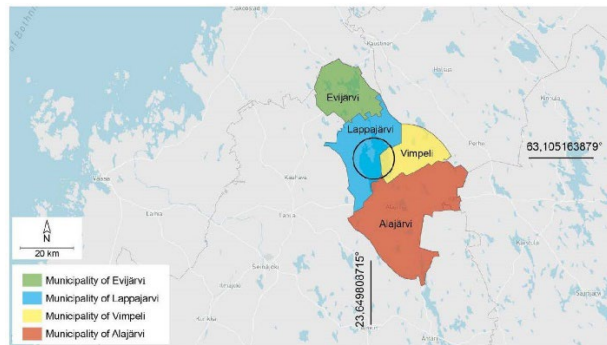
The international significant highlights of the aUGGp are:

1. The partly inundated glacial landscape of The South Fyn Archipelago. It was mainly formed during the Holocene transgression c. 9-6 ka BP and is a designated Geosite of outstanding international geological and scientific value in regards of Holocene coastal development. With its significant variability in erosional and accumulative coastal landforms, this area offers outstanding possibilities of studying ongoing coastal dynamic processes in unconsolidated sediments in a low-medium energy, shallow water setting. Still subjected to an ongoing relative sea level rise, climatic changes may well have a substantial impact on the future coastal environment in the area.
2. The Paleogene Danian-Selandian boundary exposed at the Klintholm Limestone Quarry Geosite. This significant boundary is only accessible in a few places around the world.
3. Ristinge Klint. A coastal cliff featuring a world-class example of glacial thrusting. This Geosite is also the type section of a major ice-advance and a classical site for international Quaternary research within the Baltic region.

Applicant UNESCO Global Geopark

Impact Crater Lake Geopark Lappajärvi, Finland

Geographical and geological summary



1. Physical and human geography

Impact Crater Lake Geopark is located in Southern Ostrobothnia, Western Finland, (lat. 63°09' N, long. 23°42' E). The area, 2.304 km², consists of 4 municipalities (Alajärvi, Evijärvi, Lappajärvi and Vimpeli) with a population of 20.100 inhabitants (9 inhabitants/km²). Alajärvi is the biggest town with a population of 9.700. The area is well connected to the main cities in Finland. The distance to Seinäjoki (pop. 63.800) is 60 km, to Tampere (pop. 230.000) 120 km, to Jyväskylä (pop. 143.000) less than 100 km and Vaasa (pop. 67.000) less than 100 km. All these cities have good railroad connections. There are daily ferry connections from Vaasa to Sweden and there is also an international airport in Vaasa.

Geopark area is nowadays an attractive destination with many summer residents almost doubling the population. The main attractions are the Impact Crater Lake itself with fully equipped exhibitions at the Meteorite Center and Architect Alvar Aalto's works. The area is an old lake and river valley and therefore an important place for people to fish and hunt since the stone age. Maximum temperature in summer is +25 C and minimum in winter – 25 C.

The Geopark borders follow the boundaries of the 4 participating municipalities, which date back to the 16th Century. The Eastern border follows the boundary between 2 distinct provinces: Ostrobothnia and Central Finland. In the North and South, this elongated Geopark area meets two other provinces. In the West, the border follows the municipal boundaries.

The development of the Geopark area leans heavily on education. Seinäjoki University of Applied Sciences has campus in the area; there are also 3 vocational education centres, 4 high schools, 2 vocational qualification and training centres and 21 primary schools in our area.

2. Geological features and geology of international significance

The most important and interesting geological highlight in Geopark area is the Lappajärvi Impact Crater Lake – Europe's largest impact crater lake. It is a meteorite impact site formed 78 million years ago and it is the youngest and most studied impact structure in the world with nearly 200 international scientific publications written about it. As for the visitors, it provides exceptional views of the whole crater with visible crater rims. Also, the existence of central uplift of the crater is clearly visible and can be visited.

The Geopark information points provide an exceptionally good opportunity for the visitors and local people to familiarize themselves with the area and all of the interesting sites. In the northern part of the area, there is a Meteorite Centre where one can learn how lake Lappajärvi was formed, touch authentic pieces of a meteorite, learn about other rocks and minerals, research rocks with polarized microscopes, go on a virtual reality journey to the asteroid belt and witness a meteor impact event through VR glasses. Visitors can also touch the rare rocks formed during the collision, namely Kärnäite and Suevite and its very rare impact diamonds.

On the Eastern rim of the Impact Crater, in Vimpeli, there is Lakeaharju which is part of the crater rim. The crater rim stretches from Pyhävuori (Alajärvi) to Lakeaharju. Lakeaharju is easily accessible and offers the best view of the whole Crater Lake. Lakeaharju provides a great setting for outdoor activities all year round.



Pyhävuori, in Alajärvi, is one of the greatest treasures at the Crater Lake Geopark with stunning views and diverse geological features. The most famous place in Pyhävuori is Uhrikivi –"Sacrifice rock". Uhrikivi is about 5 metres high and 8 meters wide.

Applicant UNESCO Global Geopark

Meteora-Pyli, Greece

Geographical and geological summary



Figure 1 Location Map of Meteora Pyli Geopark

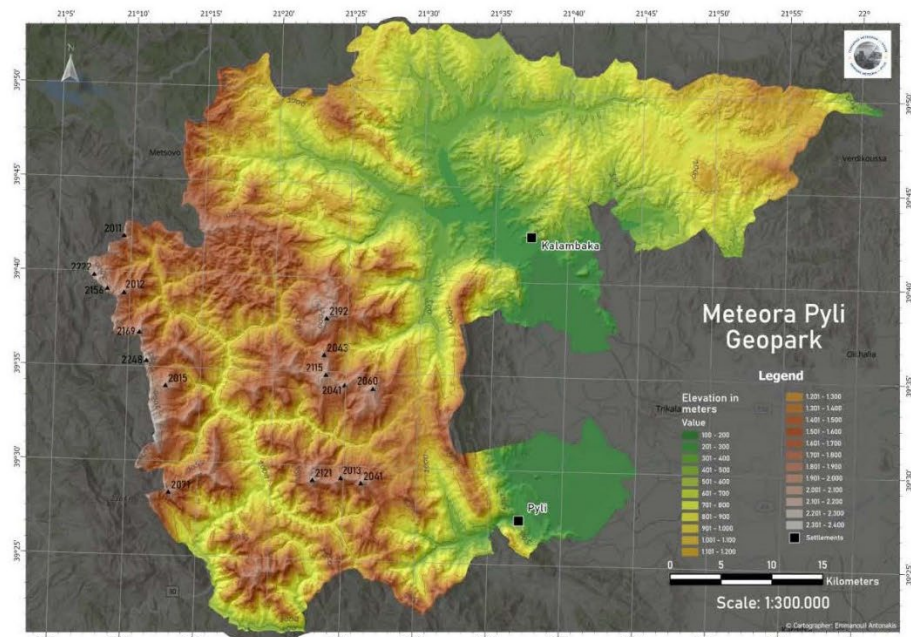


Figure 2 Boundaries of Meteora Pyli Aspiring Geopark which are identical with the boundaries of the Meteora and Pyli Municipalities

1. Physical and Human Geography

Meteora - Pyli Aspiring UNESCO Global Geopark is located in the Thessaly Region in the center of mainland Greece. The area of the aspiring Geopark includes the municipalities of Meteora and Pyli and belongs to the Trikala Regional Unit. These two municipalities together host a rich geodiversity including the outstanding landscape of the Meteora breathtaking rocks. The Geopark covers an area of 2409.545 km² with a population of 41,991 inhabitants. The biggest city within the Geopark area is Kalambaka. The entire area of Meteora, in the north of the city of Kalambaka, is blessed with a unique landscape that consists of huge rock formations. The peaks of these rocks are adorned with the Byzantine monasteries which are considered living museums. In a region of almost inaccessible sandstone peaks, monks settled on these 'columns of the sky' from the 11th century onwards.

The geomorphology of the area includes Koziakas and Pindos mountain ranges. Koziakas mountain range has a long ridge that extends from North to South. It rises from Kalambaka (Meteora) until Pyli village, is about 25 km long and constitutes the eastern extension of the South Pindos mountain range. Pindos mountain range is considered as the southernmost extension of the Dinaric Alps. South Pindos Mountains occupies the western part of the Geopark. With a vast complex of mountains, peaks, plateaus, valleys and gorges, the Pindos Mountains offer to the visitors an once-in-a-lifetime opportunity to see the hidden rich biodiversity of the Greek mountain with high altitude landscape views, wild high peaks and remnants of the Ice Age alpine lakes. These mountains also present picturesque and remote villages as well as unique wildlife and endemic flora and fauna along trekking pathways. The composition and distribution of plant species are influenced by the climate, geomorphology and geology.

Historical and archaeological record documents show the presence of humans more than 2,500 years in the area.

2. Geological Features and Geology of International Significance

In Greece, the geodynamic regime, since Late Jurassic has been subjected to the northward convergence between the African and the Eurasian lithospheric plates, which created the Hellenides mountain belt as part of the Alpine orogenic system linked to the closure of Neotethys Ocean. The Hellenides play a crucial role in the evolution of the Alpine system, as they currently develop across an active subduction zone, where the very last remnants of Neotethyan oceanic crust are now subducting beneath the Aegean and Anatolian microplates of the Eurasia plate.

The area of the Meteora-Pyli Geopark is crucial in understanding the evolution of the main Alpine orogenic event during Late Cretaceous – Paleocene as it occupies the western margin of the Pelagonian zone and a wider zone further west towards Pindos area, representing the transition from the Pelagonian continental fragment, to the Neotethyan oceanic sequence represented by the Subpelagonian and Pindos zones.

The area presents evidences for the extensive tectonic deformation and the geodynamic evolution which resulted of: the destruction of the Neotethyan oceanic lithosphere; the emplacement of the ophiolites of the Subpelagonian zone on the continental margin; the thrusting of the deep-water carbonate and siliceous rocks of the Pindos zone forming a series



of thrust sheets during suturing of the Neotethys ocean; followed by the movement of the ophiolitic bodies which are tectonically placed over the Tertiary flysch of Pindos zone. The geodynamic evolution of the area continued during the Late Eocene – Miocene Post alpine with the creation of the Mesohellenic Basin, which is filled with the undeformed molassic sediments.

UNESCO Global Geopark - Extension > 10%

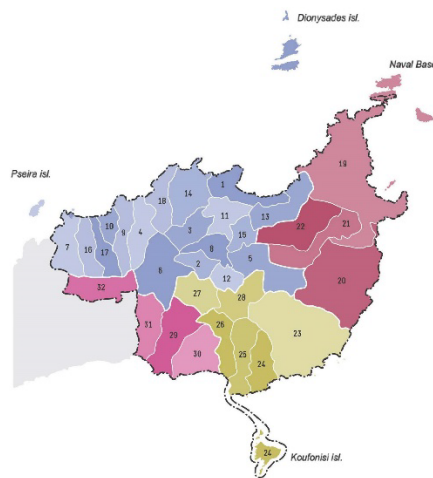
Sitia UNESCO Global Geopark, Greece

Geographical and geological summary

Current area: 517 km²
New area: 713.5 km²



Map Source: [United Nations - Geospatial, location data for a better world](https://www.un.org/geoportal/)



The area and boundaries of Sitia Geopark

- **Sitia Municipal Unit:** 1) Sitia, 2) Agros Georgios, 3) Achadria, 4) Evox Moutiano, 5) Katsikoni, 6) Krya, 7) Lastros, 8) Maronia, 9) Mesa Moutiana, 10) Myrani, 11) Piskokotolo, 12) Prasoos, 13) Roussa, 14) Skopi, 15) Stavromenos, 16) Steka, 17) Touzoti, 18) Chamazi.
- **Taraxos Municipal Unit:** 19) Palaikastro, 20) Zairoos, 21) Karydi, 22) Mafato.
- **Lefki Municipal Unit:** 23) Ziroa, 24) Agio Triada, 25) Apidra, 26) Ammosoi, 27) Pappagiannodes, 28) Chendres.
- **Anafali Municipal Unit:** 29) Lithines, 30) Perivolaki, 31) Pefthoi, 32) Chrysoptigi.

1. Physical and human geography

The Sitia Geopark is located at the eastern part of the island of Crete, at the southern part of Greece. It coincides with the 98.2% of the overall territory of the Municipality of Sitia. The total surface area of the Sitia Geopark is 713.5 km². It is mainly a mountainous area, with the Zakros and Orno Mountains dominating the landscape and the lace-like coastline all along the shores. The total population is 20 268 according to the 2021 census 2021.

2. Geological features and geology of international significance

The geology of Sitia Geopark is composed by its particular features that make it unique and of international value. The abundant Pleistocene and Miocene fossil sites, the discovery of three *Deinotherium proavum* fossils, the extensive cave systems, the breathtaking gorges, as well as the palaeo-shorelines of Zakros area are unique for Crete and of national importance. The prevalent rocks are mainly limestone, marble and schist, grouped into three main nappes, covered by more recent sediments. Minerals composition, weathering and karstic erosion shape peculiar and stunning rock formations capable of impressing the most demanding visitor. Within Sitia Geopark, some extremely rare and unique rocks occur, like the variscan metamorphics. The current geological structure of the region displays vertical changes due to the various groups of rocks, particularly the limestone and marble, which are permeable to water and thus intensely karstified, and the phyllites, schist and clays that are impermeable and affect water movement to a great extent. Effervescent springs with clean and healthy potable water can be found almost everywhere within the Geopark, while impressive waterfalls and ponds can be found within the gorges. Over the last 12 million years, the region has been fragmented by numerous faults, many of which have at times created drops that the sea filled depositing new rocks, whereas in other cases, the land rose significantly, leaving visible traces of past shorelines (marine terraces) and other impressive tectonic formations that shape the landscape, which in many positions are of unique aesthetic value.

People visit Sitia Geopark to experience an intense and impressive and beautiful landscape shaped by the contradictory forces of the active tectonics and the weathering and karstic erosion and to learn about Earth processes, geology and physical geography, not to mention the numerous activities that this landscape can offer, such as hiking, canyoning, cave diving, windsurfing, bird watching, rock climbing etc.

Scientific groups also value Sitia Geopark for its unique geology, since it is located on top of the current, active orogenic arc of the Alpine system, making it an example for the principle of actualism. One can observe and examine in situ all the procedures of an active orogeny in real time. This has resulted a plethora of scientific papers, reports and researches.

Applicant UNESCO Global Geopark

Joyce Country & Western Lakes, Ireland

Geographical and geological summary



1. Physical and human geography

The Joyce Country and Western Lakes geopark is situated in the west of Ireland, which is located in northwest Europe. The coordinates, in decimal degrees, of the geographical centre are 53.563° lat, -9.459° long. The wider area, outside the aspiring Geopark region, is served by Galway City (30km from the boundary), and the larger towns of Clifden (20 km away), Castlebar (10 km away) and Westport (5 km away). The boundary, covering 1560 km², is cross-county, crossing counties Mayo and Galway.

Two distinct geological regions are separated by three lakes. The uplands to the west in Joyce Country are made up of numerous mountains, rising from 400-800 m, and the lowlands to the east include the Western Lakes – Lough Carra (16km²), Lough Mask (81km²) and northern Lough Corrib (180km²). The climate is temperate (5.7 to 15°C) and moderated by waters from the Gulf Stream and prevailing westerly winds off the Atlantic.

The region therefore receives regular rainfall and mild winters. Numerous habitats, such as peatland, limestone pavement, woodland, grassland, and freshwater, support the wide variety of flowers, insects, birds, and mammals living in them.

The geopark is located in rural region which is sparsely populated, with around 20,000 people, and 20 towns and villages. The largest concentrations of people are located to the east of the lakes. About a third of the area is Gaeltacht (native Irish speaking). Crafts indigenous to this part of Ireland are still practised and preserved, as are local styles of dancing, music, and sports.

Economic activities in the area include agriculture (lamb and dairy), aquaculture, angling, outdoor activity providers, hospitality (accommodation and eateries), crafts and tour guiding.

2. Geological features and geology of international significance

The geology of international significance seen within Joyce Country and Western Lakes geopark can be seen over a small area of 1560 km². It is the opening of the Iapetus Ocean and the most complete record of the Grampian-Taconic Orogeny associated with its closing. It is part of an international story that spans from North America to Scotland and to Norway. Ten geosites help tell this story, and specific outcrops, such as the Currywonguan metagabbros, are important in the geoscience community as they allowed geologists to date the rocks and determine the sequence of events. Others, such as Connemara Marble, are important not only to tell part of our geological story, but as Ireland's national stone, it is also linked to the culture and heritage of the region and the country. Geological features seen in the region include igneous intrusions, structural geology, karst and glacial features. The bedrock geology comprises rocks from the Precambrian, Ordovician, Silurian, Devonian, Carboniferous, Palaeogene and Quaternary and represent the various climates and conditions that Ireland experienced throughout its tectonic history. As a result, rocks from the three main rock types can be found throughout the region. Structural features include faults, folds, and unconformities. Eggbox pitting, limestone pavements, turloughs, caves, 'boulders in their sockets' (unique to the region), tube-karren, and springs, such as one the fastest flowing spring complex in the world at Cong, make up the karst landscape found in areas of limestone bedrock. Geomorphological features, such as U-shaped valleys, drumlins, glacial deltas, moraines and Ireland's only fjord at Killary Harbour, are remnants of the glacial legacy which shaped the region to what we see today.

1. Physical and human geography

Cuilcagh Lakelands UNESCO Global Geopark is located in the northwest of the island of Ireland. The Geopark has been in existence since 2001 when Marble Arch Caves European Geopark was the first Geopark in the UK to be awarded Geopark status. Many changes have happened since then with the expansion of the Geopark into Cuilcagh Mountain Park area and subsequent expansion cross border in 2008 to encompass areas in County Cavan in Republic of Ireland making it the first transnational Geopark in the world. This has had many benefits for the local communities and stakeholders here in the Geopark over the years in terms of conservation, economic development, community engagement and geotourism. As a result of extensive community and stakeholder consultation the Geopark continues to evolve and grow, with a recent name change approved in 2021 and revised boundary for the Geopark as per this application.

The main County towns in the Geopark are Enniskillen and Cavan town with populations of 13,900 and 11,000 respectively. The population of the new proposed Geopark area is 66,356. The Geopark is located approximately 2 hours North West of Dublin and two hours south west of Belfast. Geographically, Cuilcagh Mountain forms the centre of the Geopark and at 665m is the highest peak in both counties. This holds significance for a number of reasons including the fact that the international border runs across the top of the mountain as well as its significance internationally from a geological perspective. The Geopark is home to a fascinating variety of geology, natural landscapes and historic relics. Major lakes, gently rolling drumlins and winding rivers are set against the dramatic backdrop of spectacular cliffs, rugged outcrops, hidden caves and a fabulous array of natural habitats and species. It also contains prehistoric tombs, Iron Age forts, early Christian monasteries, and Plantation Castles.

2. Geological features and geology of international significance

The geology of the CL UGGp covers a vast array of geological time starting with the oldest Precambrian rocks that were first deposited around 895 million years ago, and still continuing to the present day with the active formation of caves and karst features.

By far the most dominant geological features are as a direct result of the deposition of marine and fluvio-deltaic sedimentary rocks during the Carboniferous period. This is best seen at Cuilcagh Mountain where a complete sequence of rocks covering 8 million years (from 337 to 329 million years ago) is preserved and is one of the most important places to witness the evolution of a sedimentary basin from the Late Visean and into the Namurian). The Late Visean limestones have led to the creation of a number of other internationally important geological sites. The cave systems and the associated karst are considered to be some of the finest examples of a mature karst landscape and system in Ireland and the UK and are found in and around Cuilcagh Mountain and the adjacent uplands.

Glacial landforms play a significant part in the geodiversity of the CL UGGp and have shaped the natural landscape of the entire region. The vast tract of glacial ribbed moraines (or 'rogen' moraines) that extend across Mid-Cavan being internationally important in terms of the unique size of the individual features and with regard to glacial research advances in the understanding of ice sheet evolution.

Applicant UNESCO Global Geopark

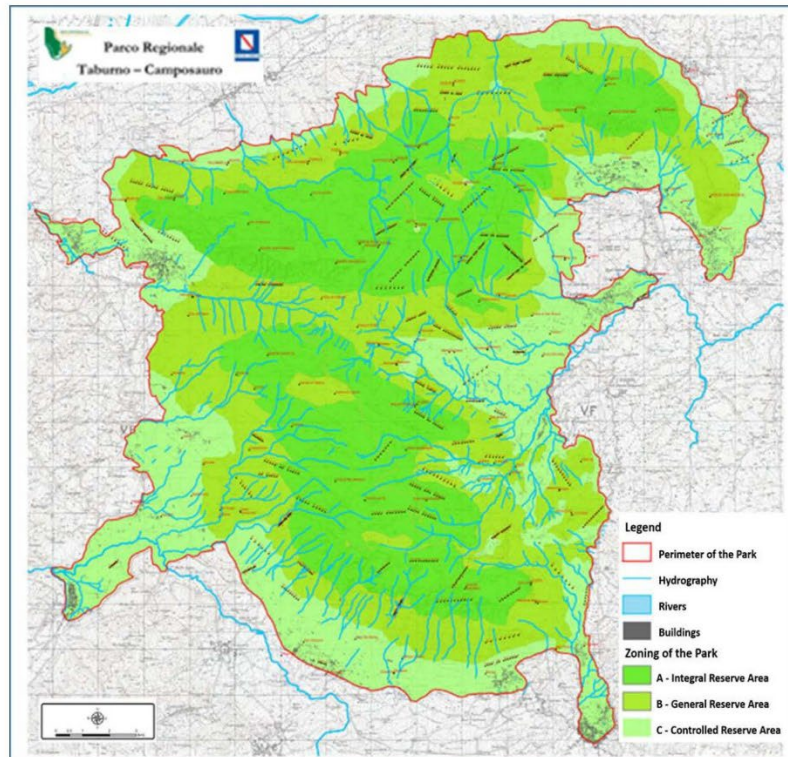
Taburno Camposauro, Italy

Geographical and geological summary

Location (see the red star in the Europe map and the red coloured shape in the Campania map)



Map of the Regional Park of Taburno Camposauro on a topographical basis of the IGM



1. Physical and human geography

The area proposed as aUGGp is located in the Campania region, in Southern Italy and falls entirely within the province of Benevento. The boundaries of this area coincide with the Taburno Camposauro Park already protected at the regional level since 2002 for an area of 123.70 sq km. This park extends into an inner area of the region and takes its name from the homonymous reliefs, included in it. These reliefs belong to the Apennine chain, which extends along the Italian peninsula from north to south. The boundaries of the Park clearly separate the foothills of the reliefs from the river valleys (Volturno, Calore, Isclero rivers), that surround it almost entirely on all sides. The altitudes varies from 1394 m at Taburno and 1390 m in Camposauro to 250 m at the foothills.

Within the Park boundaries there are partially or entirely the following municipalities: Bonea, Bucciano, Cautano, Foglianise, Frasso Telesino, Melizzano, Moiano, Montesarchio, Paupisi, Sant'Agata de 'Goti, Solopaca, Tocco Caudio, Torrecuso and Vitulano. The total population exceeds 52,000 inhabitants (2021), but they are essentially concentrated on the edge of the Park. Based on the geographical arrangement, the minimum distance from the regional capital Naples is less than 50 km, while from Benevento, Caserta and Avellino, other provincial capitals, it is respectively 15, 25 and 30 km. The distances with the regional borders are 70 km to the east with Puglia, and about 40 km to the north with Molise. As regard the populations of the Park area, they are mainly devoted to agriculture and pastoralism. These activities are carried out in compliance with the naturalistic address of the area and the maintenance of the tradition handed down over the centuries, to the point that some products have received awards and quality marks.

2. Geological features and geology of international significance

Taburno Camposauro (a)UGGp are located in the southern segment of the Apennine chain. The belonging to this segment is evident from the geological history since upper Triassic, which can be read in the outcrops of the rocks, in the form of the landscape and in the hydrogeology of this area. The same history of man, who has frequented these places from very long times (Palaeolithic period), seems to be embedded in these characteristics, indeed over the centuries man has appreciated the advantages of using these assets. In fact, it is not possible to detect in the eastern Camposauro, the beauty of the shallow marine limestone outcrops of the Cretaceous. In fact, in this period, these limestones were found suddenly emerged and therefore subject to atmospheric degradation, so they were altered and corroded. The filling of the fissures and cavities with residual deposits allowed the "colouring" of these rocks with various shades of red. Soon they became the object of mining, and today these worked stones, improperly called "marbles", adorn the monumental buildings not only in Italy (Caserta, Naples, Rome), but also abroad (France, England and even Russia).

At the foot of the slopes of the Taburno and Camposauro reliefs, whose shape could derive from important faults (still seismically active), Quaternary polygenic accumulations in large alluvial fans and detrital strata are visible. The oldest deposits given by cemented breccia with paleosols date back to the lower Pleistocene, while the more recent ones rework the debris of the previous ones through gravitational phenomena rather frequent in this context.

Intercalated to the deposits of the foothills, especially in the areas closest to the plains, partially buried or even in beautiful exposure, numerous volcanic units deriving from the Campania district of Campi Flegrei and Somma - Vesuvius. In particular, the Campanian Ignimbrite emerges in the area, put in place about 39,000 years ago, which represents the top of the explosive events that have occurred in Europe in the last 200,000 years. The top of this ignimbrite was used for the ancient settlements of this area, and nowadays constitute beauty villages perched on rocky spurs.

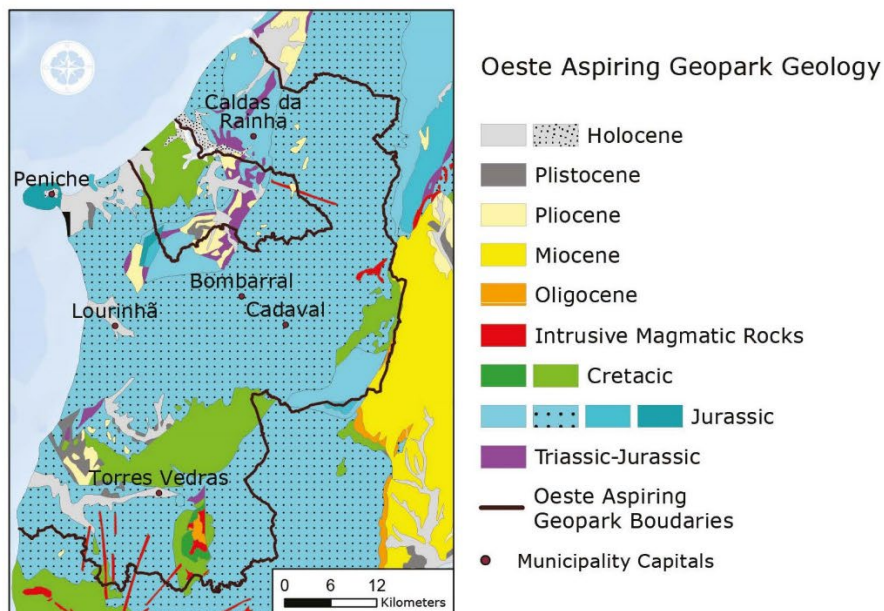
Another aspect that should not be underestimated is the abundance of water. In addition to the numerous small springs scattered almost everywhere in the Park area and to the hydrographic network that diverges from the reliefs to the surrounding plains, the groundwater feeds copious water sources at the foot of the reliefs. Among these, the Fizzo Springs, located at the south-eastern side Taburno, are the most important. They were known since Roman times, but then acquired great value when the waters were used to feed the Royal Palace of Caserta with monumental aqueducts. These sites, outside the park boundaries, have been included in the UNESCO World Heritage List.

Applicant UNESCO Global Geopark

Oeste, Portugal

Geographical and geological summary

● Aspiring UNESCO Global Geopark



1. Physical and human geography

The Oeste Aspiring Geopark (OAG) is located on Central West Portugal, North of the capital city of Lisbon, with most places around 1 hour away by car. With an over 50km long coastal area, including several attractive beaches, it stretches around 30 km to the East, thus incorporating also more inland agricultural and mountain areas.

The OAG comprises an area of 1 154 km², encompassing the territories of 6 municipalities: Bombarral, Cadaval, Caldas da Rainha, Lourinhã, Peniche and Torres Vedras. Today this territory is place for more than 213,000 habitants, with a density of around 185/km². Torres Vedras is the largest municipality, in area and number of parishes, although Peniche and Caldas da Rainha have the highest population density. All municipalities have a similar population distribution structure (young / working / elderly), very close to the national average. Over the last 20 years, the population has been quite steady in all the municipalities, and Torres Vedras even increased around 15%, showing the capability of retaining young people in these more traditional territories. The economic activity is based on many medium to small enterprises, mostly related to commerce (18%) and agriculture (16%), followed by management (13%), building (9%) tourism & catering (9%) and technical consultancy (8%). In terms of financial turnover, commerce leads with 44% and agriculture with 23%, while tourism related activities represent around 3%, but with a high impact on all the other areas.

2. Geological features and geology of international significance

The territory of the OAG is located on the Western Iberian Margin, related to the Mesozoic opening of the North Atlantic. Its sedimentary sequences are a precious record of the different geodynamic and depositional events, including also important stratigraphic and paleontological features.

The older sediments are Late Triassic salt-rich clays, deposited in sabkha environments, under arid climates on a breaking-up Pangeia. The Early and Middle Jurassic limestones document the development of an open broad epicontinental tropical sea and, within this sequence, the Toarcian GSSP (Peniche) is the main stratigraphic high-light of the territory. The Late Jurassic record is composed mainly of 2-3 km-thick siliciclastic sediments, ending with fluvio-deltaic layers containing abundant and important dinosaur remains. These include over a dozen holotypes and remarkably well-preserved egg-nests. This paleontological heritage is world-known and attracts many researchers and tourists to the region. Cretaceous fluvial deposits correspond to the late infill of the basin, containing also very important fossils, namely of the older forms of Angiosperms.

In Cenozoic times, all this thick Mesozoic infill has been affected by the alpine orogeny, up-lifting and exposing it in different places. Diapiric movements brought up to the surface the salt-rich clays and the deformed Jurassic limestones. Diapiric exhumed valleys, with thermal water occurrences, and bare limestone mountains or crests are a distinctive geomorphological feature of this territory. On the other hand, the sandy and clayey plains are place for intensive agriculture, mainly of vineyards and orchards. The coastal cliffs are an excellent place to observe the sedimentary sequences, while some long beaches and estuaries or lagoons show the influence of recent sea-level rise on coastal processes.

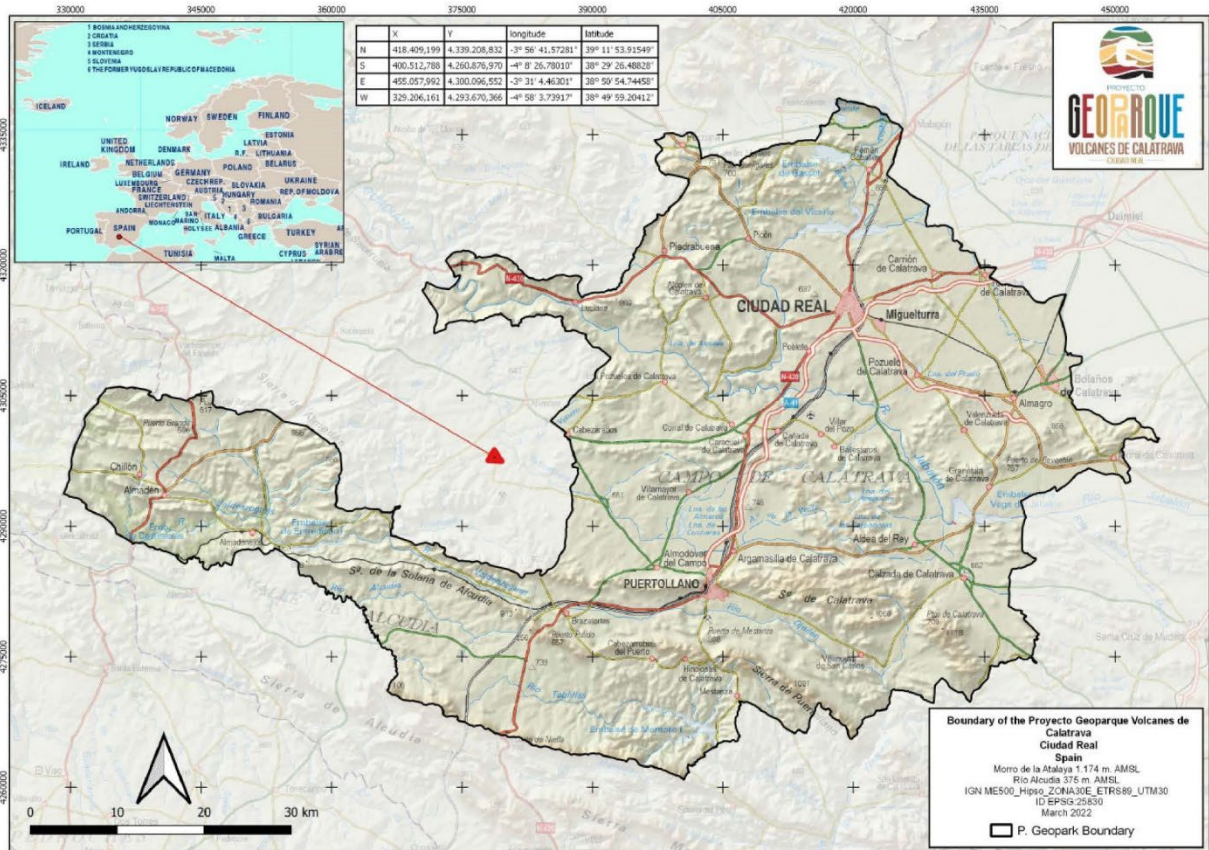


The region is an excellent mosaic of different sedimentary rocks and landscapes, with two internationally relevant geological features: the unique Toarcian Global Boundary Stratotype Section and Point (GSSP) and the remarkably rich paleontological (dinosaur) heritage.

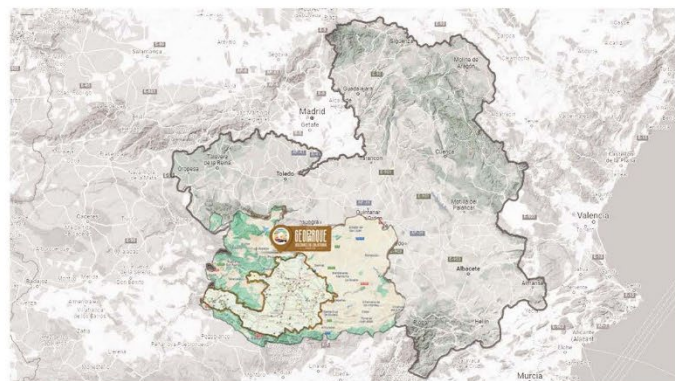
Applicant UNESCO Global Geopark

Volcanes de Calatrava, Spain

Geographical and geological summary



Localisation with Spain



Localisation within Castilla-La Mancha community

1. Physical and human geography

Ciudad Real is located southwest of the Autonomous Community of Castilla-La Mancha, occupying a large central-southwestern area of the province of Ciudad Real: 4,383.71 km², with elevations ranging between 1,174 and 375 m above sea level. The area is mainly spread over the natural region of Campo de Calatrava and the most northerly parts of the eastern Sierra Morena, represented by the western areas of the Alcudia Valley as far as Almadén, and the Ojalén Valley and the ranges that surround them, although there are also some small enclaves in the Montes de Ciudad Real, with which they share certain similarities.

The general characteristics of its physical environment are defined by the water base levels of the Guadiana and Guadalquivir rivers, and by the influence of the combination of a Palaeozoic rocky combination of quartzite and dominant slate, alternating in different mountain ranges, hills and valleys with a characteristic Appalachian morphology, and Tertiary materials of a limestone and clayey nature, which form small basins and plains that tend to intermingle with those in the more central-eastern areas. Together with all of these, numerous and diverse volcanic manifestations, almost unique in the Iberian Peninsula, stand out as singular protagonists of this area, distributed with varied morphologies of effusive and explosive genesis throughout the territory of the Geopark project.

The prevailing continental Mediterranean climate, with slight variations introduced by the topography and orientation of the slopes, determines the presence of a vegetation cover made up basically of siliceous holm oak groves and thickets, relegated to the areas with steeper slopes and poorer soil conditions.

2. Geological features and geology of international significance

The geological singularity of international importance of the 'Volcanes de Calatrava' territory coincides with the possibility of defining a chronological thread of special events that mark several geological singularities: (a) the world's most prolific mining reservoir (Global Geosite) of cinnabar, generated in favour of the "Criadero Quartzite" (Ordovician-Silurian) in the region of Almadén, and exploited by man over thousands of years: "MERCURY"; (b) the carboniferous mining basin of Puertollano, with excellently preserved botanical and faunistic paleontological evidence (Stephanian): "CARBON"; and (c) the Neogene-Quaternary intraplate ultrapotassic volcanism (with extrusions of the unusual olivine leucitites) and alkaline-ultraalkaline (with predominance of hydromagmatic and phreatomagmatic episodes generating spectacular maars, and imposing strombolian buildings), along with the existence of the Pliocene palaeontological site of vertebrates of "Las Higuieruelas" (Global Geosite), key to the understanding of the evolution of current species such as mastodons and equids: "MAGMA".

These international geological singularities are associated with highly valuable biotic interactions linked, for example, to the natural biological activity of the flora and fauna in the endorheic environments that currently provide maar-type buildings, as well as interactions with human activity (socio-economic activity and historical-cultural heritage), which have occurred over the last thousands of years.

In short, the territory "Volcanes de Calatrava" is geologically unique on an international scale because it combines - thanks to igneous processes - geological scenarios concatenated in



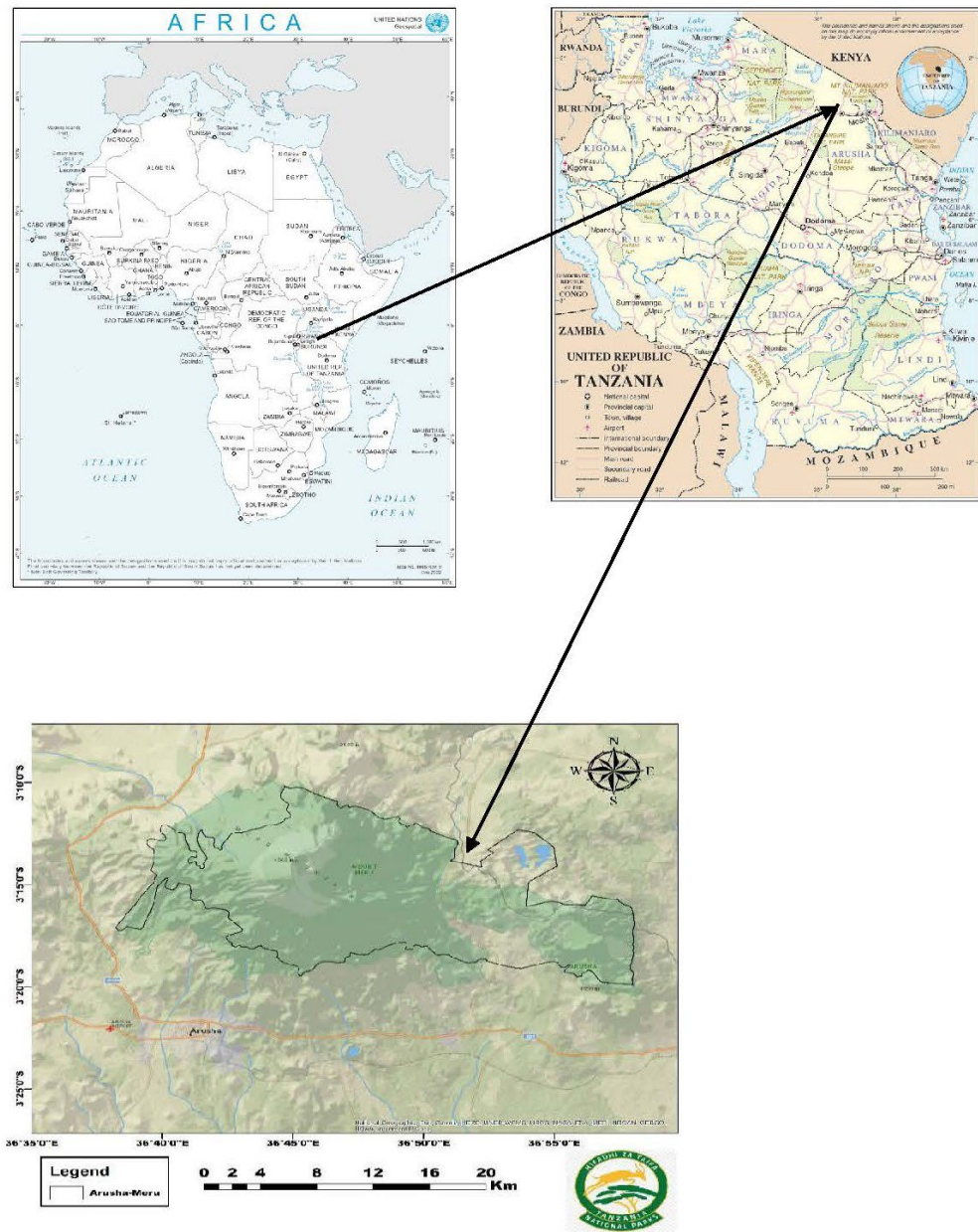
a geological time of 440 million years. The geotourism potential of this natural territory and its capacity for sustainable socio-economic development is enormous, as is its scientific, academic and educational potential.

Applicant UNESCO Global Geopark

Arusha-Meru, Tanzania

Geographical and geological summary

Location of the Arusha-Meru Aspiring Geopark, Arusha, Tanzania



1. Physical and human geography

The Arusha-Meru Aspiring geopark (aUGGp) lies between Longitudes 36° 45' and 36° 56' east and Latitudes 03 ° 12' and 03 ° 18' south. Arusha Meru aUGGP is located in Arusha Region, northeastern Tanzania in East Africa and covers 552 km². The territory is part of Arusha National Park that holds of Mount Meru (4566 m asl). It is the fifth-highest of the mountain peaks of Africa and the second one in Tanzania. The Aspiring geopark derives its name from Arusha National Park, a jewel associated with several geological sites such as Ngurdoto crater and Maio waterfall.

Arusha Meru aUGGP is surrounded with agriculturalists and pastoralists communities in the Eastern side of the East African Rift valley, which is part of the larger regional ecosystem of Mount Meru - Mount Kilimanjaro - Amboseli that covers Northern Tanzania and Southern Kenya respectively.

Administratively, the proposed Arusha Meru aUGGP lies in Arusha Region, adjacent to two districts of Longido and Arumeru. The park is boarded by 88 villages whose majority of inhabitants are Meru, few Maasai, Waarusha and other tribes. Majority of Meru are mainly farmers, few are pastoralist while the Maasai are purely livestock keeper. The geopark can be easily reachable by car and the Kilimanjaro International Airport (KIA) is located within 35 km.

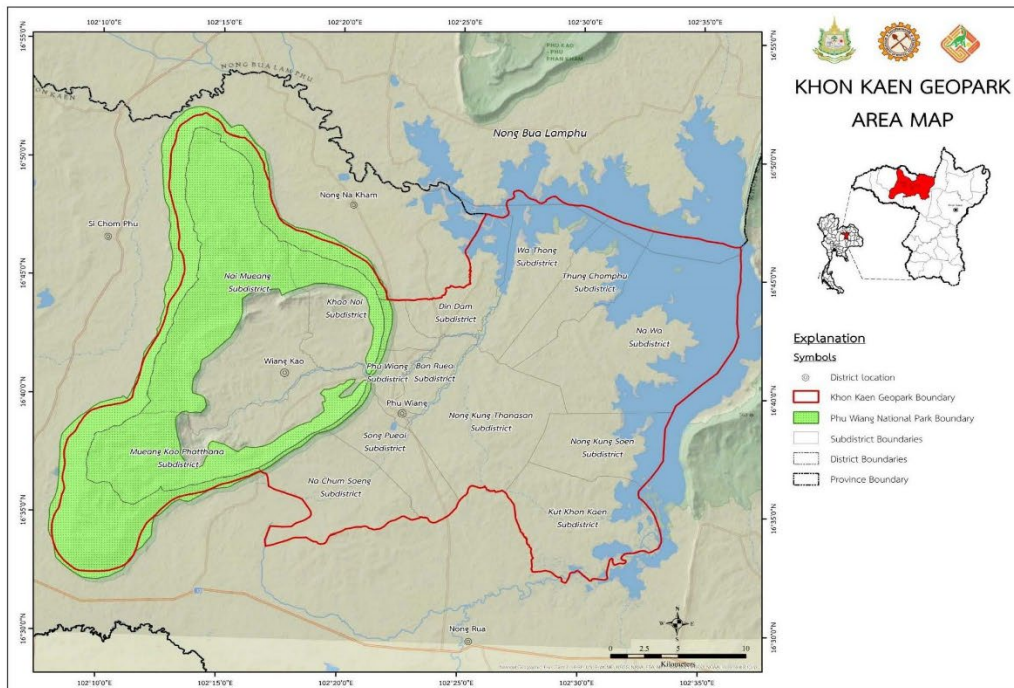
2. Geological features and geology of international significance

Arusha Meru aUGGP is located in an area of volcanic mountainous ranges associated with the Neogene Rift Valley Volcanoes. The Volcanic activity of the Mount Meru has begun approximately 1.5 Ma ago forming the Meru West volcanic center. The rocks of this group are composed of nephelinitic lava and breccia. Further studies showed that the breccia contain dominant phonolitic clasts, dated at 2 Ma, which indicating that there is series of alkaline lava eruption at the time or soon after Gregory Rift Faulting. The territory consists of some iconic sites, such as Mount Meru and Ngurdoto crater, which forms an important habitat for wildlife since it contains evergreen vegetation. The vegetation in the aspiring geopark is correlated to the altitude and geology of the area. Ngurdoto Crater is surrounded by forest whilst the crater floor consists of a swampy area. The Momela Lakes, like many in the Rift Valley, are alkaline, and the Mount Meru is a mixture of lush forests and bare rocks.

Applicant UNESCO Global Geopark

Khon Kaen, Thailand

Geographical and geological summary



Khon Kaen aspiring UNESCO Global Geopark area map indicating the boundary and location

1. Physical and human geography

Khon Kaen (a)UGGp is situated in the Khon Kaen province, Thailand and covers the entirety of both Phu Wiang District and Wiang Kao District with an altitude ranging from 200 to 844 meters above sea level. The total estimated area of Khon Kaen (a)UGGp is 1,038 sq. km. The geopark has a syncline, a mountain range called Phu Wiang comprising of Sao Khua and Phra Wihan Formation. With only one entrance and exit, the mountain is also home to several excavation sites and geosites like caves and waterfalls. Outside the mountain range, the soil characteristics is mostly sandy loam soil with low natural fertility. There are also scattered saline soil found in some regions, namely those in the surrounding plains of Wiang Kao District and Phu Wiang District. The Geopark has 3 seasons within a year: winter, summer, and rainy season, with the average year-round temperature of 27.4 degree Celsius, the average annual rainfall is 1,199 mm, with the highest rainfall occurring in September (202.3 mm). More than half of the natural forests within Khon Kaen (a)UGGp are dry evergreen. Deciduous forest and mixed forest are also found in Phu Wiang National Park, a national park located within Phu Wiang Mountain range. Endemic flora and fauna are abundant, including birds, mammals, reptiles, skinks, wildflowers, and fungi, with some newly discovered fungi species.

The total population in the Khon Kaen (a)UGGp in 2022 is 91,696 people with a population density of 88 people per square kilometer. Most of them are Isan Thais, an ethnic group descended from Laotian origin. At present, the ethnicity is largely blended with the local population. Most of the people are farmers, cultivating field crops, sugarcane, and rice as their main sustenance. In addition, there are also Chinese groups engaged in trading in the municipality of Phu Wiang Subdistrict. According to statistics of the bureau of Registration Administration, Ministry of Interior, most local people are Buddhist.

2. Geological features and geology of international significance

The most noticeable feature of Khon Kaen (a)UGGp is its paleontological discoveries and unique geomorphology. Due to the Sao Khua formation underlying Khon Kaen aUGGp's richness in fossils, many paleontological discoveries have been made. The first dinosaur fossil in Thailand has been unearthed here in 1976, which pioneered many more discoveries and advancement of paleontology in the country. The fossil record of Khon Kaen aUGGp includes a species of sauropod, three theropods, and an ornithomimosaurian. 3 out of 5 newly discovered species are carnivorous dinosaurs, indicating the abundance of paleo-ecosystem. Evidence of juvenile dinosaur fossils are also discovered throughout the sites. Radiogenic mineral studies to determine a more precise age of the Sao Khua Formation has calculated its age. The result indicated it was during the Valanginian period, between 139.8-132.6 million years ago, making the fossils found in Khon Kaen aUGGp even more important since fossils from around the world of such period are noticeably rare; only a few locations, such as those in Spain and Australia, have been noted. Knowing the age of the formation help supporting a point that some oldest dinosaur species might have originated here in Phu Wiang Mountains. In other words, the geopark could have been one of the birthplaces of Spinosauridae dinosaurs. (*Siamosaurus*), *Ornithomimosaurus* (*Kinnareemimus*), and *Megaraptora* (*Phuwiangvenator*) Apart from dinosaurs, some of the specimens found throughout the valley include bivalve, sharks, crocodylian, turtle, and fish. From its



paleontological and geomorphological value, the main geological highlight of Khon Kaen aUGGp is that it is comparable to a kingdom of dinosaurs where species lived together within the surrounding syncline of Phu Wiang Mountain as their home.

Applicant UNESCO Global Geopark

Zonguldak, Türkiye

Geographical and geological summary



1. Physical and human geography

The aspiring Zonguldak Coal Geopark (aZCGp) covers the entire province of Zonguldak. The border in the sea direction passes 2 km off the coast. Its coastal length is 80 km and the total area is 3.502 km², 160 km² of which is in the sea and 3.342 km² of which is on land. The city is surrounded by the Black Sea from the north and has a very rough terrain: 56% of the area is covered by mountains, 31% by plateaus, and 13% by plains. Having a rainy climate, it is richly endowed with freshwater resources. Due to its coastal location and climate, the vegetation of the province consists of forests mostly composed of mixed deciduous trees, depending on the typical characteristics of the region. The province is home to about 80 lichens, 20 liverworts, 90 mosses, 500 plants, 90 mushrooms, 130 butterflies, 50 freshwater fish, 150 sea fish, 7 amphibians, 25 reptiles, 308 birds and 60 mammal species. The Zonguldak basin has the country's single hard coal reserve and has significant mining-related industrial heritage. 47% of the industrial workers are employed in coal mining, 25% in the iron, steel, and metal products manufacture, and 8% in textile production. The ethnic being homogeneous, Turkish is the spoken language in the province. The increasing need to underground mining led to immigration from all over the country, therefore the city has more heterogeneous cultural structure rather than having an authentic local culture. With the geopark, hidden values will be turned out to be economical and social added value. Local culture will be able to conserve and the image of the city will be strengthened. The aZCGp will foster the role of women in society and business and also promote sustainable development. aZCGp is the first aspiring geopark the Black Sea region.

2. Geological features and geology of international significance

The earth history of the geopark goes back to more than 500 million years. The oldest rock units in the geopark area are Neoproterozoic crystalline metagranites, dated to 570-590 ma. The Paleozoic units of the İstanbul – Zonguldak (İZ) Zone include almost complete Paleozoic and Mesozoic sedimentary sequences, overlaid the Precambrian basement. The IZ Zone includes a continuous sequence from clastics to black shales of the L. Ordovician-Silurian. Devonian and L Carboniferous units are composed of shallow marine facies. U Carboniferous sequence contains terrestrial formations including coal seams - the main value of the Zonguldak basin and geoscientific theme of the aZCGp. The Paleozoic ends with the terrestrial units. Two different terrestrial units are observed in the geopark area: Permo-Triassic and U Jurassic L Cretaceous. L Jurassic - U Cretaceous rocks show a large variety of from sedimentary to magmatic suits. The U Cretaceous are characteristic volcanic arc deposits (andesitic/basaltic columns, pillow lavas) developed along the subduction zone of the Intra-Pontid ocean. It grades into the marl, shale and flychoid deposits. U Cretaceous – L Eocene deposits represent deeper marine environment. Geological units in the geopark area show evidences of three different orogenies, the Panafrican, Variscian and Alpine. The faunal, floral and paleobiogeographical evidences demonstrate the presence of the paleo-oceans (Paleotethys, Reic, Intrapontid) and the continents (Laurussia, Pangea, Laurasia). Present geomorphology is mainly derived by neotectonic and climatic process in Neogene-Quaternary, forming landscapes such as valleys, hills, side by side bays, rivers, deltas, caves, dolines, karstifications and landslides.