



# First Cameroonian Conference on Geomorphology (CCG1)



**29 September -2<sup>nd</sup> October**

**Topic: Landscape and Landforms of Cameroon**

**Venue: University of Yaoundé 1**

## ABSTRACT

Due to its wide latitude extension (2°-13° N), Cameroon benefits from a diversity of environments and landscapes in quadruple geological, morphological, bioclimatic (ecological) and human terms. This gives it the name of Africa in miniature rich in natural resources with multiscale contrasts of geomorphological landscapes. Its triangular shape offers it to be a real topomorphological hinge which has recorded all of the geodynamic events and which have marked the African continent (from the dislocation of Gondwana to the present). It summarizes in its broad outlines, the reliefs and the morphology of Africa. Basins and pediplains bristling with inselbergs are dominated by massifs with concave slopes in the northern Sahelian regions. They contrast to the south with vast polyconvex areas of levelling and degradation of the southern Cameroonian forest plateau which dominate the Atlantic coastal plain. Between these two entities, arise imposing mountainous groups covered by volcanism. These reliefs limited by tectonic and lithological escarpments and cut for the most part in the rocks of the Precambrian basement, result from a long evolution marked by the staggering of the planation surfaces, from where varied landscapes and models.

## ANNOUNCEMENT

### Rationale

Located at the bottom of the Gulf of Guinea between 2° and 13° North, then, 8° 30' and 16° 10' East, Cameroon makes the junction between Central Africa and West Africa. Its geographic location explains the variety of its natural and cultural landscapes, its climates and its diverse population that permits Cameroon to earn the name of "Africa in miniature". Covering an area of 475,000 km<sup>2</sup>, Cameroon is bordered to the northwest by Nigeria (over 1,720 km), to the north by Chad (1,122 km), to the east by the Central African Republic (822 km), to the south by the Congo (520 km), Gabon (298 km) and Equatorial Guinea (183 km). It holds a west opening of about 400 km of coastline on the Atlantic Ocean. With such a deal, it is necessary not to say useful to give a general overview reflecting the diversity of landscapes and landforms of Cameroon.

### Problem and general objective

Cameroon is a summary of all African morphological features. Its morphology extends from the plains to the mountains passing through plateaus. The country encompasses all the characteristics of tropical bases and African volcanism. In terms of topography, five natural regions (lowlands and basins of the North, Adamawa plateaus, southern Cameroonian plateau, Western highlands and coastal plain) characterize the country and are worth a look to explore various landscapes and landforms as well as their shaping. This is the subject of this conference for which seven (07) major thematic entries are proposed.

### Proposed thematic axes

The main thematic entries proposed below are roughly modelled on the different geomorphological landscapes that characterize Cameroon.

#### 1. Large fluvial basins of Cameroon (interior and exterior basins)

The hydrographic network of Cameroon is vast and in phase with the diversity of the relief (Olivry, 1986). The fact that Cameroon belongs to several hydrographic basins in Africa is intrinsically linked to its mountainous nature, since

80% of the rivers rise between 1000 and 3000m altitude (Olivry, 1986). Cameroon's drainage is thus organized around a fairly diversified hydrographic network divided into 4 major areas:

1) the Atlantic basin is drained by the Sanaga (920km long), Nyong, Ntem, Mungo, Wouri (Sigha-Nkamdjou et al, 1998; Lienou et al, 2008), Dibamba, Lokoundjé, Kienke and Lobé rivers which are the only rivers from Cameroon that end their course in the Atlantic Ocean. In this Atlantic basin, the Sanaga River is the longest in the country (920 km) with a basin of 140,000 km<sup>2</sup> accounting for 30% of the national territory; followed by Nyong, Ntem, Mungo and Wouri which totalize 20% (Olivry, 1986 & Tchindjang, 2012).

2) The Congo Basin, which collects waters from the entire eastern and south-eastern part of Cameroon, with 85,300 km<sup>2</sup> for 2.31%. It includes two main rivers: the Kadéi which is swelled by the Doumé and the Boumbé and which joins the Mambéré to form the Sangha in Central African territory; the Ngoko which joins forces with Boumba and Dja to merge with Sangha in Congolese territory.

3) The Niger Basin which collects the waters of the Benue sub-basin (Menchum, Katsina Ala, Donga) and the Cross River, with 88,100 km<sup>2</sup> for 4.17%. It is drained by the Benue which collects the waters of the Mandara and Alantika, located in the north of Adamaoua, it essentially includes the Faro and the Mayo Kébi (IRD, 1999).

4) The Chad Basin which receives the waters of Logone and the entire Far North region with 46,800 km<sup>2</sup> for 1.96%. The Logone is the main river with the Chari which originates in Central African territory. The Logone has its source in the northeast of Adamawa, Mbéré and Vina. While part of this water flows into the Benue, another submerges the Yaéres whose emptying is ensured by the El Beid and the Serbewel. The Logone and Chari rivers drain a lacustrine depression of more than 20,000 km<sup>2</sup> in the rainy season (Olivry et al., 1987, Mahé and Olivry, 1991; L'hôte et al, 2002).

Since Rivers portray the image of the physical traits of Cameroon, contributions on the dedicated geomorphological landscapes will be welcomed with emphasis on the shaping of the water courses in these environments and on erosion. We cannot forget to bring up ideas on the contact between sedimentary basins and massifs as well as the predominant tectonic models. In addition, the geosites of these large basins constitute real niches for tourism.

## **2. Coastal landscapes and northern lowlands**

The landscapes of the coastal natural region are partially made up of highlands on the one hand and the lowlands (sedimentary Basins plains, etc.) on the other hand. The Cameroonian coastal sedimentary basin, located on the edge of the Gulf of Guinea covers an area of 7000 km<sup>2</sup> (Sighomnou, 2004). It corresponds to a subsidence trench formed from the Cretaceous and gradually deepening towards the ocean where it reaches thicknesses of 4,000 m at 40 km and 8000 m further offshore. The main formations are essentially black marl and clay as well as sandstone sand. The lowlands represent a sedimentary area of 90 m above sea level. They extend between the mouth of the Akwa Yafé which constitutes the western border between Cameroon and Nigeria, and, the mouth of the Lokoundje that prolongs in an uninterrupted manner right to the Atlantic Ocean that serve as the limit to the West. The coastal plains appears limited eastwards by the Cameroonian South Plateau and northwards by the western highlands. This coastal region is essentially constituted by mangroves, creeks and sandy bars. The widths of these widely spread plains rarely exceed 150km and they are made up of sedimentary terrain covered in certain places with basalt. The morphology of detail shows many small hills convex or frankly in half oranges which seldom exceed 200 m of altitude. The Cameroonian coasts are subdivided into two large parts including the rocky coasts and the low sandy coasts. The Cameroonian coast nowadays represents a milieu of intensive erosion and modifications of the coastline from Bakassi to Campo with recurrence of floods.

The northern lowlands are units comprising the Benue basin and the Tinguelin massif, the Diamaré plain and the Chad plain which abut to the west on the Mandara mountains (Wakponou, 2004), the highest peak of the region. The whole of the plain constitutes an outwash zone of tertiary, quaternary and current alluvium found in Lake Chad. The formations are essentially sandy, clayey to clayey-sandy, sandstone and sand-limestone. The flatness is great, especially in the Yaérés, the Logone flood plains which lead to the swamps of the Chari delta. Apart from the waters of the Logone, the Yaérés equally received the waters from a dozen of mayos emanating from the Mandara Mountains. In the plains, the soils deposits are generally very sensitive to water and wind erosion, accentuated by the depletion of the vegetation cover.

It is possible for different contribution to elucidate in detail the contact between Sedimentary basins and massifs without excluding the predominant tectonic models.

### **3. Granitic and volcanic landscapes**

Cameroon has a particular wealth of granite landscapes spread across the country. The geomorphological evolution of the granites is to be considered as well as the resulting large massifs. The most picturesque is the multiple residual Landscapes and their uniqueness at times giving rise to geomorphological landscapes useful for geotourism. This is essentially with the famous granitic massifs and tors of the dry regions (Badjava, Kossa, Doyang) or those of the humid regions (Yavou, Batié, Baloum, Dshang and Bamenda). The evocation of the folding of the Figuil-Bidzar areas is not to be neglected, as well as the Koza gorges. In the zone of South Cameroon (South of Bana), the cutting of these granites into turret landscapes so close to karstic models constitutes important axes as much as the tectonics that presided the setting of these granites. The falls established on the fronts of the granitic or tectonic escarpments constitute important elements of geotourism. The Cameroonian plateaus are dotted with a variety of massifs with diversified substrata, sometimes granitic (Mont Pou, 1724 m and Bani massif, 1921 m), sometimes anorogenic (Mont Koupé, 2064 m; Mont Nlonako, 1825 m; Mont Bana, 2097 m and Mbam massif, 2263 m; etc...). The granite massifs of these different environments present a morphology of rumps and hills in half-orange, granitic domes molded on the convex slopes and especially the areas with granitic boulders and blocks on the concave convex slopes. This same morphology is enriched by the presence of multifaceted forest slopes characterized by an acyclic and polycyclic evolution (Tchindjang, 1996).

Cameroon possesses the particularity to have benefitted from volcanic activities in about 35% of its territory. These volcanic landscapes are characterized by milieu with cyclic and polycyclic evolution. The Ngaou (1900m) and the Tchabal (2000-2400m) of the Adamawa plateau will supplement the descriptions on the volcanic landscapes of Mounts Oku (3011), Bamboutos (2744), Manengouba (2411), Fako (4070) and the High Lava/volcanic Bamiléké plateau (Kagou Dongmo, 1998), Bamoun et Bamenda (trachytic volcanism). Volcanic massifs are shaped in rumps, convex slopes and basaltic planeze forms dissected by a ramified hydrographic network and bordered by gallery forest. Acid volcanic rocks such as Trachytes, Rhyolites, and phonolite outcrop as domes, spines and huge tabular walls incised by water that cross them by waterfalls. At some areas, erosion on basaltic material give way to a mixed landscape composed of duricrust rumps and picturesque granitic boulders found in the Adamawa plateau and Western Highlands. Also, the diversity of crater lakes in these volcanic highlands constitute peculiar landscapes (Ejagham, Bene, Manengouba, Edib, Dissoni, Barombi Mbo, Mami Water, Barombi-Koto, Bwando). The same with thermal and mineral springs (Baré, Bangem, Melong) (Tchindjang et al., 2011).

Contributions on granitic landscapes in all their dimensions (tectonic, modelled, planation, alterations) will feed this section. Also, contributions illustrating these volcanic Landscapes especially with regards to their diversity and plurality would obviously enrich scientific debates.

### **4. Plateaus, residual massifs and planation surfaces**

This country, made up of more than 63% of plateaus (Olivry, 1986, Tchindjang, 2012), abounds in a plurality of planation surfaces. The southern Cameroon plateau is a morphological entity made up of cells and bristling with inselbergs with concave slopes. These inselbergs have a gradient slope varying from 25 to 40 ° on certain areas. Admittedly, the plateau is very broad but, there are sectors that are typically mountainous such as north-west of Yaoundé with Mount Eloumdem, Mt Febe, Mt Mbam Minkom (1295m) to name but a few which represent residual reliefs. There are several types of planation surfaces in Cameroon including:

- Backfill surfaces coexisting with planation surfaces;
- Flexured edges and faulty dome fallout;
- Inherited planation surfaces;
- Partial planation in dry mountains.

The problem of inselbergs indissociable from that of planation surface and that are found in the tropical environments with alternating seasons. Contributions related to residual and chaotic massifs, granitic inselbergs, in short to paleoforms will be highly appreciated.

### **5. Landscapes of the Great Plutonic and Volcano Tectonic Escarpments**

In Adamawa as well as in the western highlands, the uplands are separated from the surrounding areas by vigorous escarpments of more than 700 m asl. The western and southern borders are raised and overhang the coastal

region by tectonic escarpments of 700 to 1000m range. To the east, the plateau overlooks the Nun plain (1100 m) with a fault line escarpment of 200 to 300m in command, meanwhile in the north, the plateau comes into contact with the Grassfields region (1800-3011 m) of Bamenda which dominates the Ndop collapse basin (1200m) by a fault line escarpment whose height vary between 500m and 700m and that of Tombel at 150m. Finally, a 1000 m range equally separates the Tikar penepain from the Grassfields (Morin, 1989). On the whole, this region is so affected and characterized just as Adamawa, by active fractures as evidenced by the earthquakes of Magba in 1983, Monatele in 2005 and Yaounde in 2019.

Contributions on the evolution of these escarpments and on the various contacts with lower environments would be highly appreciated.

## 6- Landscapes and areas at risks

Cameroon is a country exposed to natural hazards which modify the initial landscapes. Geomorphological landscapes of Cameroon are exposed to natural hazards whose risks induced are always quite significant. This is evidenced by the gaseous fumes from Monoun lakes (1984) with 37 dead and Nyos (1986) which killed 1,746 people. Mount Cameroon has erupted at least three times (1982, 1999, 2000). The same is true with the Ngouache mudfows in 2019 (43 victims) and the recent earthquake with a magnitude of 5.5 on the Richter scale in December 20, 2019 in Yaoundé. Landslides are numerous and widespread: Limbe in June 2003 (24 dead), Mag'haa in July 2003 (20 dead), Kekem in October 2007 (1 dead), Koutaba in October 2011 (2 dead), Dschang in 2017 (1 death) and Santchou in 2017. This means that from mass movements to volcanic occurrences, Cameroon have characteristics that expose it to these hazards. The same is true with the floods (2012 and 2017 in the Far North with 20 and 05 deaths respectively) and the sea level rise (2019 in Manoka) observed in recent times with the exacerbation of climate risks.

An inventory of these natural events is essential in order to contribute to the development of Cameroonian territory that would be instrumental in the reduction or total eradication of risks that are associated with hazards.

Contributions focusing on these different types of landscapes will be welcomed with regards to the dynamics of the slopes.

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**NB : The different contributions of the conference will be published in a Special volume *Landscapes and Landforms of Cameroon* under the *World Geomorphological landscapes* series after dual expert's report.**

## SUBMISSION PROCEDURES

Proposals for abstracts of 350 words maximum (plus the title and keywords) are to be submitted to the following email address: [acgcag20@gmail.com](mailto:acgcag20@gmail.com)

## CALENDAR

- The scientific committee will critically read the proposals.
- Launch of the call on **January 31, 2020**
- Abstracts submission until **April 15**
- The answer will reach the researchers on **April 30, 2020**.
- Registration is open from **July 15, 2020** until **August 31, 2020** for full payment of registration fees.
- The texts of accepted communications must be sent no later than **June 30, 2020**, in electronic form, to [acgcag20@gmail.com](mailto:acgcag20@gmail.com)
- A publication of the communications is planned, according to the terms of a double-blind expert opinion which will take place until **February 15, 2021**.
- Conference dates: **September 29 – October 2, 2020** in Yaoundé (Cameroon)

## REGISTRATION FEES

The registration fee is **40,000 FCFA (65 euros & 68 dollars)** for lecturers and **20,000 CFA (33 euros & 34 dollars)** for students. For students who could not pay the fees, they will be allowed to participate in the conference but without being able to benefit from the meals, the documents distributed or the field visits. Payment of the registration fee gives the right to summaries of the communications presented, lunches and the visit.

## EXCURSIONS PROGRAM

A scientific and tourist excursions program will be offered to participants, in particular:

- A visit to a lowland landscape (contact with sedimentary basin / plateau or massifs)
- A visit to the mountain landscapes around Yaoundé or after Bafia
- A visit to the geomorphosites of Nkolandom

The participation fees of the excursions are going to be covered by each participant: 25,000 FCFA, accommodation included (1 night) or 7,000 FCFA for zero nights with snack according to the chosen direction.

## SCIENTIFIC COMMITTEE

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MINRESI and Research circles: NGOUANET and NONO

These colleagues are in charge of sensitizing and encouraging other researchers to participate to the CAG Conference whether they are geologists or geographers.

### OTHER TASKS

Eric VOUNDI: sponsorship letters to MINTOUL and MINESUP

Thierry SEUTCHUENG TCHUENGA: letters of sponsorship to MINRESI

Frédéric SAHA, Sponsorship letters to IRD and IRGM

Mesmin TCHINDJANG: solicitation from AUF BACGL for sponsorship

Philippe MBEVO: Positioning and dissemination of the call on Calenda and website

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