The Barringer Family Fund for Meteorite Impact Research

Description of the project

Title: Mora Ring Structure as possible new complex impact crater in Cameroon, Central Africa

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Context and geological setting

Our knowledge on the importance of meteorite impact as a major geological process which still operated on the Earth and the other solid bodies of the cosmos by producing many circular to sub-circular patterns from various diameter sizes is improving continually. In spite of its wide size, the African continent, with a huge cratonic domain remains among the continents with a small number of known impact craters. The present Ph.D. project is devoted to the geological study of the Mora Ring Structure (MRS) with the aim to constrain its mode of formation – volcanic or impact. Mora Ring Structure, also known as the "Golda Zuelva" (~ 8 km diameter, 10°56'50.4759"N; 14°01'40.7651"E), is a regionally unique circular feature situated about 16 km from the city of Mora in the far north of Cameroon, central Africa. Its lies on the Precambrian crystalline basement rocks which is intensely deformed with numerous cross-cutting fractures and faults. There are various types of rocks, mainly, plutonic and metamorphic lithologies, and many types of so far barely investigated breccias can be found. Until today, previous geological works of this structure have been focused on its possible endogenous origin. These studies concluded that the age of Golda Zuelva was 66 ± 3 Ma (Jacquemin, 1981; Jacquemin et al., 1982), and that the structure represented an anorogenic magmatic complex. In contrast, Garvin (1986) performed a remote sensing study on some possible impact structures in Central Africa. He suggested that the Mora Ring, could be a possible meteorite impact structure or a recent eroded volcanic complex, or even a differentially weathered pluton. Finally, it could also be a large, isolated ring dyke like those known from central Nigeria. Ongoing studies by Temenou et al. (2017), were based on remote sensing analyses, but now have progressed to field investigation and laboratory work. In these preliminary studies a various kind of breccias (monomict or polymict) have been identified (Temenou et al., 2018a, b). No shatter cones have been identified yet in the field, but the chaotic deformation of the local area with much monomict brecciation has been ascertained. In addition, first petrographic analysis has shown some planar fractures in quartz.

Purpose of the project

This Ph.D. project on the Mora Ring Structure involves, GIS based mapping, images processing, an extensive petrographic study of the regional rock types from within and outside of the structure, especially of the various breccia types. We will look for the possible presence of diagnostic shock deformation (e.g., French and Koeberl, 2010). Any melt rocks located at Mora will be subjected to geochemical analysis. In addition, it will be attempted to further constrain the age of this event. The present project is aimed at investigating a possible extraterrestrial origin of the Mora Ring Structure, therefore an understanding of its origin will contribute to our knowledge of earth crater formation, and will allow us to improve our consideration about some crater-like geologic structures.

References


**Personal statement of my interest in Science**

Temenou Tiolo Aurélien is a motivated persevering person who is looking for knowledge, I like to be patient, humble and ready to work everywhere, alone or with a group depending on the circumstances. I know how to manage people and working with a team is my favorite aspect. I am a Cameroonian passionate of the geology, particularly the study of the Planetary Sciences (Planetology, Astrobiology, Shock Metamorphism, Tectonics, Structural Geology, Petrology, Geochemistry, Geophysics, Remote Sensing and Geoconservation). Planetary Sciences are part of the basis of knowledge of the universe in all its aspects. They help us to know ourselves better as human kind, and they also tell us on how to exploit rationally the resources of our environment. My interest in Science comes from my questioning on some great enigmas, and how to answer questions such as: what is the Universe? What are the phenomena that govern the shock between the different bodies of the cosmos? Where do mountains come from and what are their constituents and modes of arrangement? How to study distant objects from us? How to exploit natural resources? Where does life come from on Earth, and are we alone in the universe? Etc. Finally I found that impact cratering process is a key and a fundamental geological phenomenon which link most of these questions, and seem to be the cornerstone for their answers. I would like to boost the study of this domain (Impact Cratering) in Africa, especially in our sub-region of the central Africa. So I try to push my curiosity beyond the limits of what I think I know to seek further understanding of the geological and natural processes that have taken place and which still operate in the universe. All this with the aim of knowing ourselves better and improving our human condition to our environment by adapting it to the rhythm and laws that govern the functioning of the universe.

I cannot end this text without having a think to someone very important in my career as a young geologist. I would like to express my sincere grateful to the Emeritus Prof. Dr. Dieter Stöffler for connecting me to Prof. Dr. Wolf Uwe Reimold, my "mentor" in this field, may prof. Uwe find here my special thanks for his infinite support.