Emergence and carbonate platform formation on the Caribbean Large Igneous Province – Exposures of the Bahoruco Peninsula (Dominican Republic)

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The Caribbean Large Igneous Province (CLIP) is characterized by a discontinuous >5km thick basaltic plateau, largely of Late Cretaceous age, resting on an (originally Pacific) Jurassic ocean crust. The CLIP is thought to have formed far below the photic zone in large areas of the Caribbean Plate, and has remained deep oceanic, except for convergent settings, where it eventually became tectonically uplifted and exposed. More recently, Late Cretaceous subaerial development of the CLIP was documented by Buchs et al. (2018) in accreted sequences of W-Colombia.
Emergence of the CLIP and onset of shallow carbonates during the latest Cretaceous – Paleogene is also documented along the northern edge of the Caribbean Plate in the Lower Nicaragua Rise, the Beata Ridge and its onshore exposures in Hispaniola. Volcanic edifices of a depleted “second stage” CLIP volcanism (Dürkefälden et al., 2019) and/or a post-CLIP intraplate volcanism, may constitute the shallow substrate for carbonate buildups.
The aim of our study in the Bahoruco Peninsula (S-Dominican Republic) is to precisely date and better understand the establishment of subaerial/paralic conditions and the onset of shallow carbonate systems along the N-edge of the CLIP.
Our first field campaign (Nov. 2019) focused on the eastern Bahoruco mountains, where the volcanic basement (Dumisseau Formation, regarded as Upper Cretaceous CLIP and associated pelagic sediments) and the overlying carbonates are well exposed. In the studied outcrops, the first carbonates, mapped as Polo Formation (Joubert, 2010), are shallow, lagoonal to upper ramp rhodophycaean limestones that contain upper Paleocene (not middle Eocene as previously reported) larger benthic foraminifera.
This formation is overlain by the Upper Neiba Formation (s.l.), made of well-bedded, mostly micritic, sometimes cherty limestones containing planktonic microfossils. Dm-bedded turbidites occur occasionally and are made of reworked and displaced shallow benthic organisms. The peri-platform accumulations of the Neiba Formation cover the largest area of E-Bahoruco.

Hydrothermal activity and evidence of sub-aerial CLIP exposure have been largely debated in the Los Cheseses mining area (Espi & Pérez-Puig Obieta, 2017), where larimar, a hydrothermal blue pectiolite (gemstone) is mined. The mining area is one of our targets to understand the interaction of volcanic, hydrothermal and sedimentary processes. The hydrothermal activity has not been directly dated, but is considered to be of Late Cretaceous age. However, the overlying Paleocene-Eocene shallow carbonates show frequent silicification that we analyze to reveal their hydrothermal vs. biogenic origin. An 40Ar/39Ar

plateau age of 52.8±1.7 Ma (Early Eocene) was obtained from a dolerite dyke (whole rock) by Escuder-Viruete et al. (2016), in the basaltic (CLIP) basement of a coastal outcrop in the study area. Hence, volcanic/hydrothermal activity may have co-existed with carbonate sedimentation and may have affected Paleogene sediments. The origin of this silicification could be of major importance for the paleoenvironmental and paleogeographic interpretation of the Bahoruco carbonates.

To achieve our objectives, we analyze the sedimentology in the outcrops and in thin sections, determine micro- and biofacies, and establish a detailed biostratigraphy. Diagenetic and/or hydrothermal events will be studied using Rahman microscopy, microprobe and La-ICPMS analyses, as well as stable isotope analyses and $^{4}0Ar/^{39}Ar$ radiochronology of selected minerals, such as larimar.

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