

Title: New insights into the volcanic history of Guadeloupe and its interaction with faulting from submarine ROV observations and sampling offshore Les Saintes (Guadeloupe) - high-resolution mapping, K-Ar dating and geochemistry on data from the Subsaintes cruise (April 2017)

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Abstract:

The aim of this work is to reconstruct the submarine volcanic history in the area between the islands of Les Saintes (Guadeloupe) and Dominica and to investigate the interaction between faulting and volcanism. We will also link this submarine volcanism with surrounding volcanic islands. This area presents a high density of volcanic structures associated with a dense network of active faults as evidenced by previous studies (Feuillet et al, 2010 and Leclerc et al, 2016). The Subsaintes cruise (April 2017) has provided unprecedented high resolution marine geophysical data, visual observations and geologic samples. We combine ROV video footage with AUV high-resolution bathymetry and acoustic reflectivity imagery, precise observations on geological samples collected with the ROV to produce refined scale geological maps of the volcanic complexes and faults. A selection of the underwater lava samples was dated following the K-Ar method of Cassignol & Gillot (1982), and whole-rock geochemical data were produced and analysed. Five volcanic complexes were identified in the area, characterised by different types of volcanic structures and deposits ranging from 274 ka to over 4 Ma, showing evidence of different eruptive styles including some explosive episodes and complex volcano-tectonic interactions. On the basis of whole-rock major element geochemistry, the dominant compositions of the lava flows sampled are basaltic and andesitic. Basaltic structures mainly compose central parts of some of the volcanic complexes while the older flanks are of andesitic composition. This could be explained by a process of repeated injections of deeper-sourced magma into pre-existing chemically differentiated magmatic storage zones. Preliminary geochemical analysis of trace elements shows there may actually be several distinct source regions that might have a genetic link with magmatic systems in southern Guadeloupe. Although still in progress, this work already provides valuable new insights on unprecedented resolution into the regional volcanic history of the most volcanically active part of the Lesser Antilles volcanic arc (Guadeloupe-Dominica-Martinique) and especially in the area between Les Saintes and Dominica that might represent a zone of transition between the outer (older) and inner (recent) Lesser Antilles volcanic arcs, considering it hosts the oldest rocks ever dated in the northern part of the arc.