# EDTREF

# The GEOTREF program, a new approach for geothermal investigation Frédéric Gérard<sup>1</sup>, Simon Viard<sup>1</sup>, Michel Garcia<sup>2</sup>, and the GEOTREF members - 1: Teranov, Pointe-à-Pitre, France, 2: KIDOVA, Chaville, France

## **ABOUT THE GEOTREF PROJECT**

**GEOTREF** (multidisciplinary platform for innovation and demonstration activities for the exploration and development of high geothermal energy in fractured reservoirs

- Research, experimentation and innovation program, which aims to:
  - Improve understanding of the fractured geothermal reservoirs behavior;
  - Improve geothermal resources exploration procedure skills in the lesser Antilles arc; Improve target wells definition in order to minimize "geological" risk and optimize exploration costs;
  - Guarantee sustainable exploitation of the resource during the production phase.
- An exclusive license to prospect high temperature geothermal sites covering the Vieux-Habitants area (Basse-Terre, Guadeloupe) has been granted to GEOTREF for the implantation of a Demonstration Case Study (which aims to provide Research and Development in data as well as to validate the developed methodologies and modeling tools), in order to pursue with the development of High Energy Geothermal Development in this active volcanic area.
- To reach Research excellency, the project associates are:
- 16 PhDs and Post Doctorates from French universities and Research institutions in various fields: geology, petrography, geophysics, geochemistry, well logging, fractured reservoir characterization, dynamic simulations, phenomenological studies, uncertainty managemen
- 2 French private companies in charge of project coordination, as well as integration and valorization of the results • Funding : Investissements d'avenir - ADEME



## GEOLOGICAL CONTEXT AND INTEREST AREA

them of **geothermal intere**s During the exploration phase of the project, the geotherma reservoir characterization performed thanks to the study of

subsurface and of the exhumed potential analogs of the de



Raussen et al., 2013; Symithe et al., 2015; Vila et al., 1986

BC: Basal Complex – SC: Septentrional Chain – EP: Erosional Plain – AC: Axial Chain – VH-M: Vieux-Habitants Matéliane Escarpment – GDSVC: Grande Découverte Soufrière Volcanic Complex – MC: Monts Caraïbes The Basse-Terre Island is the result of 4 eruptive subaerial phases, punctuated by inactivity phases: I. Basal Complex; II. Septentrional Chain; III. Axial Chain, including Monts Caraïbes and IV. Grande Découverte Soufrière Volcanic Complex. The latter 2 phases are the ones outcropping at the scale of the PER and are mostly represented by non- in a deep active geothermal reservoir. cohesive formations which coat the structures.

61.600°O

Terre-De-Haut

Verati et. al, 2016

to the Anguilla bank and show Eocene to Lower Miocene volcanic and volcanosedimentary rocks consisting in the basement of the volcanic arc. We show that both neoformed (fractures) and inherited structures such as regional faults (N50°, N130°, N90° and N0°) and bedding control fluid circulation. Studying the structures and hydrothermal mineralization cropping out in these islands allows to picture how fluids are channelled by inherited structures

> The Terre-de-Haut Island, in Saintes, is a prominent analogue: the heart of the paleo-reservoir is exhumed and gives the key to the understanding of the hydrothermal system's functioning and evolution.

# GEOLOGY





Research topics tructural, Petrographic, Petrophysic and Geochronologic V. Navelot, Y. Géraud, D. Bartier (Georessources), M. Diraison (IPGS), G. Beauchamps, R Hebert, B. Ledésert, (GEC), A. Favier, J.-M. Lardeaux, M. Corsini, C. Verati, (Geoazur), S

#### FRACTURED RESERVOIR



Observation from micro-seismic with fluid injection to generate micro- datasets. seismic datasets. 1. Induced micro-seismic events. 3. Relating confining pressure to fracture system permeability. 4. Seismogram analysis. Microseism source location. mechanism.

Research topics F. Bonneau, G. Caumon, M. Raguenel (GeoRessources ), D. Bruel (Armines)

Knowledgeable & Imaginative Visions









**\_**~3 Ma

0 1km 2.00 – 2.08 Ma

2.10 – 2.40 M

#### Definition of the geological model for the deep reservoir



6. Analysis of velocity field and focal on nucleation, growth and





