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Vincent Bouchot, Bernard Sanjuan, Philippe Calcagno, Eric Gloaguen,
Isabelle Thinon, Lydie-Sarah Gailler, Jean-Michel Baltassat, Bernard
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The High-Temperature Geothermal System of Bouillante (Guadeloupe, French West Indies)

V. Bouchot¹, B. Sanjuan¹, P. Calcagno¹, E. Gloaguen¹, I. Thinon¹, L. Gailler¹, J-M. Baltassat¹, B. Bourgeois¹, C.Lerouge¹, A. Gadalia¹, E. Bourdon¹, H. Traineau², P. Patrier-Mas³, D. Beaufort³, C. Verati⁴

1) BRGM - BP 36009, 45060 Orléans Cedex 2 - France

2) CFG Services - BP 6429 - 45064 Orléans Cedex 2 - France

3) Université Poitiers, lab. HydrASA - 86022 POITIERS - France

4) Université Nice-Sophia Antipolis, Faculté des Sciences - 06108 Nice Cedex 2 - France

Correspondant: v.bouchot@brgm.fr

The Bouillante geothermal field, located on the west coast of Guadeloupe (Lesser Antilles), was explored in the 1970s, developed in the 1980s, brought into production in 1986, and expanded in 2005 to currently produce up to 15 MWe. In addition to its electricity-producing role, the Bouillante field is an outstanding research laboratory for improving our knowledge of a reference high temperature (260°C) geothermal system in island-arc environment.

A great deal of scientific research and exploration investigation have been carried out on the Bouillante geothermal field for 10 years, including geological investigation (volcanism), structural analysis of the fluid conduits, geophysical investigations both offshore (magnetics and high-resolution shallow seismics, see Calcagno *et al.*) and onshore (gravimetry, electrical resistivity tomography profile and passive seismic, see Gailler *et al.*), characterization of the surface and deep hydrothermal manifestations, numeric geological modelling of the developed field, fluid geochemistry and tracer tests (Sanjuan *et al.*) and hydrogeological modelling. This large range of multidisciplinary data has made it possible to develop an innovative conceptual model of this type of high-temperature geothermal system.

The model highlights the major influence of structural control on the development of the geothermal activity at different scales and especially on the geometry of the reservoir. It also explores new ideas concerning the geothermal system in terms of heat source, fluid circulation and spatio-temporal scenario. This scenario takes into account all events from the early magmatic activity of the Bouillante volcanic Chain (~500,000 y) up to the beginning of the geothermal field some 250,000 years later, having probably started with a phreatic explosion in the bay of Bouillante (see Patrier-Mas *et al.*, Verati *et al.*).

This 2D geothermal resource conceptual model will be used as an exploration tool to reduce geological risks for the next exploration drilling campaign.

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