A decade of near-seafloor geophysical surveys at Brothers volcano (southern Kermadec Arc, New Zealand)

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Brothers volcano is arguably more hydrothermally active than any other volcano along the Kermadec arc, with three hydrothermal fields located on the caldera walls and two hydrothermal fields on the Upper and Lower cones, respectively. These sites show different types of hydrothermal activity in terms of temperature, chemistry and associated mineralization, representing windows into the complicated hydrothermal systems that are associated with submarine arc volcanoes. For these reasons, the Brothers volcano hydrothermal system was recently drilled by the International Ocean Discovery Program (IODP). Here we show the results of ten years of near-seafloor geophysical observations collected using different platforms such as Autonomous Underwater Vehicles (AUVs) and Remotely Operated Vehicles (ROVs). High-resolution bathymetry, magnetics and heat-flow data and recent developments in geophysical inversion and quantitative interpretation provide essential information to improve models of hydrothermal circulation at Brothers volcano, which is a fundamental framework to investigate the future IODP results.