Geophysical Research Abstracts, Vol. 5, 08701, 2003

THERMAL, PRESSURE, AND FLUID MIGRATION REGIME IN AND AROUND MUD VOLCANOES, IN THE SOUTHERN BARBADOS ACCRETIONARY PRISM

S-H. Guerlais (1,2), E. Deville (1), F. Schneider (1), S. Lallemant (2)

(1) Institut Français du Pétrole, 1 et 4, avenue de Bois-Préau, 92852 Rueil-Malmaison Cedex, France (2) Université de Cergy-Pontoise , département des sciences de la terre, av. du parc, 95031 Cergy Pontoise, France (s-helene.guerlais@ifp.fr)

The heat flow regime of the southern area of the Barbados accretionary prism is partially defined from heat flow measurements at the sea floor, and from the depths of bottom-simulating reflectors (BSR), which is considered as the base of the temperature pressure field for gas hydrate stability. It appears that in average heat flows are high at the front of the prism (more than 70 mW/m^2), and relatively low in its inner part (lower than 40 mW/m^2).

Thermal positive anomalies compared to the surrounding sediments are well expressed on top and around some mud volcanoes, which are especially abundant in the southern part of the Barbados wedge. Those high heat flows, evidenced by direct temperature measurements, are related to heat diffusion associated to the circulation of hot fluids into the conduits of the mud volcanoes.

A 2D modelling in the southern part of the accretionary prism, an area of high sediment thickness and rich in mud volcanoes, allows a simulation of the overpressure field and the fluid migration in and around mud volcanoes. This can be compared to a similar 2D modelling made in the Nothern part of the prism in the area where ODP wells are available, and where sediment thickness is low and mud volcanoes absent.

We also studied the temperature distribution within the mud conduits of some mud volcanoes onshore Trinidad. We noticed an influence of the geometry of the conduits on the fluid circulation and thus on the temperature distribution. Complex tempera-

ture distribution implying convection processes were measured in large mud conduits. Whereas linear temperature implying processes close to simple advection were observed in linear mud chimneys. It is worth to note that in both cases one can obtain reverse thermal gradients that can be related either to the geometry of the convective cells or to changes during time of the temperature of the fluid flows at the base of the investigated conduits.