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ABSTRACT

CHARACTERISTICS AND SIGNIFICANCE OF A LARGE POCKMARK FIELD, NORTHERN OFFSHORE TRINIDAD

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Detailed mapping of the sea floor off the north coast of Trinidad has revealed a subsea terrain dominated by a field of large pockmarks covering an area greater than 55 square kilometers. The field lies in water depths between 150 and 166 meters; two distinctly different pockmark fields lie farther to the north and south. The individual pockmarks that populate the field have diameters ranging from several meters to several hundred meters across. Elongated coalesced pockmarks define the northern margin of the pockmark field; north of which only a few sporadic large pockmarks dot the seafloor. The seafloor sediment surrounding the pockmarks consists of undifferentiated silty clay with a thickness generally between 9 to 13 meters. A thin regional carbonate layer consisting of a mixture of authigenic carbonate and fossil corals underlies the very soft surficial clay. This carbonate layer is exposed in the pockmark floors and locally thickens towards the centers of each pockmark. Small isolated mounds extend up from the exposed carbonate and tend to increase in size and abundance outwards from the center of each pockmark. The regional carbonate is underlain by a clay layer that thickens towards the south and pinches out towards the north. The clay is in turn underlain by a relatively thick mass transport complex (MTC).

At first glance these fields exhibit rather conspicuous surface geometries. Considering the lack of shallow faulting in the area, the spatial arrangements of pockmarks are likely constrained by underlying sediment properties. Detailed examination of the shallow geology reveals an intricate interrelationship between the pockmark field and several near surface features.

Previous pockmark researchers have shown that these seafloor depressions usually form from fluids, gas, or both, escaping through the seafloor sediments into the water column. Active water/gas seepage and pockmark formation has occurred from earthquake activity in other seismic-prone regions of the world. In one instance, unusual methane expulsions were recorded several times during the hours before an earthquake. Because this pockmark field offshore Trinidad lies in a highly active tectonic setting, we believe conditions immediately above a pockmark should be monitored over time; monitoring should include temperature, salinity, and methane content of the water column as well as periodic precision mapping of the pockmark field.

Existing pockmarks historically have not been considered to be a particularly menacing geologic hazard. If further studies reveal that Trinidad's northern pockmark field is catastrophically related to earthquake activity and the subsurface sediment type, we will need to re-assess the hazards typically associated with pockmarks. It is important to acquire new data, integrate existing data and raise the general awareness of these dynamic features. The pockmark field off northern Trinidad may eventually become a highly valuable natural laboratory in which to further our understanding of seafloor sedimentation, seismic activity, and fluid/gas dynamics.