

Active Seepage Detection, Identification and Correlation Using Geophysical and Geochemical Methods, Yampi Shelf, Australia

Logan, G.A.¹, Gregg J. Brunskill², E. Grosjean¹, K.A. Burns², N. Rollet¹, A.T. Jones¹, J.M. Kennard¹, B. Opdyke³ (1) Geoscience Australia, Canberra, Australia (2) Australian Institute of Marine Science, Townsville, Australia (3) Australian National University, Canberra, Australia

Two recent offshore surveys (GA S276 and AIMS SS06/2005) have been carried out over the Cornea oil and gas discovery. Plumes of gas were observed using side-scan sonar (100 & 500 kHz) rising up from reflective blocky features a few meters across and/or pockmarks up to 10 m across and ~1 m deep. Active seepage was found around areas of attenuated seismic signal or high velocity pull-up on 3-D and 2-D data, related, presumably, to secondary carbonate cementation. The plumes were also observed using hull-mounted echo sounders (12, 120, 200 kHz) and were most intense during low spring tides. A range of cemented tubes were sampled using dredges during both surveys. These ranged from clearly identifiable Sabelariid worm tubes to highly encrusted carbonate tubes that may be abiogenic. Analysis of highly encrusted tubes revealed a range of n-alkanes from C13 to C32, maximising around C16 with no odd over even preference.

In one area gas was seen at the surface, and bubbles broke with thin oily films. Moreover, oily globules were observed in the water column during sampling (SS06/2005). Gas bubbles were collected and analysed for molecular and isotopic composition, revealing a very dry gas (99% methane, $\delta^{13}\text{C} = -41\text{‰}$). This composition is very similar to the gas analysed from the Cornea reservoir and indicates that seeping hydrocarbons are either derived from the reservoir or a similar hydrocarbon source. The location of this active seep area (0.5 x 1.4 km) has also shifted over 1 km between the two surveys.