

Spectral Detection of Oil and Gas Seeps on the Ocean Using Airborne and Satellite Sensors

Radlinski, Andrzej P., Geoscience Australia, Canberra, Australia

Spectral signatures of gas and oil seeps have been identified by analysing airborne hyperspectral data (Hymap Sensor) acquired over areas of controlled oil release at floating production facilities and at sites of known natural gas seepage. These data support theoretical predictions that thin oil films do not exhibit characteristic spectral absorption lines in the near infrared region. Instead, the modification of water albedo in a broad spectral range provides two different signatures for oil and gas. These spectral signatures have now been applied to locate unknown oil and gas seeps using hyperspectral data acquired over selected targets on the North West Shelf of Australia. The location of these seeps is consistent with their geological setting.

The nature of the spectral signature has allowed the feasibility of multispectral data for seep detection to be tested. Multispectral images acquired on various satellite borne detectors were tested for natural hydrocarbon seep detection over Coal Point, California, an area of active hydrocarbon seepage. This approach has allowed practical limits for seep detection to be established based on resolution and signal-to-noise ratio for these sensors. More testing is needed to fully establish the limits of applicability of the multispectral approach. However, the methods presented here show promise for quick and cost-efficient screening of large areas of continental shelf for gas and oil seeps.