

<https://news.vice.com/article/in-photos-shells-gulf-of-mexico-oil-spill>

# Oil Spill Detection Using Remote Sensing

## By Billy Walowitz

### Introduction

As the global demand for energy increases, companies are drilling for oil deeper and deeper offshore. This new exploration resents new environmental hazards and the need for better detection of spills.

Remote sensing is a powerful tool to use to determine where oil spills are. There have been major spills such as BP's Deepwater Horizon and Exxon Valdez, however, there are other spills that are caused by operation of ships moving across the world's oceans.

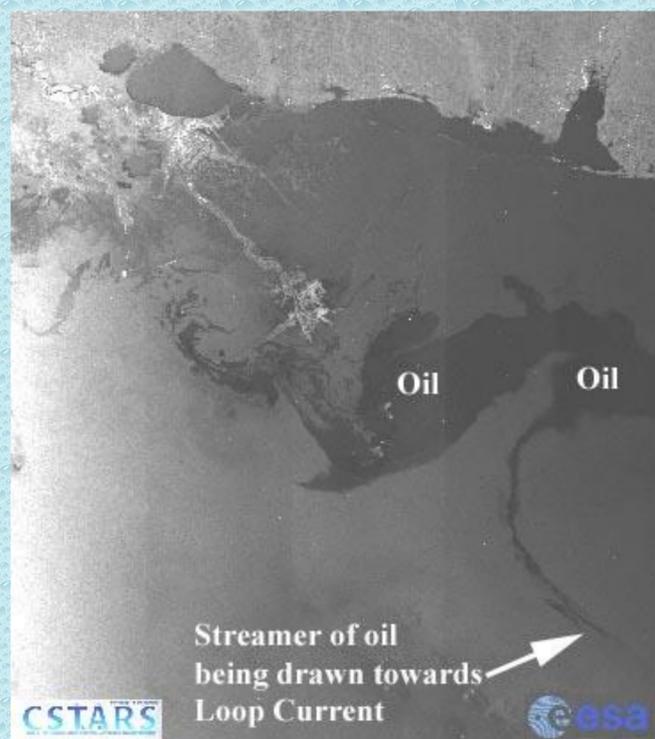
### Satellites and Sensors

- ENVISAT
- MODIS (Moderate Resolution Imaging Spectroradiometer)
- AVIRIS (Airborne Visible/Infrared Imaging Spectrometer)
- SAR (Synthetic Aperture Radar) Sensor

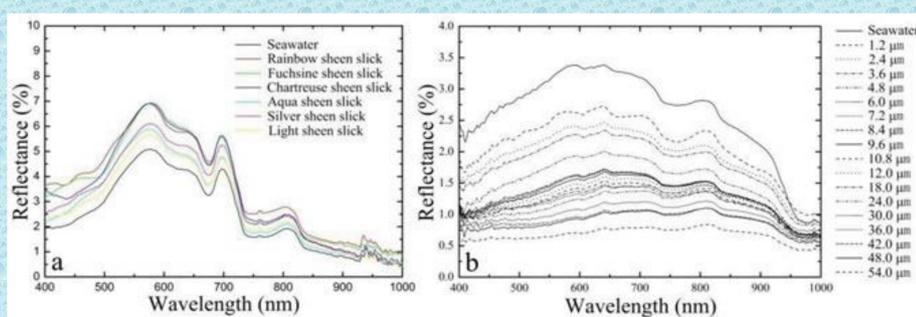
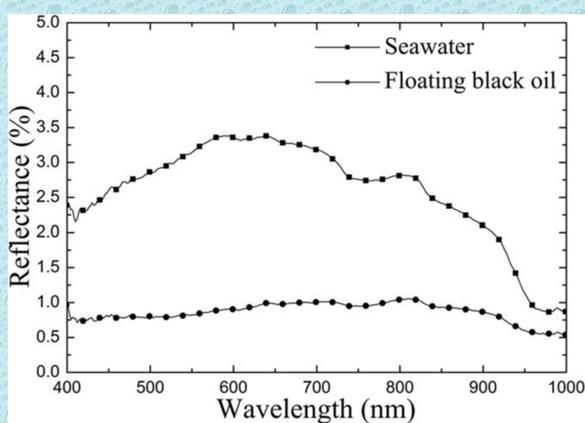
### Reflectance Values

Depending on the type of oil on the surface of the water, reflectance values differ. The darker the oil, the lower the reflectance value.

Oil slicks, depending on the thickness, will have varying response curves as well. Generally, the thicker the oil slick, the lower reflectance values.



[http://www.wunderground.com/hurricane/2010/oil\\_SAR\\_may21.jpg](http://www.wunderground.com/hurricane/2010/oil_SAR_may21.jpg)



Reflectance graphs of oil slicks sourced from Lu et al. 2013

### Conclusions

Oil spill detection technology is evolving and is making it easier to detect the hotspots for oil spills.

Most of the oil spills detected are from operational use of the ships, however there were malicious spills.

SAR is a good way to tell contrast between ocean and oil spills because it can be hard when only looking at reflectance values.

With these new technologies, we will be able to better monitor changes in the environment and how oil spills move in the open ocean

### References

- Camilla Brekke, Anne H.S. Solberg, Oil spill detection by satellite remote sensing, Remote Sensing of Environment, Volume 95, Issue 1, 15 March 2005, Pages 1-13, ISSN 0034-4257, <http://doi.org/10.1016/j.rse.2004.11.015>.
- Ira Leifer, William J. Lehr, Debra Simecek-Beatty, Eliza Bradley, Roger Clark, Philip Dennison, Yongxiang Hu, Scott Matheson, Cathleen E. Jones, Benjamin Holt, Molly Reif, Dar A. Roberts, Jan Svejksky, Gregg Swayze, Jennifer Wozencraft, State of the art satellite and airborne marine oil spill remote sensing: Application to the BP Deepwater Horizon oil spill, Remote Sensing of Environment, Volume 124, September 2012, Pages 185-209, ISSN 0034-4257, <http://doi.org/10.1016/j.rse.2012.03.024>.
- Lu, Yingcheng, et al. "Progress in Marine Oil Spill Optical Remote Sensing: Detected Targets, Spectral Response Characteristics, and Theories." Marine Geodesy, vol. 36, no. 3, Sept. 2013, pp. 334-346. EBSCOhost, doi:10.1080/01490419.2013.793633.
- M. Konik, K. Bradtke, Object-oriented approach to oil spill detection using ENVISAT ASAR images, ISPRS Journal of Photogrammetry and Remote Sensing, Volume 118, August 2016, Pages 37-52, ISSN 0924-2716, <http://doi.org/10.1016/j.isprsjprs.2016.04.006>.