## OIL-SPILL: A MAN-MADE DISASTER

A bird condition after the Deepwater Horizon oil blowout in 2010. The post-treatment survival rate of the Oil affected birds is < 1%.
Photo credit: Louisiana Governors Office/Alamy Stock Photo.

Oil weakens and kills vegetation, leading to the loss of roots, impacted by the Deepwater Horizon blowout 2010.
Photo credit: Bruce A. Davis, Department of Homeland Security.

OIL-SPILL DETECTION

$|\Re(\langle S_{HH} S_{VV}^* \rangle)|$ M_{33} γ_{CO} P_X
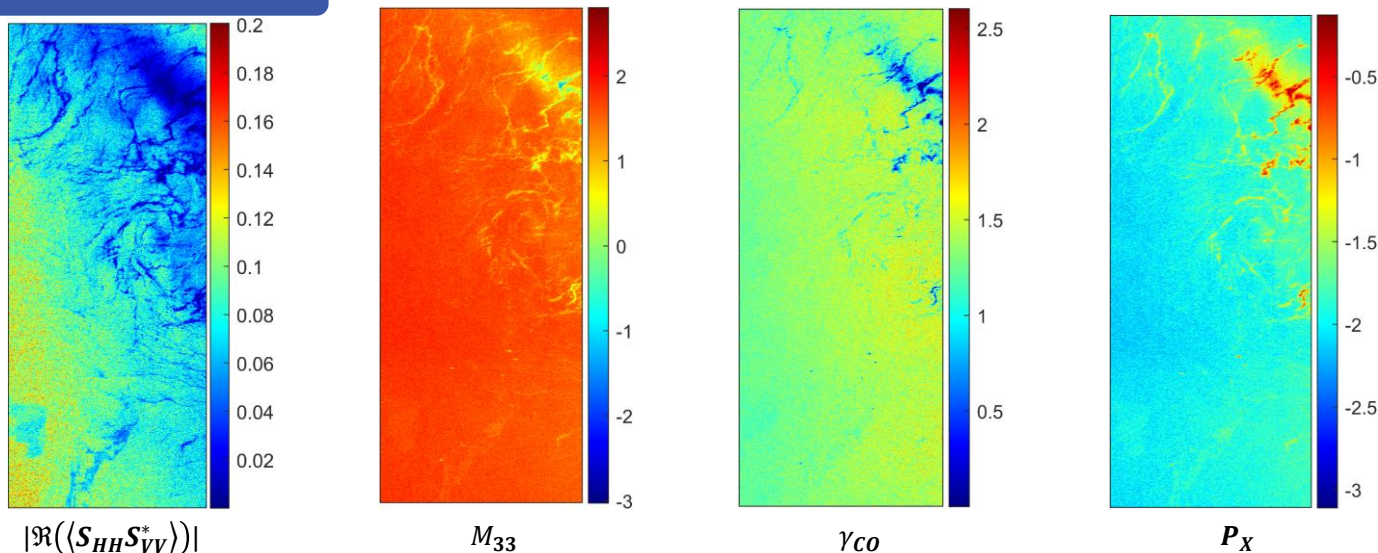
Oil Spill detection based on hybrid-polarimetry SAR using various parameters derived through the proposed method. Results obtained real Satellite Hybrid-polarimetry SAR data taken in the region of Deepwater Horizon blowout.

METHODOLOGY

Closely Look into Two Properties

1. The SAR Sensor must capture enough information about the surface to clearly distinguish between oil-spilled and oil-free regions.

2. The revisit time of the SAR sensor needs to be as short as possible to identify minor spills before they can cause widespread damage.

SAR Configuration	Information Content	Revisit Time
Single-Pol SAR	Poor	Optimum
Compact-Pol SAR (Hybrid-pol CTLR)	Sufficient Information: Much greater than Single-pol and less than Full-pol	Optimum
Full-Pol SAR	Optimum	Poor

$$\langle |S_{HV}|^2 \rangle = \frac{\prod_{i=1}^{2} \lambda_i}{\sum_{i=1}^{2} \lambda_i + 2\Im(J_{12})}$$

Derived using hybrid pol CTLR

References
[1] A. Kumar, R. K. Panigrahi and M. Martorella, "Closed-form Solution for Accurate Estimation of $\langle |S_{HV}|^2 \rangle$ in Hybrid-Polarimetry SAR for Oil Spill Monitoring"," presented in *4th URSI Atlantic Radio Science Meeting - 2024., Gran Canaria, Spain*
[2] A. Kumar, V. Mishra, R. K. Panigrahi and M. Martorella, "Application of Hybrid-Pol SAR in Oil-Spill Detection," in *IEEE Geos. and Remote Sen. Let.*, vol. 20, pp. 1-5, 2023, Art no. 4004505.