

Real time Oil and Gas source Identification using Unmanned Aerial Systems

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Gas exploration and environmental compliance and assessment are critical activities for the energy industry. Oil spills damp short surface waves on ocean and reduce the backscattered radar resulting in dark areas on SAR images. Satellite radar, especially SAR, is commonly used instead of optical sensors for remote ocean pollution monitoring because of all-weather and all-day capabilities. Satellite SAR sensors used for preliminary oil spill assessment suffer from low spatial and temporal resolution. However, UAS equipped with SAR can provide detailed oil spill analysis and offer better spatial and temporal resolution than their satellite counterparts. UAS' real-time data allow better quantification and monitoring of spills, even with confounding environmental variables present. Some natural phenomena such as grease ice, threshold wind speed areas, wind sheltering, rain cells and internal waves may also appear as dark patches in SAR images, making it challenging to distinguish between oil spills and such phenomena only based on SAR images. To address the aforementioned issues we will use advanced sensor fusion and data analytics on a UAS system which is equipped with air quality sensors and Electro-Optical/Infrared (EO/IR) and SAR imaging. Given the very large array of measurements, complex image analysis and fusion of SAR and EO/IR imagery, the need of data streaming and steering is inevitable.