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Sensor agnostic BlueSky Resources has spent the last four years developing data analytics technology that brings increased understanding of emissions forensics at industry operational sites. The journey began with point source emissions in the Permian Basin for Oil & Gas but has moved to tougher challenges with diffuse emissions in Mining and Landfills. By combining relevant ground, drone, airborne and satellite remote sensing techniques, our customers have been able to gain important insights into validating detects in these dynamic operational environments, and to infer what are the causal activities that can lead to mitigation.
The task goes well beyond sensor data types; alternate wind models have been critical for debunking or validating potential plume detects, and high resolution optical data has been essential for homing in on plume sources. By aggregating the appropriate data, it is possible to reduce uncertainty around both quantification and location so that pragmatic decisions can be undertaken by operators. We show examples of how reliance on public or limited data can leave ambiguity, whereas analytics on appropriately designed data campaigns that comprehend the limits of detection for various technologies, can lead to improved assessments that don’t waste operators’ valuable time.
We found multi-sensor data collection strategies could improve diffuse emissions detection in open pit mines, but this is still a difficult problem due to highly spurious causal activities, and that pragmatic mitigation solutions are still in their infancy in those settings. While Landfills are similarly dynamic, diffuse emissions from waste can be more persistent and detectable from a variety of sensor modalities. Most importantly, waste management firms have been installing gas collection systems for many years to collect and destroy methane or process as renewable natural gas so there are proven mitigation strategies available as well. Once again, the combination of remote sensing data alongside contextual and operational data is crucial for navigating the range of multi-sensor measurement uncertainties and distilling location and magnitude of detected methane plumes. This ultimately leads to more effective reporting of emissions and, in landfills, for improved performance of gas collection methane mitigation infrastructure. The availability of continuous LFG flow data stacked up against ground and satellite sensors, for example, has highlighted that raised emissions are often of short duration related to gas system down time, not faulty landfill cover or active face issues of longer duration.
Next steps will be to automate the most effective emissions forensic workflows, to drive lower measurement uncertainties and enable faster mitigation decisions across entire operator asset portfolios. We look forward to reporting back at a future session on how appropriate data streams married to embedded AI brings a daily dose of actio
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