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GLOBAL GREENHOUSE GASES EMISSIONS ESTIMATION THROUGH SMALL SATELLITE
CONSTELLATIONS

Abstract

Climate change is one of the biggest challenges of our generation. It is also recognized as one of the challenges where use of Earth Observations (EO) can make the most difference, as EO has the capability to capture environmental and socio-economic data over a range of spatial, spectral, and temporal resolutions. This highly depends on the amount and quality of data available to provide valuable analytics on carbon and methane footprints. However, current GHG measurements methods are not able to satisfy the emerging urgent need for neutral and reliable data. There is and will be massive political pressure to provide favorable measurements based on more precise and neutral approaches. The goal of current project is to establish a network of new data sources for GHG monitoring with high temporal and special resolution to expand the existing monitoring systems and enable new emissions monitoring applications to combat the climate crisis. This is achieved using a small satellite constellation carrying a set of novel instruments for active remote sensing and advanced fusion algorithms. Compared to existing solutions, proposed constellation will improve the temporal revisit over the globe while meeting the high accuracy and spatial resolution requirements. High revisit rate and global coverage will be enabled by 12 satellites on Low Earth Sun Synchronous Orbit. High sensitivity and resolution of 10x10m for 0.9 m-to-1.7m bands with 20 km swath will enable new precisions for monitoring of GHGs changing the way emissions are monitored and offset. System will offer single measurements of point sources enabling new applications. The gas loads information per specific area or region will allow development and industrial sites to plan and manage their greenhouse gas emissions, align with current guidance, policies, and trends related to climate change/global warming, calculation of carbon footprints, and the applications of offsets to reduce carbon footprints. Using novel observation technology, satellite constellation will be capable of attributing emissions directly to individual facilities. The emissions data will be later transformed into actionable insights with our in-house analytics, facilitating the optimization of their operations, reduce emissions and uphold environmental standards.