Evaluation of Advanced Satellite Missions for Pipeline Monitoring Applications

Paul Adlaka¹, Igor Zhakarov¹, Zhaohua Chen¹, Chris Hardy¹, John Bennett¹, Dennis Nazarenko²
¹C-CORE, ²LOOKNorth

The evolution of the satellite based remote sensing sector provides an opportunity to reframe the use of these data for many applications including oil and gas pipeline monitoring. Several important factors will have an impact on how these data can be utilized including data policies structured around ‘free and open’ data access, the growth in cubesat technologies that permit new thinking on mission configurations, advance sensors such as high resolution video, and technologies for managing and analyzing large volumes of data. This evolution has the strong potential to positively impact the pipeline sector by supporting modeling and management of risk to the public, the environment, and the operator’s assets. However, determining which systems are best suited to specific information requirements of the pipeline sector, and determining which systems add value to the existing monitoring approaches, can be a challenge with this rapidly changing landscape.

Some of the capabilities that are now available or will be in the near future include:

- The potential for over 60 imaging opportunities a day to support activity monitoring;
- Global collection on a daily basis without tasking that allows analysis of an area prior to a reported event;
- Advanced sensor capabilities that allow data acquisitions using dual frequency radar with different penetration depths for enhanced analysis of geohazards;
- High resolution video for surveillance, characterization of activities, or rapid DEM generation.

The shift from scene based pricing to one that allows for corridor pricing, coupled with lower costs per square kilometer increases the value and therefore the feasibility of an operational monitoring implementation.

Some examples of pipeline applications that may benefit from this evolution include threat identification (3rd parties, earthworks, materials stockpiles), hazards (geo-hazards, floods, fires, erosion into water bodies), and surface cover changes (high consequence areas, deforestation, burn areas, vegetation growth or stress).

In this presentation we review the existing and expected systems with potential application to the pipeline sector, illustrate how these missions can support pipeline monitoring applications; and provide an initial cost-benefit analysis of these new data sources for operational use.